Zurich ServiceNow AI Platform Capabilities

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Extend ServiceNow AI Platform capabilities

Extend the ServiceNow AI Platform with additional applications and features.

Get started

Choose one of these tiles to get started.

Manage the Configuration Management Database (CMDB) Configure connected devices, apps, and services you use with a powerful decision support tool.	**Manage Instance Data Sources** Handle all your data efficiently across instances, databases, and more.	**Manage Content** Create and share documents and knowledge articles with your users.
Manage Services Manage service-related applications like self-service, and the service catalog.	**Manage People and Work** Take care of administrative and management demands in one place.	**Additional Capabilities** Explore additional capabilities.

Manage the CMDB

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

Manage Instance Data Sources

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

Manage Content

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

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Manage Services

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

Manage People and Work

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

Legacy Capabilities

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

Configuration Management

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

Overview of CMDB

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

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

Configuration Management Database (CMDB)

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

Common Service Data Model (CSDM)

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

Application services

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

Data integration

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

Troubleshoot and get help

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

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

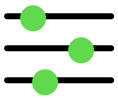
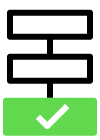
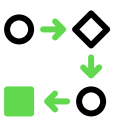
Configuration Management Database (CMDB)

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

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

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

Get started

Explore Overview of CMDB and its predefined tables and key classes.	Configure Populate the CMDB.	CMDB Workspace  Manage CMDB health through dashboards.
CI Class Manager View, create, or edit basic class definitions and class settings for identification and Reconciliation, and CMDB Health.	CMDB 360 / Multisource CMDB  Track and manage how multiple sources populate the same CI attributes.	CMDB Data Manager  Perform bulk management of CI life cycle operations such as deletion, archival, and attestation.

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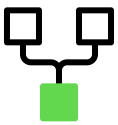
Duplicate CIs Remediate single or bulk de-duplication tasks.	CIs attestation Verify the existence of actual IT infrastructure and applications, systematically and in bulk.	Data Certification Validate all your data in the CMDB on a regular schedule or on-demand, in CMDB and non-CMDB tables.
CMDB Query Builder Build complex infrastructure and service queries.	Unified Map  View a hierarchical map of CIs and the relationships between them.	CMDB Health Monitor and maintain CMDB health: duplicate CIs, required CI fields, and audits.
Reference Reference topics provide detailed descriptions of tables, properties, forms, and roles.		

Troubleshoot and get help

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

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Exploring CMDB

Use the topics in this section to learn and explore CMDB concepts, its predefined tables and the relationships between them.

Overview of CMDB

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

https://player.vimeo.com/video/973320817?h=1eb2620107&badge=0&autopause=0&player_id=0&app_id=58479

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

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

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

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

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

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

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

Extended CMDB

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

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

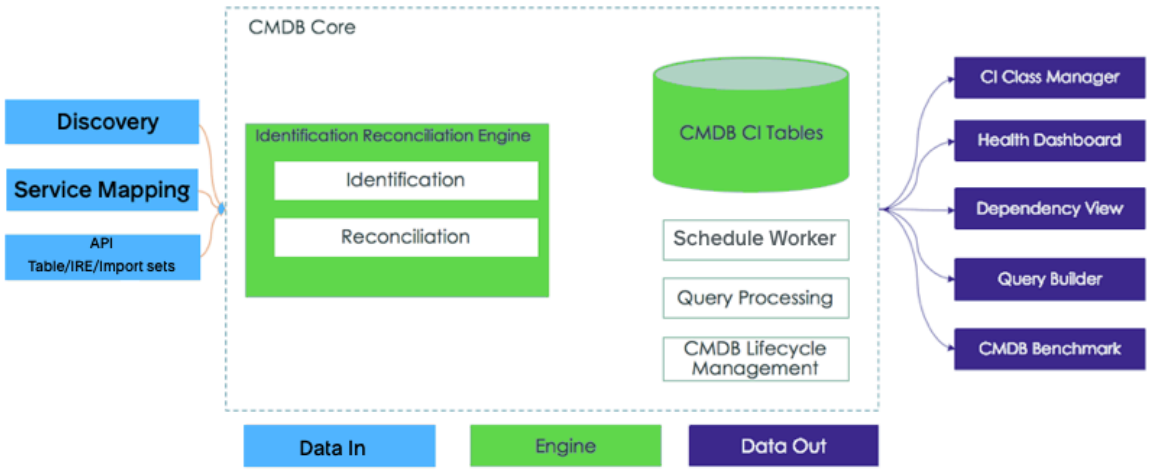
- CMDB Mainframe (com.snc.cmdb.mainframe)
- CMDB Radio Category (com.snc.cmdb.radio.category)
- CMDB Telecom Category (com.snc.cmdb.telecom.category)
- CMDB Test Equipment (com.snc.cmdb.test.equipment)

CMDB hierarchy and CI Class Manager

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

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

Architecture



Related tables

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

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

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Localization

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

Roles required

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

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

Related topics

CMDB schema model

CMDB tables descriptions

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

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

Class descriptions are integrated into the CI Class Manager and appear in the **Description** field on the Basic Info page for a class. For more information about viewing class descriptions, see View and edit class definitions and metadata.

Table name	Label (display name)	Table description
cmdb_ci	Configuration Item	Base configuration item (CI) table.
cmdb_ci_acc	Accessory	Accessories for phones, computers, and so on.
cmdb_ci_ad_controller	Active Directory Domain Controller	Microsoft Active Directory domain controller.
cmdb_ci_ad_domain	AD Domain	Microsoft Active Directory domain.
cmdb_ci_aix_server	AIX Server	Server running the AIX operating system.
cmdb_ci_alias	Alias	Pseudonym for data locations, virtual email addresses, pointers, and so on.

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Table name	Label (display name)	Table description
cmdb_ci_apache_web_server	Apache Web Server	Server hosting Apache web server software.
cmdb_ci_appl	Application	Application, which is a collection of files and data that deliver a service and manage business processes.
cmdb_ci_appl_now_app	ServiceNow Application	CIs that Event Management generates for various components such as Impact calculator, which is used to bind alerts that are later shown in maps. Used internally by self-health when monitoring internal health checks for key components such as connector instance status and MID Server status. Parent class for all ServiceNow applications.
cmdb_ci_application_cluster	Application Cluster	Logical group of servers with clustering software installed on each of the servers in the group so that the group acts like a single system.
cmdb_ci_application_server_resource	Application Server Resource	Parent class for application servers such as Coldfusion application server.
cmdb_ci_app_server	Application Server	A base table for logical CIs, which indicate the primary function of a physical or virtual server such as a Tomcat server or a WebSphere server.
cmdb_ci_app_server_composer	Composer	Server hosting IBM WebSphere Multichannel Bank Transformation Toolkit.
cmdb_ci_app_server_datapower	Data Power	Server hosting IBM DataPower Gateway Secure software.
cmdb_ci_app_server_domino	Domino	Server hosting IBM Domino software.
cmdb_ci_app_server_hp_ucmdb	HP uCMDB	Server hosting HP uCMDB software.
cmdb_ci_app_server_java	JavaServer	Server hosting Java applications.
cmdb_ci_app_server_jb_module	delivery Controler	Server hosting an inner module of JBoss application (deployed application).

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Table name	Label (display name)	Table description
cmdb_ci_app_server_jboss	JBoss	Server hosting a JBoss Application Server (JBoss AS), which is a cross-platform Java application server, open-source developed by the JBoss software company.
cmdb_ci_app_server_jrun	Jrun	Server hosting JRun applications.
cmdb_ci_app_server_jrun_war	Jrun WAR	Server hosting the inner module of a JRun application (deployed application).
cmdb_ci_app_server_ora_ess	Oracle Essbase Server	Server hosting Oracle Essbase software.
cmdb_ci_app_server_ora_ias	Oracle iAS	Server hosting Oracle internet Application Server.
cmdb_ci_app_server_ora_ias_m	Oracle iAS Web module	Server hosting the inner module of the Oracle iAS application (deployed application).
cmdb_ci_app_server_remedy	Remedy HSServer	Server hosting Remedy HSSServer application.
cmdb_ci_app_server_tomcat	Tomcat	Server hosting Apache Tomcat software.
cmdb_ci_app_server_tomcat_war	Tomcat WAR	Server hosting inner module of Apache Tomcat application (deployed application).
cmdb_ci_app_server_vendavo	Vendavo Application Server	Server hosting Vendavo Application Server software.
cmdb_ci_app_server_weblogic	BEA Weblogic	Server hosting Oracle WebLogic Server.
cmdb_ci_app_server_webseal	Webseal	Server hosting IBM Tivoli Access Manager solution.
cmdb_ci_app_server_websphere	IBM Websphere	Server hosting IBM WebSphere software.
cmdb_ci_app_server_wl_module	WeblogicModule	Server hosting inner module of WebLogic.
cmdb_ci_app_server_ws_ear	Websphere EAR	Server hosting inner module of IBM WebSphere software.
cmdb_ci_app_server_ws_odr	Websphere ODR LB	Server hosting WebSphere ODR LB application.
cmdb_ci_appl_active_directory	Active Directory Service	Inner software module of AD Domain application.
cmdb_ci_appl_biztalk	BizTalk	Microsoft BizTalk Server software.

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Table name	Label (display name)	Table description
cmdb_ci_appl_biztalk_orch	BizTalk Orchestration	Inner module of Microsoft Biztalk Server software.
cmdb_ci_appl_ca	CA Enterprise Communicator	CA Enterprise Communicator software.
cmdb_ci_appl_ca_dir_server	CA eTrust Directory Server	CA eTrust Directory Server software.
cmdb_ci_appl_ca_ent_man	CA Introscope Enterprise Manager	CA introscope Enterprise Manager software.
cmdb_ci_appl_ca_id_man	CA Identity Manager Provisioning Server	CA Identity Manager Server software.
cmdb_ci_appl_cisco_call_man	Cisco CallManager	Cisco CallManager (Cisco Unified Communications Manager) software.
cmdb_ci_appl_cisco_fibre	Cisco Fibre InterConnect	Cisco Fibre InterConnect software.
cmdb_ci_appl_citrix_app	Citrix Application Icon	Inner module of Citrix software.
cmdb_ci_appl_citrix_collector	Citrix Collector	Citrix Collector software.
cmdb_ci_appl_citrix_xenapp	Citrix XenAPP or Presentation Server	Citrix XenApp software.
cmdb_ci_appl_connectit	Connect-It Service	Connect-It software.
cmdb_ci_appl_controlm	Control-M	Control-M software.
cmdb_ci_appl_delivery_controler	Delivery Controler	Application delivery controller software.
cmdb_ci_appl_doc_brava_proc	Documentum Brava Job Processor	Brava (EMC Documentum) job processor software.
cmdb_ci_appl_doc_brava_server	Documentum Brava License Server	Brava (EMC Documentum) License Server software.
cmdb_ci_appl_doc_docbase	Documentum DocBase	Documentum Docbase software.
cmdb_ci_appl_doc_docbroker	Documentum Broker	Documentum Docbase broker software.
cmdb_ci_appl_dot_net	.NET Application	Microsoft .NET application software.
cmdb_ci_appl_fastsearch	Fast Search	Microsoft FAST Search software (for the SharePoint collaboration platform).
cmdb_ci_appl_generic	Generic Application	Generic application, which is identified by the system when there is an endpoint with an open port in listen mode and there is no pattern for it.

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Table name	Label (display name)	Table description
cmdb_ci_appl_glassfish	GlassFish	Oracle GlassFish Server software.
cmdb_ci_appl_glassfish_war	GlassFish WAR	Inner module of GlassFish application (deployed application).
cmdb_ci_appl_groundwork	Groundwork	Groundwork (open source) monitoring software.
cmdb_ci_appl_hp_index	HP SM Index Server	HP Service Manager Index Server software.
cmdb_ci_appl_hp_operations	HP Operations Manager	HP Operations Manager software.
cmdb_ci_appl_hp_qc	HP Quality Center	HP Quality Center software.
cmdb_ci_appl_hp_service	HP Service Manager	HP Service Manager software.
cmdb_ci_appl_hp_sm_kb	HP SM KnowledgeBase	HP Service Manager KnowledgeBase software.
cmdb_ci_appl_ibm_cics	IBM CICS	IBM CICS Transaction Server software.
cmdb_ci_appl_ibm_ctg	IBM CTG	IBM CICS Transaction Gateway software.
cmdb_ci_appl_ibm_wmb	IBM WebSphere Message Broker	IBM WebSphere Message Broker software.
cmdb_ci_appl_ibm_wmb_listener	IBM WMB Http Listener	IBM WebSphere HTTP Listener software.
cmdb_ci_appl_ibm_wmq	IBM MQ Manager (Formerly IBM WebSphere MQ)	IBM MQ software.
cmdb_ci_appl_ibm_wmq_queue	IBM MQ Queue (Formerly IBM WebSphere MQ Queue)	Inner module of IBM MQ software.
cmdb_ci_appl_itam	ITAM Asset Center	HP Asset Center software.
cmdb_ci_appl_mongo_config_serv	Mongo Config Server	Mongo Configuration Server software.
cmdb_ci_appl_mongos	Mongos Server	MongoDB server software.
cmdb_ci_appl_ms_dynamic_crm	Dynamic CRM Component	Microsoft Dynamic CRM software.
cmdb_ci_appl_msmq	MSMQ	Microsoft Message Queuing (MSMQ) software.
cmdb_ci_appl_ora_conc	Oracle Concurrent Server	Oracle Concurrent Server software.
cmdb_ci_appl_ora_disc	Oracle Discoverer Engine	Oracle Discoverer software.

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Table name	Label (display name)	Table description
cmdb_ci_appl_ora_disc_ui	Oracle Discoverer UI	Oracle Discoverer UI module software.
cmdb_ci_appl_ora_ebs	Oracle ESB	Oracle Enterprise Service Bus software.
cmdb_ci_appl_ora_forms	Oracle Forms Engine	Oracle Forms software.
cmdb_ci_appl_ora_forms_ui	Oracle Forms UI	Oracle Forms UI software.
cmdb_ci_appl_ora_fs	Oracle Fulfillment Server	Oracle Fulfillment Server software.
cmdb_ci_appl_ora_http	Oracle HTTP Server	Oracle HTTP Server software (web tier of Oracle Fusion middleware).
cmdb_ci_appl_ora_jms_queue	Oracle Weblogic JMS Queue	Oracle WebLogic JMS software.
cmdb_ci_appl_ora_metric_client	Oracle Metric Client	Oracle Metric client software.
cmdb_ci_appl_ora_metric_svr	Oracle Metric Server	Oracle Metric server software.
cmdb_ci_appl_ora_notif_svr	Oracle Notification Server	Oracle Notification Server (ONS) software.
cmdb_ci_appl_ora_oacore	Oracle OACORE Server	Oracle OACORE server software.
cmdb_ci_appl_ora_oafm	Oracle OAFM Server	Oracle OAFM server software.
cmdb_ci_appl_ora_pm	Oracle Process Manager	Oracle BPEL Process Manager server software.
cmdb_ci_appl_ora_queue	Advanced Queue Queue	Oracle Advanced Queuing software.
cmdb_ci_appl_ora_report	Oracle Report Server	The Oracle Report Server software.
cmdb_ci_appl_ora_tns	Oracle App TNS Service	Oracle Application Express (TNS) listener software.
cmdb_ci_appl_ora_tnslsnr	Oracle TNS Listener Engine	Oracle Application Express software.
cmdb_ci_appl_peoplesoft	Peoplesoft Application Server	Peoplesoft Application Server software.
cmdb_ci_appl_rabbitmq	RabbitMQ	RabbitMQ (open source) software.
cmdb_ci_appl_rabbitmq_cluster	RabbitMQ Cluster	RabbitMQ Cluster (open source) software.
cmdb_ci_appl_sap_ascs	SAP ASCS Application	SAP ASCS software.
cmdb_ci_appl_sap_bo	SAP Business Objects CMS Server	SAP Business Objects CMS server software.

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Table name	Label (display name)	Table description
cmdb_ci_appl_sap_bo_scheduler	SAP BO BOXIScheduleRouter	SAP BO BOXIScheduleRouter software.
cmdb_ci_appl_sap_bus_obj	SAP Business Objects	SAP bushiness Object application.
cmdb_ci_appl_sap_ci	SAP CI Application	The SAP Central Instance software.
cmdb_ci_appl_sap_di	SAP DI Application	Oracle Development Infrastructure (DI) software.
cmdb_ci_appl_sap_ers	SAP ERS Application	Oracle Evaluated Receipt Settlement (ERS) software.
cmdb_ci_appl_sap_hana_db	SAP Hana Db	SAP HANA software.
cmdb_ci_appl_sap_jc	SAP JC Application	SAP JC (java application) software.
cmdb_ci_appl_sap_scs	SAP SCS Application	SAP SCS (central services) software.
cmdb_ci_appl_sendmail	Sendmail	Sendmail (open source) software.
cmdb_ci_appl_sharepoint	SharePoint	Microsoft SharePoint software.
cmdb_ci_appl_sp_service	SharePoint Service	Microsoft Windows Sharepoint Services (WSS) software.
cmdb_ci_appl_tibco_hawk	Tibco Hawk	TIBCO Hawk software.
cmdb_ci_appl_tibco_matrix	ActiveMatrix Business Works	TIBCO ActiveMatrix BusinessWorks software.
cmdb_ci_appl_tibco_matrix_proc	ActiveMatrix Business Works Process	TIBCO ActiveMatrix BusinessWorks Process software.
cmdb_ci_appl_tibco_message	Tibco Enterprise Message Service	TIBCO Enterprise Message Service software.
cmdb_ci_appl_tibco_queue	EMS Queue	Tibco EMS (Enterprise Message Service) Queues software.
cmdb_ci_appl_tuxedo	Tuxedo	Tuxedo software (middleware transactions for UNIX, Extended for Distributed Operations).
cmdb_ci_appl_tuxedo_portal	Tuxedo Portal	Tuxedo portal software.
cmdb_ci_appl_vign_content_svr	Vignette Content Management Server	Vignette (Open Text Corp) Content Management Server software.
cmdb_ci_appl_vignette_search	Vignette Search Starter	Vignette (Open Text Corp) Search Server software.

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Table name	Label (display name)	Table description
cmdb_ci_appl_vignette_server	Vignette Server	Vignette (Open Text Corp) Server software.
cmdb_ci_appl_weblogic_jms	Weblogic JMS Server	WebLogic JMS software.
cmdb_ci_appl_weblogic_lb	Weblogic LB	WebLogic Server load balancer software.
cmdb_ci_appl_weblogicmodule	Weblogic Module Server	WebLogic Server software.
cmdb_ci_appl_websphere_portal	Websphere Portal	WebSphere Portal software.
cmdb_ci_appl_wmb	WMB Flow	WebSphere Message Broker software.
cmdb_ci_application_cluster	Application Cluster	Logical cluster of application-tier servers.
cmdb_ci_application_software	Application Software	Computer program designed to perform a group of coordinated functions, tasks, or activities for the benefit of the user. An extension of the Software table, providing installed software information (not a running process).
cmdb_ci_ats_power_eq	Automatic Transfer Switch	Electrical power switch that switches a load between two sources.
cmdb_ci_availability_set	Availability Set	Logical grouping of virtual machines running on Microsoft Azure platform.
cmdb_ci_base_rpa_process	Base Bot Process	Business reason, process type, and schedule.
cmdb_ci_base_rpa_robot	Base Robot	Machine where robot is running, state, and type.
cmdb_ci_batch_job	Batch Job	A computer program or set of programs processed in batch mode.
cmdb_ci_aws_datacenter	AWS datacenter	Logical representation of an Amazon Web Services datacenter.
cmdb_ci_azure_datacenter	Azure datacener	Logical representation of a Microsoft Azure datacenter.
cmdb_ci_business_app	Business Application	All business applications.
cmdb_ci_business_process	Business Process	A process that is owned and carried out by the

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Table name	Label (display name)	Table description
		business and contributes to the delivery of a product or business service to a business customer.
cmdb_ci_chassis_server	Server Chassis	A metal structure that is used to house or physically assemble servers in various different form factors.
cmdb_ci_cim_profile	CIM Profiles	CIM Profiles (UML).
cmdb_ci_cim_server	CIM Server	Server hosting CIM profiles.
cmdb_ci_circuit	Circuit	Electrical circuits information.
cmdb_ci_cloud_database	Cloud Database	Database which runs on a cloud computing platform.
cmdb_ci_cloud_ip_address	Cloud IP Address	Web server which runs on a cloud computing platform.
cmdb_ci_cluster	Cluster	Logical group of computing resources bound together by software to function as one logical computing resource.
cmdb_ci_cluster_node	Cluster Node	Single computing resource which is logically/ operationally bound into a cluster.
cmdb_ci_cluster_resource	Cluster Resource	System object that is a set or grouping of cluster resources that are used to manage events that occur in a clustered environment.
cmdb_ci_cluster_vip	Cluster Virtual IP	Cluster VIP information.
cmdb_ci_cmp_price_product_base	Cloud Product Price Base	Used to calculate the approximate monthly cost of running a stack built on Virtual Servers in cloud environment: • Cloud Price Base: Common price base to store pricing info of all the resources of all the supported clouds. • Cloud Price Product Base: Base table to store the common attributes of all the pricing resources. • VM Instance Price: Specific table that extends the Cloud Price Product base to store the VM specific product info of all the supported clouds.

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Table name	Label (display name)	Table description
		Parent class for cloud product prices such as VM instance price.
cmdb_ci_cmp_resource	Cloud Resource	Generic cloud resources.
cmdb_ci_comm	Communication Device	Communication devices information. A choice list containing devices such as cellphone, phone, conference phone, and Wi-Fi.
cmdb_ci_computer	Computer	An extension of the Hardware table, capturing computer properties.
cmdb_ci_computer_room	Computer Room	Logical representation of a computer room.
cmdb_ci_config_automation_server	Management Server	Dev Ops tools such as Chef and Puppet, that are used to manage server configurations. Parent class for application management servers.
cmdb_ci_config_file	Configuration file	Configuration files which establish the parameters and initial settings for some computer programs.
cmdb_ci_crac	Computer Room AC	Air conditioning units used to cool data centers.
cmdb_ci_csu_dsu_network	CSU/DSU	Digital-interface device used to connect networking equipment to a digital circuit.
cmdb_ci_database	Database	Organized collection of data such as the set of files where data is stored, the reason for a database, and the metadata about the data.
cmdb_ci_datacenter	Data Center	Facility used to house computer systems and associated components, such as telecommunications and storage systems. It generally includes redundant or backup power supplies, redundant data communications connections, environmental controls (such as air conditioning and fire suppression), and various security devices.

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Table name	Label (display name)	Table description
cmdb_ci_datapower_server	Data Power Hosting Server	Server running IBM DataPower Gateway software.
cmdb_ci_datastore	Datastore	Datastores are like file systems, abstracting the physical storage and providing a model for storing files. The child class represents the VMware specific Datastore. Parent class for VMWare datastore object types such as vCenter Datastores.
cmdb_ci_db_catalog	Database Catalog	Metadata which defines database objects such as base tables, views (virtual tables), synonyms, value ranges, indexes, users, and user groups, for a specific database instance.
cmdb_ci_db_db2_catalog	DB2 Catalog	Database catalog for DB2 database.
cmdb_ci_db_db2_instance	DB2 Instance	Instance of a DB2 database.
cmdb_ci_db_hbase_instance	HBase Instance	Instance of an HBase database.
cmdb_ci_db_instance	Database Instance	Software and memory used to manipulate data in a database.
cmdb_ci_db_mongodb_instance	MongoDB Instance	Instance of a MongoDB database.
cmdb_ci_db_mssql_analysis	SQL Server Analysis Services	Microsoft SQL Server Analysis Services software.
cmdb_ci_db_mssql_catalog	MSFT SQL Catalog	Database catalog for a specific instance of a Microsoft SQL database.
cmdb_ci_db_mssql_instance	MSFT SQL Instance	Microsoft SQL instance.
cmdb_ci_db_mssql_int_job	SQL Server Integration Services Job	Scheduled job to run a SQL Server Integration Service package.
cmdb_ci_db_mssql_integration	SQL Server Integration Services	MSQL Server Integration Services software.
cmdb_ci_db_mssql_reporting	SQL Server Reporting Services	SQL Server software used for server-based reporting generation.

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Table name	Label (display name)	Table description
cmdb_ci_db_mysql_catalog	MySQL Catalog	Database catalog for a specific instance of a MySQL database.
cmdb_ci_db_mysql_clustermgnode	MySQLClusterMGMNode	MySQL primary administrative interface to a running cluster.
cmdb_ci_db_mysql_clusternode	MySQLClusterDataNode	Summary table used in the [ndbd] or [ndbd default] sections of a config.ini file for configuring MySQL Cluster data nodes.
cmdb_ci_db_mysql_instance	MySQL Instance	Instance of a MySQL database.
cmdb_ci_db_ora_catalog	Oracle Catalog	Database catalog for a specific instance of an Oracle database.
cmdb_ci_db_ora_instance	Oracle Instance	Instance of an Oracle database.
cmdb_ci_db_ora_listener	Oracle Database Listener	Process that runs on an Oracle Database Server.
cmdb_ci_db_postgresql_instance	PostgreSQL Instance	Instance of a PostgreSQL database.
cmdb_ci_db_syb_catalog	Sybase Catalog	Database catalog for a specific instance of a Sybase database.
cmdb_ci_db_syb_instance	Sybase Instance	Instance of a Sybase database.
cmdb_ci_desktop_software	Desktop Software	Software used on desktops and laptops.
cmdb_ci_dir_policy_server	Policy Server	Policy server, which provides a security component of a policy-based network that provides authorization services and facilitates tracking and control of files.
cmdb_ci_dir_site_minder_server	Site Minder	Server running SiteMinder software.
cmdb_ci_directory_ad_forest	AD Forest	Active Directory forest.
cmdb_ci_directory_ha	HA Proxy	HAProxy software.
cmdb_ci_directory_iifp	IIFP	Identity Identification Feature Pack (Active Directory) software.
cmdb_ci_directory_ldap	LDAP DB	LDAP (Lightweight Directory Access Protocol) database software.
cmdb_ci_directory_server	Directory Server	Server running LDAP software.

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Table name	Label (display name)	Table description
cmdb_ci_disk	Disk	General category of data storage mechanisms.
cmdb_ci_disk_partition	Disk Partition	Sections of a disk separated so that information in each section can be managed separately.
cmdb_ci_display_hardware	Display Hardware	Hardware used to display information in visual form.
cmdb_ci_dns_alias	DNS Alias	Synonym for the host used to resolve DNS addresses.
cmdb_ci_dns_name	DNS Name	Primary DNS names.
cmdb_ci_docker	Docker Container	Docker containers (a runtime instance of a docker image).
cmdb_ci_docker_engine	Docker Engine	Docker software for running and managing Docker containers.
cmdb_ci_docker_image	Docker Image	Docker images. Ordered collection of root filesystem changes and the corresponding execution parameters for use within a container runtime.
cmdb_ci_docker_image_tag	Docker Image Tag	Docker tag, which is a label applied to a Docker image in a repository.
cmdb_ci_docker_local_image	Docker Local Image	Locally managed Docker image.
cmdb_ci_drs_vm_config	DRS VM Config	Distributed Resource Scheduler (DRS) behavior for the VMs in the vCenter that override the cluster behavior.
cmdb_ci_ec2_instance	EC2 Virtual Machine Instance	Virtual machine running in the Amazon Elastic Compute Cloud (EC2) platform.
cmdb_ci_email_server	Email Server	Server running email software.
cmdb_ci_email_server_jes	JES	Server running JES software (multi-featured hybrid MTA/ MDA server).
cmdb_ci_endpoint	Endpoint	Endpoint, which represents the entry point to a service, a process, or a queue or topic destination in service-oriented architecture.
cmdb_ci_environment	Environment	Logical grouping of hardware and software used to develop, test, and deliver computing

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Table name	Label (display name)	Table description
		services. For example: development, test, quality assurance, and production.
cmdb_ci_esx_resource_pool	ESX Resource Pool	VMware set of physical resources.
cmdb_ci_esx_server	ESX Server	Physical ESX server running the VMware ESXi operating system.
cmdb_ci_exchange_backend	ExchangeBackEndServer	Server running Exchange software.
cmdb_ci_exchange_cas	Exchange Client Access Server	Server running Exchange software providing client access services.
cmdb_ci_exchange_edge_transport_server	Exchange Edge Transport Server	Server running Exchange Edge Transport software.
cmdb_ci_exchange_frontend	ExchangeFrontEndServer	Server running Exchange software.
cmdb_ci_exchange_hub	ExchangeHub	Server running Exchange Hub software.
cmdb_ci_exchange_hub_transport_server	Exchange Hub Transport Server	Server running Exchange Hub software providing transport services.
cmdb_ci_exchange_mailbox	Exchange MailBox	Exchange email account.
cmdb_ci_exchange_mailbox_server	Exchange Mailbox Server	Server running Exchange software providing client access services.
cmdb_ci_exchange_service_component	Exchange Service Component	Exchange Service Component software.
cmdb_ci_facility_hardware	Facility Hardware	Base class for hardware used to facilities services such as electric, water, sewer, air, and security.
cmdb_ci_fc_disk	Fibre Channel Disk	Base table for fibre channel disk.
cmdb_ci_fc_export	Fibre Channel Export	Storage volume exported by a storage server via Fibre Channel protocol.
cmdb_ci_fc_port	Fibre Channel Port	Fibre Channel port on a storage server, FC switch, or on a host's HBA.
cmdb_ci_fddi_network	FDDI Cards	Fiber Distributed Data Interface cards.
cmdb_ci_file_system	File System	File system information for a server, capturing details such

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Table name	Label (display name)	Table description
		as mount point, capacity, and type of file system.
cmdb_ci_file_system_nfs	NFS File system	Extension of File System, which provides NFS file system information.
cmdb_ci_file_system_smb	SMB File system	Extension of File System, which provides SMB file system information.
cmdb_ci_firewall_network	Firewall Hardware	Firewall hardware.
cmdb_ci_ftp_server	FTP Server	Server providing FTP services.
cmdb_ci_fuel_tank	Fuel Tank	Fuel tank.
cmdb_ci_generator_power_eq	Power Generator	Power generator.
cmdb_ci_group	Group	Logical group of CIs.
cmdb_ci_hardware	Hardware	Base class for hardware.
cmdb_ci_host_cluster	Host Cluster	Cloud agnostic way of representing a group of hosts as a cluster. The child class represents VMware vCenter Cluster specific details. Parent class for VMWare host cluster object types such as vCenter Clusters.
cmdb_ci_hpux_server	HPUX Server	Server running HPUX software.
cmdb_ci_hub_network	Hub Hardware	Physical network hub.
cmdb_ci_hvac	HVAC Equipment	Heating, ventilation, and air conditioning equipment.
cmdb_ci_hyper_v_cluster	Hyper-V Cluster	Cluster of the Hyper-V servers.
cmdb_ci_hyper_v_instance	Hyper-V Virtual Machine Instance	Hyper-V virtual machine instance. This table extends the generic Virtual Machine Instance [cmdb_ci_vm_instance] table.
cmdb_ci_hyper_v_network	Hyper-V Virtual Network	Hyper-V virtual network.
cmdb_ci_hyper_v_object	Hyper-V Object	Base class for all Hyper-V objects.
cmdb_ci_hyper_v_resource_pool	Hyper-V Resource Pool	Hyper-V resource pool.
cmdb_ci_hyper_v_rpool_comp	Hyper-V Resource Pool Component	Resource pool component belonging to resource pool.

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Table name	Label (display name)	Table description
cmdb_ci_hyper_v_server	Hyper-V Server	Server running Hyper-V software.
cmdb_ci_ids_network	Intrusion Detection System	Security intrusion detection systems.
cmdb_ci_iisdirectory	IIS Virtual Directory	Virtual Directory in IIS Manager.
cmdb_ci_imaging_hardware	Imaging Hardware	Hardware used to create electronic/physical images.
cmdb_ci_inetinfo	Inetinfo service	Inetinfo service of IIS application.
cmdb_ci_inf_software	Infrastructure Software	Base class for enterprise software or programs specifically designed to help business organizations perform basic tasks such as workforce support, business transactions and internal services, and processes.
cmdb_ci_information_object	Information Object	Types of information that a business application or any other entity handles. For example: 'Employee Salary Data', Employee Personal Data', and 'Sales Data'. For more information, see CSDM implementation stage — Fly and Enterprise Architecture (formerly Application Portfolio Management) and CSDM tables - Legacy.
cmdb_ci_installed_bundles	Installed Bundles	Extension of the Virtual Machine Object [cmdb_ci_vm_object] table, which represents bundles of installed software.
cmdb_ci_infra_service	Infrastructure Service	IT services which support providing computing infrastructure.
cmdb_ci_infra_service_ldap	LDAP Service	Running LDAP service.
cmdb_ci_ip_address	IP Address	IP address.
cmdb_ci_ip_device	IP Device	Base class for devices with an IP address.
cmdb_ci_ip_firewall	IP Firewall	Firewall hardware.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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Service tables

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

Key fields in the Service table

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

Service Configuration Item Association table

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

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

CMDB schema model

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

Related ServiceNow® Store apps and reference information:

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

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

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

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

Key class categories

The following items are general class categories that are typically key in organizations. You can for example, use this list as a general guideline for choosing classes to be set as Principal Class so you can track health and pay attention to the most important classes in your CMDB. For more information about Principal Class, see Update class list in the Principal Class filter:

- Servers (physical and virtual): Classes that are typically well-understood, relatively stable, and which form the backbone of most infrastructure.
- Databases: Classes of high business impact, critical for incident triage, and relatively straightforward to discover and maintain.
- Network devices (core infrastructure): Classes such as routers, switches, firewalls, and load balancers—hardware that connects everything. If setting as Principal Class, then as a general guideline, prioritize core and critical devices over access switches.

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- Application servers.
- Storage.

Key CMDB classes

Key classes in the CMDB:

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

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

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

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

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

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

CI attributes

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

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

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

Configuration Item [cmdb_ci] class

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

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

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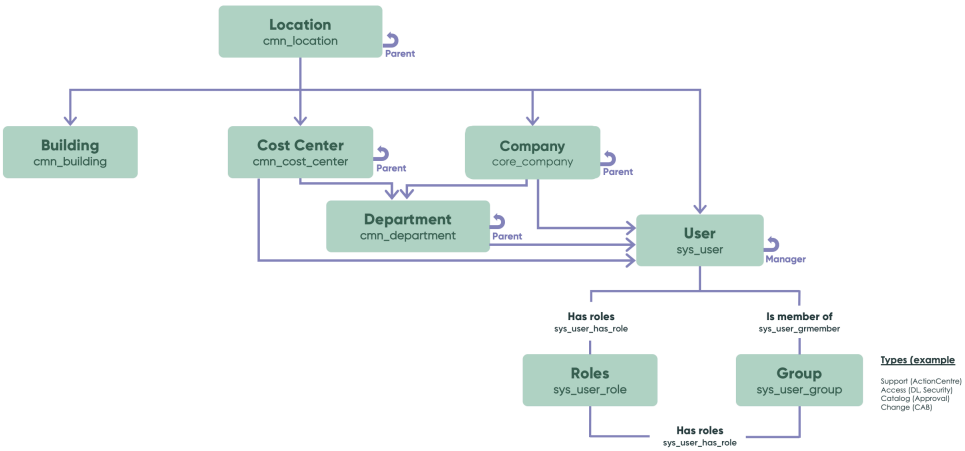
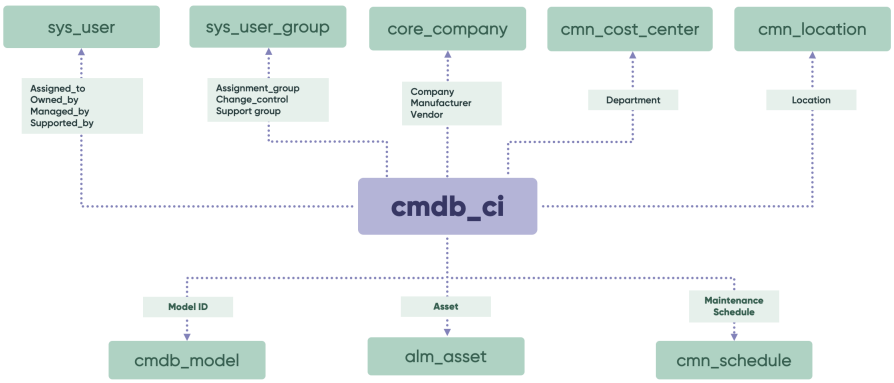
For descriptions of common CMDB tables in a base system, see CMDB tables descriptions.

Common core, user tables



now.

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



Attributes

Attribute	Description
Asset tag	Asset tag/service tag for the specific asset
Assigned	Date and time of assignment to user

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Attribute	Description
Attributes	Description of usage of attributes for the instance
Can Print	Indicates whether the instance can print
Category	Name of category applicable to the instance
Checked in	Date and time of checking in
Checked out	Date and time of checking out
Class	System class name
Comments	Comments related to the instance
Correlation ID	ID of the instance from another data source
Cost	Financial value in local currency (as defined in the Cost Currency field)
Cost currency	Name of currency (such as dollars, pounds, Euros)
Created	Date and time record was created
Created by	Name of person/data source which initially created the record
Description	Fit (how deployed) and function (purpose) of the instance
Discovery source	Name of primary (most trusted) discovery source
DNS Domain	Name of the DNS domain to which the instance belongs
Domain	ID of the domain to which the instance belongs
Domain Path	Path of the domain to which the instance belongs
Due	Date and time instance was due
Due in	Description of the manner of which the instance was due
Fault Count	Number of faulty recorded against the instance to date
First Discovered	Date and time instance was initially discovered
Fully Qualified Domain Name	Full path name of domain to which the instance belongs
GL account	General Ledger account name/number
Installed	Date and time instance was most recently installed
Invoice number	Invoice number used in acquisition process
IP Address	Primary IP address used by the instance
Justification	Description of the justification for the instance

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Attribute	Description
Lease contract	Number of current leasing contracts
MAC Address	MAC address of the instance
Model Number	Manufacturer original model number
Monitor	Indicates whether the instance is monitored
Most Recent Discovery	Date and time instance was last discovered
Name	Name of the CI instance
Operational Status	Configurable choice list with values for current operational states
Order received	Date and time instance was initially received
Ordered	Date and time instance was initially ordered
PO number	Purchase order number used in acquisition process
Purchased	Date instance was purchased
Requires verification	Flag indicating whether verification is required for the instance
Serial number	Serial number of the instance
Skip sync	Flag indicating whether synchronization between Asset Management and CMDB can be skipped
Start Date	Date and time the instance was last started
Subcategory	Name of Subcategory applicable to the instance
Sys ID	ServiceNow Sys ID (GUID)
Tags	Related tags
Updated	Date and time instance was last updated
Updated by	Person/data source which last updated the record
Updates	Configurable choice list with values for update states
Warranty expiration	Date current warranty expires

Reference attribute	Reference to
Approval Group	Group table
Asset	Asset table
Assigned to	User table
Change Group	Group table
Company	Company table
Cost center	Cost Center table

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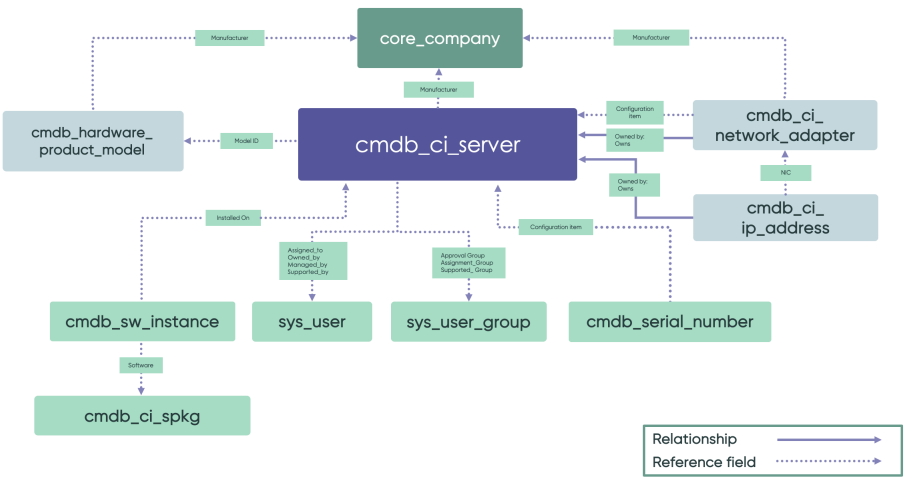
Reference attribute	Reference to
Department	Department table
Location	Location table
Maintenance Schedule	Schedule table
Managed by	User table
Manufacturer	Company table
Model ID	Product Model table
Owned by	User table
Schedule	Schedule table (for normal processing)
Support group	Group table
Supported by	User
Vendor	Company table

Hardware [cmdb_ci_hardware] class

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

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

Hardware, Computer, Server Schema



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

Attributes

The Hardware class adds the following unique attributes:

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

Key relationship structures

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

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

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

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

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

- Network adapter:

  - Use the Network Adapter [cmdb_ci_network_adapter] class to store network adapters.
  - Set the *Name* attribute in the Network Adapter class to be the name of the Network Adapter device (such as eth0, eth1).

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- Set the *MAC Address* attribute to be the MAC address value. Format the string with colon separators between octets and lower case hexadecimal characters with padded zeros.

  For example: 'f8:f2:1e:00:d4:66'

- In the CI Relationship [cmdb_rel_ci] table, create an *Owned By::Owns* relationship to the associated Hardware CI. Specify a reference from the Network Adapter [cmdb_ci_network_adapter] table using the CI with a reference to the associated Hardware CI.

- IP address:

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

- Network adapter and IP address:

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

Key reference structures

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

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

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

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If either the Software Asset Management Foundation [com.snc.sams] or the Software Asset Management [com.snc.software_asset_management] plugin is installed, then store software details in the Software Installation [cmdb_sam_sw_install] table instead of the cmdb_software_instance table.

- The *Manufacturer* and *Model ID* are reference attributes to the Company [core_company] and Product Model [cmdb_model] tables respectively.
- The *Owned By*, *Assigned To*, *Managed By*, and *Supported By* are reference attributes to the User [sys_user] table. The *Change Group* and *Support Group* are reference attributes to the Group [sys_user_group] table.

Identification rule

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

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

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

For more information, see CMDB Identification and Reconciliation (IRE).

Computer [cmdb_ci_computer] class

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

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

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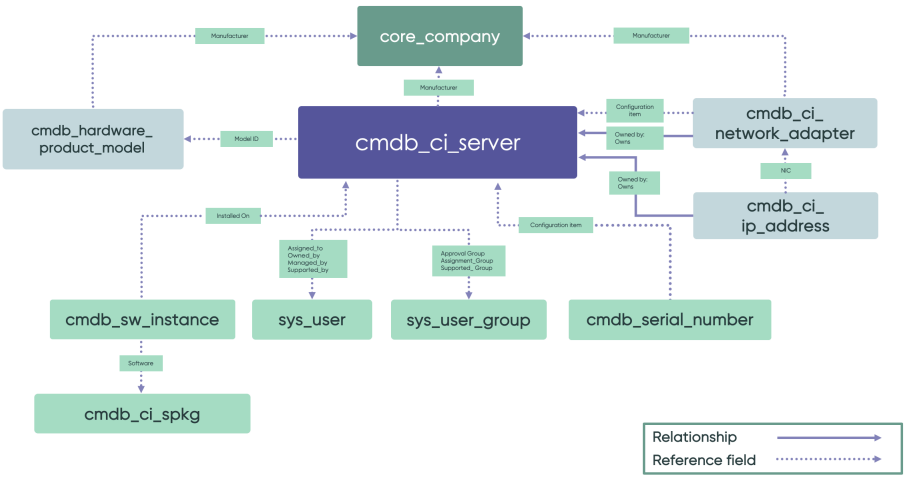
Hardware, Computer, Server Schema



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

Attributes

The Computer class adds the following unique attributes:

Attribute	Description
CD_ROM	Denotes whether a CD ROM exists.
CD Speed	Speed of CD_ROM.
Chassis type	Type of computer chassis.
CPU core count	Number of cores per CPU.
CPU core thread	Number of threads per core.
CPU count	Number of CPUs.
CPU name	Name of CPU.
CPU speed (MHz)	Speed of CPU.
CPU type	CPU type.
Disk space (GB)	Amount of disk space (in GB).
Floppy	Type of floppy drive.
Form factor	Form factor of the computer.
Object ID	Object ID of the computer (such as the virtual machine ID associated with the computer).
Operating System	Name of the operating system.
OS Address Width (bits)	Operating system bit (such as 32, 64).

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Attribute	Description
OS Domain	NA
OS Service Pack	Service pack installed on the operating system .
OS Version	Version of the operating system.
RAM (MB)	Amount of RAM on the computer.
IsVirtual	True/False denoting whether the device is running on a virtual machine instance.

Reference attribute	Reference to
CPU manufacturer	Company [core_company] table

Schema description

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

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

Key relationship structures

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

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

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

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

  - *system*: Product identification such as a serial number for software, a die number on a hardware chip, or a project number (for noncommercial products).
  - *uuid*: Universally unique identifier (UUID) for the product. A UUID is a 128-bit identifier that is guaranteed to be different from other generated UUIDs.

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- *chassis*: Manufacturer-allocated number that is used to identify a physical element. Value is the Serial Number member of the System Enclosure or Chassis structure in the SMBIOS information. This type represents the properties associated with a physical system enclosure.
- *bios*: The assigned serial number of the BIOS. This type represents the attributes of the computer system basic input/output services (BIOS) that are installed on the computer.
- *baseboard*: Manufacturer-allocated number that is used to identify the physical element. This property is inherited from CIM_PhysicalElement, and is sometimes referred to as the 'Motherboard Serial Number'.

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

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

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

- Network adapter and IP address:

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

Key reference structures

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

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

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

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

Identification rule

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

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

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

For more information, see CMDB Identification and Reconciliation (IRE).

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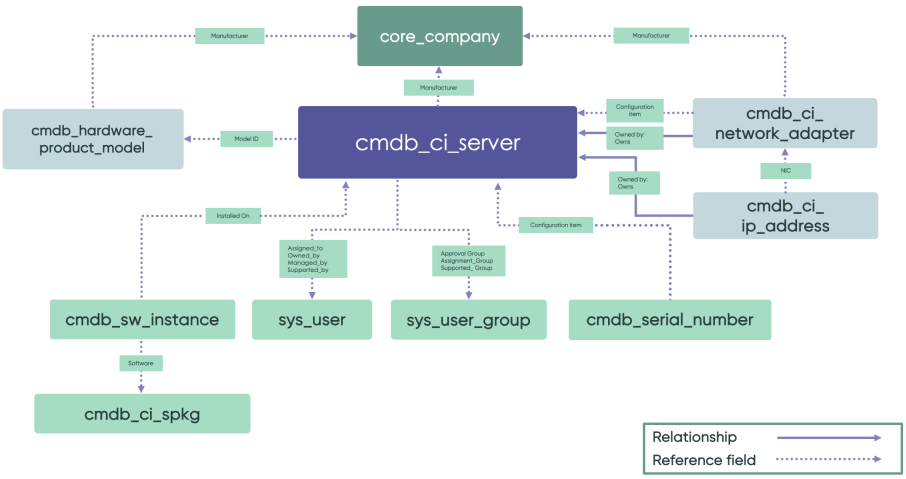
Server [cmdb_ci_server] class

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

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

Hardware, Computer, Server Schema



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

Attributes

The Server class adds the following unique attributes:

Attribute	Description
Classification	Type of server, such as production, development, disaster recovery, or user acceptance testing (UAT).
Firewall status	Internet or intranet facing server.
Host name	Use the Name attribute to store the host name of the server instead of the Host name attribute.
Used for	Business service supported by the server, such as production, staging, or quality assurance (QA). This attribute uses the *Used for* choice list field from the Service [cmdb_ci_service] table.

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

Reference classes

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

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

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Reference class	Name	Description
cmdb_ci_lb_network	Network Load Balancer	Network load balancer hardware.
cmdb_ci_Unix_Server	Unix Server	Server running Unix operating system.
cmdb_ci_linux_server	Linux Server	Server running Linux operating system.
cmdb_ci_virtualization_server	Virtualization Server	Abstract base table used by Hyper-V Server [cmdb_ci_hyper_v_server] and ESX Server [cmdb_ci_esx_server].
cmdb_ci_mainframe	IBM Mainframe	Large-scale computer system with high-end capabilities.

Schema description

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

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

Key relationship structures

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

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

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

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

  - *system*: Product identification such as a serial number for software, a die number on a hardware chip, or a project number (for noncommercial products).
  - *uuid*: Universally unique identifier (UUID) for the product. A UUID is a 128-bit identifier that is guaranteed to be different from other generated UUIDs.

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- *chassis*: Manufacturer-allocated number that is used to identify a physical element. Value is the Serial Number member of the System Enclosure or Chassis structure in the SMBIOS information. This type represents the properties associated with a physical system enclosure.
- *bios*: The assigned serial number of the BIOS. This type represents the attributes of the computer system basic input/output services (BIOS) that are installed on the computer.
- *baseboard*: Manufacturer-allocated number that is used to identify the physical element. This property is inherited from CIM_PhysicalElement, and is sometimes referred to as the 'Motherboard Serial Number'.

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

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

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

- Network adapter and IP address:

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

Key reference structures

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

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

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

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

Identification rule

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

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

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

For more information, see CMDB Identification and Reconciliation (IRE).

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VMware vCenter Object [cmdb_ci_vcenter_object] class

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

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

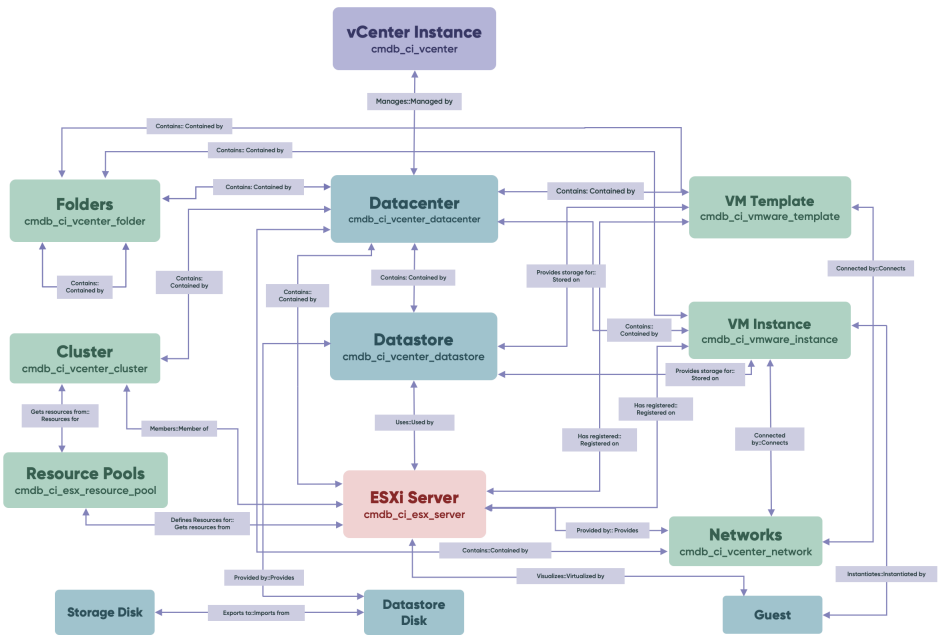
Schema description

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

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

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

VMWare vCenter Instance schema structure



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

Key reference structures

The Guest has the following important key reference structures:

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

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Identification rules

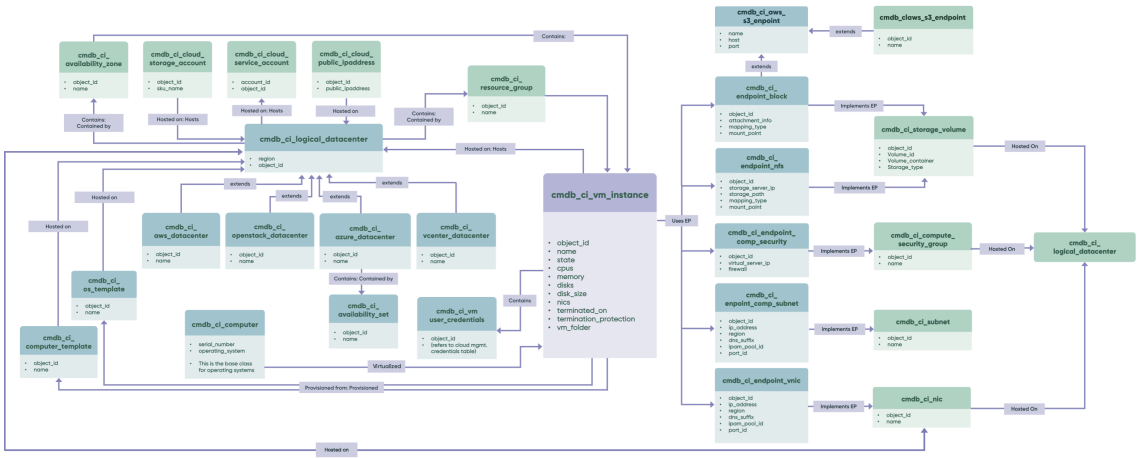
- Guest operating system: Guest operating system is modeled as Server (with *IsVirtual* set to **true**) and therefore identification rules follow the rules for the Server class. In most operating systems, BIOS UUID is reported as serial number. It is essential that you follow proper VMware guidelines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

Cloud class

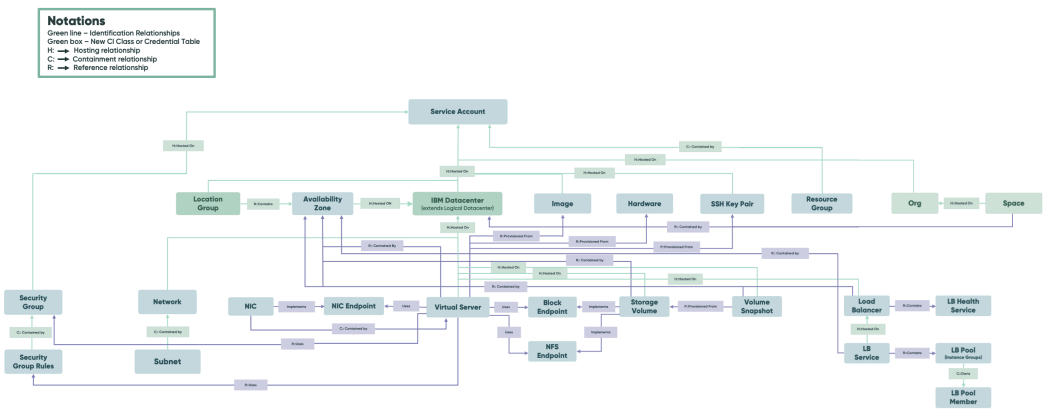
Description, identification rule, and other important schema structures for the CMDB cloud classes.

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

AWS/Azure/OpenStack class model



IBM Datacenter Cloud Schema model



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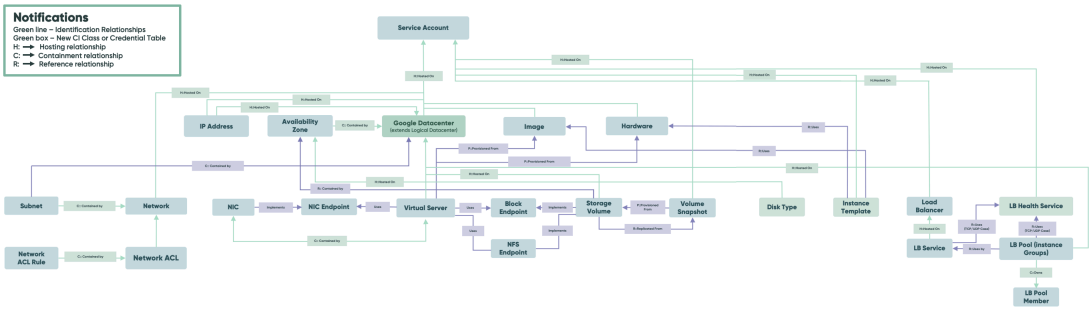
Google Datacenter Schema Model



Cloud schema description

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

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

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

Ensure the following:

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

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

Identification rule

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

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

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

  Logical Datacenter itself, has two identifier entries:

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

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

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

For more information, see CMDB Identification and Reconciliation (IRE).

CMDB classifications and class dependency

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

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

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

Independent CIs

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

Dependent CIs

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

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

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

For more information, see Identification rules.

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Dependent CIs management

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

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

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

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

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

Examples of dependent CIs needing cascade-cleanup:

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

Enable dependent CIs management

To enable dependent CIs management:

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

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

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Use of CMDB Data Manager to perform cascade-cleanup operations

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

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

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

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

Cascade-retire dependent CIs

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

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

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

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

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

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

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

Cascade-archive dependent CIs

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

Orphan dependent CIs are not immediately archived. When a CI is archived, all the CI relationship records for that CI in the [cmdb_rel_ci] table, are also archived. The system then

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checks for any dependent CIs that were orphaned as a result of this archiving. Any CIs in the dependency chain that are identified as orphan dependent CI, are checked for any of the following conditions. CIs that meet any of these conditions are not orphan dependent CIs and therefore will not be archived:

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

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

Cascade-delete dependent CIs

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

1. CI is updated to be deleted as the CI's Life Cycle Stage attribute is set to End of Life according to CSDM standards.
2. All relationships in the cmdb_rel_ci table, associated with the deleted CI, are deleted.
3. Business rule *After BR: CMDB Dependent CI Delete* runs (only if the system property *cmdb.dependent.ci.cascade.op.enabled* is **true**) to check each of the deleted relationships in the CI Relationship [cmdb_rel_ci] table, whether the other CI (parent or child) in the relationship is an orphan dependent CI.

   If yes: Those orphan dependent CIs are added to the CMDB Dependent CI Ledger [cmdb_dependent_ci_ledger] table and set with Action = Delete.
4. Scheduled Job *CMDB DependentCI Policy Processor* runs (if the system property *cmdb.dependent.ci.cascade.retire.enabled* is true) to process the CIs in the CMDB Dependent CI Ledger [cmdb_dependent_ci_ledger] table. Those CIs are set as being ready to be deleted upon approval using the CMDB Data Manager. A task is created in the CMDB Data Manager against the Dependent CI Delete policy to actually delete the CIs.

Orphan dependent CIs aren't immediately deleted. Prior to deleting each of the CIs relationship in the CI Relationship [cmdb_rel_ci] table, the system checks if other CI in the relationship belongs to a dependent class. Any CIs in the dependency chain that are identified as dependent on the deleted CI, are checked for any of the following conditions. CIs that meet any of these conditions aren't orphan dependent CIs and therefore aren't marked for deletion:

- The CI is an unhandled duplicate CI (the CI is associated with an unresolved de-duplication task).
- The CI has multiple parent CIs.

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

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

Extraneous relationships

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

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

Cascade-cleanup existing orphan dependent CIs

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

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

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

Configure automatic recovery settings

You can use the system property *cmdb.dependent.ci.stale.record.cleanup.duration* to control the automatic recovery mechanism for stuck CI records in the CMDB Dependent CI Ledger [cmdb_dependent_ci_ledger] and CMDB CI End Of Life Ledger [cmdb_ci_end_of_life_ledger] tables. This property defines how many days a CI record can remain in **PROCESSING** state before being automatically reset to **NEW** for reprocessing.

About the property:

- Type: Integer
- Default value:

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  - For the CMDB Dependent CI Ledger table processing: 2
  - For the CMDB CI End Of Life Ledger table processing: 1
- Other values: The general guideline for most environments is to set the property to 1-3 days. For high-volume environments where quick recovery is critical, set to a shorter duration such as 1 day, and for environments with long-running CI processing jobs, set to a longer duration such as 3-5 days.

> **Note:**
> If *cmdb.dependent.ci.stale.record.cleanup.duration* is set to zero or a negative value, the system uses the default value (2 days). Setting too low may reset legitimately long-running processes, and setting too high may delay recovery of genuinely stuck records.

When the CMDB Data Manager processes dependent CIs (for retire, archive, or delete operations), the state of records is set to **PROCESSING**. If processing fails due to system errors, crashes, or timeouts, these records can become stuck and processing never completes.

The cleanup job:

1. Identifies records in **PROCESSING** state that haven't been updated in the number of days specified in the *cmdb.dependent.ci.stale.record.cleanup.duration* property.
2. Sets the state of those records to **NEW**.
3. Assigns those records to the current cluster node for reprocessing.

This property is used in the following two scenarios:

Dependent CI Policy Processing

- Location: CMDBDataManagementPolicyProcessor.java:561-571
- Default: 2 days
- Triggered by: Scheduled job for dependent CI management policies
- Purpose: Cleans stuck records in the cmdb_dependent_ci_ledger table

End-of-Life CI Ledger Processing

- Location: CMDBCiEndOfLifeLedger
- Processor.java:57
- Default: 1 day
- Triggered by: Scheduled job for EOL CI processing
- Purpose: Cleans stuck records in the CI end-of-life ledger table

For monitoring purposes, check the system logs for cleanup activity. Log messages such as "Completed cleaning cis which are stuck in processing state, updated X CIs from PROCESSING to NEW state", indicate how many records were reset from **PROCESSING** to **NEW** state.

Sample scenario: cascade-retire

1. Enable dependent CIs management.
2. In CMDB Data Manager, create and publish a Retire policy. For example, retire an independent Linux Server CI with relationships to the dependent CIs Network Adapter and File System.

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3. Wait for the scheduled job *CMDB Data Manager Retire Policy Processor* to run, or run it manually.
4. In the Data Manager overview page, select the Open task card and approve the retirement task (Approval=Approved). Change the state of the task to 'Work in progress' if it doesn't change automatically. This will retire the Linux Server CI and add it to the cmdb_ci_end_of_life_ledger table.
5. Run the scheduled job *CMDB Cascade Retire Dependent CIs*.

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

CMDB record types

The CMDB contains the following major record types.

CMDB record types

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

Related Lists of CI components

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

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

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

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

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

Icons in related lists

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

Icon	Description
Currently active incidents	For currently active incidents against this configuration item
Currently active problems	For currently active problems against the configuration item
Currently active changes	For currently active changes against the configuration item that are not covered in the past, current, pending changes. For example, a request to update the operating system on a server that is currently in progress may display this icon.
Recently completed changes	For changes that were recently completed against the configuration item. changes with an "Actual_end_date" in the past.
Planned changes	For changes that are planned soon against the configuration item. changes with an "Actual start date" in the future.
Currently active changes	For currently active changes against the configuration item that have an "Actual start date"
Recently completed outages	For outages that were recently completed against the configuration item. outages with an "end" date in the past.
Planned outages	For outages that are planned soon against the configuration item. outages with a "begin" date in the future.
Currently active outages	For currently active outages against the configuration item that have a "begin" date in the past and no "end" date
Issues with downstream CI	This will only show up in the Tree view and indicates that a configuration item that is downstream has at least one of the above issues against it.

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

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Teams related list

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

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

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

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

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

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

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

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

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

By-directional synchronization

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

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

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

Add the Teams related list to a Service CI form

By default, the tab for the Teams related list doesn't appear in the Related Lists section on Service CI forms. You can add the Teams related list by selecting the form's Additional actions

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menu, selecting **Configure** and then **Related Lists**. In the Available list that appears, move **Teams** to the Selected list and then select **Save**.

Add a custom group type to the Teams related list

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

Before you begin

Role required: itil_admin, asset, or cmdb_admin

About this task

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

Procedure

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

Create a CI class

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

Before you begin

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

Role required:

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

About this task

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

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

Procedure

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

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

6. On the **Add Attributes** tab, click the + sign and enter details for each new class column.
7. Click **Next**.
   For description of the different columns in the list view, see Dictionary entry form. To designate an attribute as a CI identifier for class identification, double-click the attribute's Identification Rule column and set it to **true**.
8. On the **Set Identification Rule** tab, examine the **Derived** identification rule and its **Identifier Entries**.
   You can click **Replace** to replace the derived rule with a new identification rule and new identifier entries specific to the new class. See Identification rules for details about identification rules and identifier entries.
9. On the **Dependencies** tab, click **Add dependency** to add dependent rules.
   The **Dependencies** tab appears only if there are dependent identification rules for the selected class.
10. On the **Add Reconciliation Rules** tab, click **Add** to create the following rules:
    a. Reconciliation Rules
    b. Data Refresh Rules

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11. On the **Add Suggested Relationships** tab, review the diagram of the class derived suggested relationships.
12. Use the filter to display only inbound, outbound, or specific relationship types.
13. To add a suggested relationship for the class:
    a. Click **New**.
    b. In the Add Suggested Relationship dialog box, select a **Relationship** and a **Target Class** for the relationship. **This Class** and the **Target Class** become parent or child in the suggested relationship, based on your selection of the **Relationship**.
    c. Click **Save**.
    When building relationships for the class in the Query Builder, the list of suggested relationships is updated.
14. Click **Done**.

Related topics

CMDB Identification and Reconciliation (IRE)

Reclassify a CI

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

Before you begin

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

About this task

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

When you reclassify a CI, the following occurs.

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

Depending on the reclassification, the following occurs.

Downgrade

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

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

Upgrade

The CI class is updated to a class that is lower in the class hierarchy, and the newly assigned class is a derived child of the current class and has additional

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attributes. For example, reclassifying a CI from the `cmdb_ci_computer` class to the `cmdb_ci_server`.

Switch

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

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

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

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

Procedure

1. Locate the CI that you want to reclassify and display it in a list view.
   You can use the application navigator. Or for example, if the CI is a server, then in the navigation search box, type `cmdb_ci_server.list` to display the CI in the **Servers** view.
2. Ensure that the **Class** field is displayed in the list.
   If you do not see this attribute, personalize the list to add the **Class** field.
3. Double-click the **Class** value for the CI, and select a new class.
4. Click the green check box to confirm your selection.

Delete CIs

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

Before you begin
Role required: itil_admin

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

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

Procedure

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

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5. Click **Actions on selected rows** and then click **Delete**.
6. Click **Delete** in the **Confirmation** dialog box.

Result

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

View and edit class definitions and metadata

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

Before you begin

Role required: none

About this task

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

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

Procedure

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

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

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

       Role required: personalize_dictionary for reading and writing

       To add an attribute:

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

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

  See CMDB Identification and Reconciliation (IRE) for more information.

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

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

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

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

  Role required: itil.

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

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

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

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

Related topics

Create or modify map icons

Update class list in the Principal Class filter

A Principal Class is a designation for those CMDB classes that are most important or critical for foundational data health and governance in the organization. Manage the list of classes in the Principal Class filter so that those classes are prioritized for tracking, health, certification, lifecycle management, and class list views.

About this task

In a base system, the Principal Class filter doesn't contain any classes.

Designating certain CMDB classes as principal classes is a strategic way to focus your CMDB and governance on the CIs that matter most to day-to-day operations. Principal classes identify the classes that are in scope for operational processes—such as change, incident, problem, and quality management. Those classes represent the most critical infrastructure components with meaningful service impact. Limiting some CMDB functions to this set of most essential classes can help organizations improve data quality and ownership, reduce noise in reporting and impact analysis, and more consistently measure health, compliance, and operational risk where it counts.

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General guidelines for designating a class as principal:

- Consider stability and business impact: Choose those classes that are stable, well-understood, and have a direct impact on business operations.
- Prioritize core infrastructure: When in doubt, select those classes that represent the backbone of your IT environment.
- Consult stakeholders: Engage with infrastructure, application, and security teams to validate your selections.
- Review regularly: As your environment evolves, periodically review and update principal classes to ensure continued relevance.

The Principal Class filter has uses across the CMDB, such as:

- In CI lists and dashboards: The Principal Class filter restricts CIs to only those in the filter, so you can focus on those CIs that require attention. For more information about list view filters, see Save and use filters in a list view.
- CMDB Workspace: You can apply the Principal Class filter in the Discovery sources card in the CMDB 360 dashboard. For more information, see CMDB 360 experience in CMDB Workspace and in Service Graph Workspace.
- CMDB success advisor: CMDB success advisor dashboards rely on principal classes to generate recommendations and KPIs. You can set principal classes in CMDB success advisor for Data Foundations to track the foundational data health of your CMDB. This alignment ensures that insights reflect actual business priorities. For more information, see CMDB success advisor.
- HAM (Hardware Asset Management) integration: When model categories are added to the CMDB success advisor for HAM, they are marked as principal classes if they weren't already and will appear in the CMDB success advisor for Data Foundations if already set up. For more information, see Using CMDB success advisor for HAM, Hardware Asset Management, and CMDB CI Class Models.
- Principal CI class agent in Now Assist for CMDB: This agent suggests classes to be set as principal classes, and then automates setup for consistency across environments. For more information, see Getting advice from Now Assist on CMDB governance.

The Principal Class setting applies only to the current class and is not derived by child classes. For details about the CMDB class hierarchy, see CMDB schema model.

Before you begin

Role required: sn_cmdb_admin or itil_admin, and personalize_dictionary

Procedure

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

Result

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

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What to do next

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

- Scenario 1:
  1. In the **Filter navigator**, type `cmdb_ci.list` and then press the Enter key.
  2. In the Configuration Items list view, select the **List controls** menu icon, select **Filters** and then select **Principal Class**.
- Scenario 2:
  1. Open a Change Request form.
  2. Scroll down and select the **Affected CIs** tab. Select **Add**.
  3. In the **Add Affected CIs** form, select the **List controls** menu icon, select **Filters** and then select **Principal Class**.

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

CI relationships in the CMDB

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

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

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

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

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

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

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

You can add to automatically discovered relationships, create relationships, or edit relationships for a CI by launching the CI relationship editor from the CI form. As an alternative to the CI relationship editor, Unified Map in the CMDB Workspace store app provides the latest functionality for editing CI relationships. For more information, see Edit relationships in Unified Map.

Dependent and non-dependent relationships

Dependent relationships, such as tomcat RunsOn Hardware, are used by the Identification and Reconciliation Engine (IRE) to identify dependent CIs. The IRE avoids duplicate entries of CIs into your Configuration Management Database (CMDB) by leveraging these relationships to determine if a recently discovered CI is already in the CMDB.

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For non-dependent relationships, the CMDB tracks the discovery source and the last scanned time in the Relationship Sources [sys_rel_source] table. Non-dependent relationships aren't used for CI identification, and can be deleted when no longer needed.

To avoid burdening your IRE with excessive load, by default, the Relationship Sources [sys_rel_source] table doesn't auto-populate. If you want to track full information on non-dependent relationships, you can change the default using the glide.identification_engine.populate_sys_rel_source property.

Dependent relationships are used for CI identification, so they shouldn't be directly deleted as they aren't tracked.

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

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

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

Key relationships

The following table contains descriptions for some key CMDB relationships.

Parent	Child	Description
Applicative Flow To	Applicative Flow From	Connections between endpoint CIs. **Note:** For internal use only (service model).
Connects to	Connected by	Network Connections between elements that are talking to each other. Examples: Workstation to switch, switch to switch, kubernetes workload to service.
Contains	Contained by	Typically a containment relationship (CI to contained CI). The child CI typically has a single parent CI with this relationship type. Examples: Tomcat to Tomcat WAR, VMware Datacenter contains Network.

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Parent	Child	Description
Defines resources for	Gets resources from	Parent CI defines/gets resources from a child CI. Example: VMware - Resource pool gets resources from ESX Server.
Depends on	Used by	Parent CI depends on child CI. Meaning that problem/change in the child CI may impact the parent CI.
Hosted on	Hosts	Hosting relationship between an element and its host. Examples: Cloud resource to logical data center, k8s workload to k8s cluster.
Implement End Point To	Implement End Point From	Endpoint to CI that exposes this endpoint. **Note:** For internal use only (service model).
Manages	Managed by	Typically used where one CI manages one or more other CIs. Example: vCenter manages vCenter Datacenter.
Members	Member of	Typically used with clusters where a cluster node is a member of a cluster. Example: ESXi Server is a member of vCenter Cluster.
Owns	Owned by	Usually a containment relationship (CI to owned CI). The child CI typically has a single parent with this relationship type.
Runs on	Runs	Typically between a CI that represents a software application, to the hosting hardware/VM.

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Parent	Child	Description
		Example: Tomcat 'Runs on' Linux server.
Use End Point To	Use End Point From	From the CI to an outgoing endpoint. **Note:** For internal use only (service model).

Related topics

Create a CI relation rollup

Suggested class relationships

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

Suggestion model

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

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

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

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

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

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

Suggested CI relationships in the relationship editor

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

For example, consider these relationship types in the system:

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

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

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

Typically, neither of the following definitions would be appropriate:

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

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

Related topics

CI Class Manager

Add a suggested relationship

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

Before you begin

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

Procedure

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

Suggested Relationship fields

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

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

Example: Suggested relationship you can add

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

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

What to do next

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

Relationship governance rules

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

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

Relationship governance rules consist of:

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

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General behavior

- Relationship governance rules support inheritance.

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

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

  For example, the following relationships are valid:

  - cmdb_ci_appl Depends On::Used by cmdb_ci_service
  - cmdb_ci_appl Receives data from::Sends data to cmdb_ci_service

Reports

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

CI relations formatter

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

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

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

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Note:

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

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

    CI1 > CI2 (These relationships appear as a direct relationship without endpoint, because endpoint is a parent in one relationship and a child in another relationship).
  - Example: CI1 > endpoint1 > CI2 > endpoint2

    Two relationships appear in the relations formatter:

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

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

Controls for viewing related CIs

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

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

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Related items settings

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

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

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

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

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Properties related to performance

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

Related topics

Create a formatter and add it to the form

Create or edit a relationship filter

Domain separation

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

How domain separation works in the relations formatter and relationship editor

- **Relations formatter**

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

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

  By default domain separation is supported in the relations formatter.

- **Relationship editor**

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

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

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

By default domain separation is supported in the relationship editor.

Related topics

Domain separation and Configuration Management Database (CMDB)

Create or edit a relationship filter

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

Before you begin
Role required: ecmdb_admin

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

Procedure
1. Navigate to **All** > **Configuration** > **Relationships** > **Relationship Filters**.
2. Click **New** or select a filter to edit.
3. Enter or edit the relationship filter name.
4. Right-click the form header and click **Save**.
5. In the **Configuration Types** section, click **Edit**.
6. On the **Edit Members** form, select the tables of the CIs that you want to show with the filter and then move the tables to the **Configuration Types list**.
7. Click **Save**.

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

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

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

Exclude relationships from the relations formatter view

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

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Before you begin

Role required:

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

Procedure

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

Legacy CI relations formatter

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

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

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

- Select the flat layout icon ( ) to group related CIs by relationship.
- Select the tree layout icon ( ) to group related CIs in a hierarchical tree.

CI relationship editor

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

As an alternative to the CI relationship editor, Unified Map in the CMDB Workspace store app provides the latest functionality for editing CI relationships. For more information, see Edit relationships in Unified Map.

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

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

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

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

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

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

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

Suggested relationships

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

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

Downstream relationships

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

Upstream relationships

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

Related topics

Add a suggested relationship

Create or edit a CI relationship

Legacy CI relationship builder

Create or edit a CI relationship

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

About this task

As an alternative to the CI relationship editor, Unified Map in the CMDB Workspace store app provides the latest functionality for editing CI relationships. For more information, see Edit relationships in Unified Map.

Before you begin

Role required:

- To create relationships: ITIL or asset
- To view relationships, depending on the state of the Table API ACL:

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- If inactive (default): ITIL or asset
- If active: ITIL or asset, and snc_platform_rest_api_access

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

About this task

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

Procedure

1. Launch the relationship editor:

   a. Open a CI form.
   For example:

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

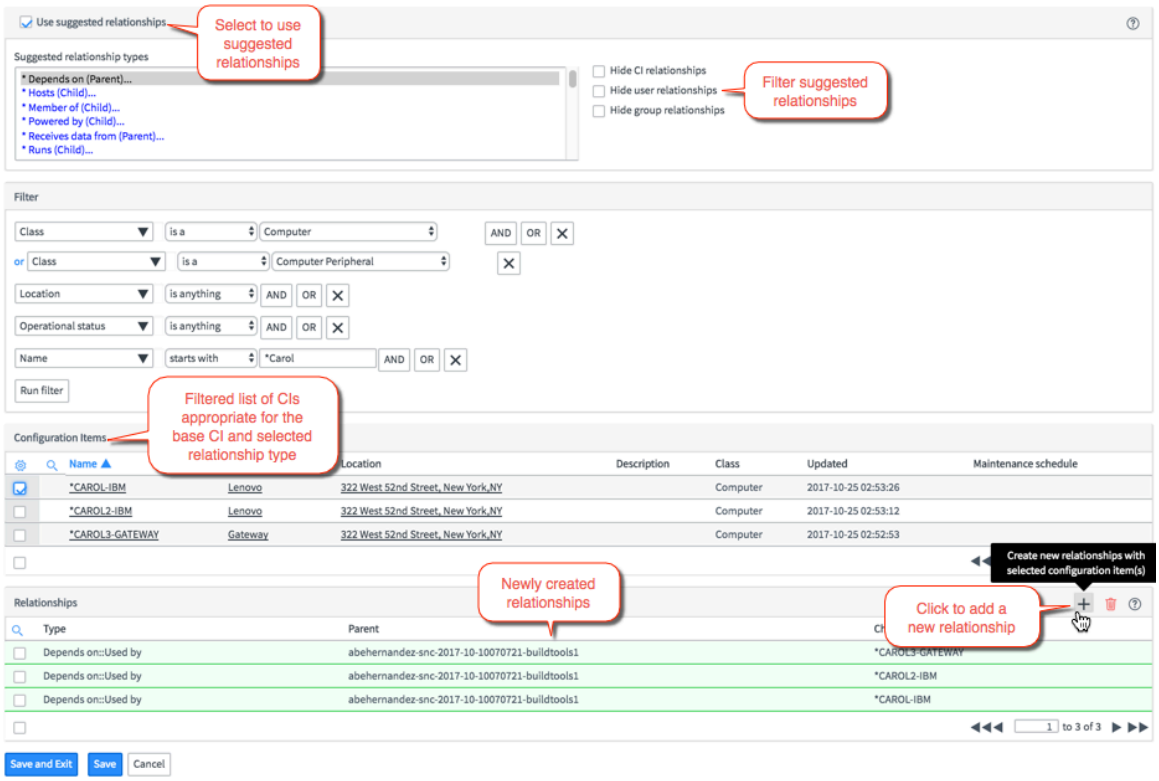
      ii. On the CI Class Manager page, select **Open Hierarchy**.

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

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

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

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



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a. Select **Use suggested relationship**.

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

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

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

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

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

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

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

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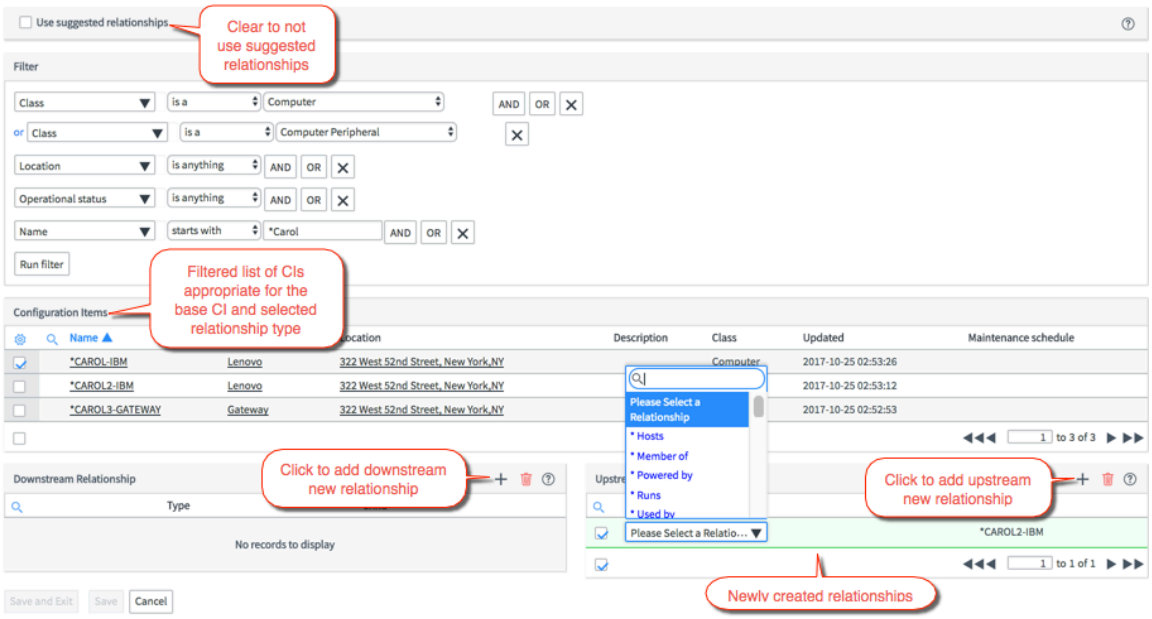

a. Clear **Use suggested relationship**.

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

c. With at least one CI selected in the **Configuration Items** list, click the '+' sign in the **Downstream Relationships** section or the **Upstream Relationships** section to create the relationship.

- Add the relationship to **Downstream Relationships** to create a relationship in which the base CI is the parent CI and the selected CI is the child CI.
- Add the relationship to **Upstream Relationships** to create a relationship in which the base CI is the child CI and the selected CI is the parent CI.

d. For each newly created relationship in either the **Downstream Relationships** or the **Upstream Relationships** lists, click **Please select a relationship** and select a relationship type.

- The list of available relationship types in the **Downstream Relationships** list contains parent relationships only, in which the base CI is the parent CI.
- The list of available relationship types in the **Upstream Relationships** list contains child relationships only, in which the base CI is the child CI.

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

Related topics

Suggested class relationships

CI relationships in the CMDB

CI relationship security

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Delete a CI relationship

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

About this task

As an alternative to the CI relationship editor, Unified Map in the CMDB Workspace store app provides the latest functionality for editing CI relationships. For more information, see Edit relationships in Unified Map.

Before you begin

Role required: ITIL or asset

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

Procedure

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

Legacy CI relationship builder

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

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

Select a CI relationship type

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

Filter the list of CI relationships

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

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

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

Select CI relationship targets

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

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

1. Link or unlink items.

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

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

2. Apply or cancel your changes.

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

Related topics

CI relationships in the CMDB

Relation qualifier

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

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

For example, for a relationship between a parent CI and a child CI, you can add a relation qualifier to note that the relationship was discovered based on traffic (such as

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cmdb_ci_qualifier_traffic_based_connection). This results in having two records in the CI Relationship [cmdb_rel_ci] table for the relationship.

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

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

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

CI relationship security

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

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

Related topics

CI relationships in the CMDB

Create a CI relation rollup

Create a CI relation rollup

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

Before you begin

Role required: ecmdb_admin

About this task

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

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

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

Procedure

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

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CI Relationship Rollup fields

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

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

Related topics

CI relationships in the CMDB

CMDB CI Class Models

The CMDB contains base-system classes that store data about configuration items (CIs). The CMDB CI Class Models ServiceNow® Store app adds class models that extend the CMDB class hierarchy, including class descriptions, identification rules, identifier entries, and dependent relationships if applicable.

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

See the full release notes for all CMDB CI Class Models.

Related ServiceNow® Store apps and reference information:

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

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Add class models

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

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

Discover using extension classes

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

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

Request apps on the Store

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

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Verify successful installation

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

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

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

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

API extension classes

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

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

See the full release notes for all CMDB CI Class Models.

Request apps on the Store

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

APIs

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

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

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

Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates. For additional detail, see the Community article titled "New Data Model in CMDB for APIs".

CMDB CI Class Models: The following classes for API are available. For the list of classes in the base system, including classes that this app might extend, see CMDB tables descriptions.

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

Class attributes

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

API [cmdb_ci_api]

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

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API [cmdb_ci_api] (continued)

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

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

API Component [cmdb_ci_api_component]

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

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API Component [cmdb_ci_api_component] (continued)

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

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

API Frontend [cmdb_ci_api_frontend]

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

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API Backend [cmdb_ci_api_backend]

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

API Gateway [cmdb_ci_api_gateway]

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

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

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

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

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

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

In API gateways and developer portals, an API product bundle is a collection of one or more APIs for consumption by developers and applications. Some platforms use the term for an API product alone.

API Product Bundle [cmdb_ci_api_product_bundle]

Attribute	Data type	Description
ID	String (255)	Unique identifier of the API product bundle.
Discovered Approval Type	String	Type of request approval as discovered from the source system.
Discovered Access Type	String	Access configuration as discovered from the source system. For example, public or internal.

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API Product Bundle [cmdb_ci_api_product_bundle] (continued)

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

To access one or more API product bundles, a developer can register for an API consumer subscription on a developer portal. The subscription registers with one or more bundles and provides a key for access to the APIs in the bundles.

API Consumer Subscription [cmdb_ci_api_consumer_subscription]

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

The WebACL class [cmdb_ci_web_acl] represents ACLs for CloudFront, API gateway REST APIs, application load balancers, AppSync GraphQL APIs, Cognito user pools, App Runner services, AWS Verified Access, and the Azure Front Door application gateway.

Key relationship structures

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

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API relationships

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

Related non-CMDB tables

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

API related list

API Deployment [api_deployment]

Attribute	Data type	Description
Name	String (100)	Name of the API deployment.
API	Reference	Reference to the deployed API (cmdb_ci_api).
Unmatched API Endpoint	Reference	Reference to the unmatched API endpoint, if the API doesn't

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API Deployment [api_deployment] (continued)

Attribute	Data type	Description
		match an existing API (cmdb_ci_unmatched_api_endpoint).
Configuration Item	Reference	Reference to the CI. This is typically manually specified as a reference, if you know what CI the API is deployed to.

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

API Component related list

API Header [api_header]

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

API Gateway related lists

API Consumer [api_consumer]

Attribute	Data type	Description
Username	String (100)	Name of the API consumer.

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API Consumer [api_consumer] (continued)

Attribute	Data type	Description
		Note: The **Consumer** field in the api_policy table is a reference field. To display the username in the **Username** field on the API Policies list, you must set the *display* attribute of **Username** to `true`. If the attribute is not set to `true`, then the list displays the Sys ID instead.
ID	String (255)	Unique identifier from the source system.
Custom ID	String (100)	Alternate display name of the user.
API Gateway	Reference	Reference to the gateway where the consumer is defined (cmdb_ci_api_gateway).
API Consumer Type	List	API user type (user_type). You can specify: • Internal • External • Unknown
Discovered State	String	Represents the current status of the API consumer's account.
Provider	String	Name of the identity management provider responsible for authenticating the API consumer.
Email	String	Email address of the API consumer.
Registration Date	Date/Time	Date the consumer registered with the providing platform.

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API Consumer Access [api_consumer_access]

Attribute	Data type	Description
API Consumer	Reference	Reference to the API consumer record. For example, cmdb_ci_api_consumer.
API	Reference	Reference to the API [cmdb_ci_api] to which the consumer is requesting access.
Auth Method	String	Authentication method used by the API consumer to access the API. For example, API key or OAuth.
State	Choice	Indicates whether the access is currently active or inactive.
Last used	Date/Time	Last date and time the API consumer accessed the API.
Valid to	Date/Time	Expiration date of the consumer's access to the API.

API Policy [api_policy]

Attribute	Data type	Description
Name	String (100)	Name of the API policy.
ID	String (255)	Unique identifier from the source system.
Frontend	Reference	Reference to the API Frontend (cmdb_ci_api_frontend).
Managed API	Reference	Reference to the Managed API (cmdb_ci_managed_api).
Consumer	Reference	Reference to the API Consumer (api_consumer) non-CMDB table.

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API Policy [api_policy] (continued)

Attribute	Data type	Description
		Note: **Consumer** is a reference field. To display the api_consumer (Username) in the API Policies list, you must set the *display* attribute to `true` for **Username** field on the api_consumer table. If the attribute is not set to `true`, then the list displays the Sys ID instead.
Protocols	String	Array of protocols that this API policy can apply to.
Active	Boolean	Determines if this non-CMDB table is considered active or inactive.
API Gateway	Reference	Reference to the gateway where the consumer is defined (cmdb_ci_api_gateway).

Unmatched API extension classes

The CMDB CI Class Models store app adds or updates classes for unmatched APIs. API endpoints that are not structured well enough to populate the API [cmdb_ci_api] and API Component [cmdb_ci_api_component] classes instead populate the Unmatched API Endpoint [cmdb_ci_unmatched_api_endpoint] class. Unmatched APIs are typically used by integrations like security scanners or observability tools.

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

See the full release notes for all CMDB CI Class Models.

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Unmatched APIs

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

Classes

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

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

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

Class attributes

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

Unmatched API Endpoint [cmdb_ci_unmatched_api_endpoint]

Attribute	Data type	Description
Method	String	Backend protocol types of the API. Examples: • Lambda • HTTP • Logic App
Protocol	String	Communication protocol. Example: HTTP, HTTPS.
URL	String (1024)	URL of the resource being called.
ID	String (1024)	Unique identifier from the source system.
Internet Facing	Boolean	Boolean that denotes whether the component is reachable from the public internet. Specify 1 or "true" if the component is reachable.
Authorization	String	Type of authorization or authentication method. Example:

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Unmatched API Endpoint [cmdb_ci_unmatched_api_endpoint] (continued)

Attribute	Data type	Description
		• Basic • Key • Oauth • None
Request data types	String (255)	List of data types in the request. Examples: • CC • Email • Address
Response data types	String (255)	List of data types in the response. Examples: • CC • Email • Address

Key Relationship Structures

The Unmatched API Endpoint [cmdb_ci_unmatched_api_endpoint] CMDB class and API Endpoint Discovered [api_endpoint_discovered] non-CMDB table are intended for scenarios where unstructured API data is ingested and needs to be processed beyond the capabilities of IntegrationHub-ETL.

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

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

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

API Endpoint Discovered [api_endpoint_discovered]

Attribute	Data type	Description
Name	String (100)	Name of the API endpoint.
Method	String	REST API methods. Examples:

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API Endpoint Discovered [api_endpoint_discovered] (continued)

Attribute	Data type	Description
		• GET • POST • DELETE
URL	String (1024)	URL of the resource being called.
Type	List	Type of API. You can specify: • REST • SOAP • HTTP • gRPC • GraphQL • Websocket
Authorization	String	Type of authorization or authentication method. Example: • Basic • Key • OAuth • None
Internet Facing	Boolean	Boolean that denotes whether the component is reachable from the public internet. Specify 1 or "true" if the component is reachable.
Request Datatypes	String (255)	List of data types in the request. Examples: • CC • Email • Address
Response Datatypes	String (255)	List of data types in the response. Examples: • CC • Email • Address
Headers	String (255)	Comma-separated list of header names.

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API Endpoint Discovered [api_endpoint_discovered] (continued)

Attribute	Data type	Description
Configuration Item	Reference	Reference to a matching CMDB CI (API Component or Unmatched API Endpoint).

Related non-CMDB tables

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

API Deployment [api_deployment]

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

Avi load balancer extension classes

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

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

See the full release notes for all CMDB CI Class Models.

Request apps on the Store

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Avi load balancer

The Avi Vantage platform is built on software-defined principles, enabling a next-generation architecture to deliver the flexibility and simplicity expected by IT and lines of business. The Avi Vantage platform architecture separates the data and control planes to deliver application services beyond load balancing, such as application analytics, predictive autoscaling, micro-segmentation, and self-service for app owners in on-premises or cloud environments. The

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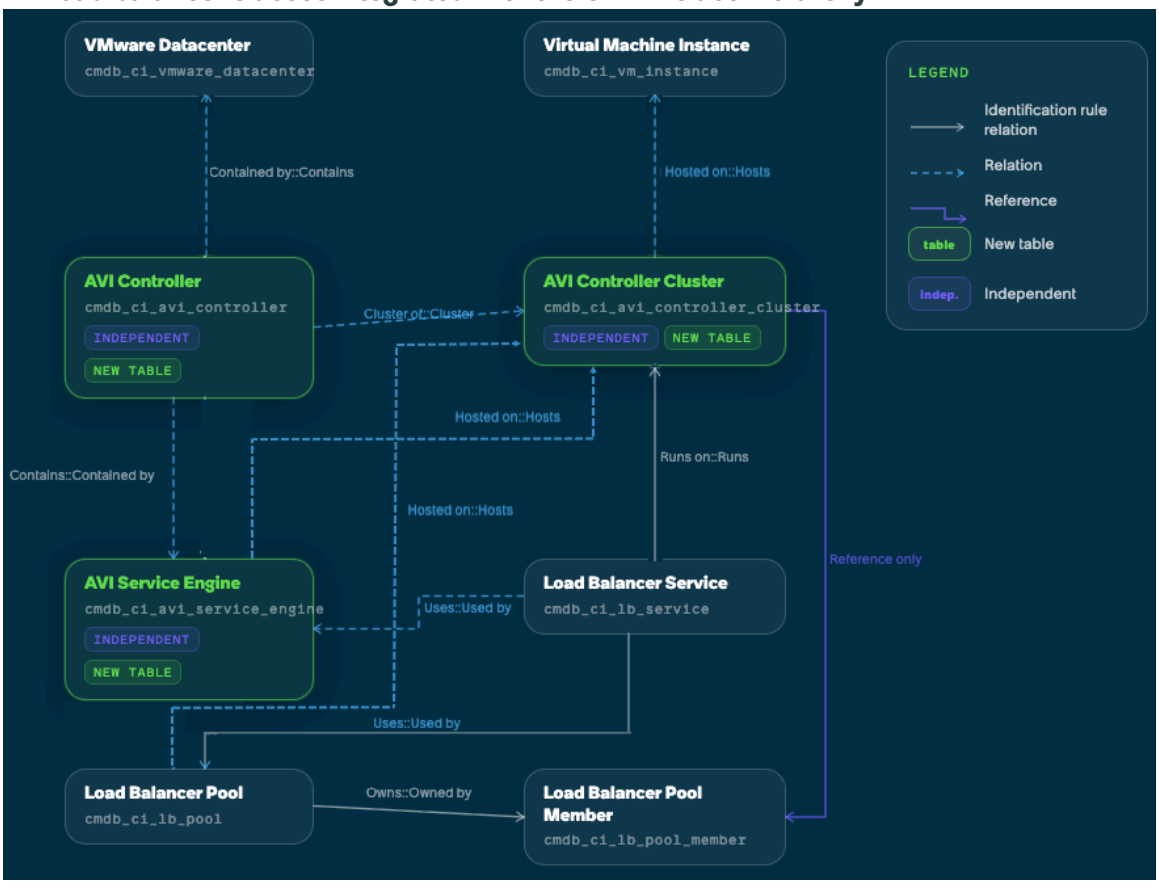
platform provides a centrally managed, dynamic pool of load balancing resources on commodity x86 servers, virtual machines, or containers, to deliver granular services close to individual applications. Providing these services allows network services to scale near infinitely without the added complexity of managing hundreds of disparate appliances.

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

Avi load balancer classes integrated with the CMDB class hierarchy



Classes

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

Class	Extends	Description
Avi Controller [cmdb_ci_avi_controller]	Virtual Machine Object [cmdb_ci_vm_object]	Avi Controller is a single point of management and control that is the 'brain' of the entire Avi Vantage system, and typically deployed as a redundant three-node cluster.
Avi Controller Cluster [cmdb_ci_avi_controller_cluster]	Virtual Machine Object [cmdb_ci_vm_object]	Avi Controller cluster uses big data analytics to analyze the data and present actionable insights to administrators on

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Class	Extends	Description
		intuitive dashboards on the Avi Admin Console.
Avi Service Engine [cmdb_ci_avi_service_engine]	Virtual Machine Object [cmdb_ci_vm_object]	Avi Service Engines (SEs) handle all data plane operations within Avi Vantage by receiving and executing instructions from the Avi Controller.

Class columns

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

Avi Service Engine [cmdb_ci_avi_service_engine]

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

Related topics

CMDB schema model

BYOL model of RDS for Oracle extension classes

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

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

See the full release notes for all CMDB CI Class Models.

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BYOL Model of RDS for Oracle

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

The base system supports discovery of the RDS Databases and their licenses.

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Classes

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

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

Class Columns

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

Serverless Hardware [cmdb_ci_serverless_hardware]

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

Cloud Database [cmdb_ci_cloud_database]

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

Cassandra extension classes

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

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

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Cassandra

Cassandra is a distributed database that is treated as one database and that runs on a cluster of Linux nodes. A Cassandra cluster CI represents a logical entity that doesn't refer to a Linux node.

Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates. For the list of classes in the base system, including classes that this app might extend, see CMDB tables descriptions.

Cassandra classes

Class	Extends	Description
Cassandra cluster node [cmdb_ci_cassandra_cluster_node]	Cluster node [cmdb_ci_cluster_node]	• "Hosts" cmdb_ci_cassandra_instance • "Cluster Of" cmdb_ci_cassandra_cluster • "Hosted On" cmdb_ci_server
Cassandra instance [cmdb_ci_cassandra_instance]	DB instance [cmdb_ci_db_instance]	• "Runs On" cmdb_ci_server • "Hosted on" cmdb_ci_cassandra_cluster_node • "Contains" cmdb_ci_config_file_tracked
Cassandra keyspace [cmdb_ci_cassandra_keyspace]	DB catalog [cmdb_ci_db_catalog]	"Hosted On" cmdb_ci_cassandra_cluster

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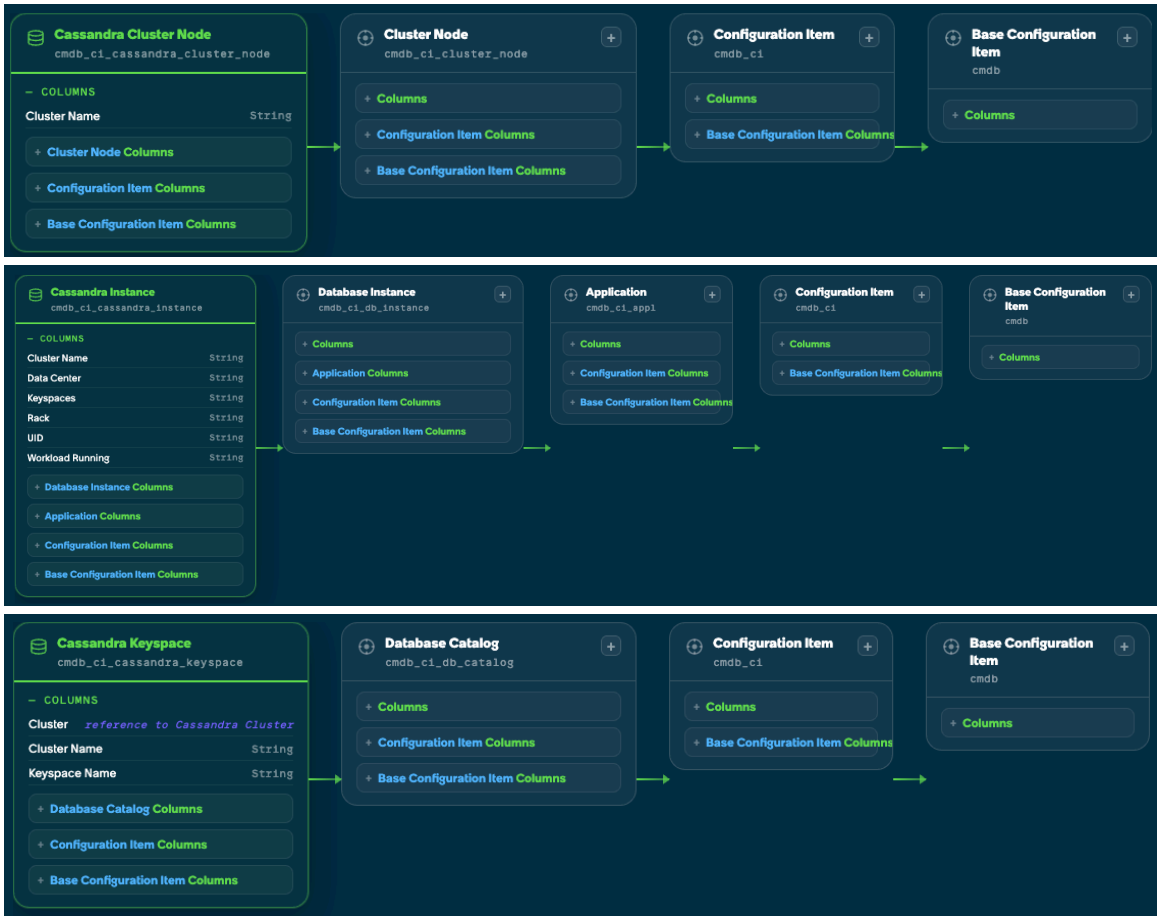

DNS resource record classes

The CMDB CI Class Models ServiceNow Store app adds or updates classes for DNS records, also known as a DNS resource records (RR).

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DNS zone resource records

A DNS record is an entry in the domain name system (DNS) database that provides information about a specific aspect of a domain name. Each DNS record contains data associated with a domain name, such as IP addresses, mail server addresses, or other resources. Each type of record serves a specific purpose, such as mapping domain names to IP addresses (A records), identifying mail servers for a domain (MX records), and providing aliases for domain names (CNAME records), among others. DNS resource records are essential for the proper functioning of the DNS infrastructure on the internet.

See the full release notes for all CMDB CI Class Models.

Note:
In CMDB CI Class Models release 1.57, existing classes in the CMDB schema that represent DNS resource records like A, AAAA, CName, and so on are deprecated. The following classes are defined with an ideal base, child class, and identification rule.

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Supported DNS resource record types

- A Record: Holds the IP address of a domain.
- AAAA Record: Contains the IPv6 address of a domain.
- CNAME Record: Forwards one domain or subdomain to another domain. Does not provide an IP address.
- MX Record: Directs mail to an email server.

The supported record types enable actions like the following:

- Capture domain name registration in the CMDB and create workflow to request, approve, and track life cycle.
- Auto-populate the data from integration to the registrar.
- Connect the data to an IPAM record.
- Connect the data to the certificate on the DNS.
- Connect the data to the CDN provider.

DNS resource record classes integrated with the CMDB class hierarchy

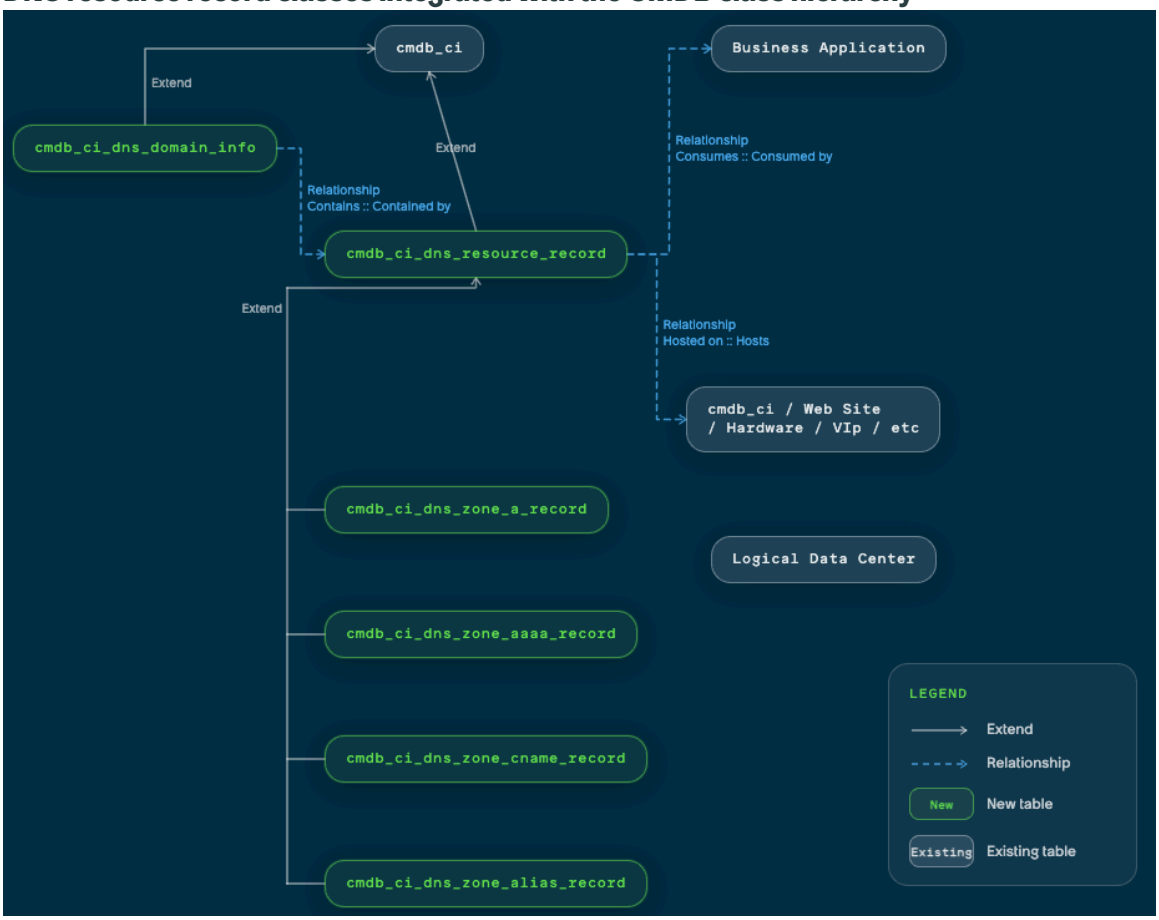

Table: cmdb_ci_dns_resource_record

This section lists the classes that the CMDB CI Class Models store app adds or updates. For the list of classes in the base system, including classes that this app might extend, see CMDB tables descriptions.

DNS record detail from Domain Name Server (DNS) for a WWW domain.

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Column	Description	Details
DNS Service Provider [service_provider] Replaces the deprecated column: DNS Service Provider [name]	Defines which DNS service provider supplied this value, examples like Cloudflare,Google DNS, OpenDNS, Local DNS,Private DNS,empty, and so on.	Identification Rule (name +service_provider) allow null String (255)
Time to Live [ttl]	Time, in seconds, that a DNS record will be cached by an outside DNS server or resolver.	integer
Record Class [record_class]	Class of DNS record.	• IN (Internet) (default) • CH (Chaosnet) • HS (Hesiod)

Table: cmdb_ci_dns_zone_a_record

A records hold only IPv4 addresses.

Column	Description	Details
A IP Address [ip_address]	IPv4 address	ip_addr Identification Rule (name+service_provider +ip_address) allow null

Table: cmdb_ci_dns_zone_aaaa_record

AAAA records hold only IPv6 addresses.

Column	Description	Details
AAAA IP Address [ip_address]	IPv6 address	ip_addr Identification Rule (name+service_provider +ip_address) allow null

Table: cmdb_ci_dns_zone_cname_record

A canonical name (CNAME) record points from an alias domain to a canonical domain.

Column	Description	Details
Canonical Name [cname]	Fully qualified domain name / Canonical Name.	String (255)

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Column	Description	Details
		Identification Rule (name +service_provider+cname) allow null

Table: cmdb_ci_dns_zone_alias_record

An ALIAS record points domain name to a hostname instead of an IP address.

Column	Description	Details
Alias Name [alias_name]	Alias name of the DNS record.	String (255) Identification Rule (name+service_provider +alias_name) allow null

Table: cmdb_ci_dns_domain_info

Domain Name enables you to trace ownership and tenure of domain name details using DNS lookup tools like whois.

Column	Description	Details
Domain Name [domain_name]	WWW Domain Name value from the DNS lookup tool.	String (255) Identification Rule (Name)
Registry Domain ID [registry_domain_id]	Registry Domain ID value from the DNS lookup tool.	String (255)
Registrar [registrar]	Registrar value from the DNS lookup tool.	String (255)
Domain Creation Date [domain_creation_date]	Creation Date of the domain from the DNS lookup tool.	glide_date_time
Domain Updated Date [domain_updated_date]	Updated Date of the domain from the DNS lookup tool.	glide_date_time
Registrar Registration Expiration Date [registrar_registration_expiration_date]	Registrar Registration Expiration Date value from the DNS lookup tool.	glide_date_time

Extend classes and rules for third-party integrations

Extend and update CMDB CI Class Models store app classes and rules when using third-party integration tools.

When using a third-party tool to integrate with ServiceNow apps, gaps can occur between the integration and different CIs. Some of the integrated tables and classes may be missing classes and rules that are not included with the CMDB CI Class Models store app.

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This section lists the classes that the CMDB CI Class Models store app adds or updates. The classes and rules in the following table enable you to add and extend the CMDB CI Class Models store app for integrations.

Table	Extends	Rules and related entries
Postgresql Schema cmdb_ci_postgresql_schema	cmdb_ci_db_catalog	Containment rule: cmdb_ci_db_postgresql_instance->Contains:Contained By->cmdb_ci_postgresql_schema
		Identification Rule: Dependent, Attributes: name
		Related Entries (cmdb_related_entry): • Identifier: cmdb_ci_postgresql_schema • Related table: cmdb_key_value • Referenced field: configuration_item
Information Object cmdb_ci_information_object	cmdb_ci	Identification rule: Independent, attributes: name
		Related Entries (cmdb_related_entry): • Identifier: cmdb_ci_information_object • Related table: cmdb_key_value • Referenced field: configuration_item
Oracle Catalog cmdb_ci_db_ora_catalog	cmdb_ci_db_catalog	Related Entries (cmdb_related_entry): • Identifier: cmdb_ci_db_ora_catalog • Related table: cmdb_key_value • Referenced field: configuration_item
MySQL Catalog cmdb_ci_db_mysql_catalog	cmdb_ci_db_catalog	Containment rule: cmdb_ci_db_mysql_instance->Contains:Contained By->cmdb_ci_db_mysql_catalog
		Identification rule: Dependent, attributes: name

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Table	Extends	Rules and related entries
		Related Entries (cmdb_related_entry): • Identifier: cmdb_ci_db_mysql_catalog • Related table: cmdb_key_value • Referenced field: configuration_item
MS SQL Database cmdb_ci_db_mssql_database	cmdb_ci_db_instance	Related Entries (cmdb_related_entry): • Identifier: cmdb_ci_db_mssql_database • Related table: cmdb_key_value • Referenced field: configuration_item
Sybase Catalog cmdb_ci_db_syb_catalog	cmdb_ci_db_catalog	Containment rule: cmdb_ci_db_syb_instance->Contains:Contained By->cmdb_ci_db_syb_catalog
		Identification rule: Dependent, attributes: name
		Related Entries (cmdb_related_entry): • Identifier: cmdb_ci_db_syb_catalog • Related table: cmdb_key_value • Referenced field: configuration_item
DB2 Database (formerly DB2 Catalog) cmdb_ci_db_db2_catalog	cmdb_ci_db_catalog	Containment rule: cmdb_ci_db_db2_instance->Contains:Contained By->cmdb_ci_db_db2_catalog
		Identification rule: Dependent, attributes: name
		Related Entries (cmdb_related_entry): • Identifier: cmdb_ci_db_db2_catalog • Related table: cmdb_key_value • Referenced field: configuration_item

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For the list of classes in the base system, including classes that this app might extend, see CMDB tables descriptions.

Related topics

CMDB schema model

Firewall extension classes

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

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

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Firewalls

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

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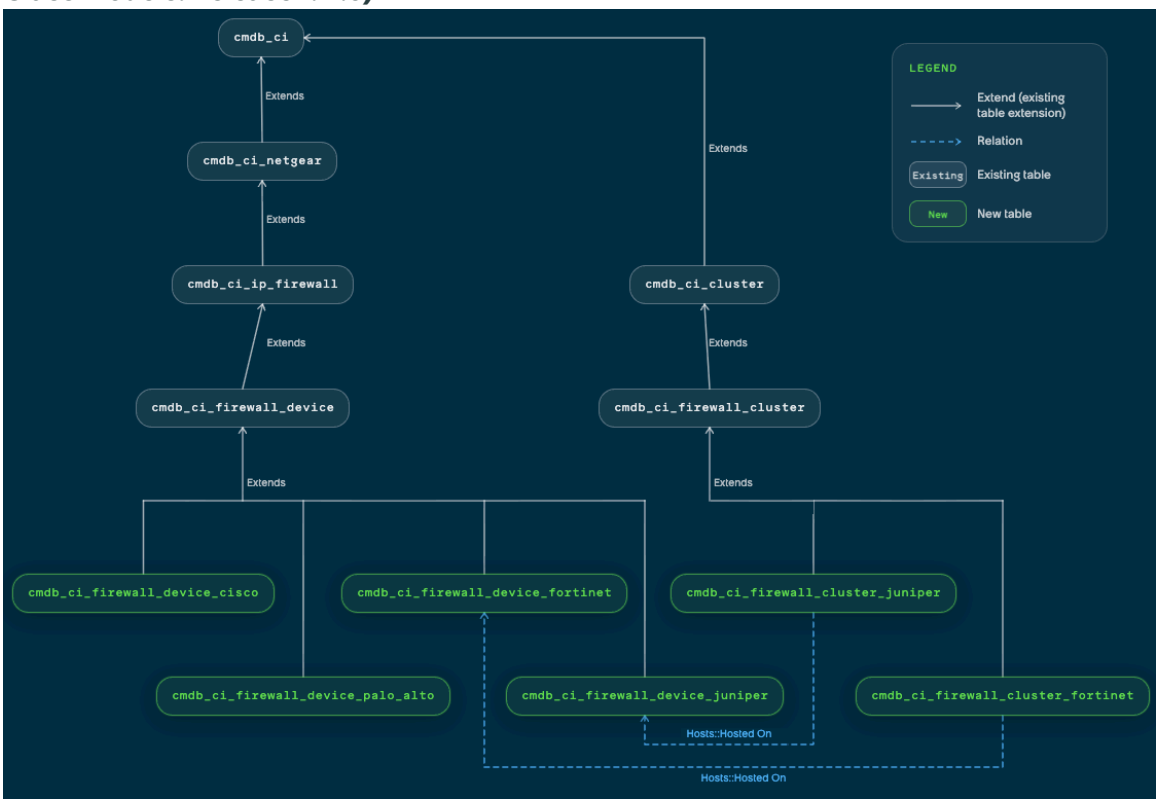
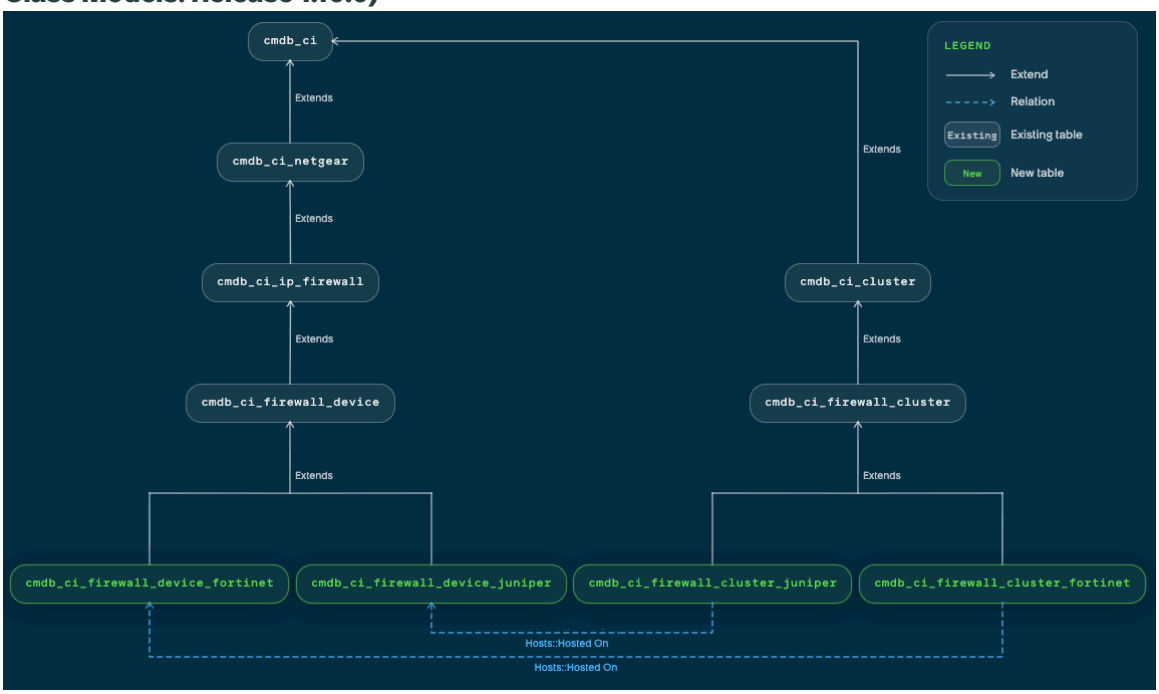
Firewall extension classes integrated with the CMDB class hierarchy (CMDB CI Class Models: Release 1.11.0)



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



Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates.See the class columns table for further details about the columns added for each class. CMDB CI Class Models: Release 1.10.0 adds or updates the following classes for the discovery of network firewall

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devices. For the list of classes in the base system, including classes that this app might extend, see CMDB tables descriptions.

Class	Extends	Description
IP Firewall [cmdb_ci_ip_firewall]	NETGEAR [cmdb_ci_netgear]	Contains all network firewalls.
Firewall Device [cmdb_ci_firewall_device]	IP Firewall [cmdb_ci_ip_firewall]	Network security system that monitors and controls incoming and outgoing network traffic, based on security policies.
Fortinet Firewall Device [cmdb_ci_firewall_device_fortinet]	Firewall Device [cmdb_ci_firewall_device]	Fortinet firewall device.
Fortinet Firewall Interface [cmdb_ci_fortinet_firewall_interface]	Network Interface [cmdb_ci_ni_interface]	Discovered by the Next Generation Fortinet Network Firewall - REST pattern. See Fortinet firewall and FortiGate VDOM REST-based discovery.
Fortinet Firewall Policy [cmdb_ci_fortinet_firewall_policy]	Firewall Security Policy [cmdb_ci_firewall_sec_policy]	Discovered by the Next Generation Fortinet Network Firewall - REST pattern. See Fortinet firewall and FortiGate VDOM REST-based discovery.
Fortinet Virtual Domain [cmdb_ci_fortinet_vdom]	IP Firewall [cmdb_ci_ip_firewall]	Discovered by the Next Generation Fortinet Network Firewall - REST pattern. See Fortinet firewall and FortiGate VDOM REST-based discovery.
Juniper Firewall Device [cmdb_ci_firewall_device_juniper]	Firewall Device [cmdb_ci_firewall_device]	Juniper firewall device.
Firewall Device Group [cmdb_ci_firewall_device_group]	CMDB CI [cmdb_ci]	Group of firewall devices.
Panorama Firewall Device Group [cmdb_ci_firewall_device_group_panorama]	Firewall Device Group [cmdb_ci_firewall_device_group]	Group of Panorama firewall devices.
Palo Alto Firewall Device [cmdb_ci_firewall_device_palo_alto]	Firewall Device [cmdb_ci_firewall_device]	Palo Alto firewall device.
Firewall Cluster [cmdb_ci_firewall_cluster]	[cmdb_ci_cluster]	Group of firewall nodes that work as a single logical entity.
Fortinet Firewall Cluster [cmdb_ci_firewall_cluster_fortinet]	Firewall Cluster [cmdb_ci_firewall_cluster]	Fortinet firewall cluster.

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Class	Extends	Description
Juniper Firewall Cluster [cmdb_ci_firewall_cluster_juniper]	Firewall Cluster [cmdb_ci_firewall_cluster]	Juniper firewall cluster.
Firewall Manager [cmdb_ci_firewall_manager]	CMDB CI [cmdb_ci]	System that provides centralized management for many firewall devices and the security policies residing on them.
Panorama Firewall Manager [cmdb_ci_firewall_manager_panorama]	Firewall Manager [cmdb_ci_firewall_manager]	The centralized network security management tool for Palo Alto Networks firewalls.
Firewall Security Policy [cmdb_ci_firewall_sec_policy]	CMDB CI [cmdb_ci]	The security policy that the firewall device enforces.
Panorama Firewall Security Policy [cmdb_ci_firewall_sec_policy_panorama]	Firewall Security Policy [cmdb_ci_firewall_sec_policy]	The security policy that the Panorama firewall device enforces.

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

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

Class columns

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

IP Firewall [cmdb_ci_ip_firewall] class

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

Firewall Cluster [cmdb_ci_firewall_cluster] class

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

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

Related topics

CMDB schema model

IBM Hardware Management Console (HMC) extension classes

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

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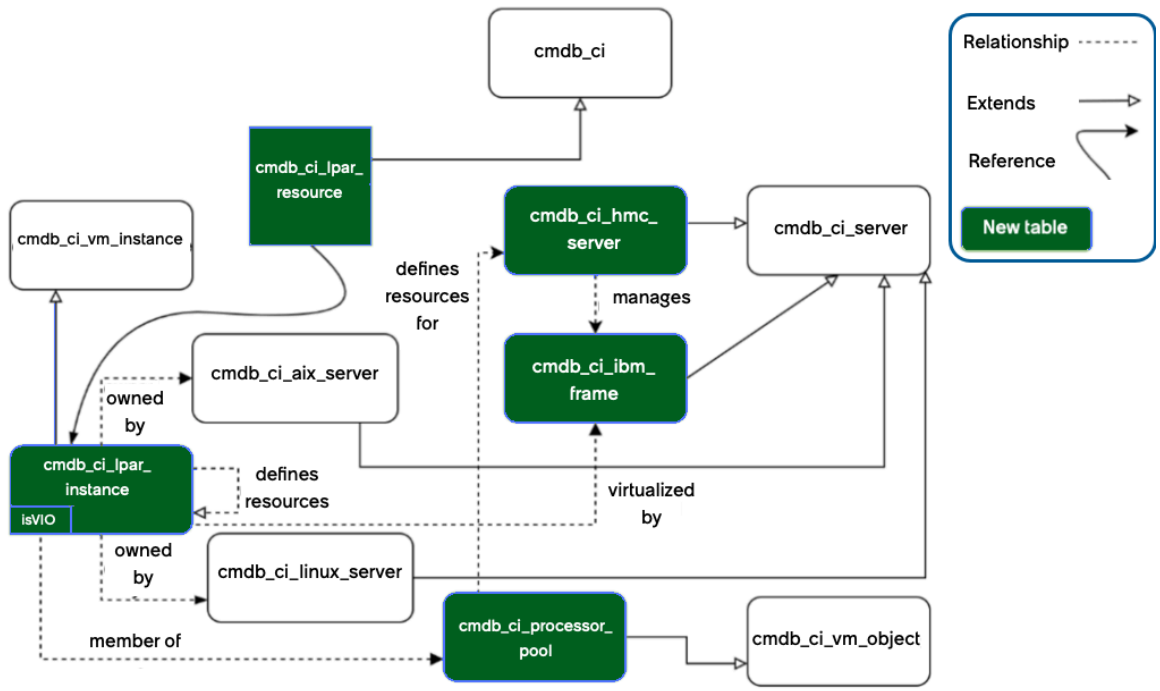
IBM Hardware Management Console (HMC)

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

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

IBM HMC extension classes integrated with the CMDB class hierarchy



Classes

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

CMDB CI Class Models: Release 1.3.0 adds the following classes for the IBM HMC.

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

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

Class	Extends	Description
IBM HMC Server [cmdb_ci_hmc_server]	Server [cmdb_ci_server]	IBM console that manages frames and assigns logical partitions (LPARs) to pools.
IBM Frame [cmdb_ci_ibm_frame]	Server [cmdb_ci_server]	IBM physical machine with considerable resources that can be virtualized.
IBM LPAR Instance [cmdb_ci_lpar_instance]	Virtual Machine Instance [cmdb_ci_vm_instance]	IBM logical partition representing the virtual aspect of the operating system.
LPAR Resource [cmdb_ci_lpar_resource]	Configuration Item [cmdb_ci]	Resource of an LPAR instance.
IBM HMC Processor pool [cmdb_ci_processor_pool]	Virtual Machine Object [cmdb_ci_vm_object]	IBM shared pool used to allocate processors to a group of LPARs.

Class columns

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

IBM Frame [cmdb_ci_ibm_frame] class

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

IBM HMC Processor pool [cmdb_ci_processor_pool] class

Added columns	Description
LPAR IDs	LPAR IDs.

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IBM HMC Processor pool [cmdb_ci_processor_pool] class (continued)

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

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

IBM HMC Server [cmdb_ci_hmc_server] class

Added columns	Description
Frame count	Count of frames.

Added columns	Description
Is VIO	Flags whether this VM is a (VIO) virtual input/output server in the HMC topology.
High Watermark VCPU	Peak in the utilization of virtual CPU assigned to during the reporting period.
Frame Serial Number	Serial number of a frame (frame being a physical machine such as ESX).
VIO Servers	List of VIO servers.

LPAR Resource [cmdb_ci_lpar_resource] class

Added columns	Description
Node name	Name of the node.
Partition Name	Name of the partition.
Partition Number	Number of the partition.
Type	Type of LPAR Resource.
Mode	Mode of LPAR Resource.
Entitled Capacity	Allotted capacity granted.
Partition Group-ID	ID of a group of partitions.
Shared Pool ID	ID of a pool of shared processors.
Online Virtual CPUs	A virtual CPU.
Maximum Memory	Maximum amount of memory.
Minimum Memory	Minimum amount of memory.
Variable Capacity Weight	Logical partition processor capacity weight.
Minimum Capacity	Minimum number of processes.
Capacity Increment	Increments of process.
Maximum Physical CPUs in system	Maximum CPUs allotted in system.
Active Physical CPUs in system	Current CPUs in system.

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LPAR Resource [cmdb_ci_lpar_resource] class (continued)

Added columns	Description
Active CPUs in Pool	Number of active CPUs within a pool.
Shared Physical CPUs in system	Number of shared CPUs within a system.
Maximum Capacity of Pool	Maximum capacity of processes within a pool.
Entitled Capacity of Pool	Number of processes that are entitled.
Unallocated Capacity	Number of free spaces.
Physical CPU Percentage	Number of CPUs allocated to system.
Unallocated Weight	At no extra charge resources on instance.
Desired Virtual CPUs	Target number of virtual CPUs.
Desired Memory	Target amount of memory.
Desired Variable Capacity Weight	Targeted processor load.
Desired Capacity	Target resources used within instance.
High Watermark VCPU	Peak in the utilization of virtual CPU assigned to during the reporting period.

IBM HMC Processor pool [cmdb_ci_processor_pool] class

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

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

Related topics

CMDB schema model

Internet of Things (IoT) extension classes

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

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

See the full release notes for all CMDB CI Class Models.

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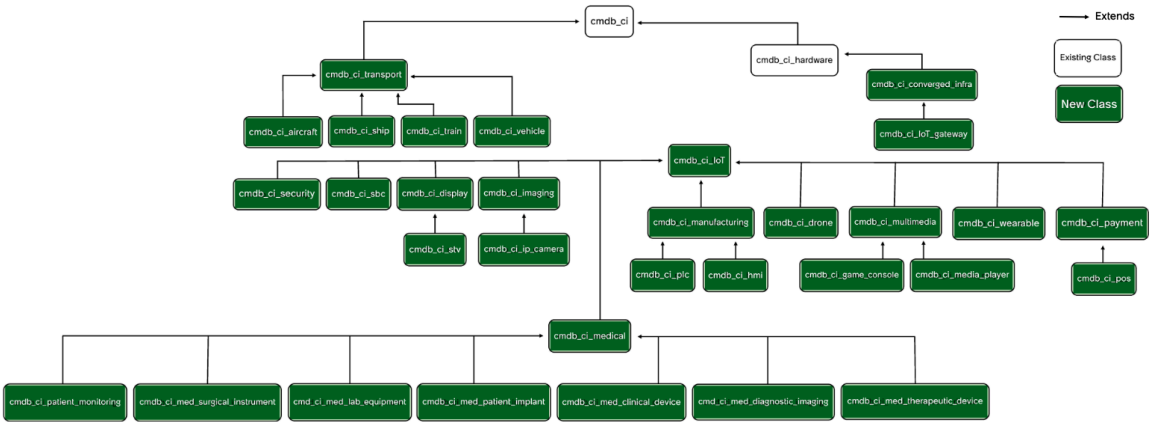
Internet of Things (IoT)

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

IoT extension classes integrated with the CMDB class hierarchy



Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates. For the list of classes in the base system, including classes that this app might extend, see CMDB tables descriptions.

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

Class	Extends	Description
Transport Type [cmdb_ci_transport]	cmdb_ci	Types of transportation that contain interconnected technology.
Converged Infrastructure [cmdb_ci_converged_infra]	cmdb_ci_hardware	Devices that serve both computing and networking functions.
IoT Device [cmdb_ci_IoT]	cmdb_ci_hardware	Parent table that contains Internet of Things device types.
Aircraft	Transport Type	A transportation method that utilizes air or space as its

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Class	Extends	Description
[cmdb_ci_aircraft]	[cmdb_ci_transport]	primary pathway. For example, airplanes and helicopters.
Ship [cmdb_ci_ship]	Transport Type [cmdb_ci_transport]	A transportation method that utilizes water as its primary pathway. For example, ships.
Train [cmdb_ci_train]	Transport Type [cmdb_ci_transport]	A transportation method that utilizes rails as its primary pathway. For example, Amtrak.
Vehicle [cmdb_ci_vehicle]	Transport Type [cmdb_ci_transport]	A transportation method that utilizes wheels or tracks as its method of movement. For example, cars, trucks, bulldozers.
IoT Gateway [cmdb_ci_IoT_gateway]	Converged Infrastructure [cmdb_ci_converged_infra]	A device that provides the following services: • Forwards packets between LAN and WAN on the IP layer. • Performs application layer functions between IoT nodes and other entities. • Enables local, short-range communication between IoT devices.
Security Device [cmdb_ci_security]	IoT Device [cmdb_ci_IoT]	Connected device that serves a security function such as badge readers.
Single Board Computing [cmdb_ci_sbc]	IoT Device [cmdb_ci_IoT]	Single Board Computing device such as a Raspberry Pi.
Display Device [cmdb_ci_display]	IoT Device [cmdb_ci_IoT]	Connected device that displays images.
Imaging Device [cmdb_ci_imaging]	IoT Device [cmdb_ci_IoT]	Connected device that captures images.
Medical Device [cmdb_ci_medical]	IoT Device [cmdb_ci_IoT]	Connected device that serves a Medical Care function such as a nurse call unit.
Manufacturing Device [cmdb_ci_manufacturing]	IoT Device [cmdb_ci_IoT]	Connected device that helps a manufacturing process.
Multimedia Device	IoT Device	A connected device that helps the generation or delivery of media content.

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Class	Extends	Description
[cmdb_ci_multimedia]	[cmdb_ci_IoT]	
Payment Device [cmdb_ci_payment]	IoT Device [cmdb_ci_IoT]	Connected device that allows for purchasing goods or services.
Drone [cmdb_ci_drone]	IoT Device [cmdb_ci_IoT]	Unmanned connected device with mobility.
Wearable Technology [cmdb_ci_wearable]	IoT Device [cmdb_ci_IoT]	Connected device that is worn by an entity such as a smart watch.
Smart Television [cmdb_ci_stv]	Display Device [cmdb_ci_display]	A television that is network connected and can run applications.
IP Camera [cmdb_ci_ip_camera]	Imaging Device [cmdb_ci_imaging]	A camera that is network connected.
Patient Monitoring [cmdb_ci_med_patient_monitoring]	Medical Device [cmdb_ci_medical]	Monitors and tracks various physiological parameters of a patient. Monitors heart rate, blood pressure, oxygen levels, respiratory rate, and so on.
Surgical Instrument [cmdb_ci_med_surgical_instrument]	Medical Device [cmdb_ci_medical]	Devices used during surgical interventions. Life support tools and tools to assist surgeons in precise and controlled maneuvers.
Lab Equipment [cmd_ci_med_lab_equipment]	Medical Device [cmdb_ci_medical]	Specialized tools, apparatus, and instruments used in scientific research, experiments, and analyses.
Patient Implant [cmdb_ci_med_patient_implant]	Medical Device [cmdb_ci_medical]	Medical devices or tissues that are surgically placed inside a patient's body.
Clinical Device [cmdb_ci_med_clinical_device]	Medical Device [cmdb_ci_medical]	Devices used in a clinical setting for overall management, medical staff, and patient aid.
Diagnostic Imaging [cmd_ci_med_diagnostic_imaging]	Medical Device [cmdb_ci_medical]	Specialized equipment used in medicine to visualize the internal structures of the body.
Therapeutic Device [cmdb_ci_med_therapeutic_device]	Medical Device [cmdb_ci_medical]	Specialized tools that aid in the treatment, rehabilitation, or management of health conditions. Can range from orthopedic supports

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Class	Extends	Description
		to cardiac implants and neurostimulation devices.
Process Logic Controller [cmdb_ci_plc]	Manufacturing Device [cmdb_ci_manufacturing]	A logic controller that is network connected which is used in manufacturing. For example, devices made by Siemens and Allen Bradley.
Human Machine Interface [cmdb_ci_hmi]	Manufacturing Device [cmdb_ci_manufacturing]	An HMI that is network connected which is used in manufacturing. For example, devices made by Siemens and Allen Bradley.
Game Console [cmdb_ci_game_console]	Multimedia Device [cmdb_ci_multimedia]	A device that is network connected which is used to play games or stream media. For example, an Xbox or Playstation.
Media Player [cmdb_ci_media_player]	Multimedia Device [cmdb_ci_multimedia]	A device that is network connected which is used to play digital media content. For example, Amazon Fire TV.
Display Monitor Control [cmdb_ci_monitor_control]	Multimedia Device [cmdb_ci_multimedia]	A device that is network connected that controls the display of media on a monitor. For example, a Crestron Media Controller.
Point of Sale Device [cmdb_ci_pos]	Payment Device [cmdb_ci_payment]	A device that is network connected which is used in the purchase of goods or services. For example, a credit card reader.

Related topics

CMDB schema model

Kong extension classes

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

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

See the full release notes for all CMDB CI Class Models.

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Kong

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

Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates. For the list of classes in the base system, including classes that this app might extend, see CMDB tables descriptions.

CMDB CI Class Models: Release 1.49.0 adds the following classes for Kong.

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

Class attributes

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

Kong Gateway [cmdb_ci_kong_gateway]

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

Kong Load Balancer [cmdb_ci_lb_appl]

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

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Kong Target [cmdb_ci_kong_target]

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

Key Relationship Structures

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

Kong relationships

Parent class	Relationship	Child class	Relationship type
API Backend [cmdb_ci_api_backend]	Uses::Used By	Kong Load Balancer	Suggested
Kong Load Balancer [cmdb_ci_lb_appl]	Contains::Contained By	Kong Target	Dependent
Kong Gateway [cmdb_ci_kong_gateway]	Provides::Provided By	Kong Load Balancer	Dependent

Related non-CMDB tables

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

Kong Workspace [kong_workspace]

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

Kong gateway example

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

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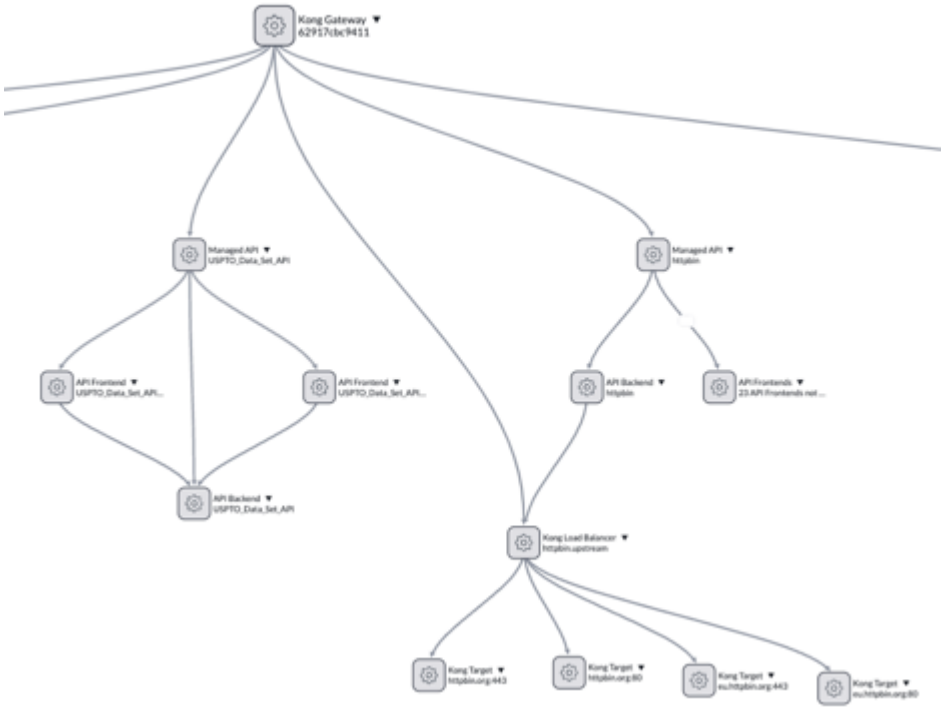

Kubernetes extension classes

The Discovery and Service Mapping app adds or updates classes for the Kubernetes pattern.

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

See the full release notes for all CMDB CI Class Models.

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Kubernetes pattern

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

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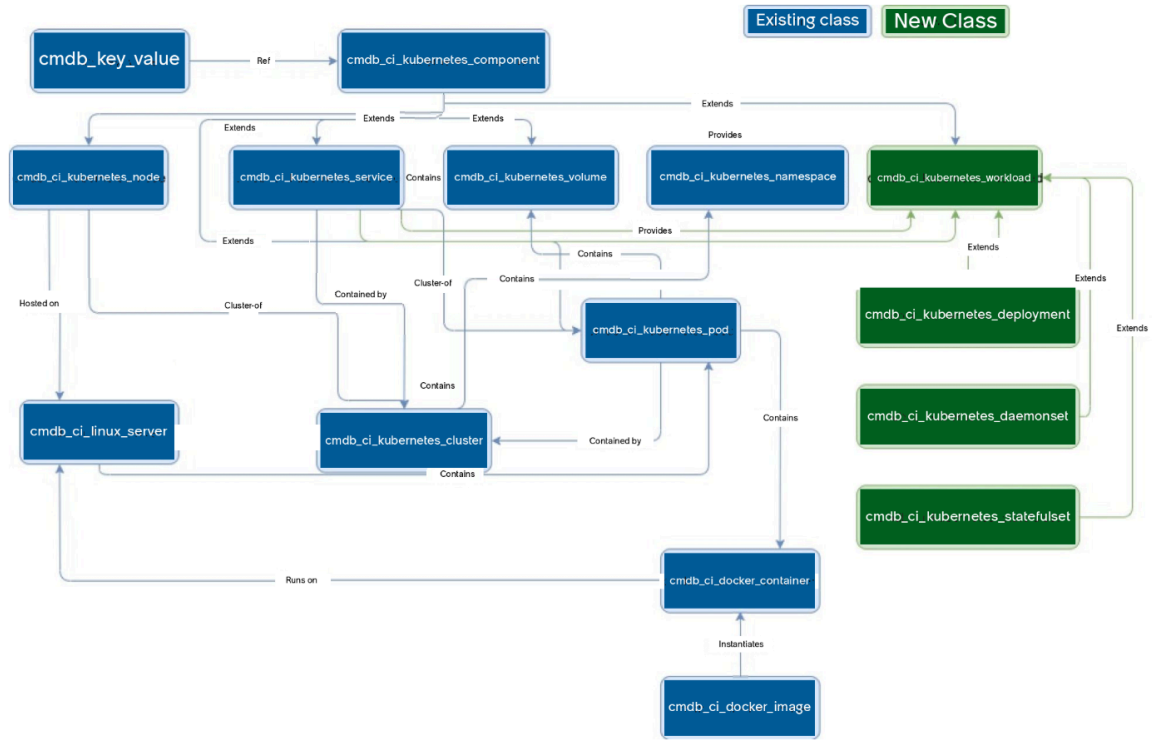
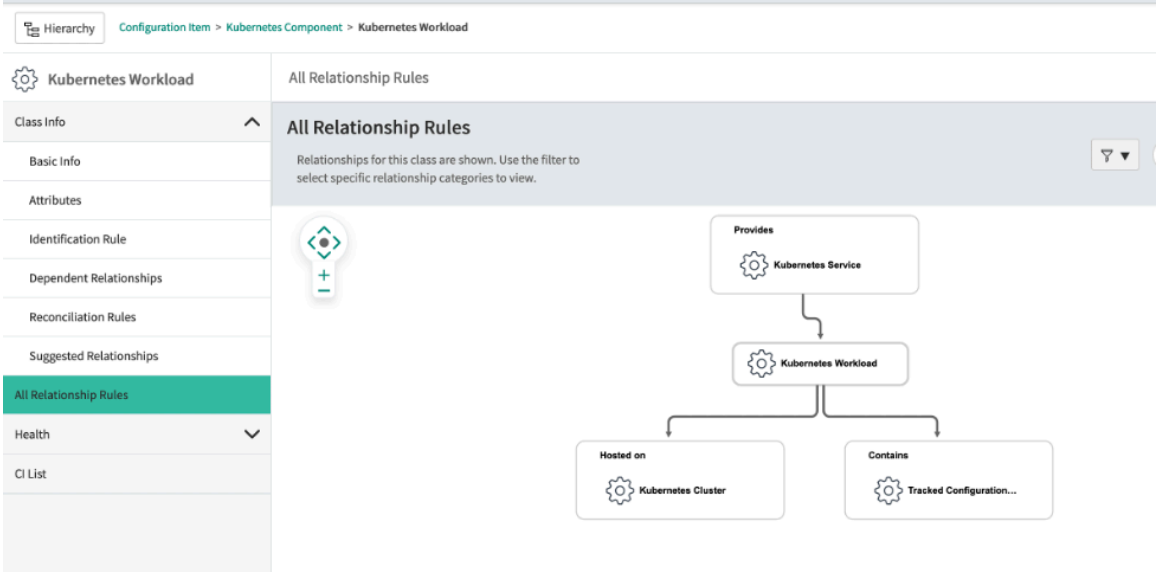
Kubernetes extension class integrated with the CMDB hierarchy



Kubernetes workload



Classes

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

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

Class	Extends	Fields	Relation
cmdb_ci_kubernetes_workload	cmdb_ci_kubernetes_components		Provides from cmdb_ci_kubernetes_service

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

Related topics

CMDB schema model

Network Intrusion Detection System (NIDS) CI extension class

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

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

See the full release notes for all CMDB CI Class Models.

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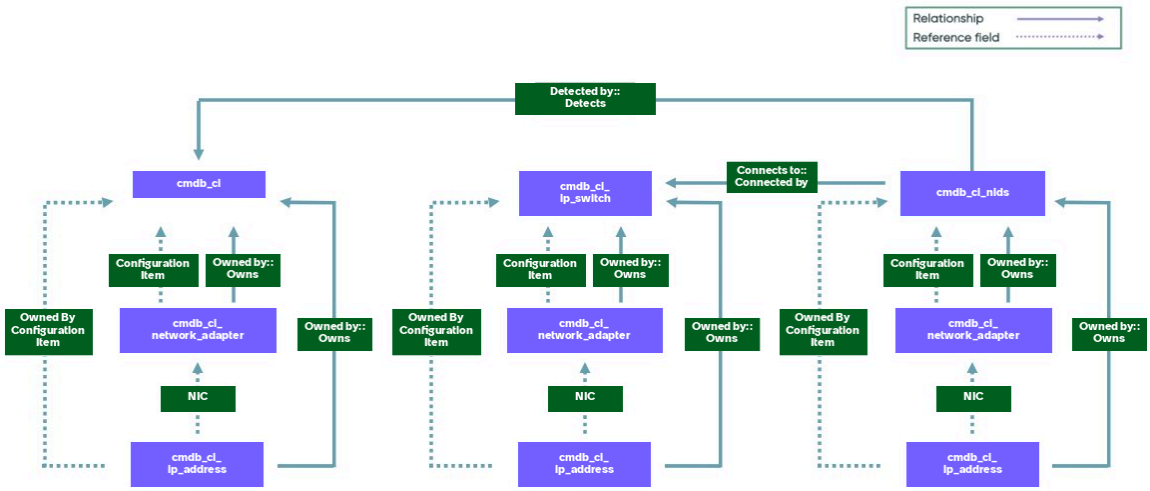
Network Intrusion Detection System (NIDS) schema structure



Classes

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

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

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

Class columns

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

Network Intrusion Detection System (NIDS) [cmdb_ci_nids] class

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

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

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

Roles and Access Control Logic (ACLs)

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

Key relationship structure

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

1. Assigns the following NIDS-related metadata values to the CI:
   a. Location
   b. Company
   c. Related users (Owned by, Managed by, Supported by, Assigned to)
   d. Related user groups (Approval group, Managed by Group, Support group, Change group)
2. If the NIDS network type is set to OT, it assigns the following NIDS-related metadata values to the CI:
   a. Creates an OT device (cmdb_ot_entity) record for the CI, using the cmdb_ot_entity reference on the CI.
   b. Assigns the NIDS assignment zone to the OT device record.
   c. If the Industrial Process Manager is installed, assign the NIDS assignment site to the OT device record.
3. *Life Cycle Stage* and *Life Cycle Stage Status* values for the CI are used to capture the learning mode of a sensor.
   - If *Life Cycle Stage* is **Operational** and *Life Cycle Stage Status* is **Learning Mode**, then validation is unsuccessful.
   - If *Life Cycle Stage Status* is **In Use**, validation is successful.

Network Inventory (NI) extension classes

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

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

- Class descriptions
- Identification rules

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- Identifier entries
- Dependent relationships, if applicable.

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

See the full release notes for all CMDB CI Class Models.

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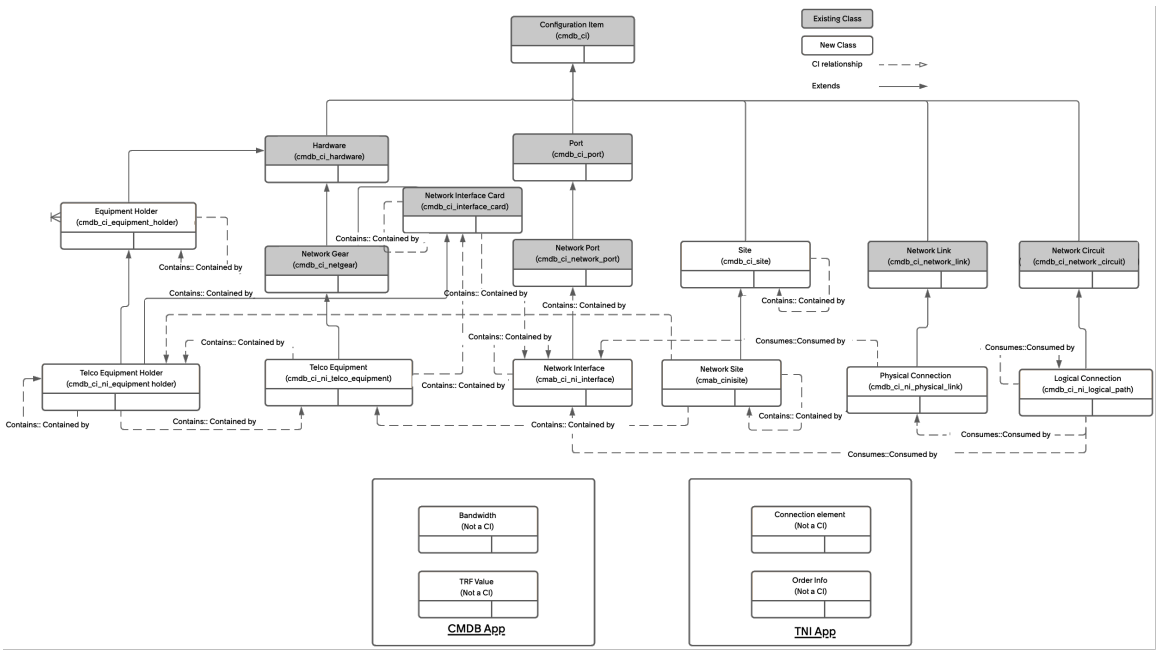
Telecommunications Network Inventory (NI) schema structure



Classes

This section lists the classes that the CMDB CI Class Models store app adds or updates. For the list of classes in the base system, including classes that this app might extend, see CMDB tables descriptions.

NI extension classes

Class	Extends	Description
Network Site [cmdb_ci_ni_site]	Site [cmdb_ci_site]	Network Site. Captures and maintains the location-specific attributes for each network site, including the network centers, buildings, floors,

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NI extension classes (continued)

Class	Extends	Description
		and rooms where equipment is located. The network site records enable you to view all the equipment at a location. You can filter the locations by the assigned type, role, or function categories.
Telco Equipment Holder [cmdb_ci_ni_equipment_holder]	Equipment Holder [cmdb_ci_equipment_holder]	Telco Equipment Holder. Represents the physical units that contain the telecommunications equipment, including the cages, bays, cabinets, slots, relay racks, and line ups. The line ups contain the individual relay racks. Each relay rack contains the equipment shelves. The equipment holders can contain the other equipment holders. The equipment holder records enable you to track and manage your network assets.
Telco Equipment [cmdb_ci_ni_telco_equipment]	Network gear [cmdb_ci_netgear]	Telco Equipment. Represents a shelf or device that provides the technical functionality in a network. Examples include the routers, modems, mobile devices, optical cables, relays, and switches. The equipment can have slots, cards, or ports. The equipment can exist within an equipment holder or by itself because not all equipment is rack mounted.

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NI extension classes (continued)

Class	Extends	Description
		The equipment records enable you to track and manage your network assets.
Telco Filler Component [cmdb_ci_filler_component]	Hardware [cmdb_ci_hardware]	Filler Component. Represents a cover for empty spots/slots in a rack or device. Often made of flat metallic or plastic materials, helps separate cold and hot air zones, helps prevent dust from entering the chassis, and ensures proper airflow through the chassis or rack.
Telco Heat Baffle [cmdb_ci_heat_baffle]	Filler Component [cmdb_ci_filler_component]	Heat Baffle. Represents hardware used to help direct rising hot air away from equipment.
Telco Service Switching Point (SSP) [cmdb_ci_service_switching_point]	Telco Equipment [cmdb_ci_ni_telco_equipment]	Service Switching Point (SSP). Switch in a telecommunications network that sends a query to a central database called a service control point (SCP) via the SS7 network to determine how a TDM call can be routed. SSPs can be part of a voice switch or a separate computer connected to it.
Telco Service Control Point (SCP) [cmdb_ci_service_control_point]	Telco Equipment [cmdb_ci_ni_telco_equipment]	Service Control Point (SCP). Represents service control points (SCPs) in the Signaling System 7 (SS7) network responsible for routing

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NI extension classes (continued)

Class	Extends	Description
		calls and managing special features.
Telco Control Component [cmdb_ci_telco_control_component]	Telco Equipment [cmdb_ci_ni_telco_equipment]	Control Component. Device in a computer hardware component that creates an interface between a computer's main system motherboard and other hardware components. Some will be integrated directly into the motherboard, while others may be added on as expansion devices.
Network Interface [cmdb_ci_ni_interface]	Network Port [cmdb_ci_ni_network_port]	Network Interface. Captures and maintain equipment-specific attributes for the network interfaces. Identification: Serial Number (100) Name (200) Dependent on • Hardware (contains::contained by) • Logical Composite (contains::contained by) • Network Port (contains::contained by) • Virtual Machine Object (contains::contained by) • Kubernetes Component

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NI extension classes (continued)

Class	Extends	Description
		(contains::contained by) • Application Service (contains::contained by) Attribute of Network Port: MTU Size [mtu_size] In networking, maximum transmission unit (MTU) is a measurement representing the largest data packet that a network-connected device will accept. Measured in integer bytes. Use cases: • Optimizing network performance: Setting the right MTU size can reduce overhead and maximize data throughput. • Avoiding fragmentation: A properly configured MTU helps prevent packet fragmentation, reducing processing load and transmission delays. • Tuning for network type: Different networks (for example, VPNs, WANs) may require specific MTU sizes to promote compatibility and optimal performance.
Network Interface Card (formerly Interface Card) [cmdb_ci_interface_card]	Hardware [cmdb_ci_hardware]	Network Interface Card. Represents interface cards that are stored in a network. Cards can

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NI extension classes (continued)

Class	Extends	Description
		occupy more than one slot and can contain other cards. They can be the equipment ports that are physical or logical (virtual). Each port is assigned a bandwidth value. The bandwidths are consumed when used in network designs.
Network Service Instance [cmdb_ci_network_service_instance]		Network Service Instance represents a specific deployed, provisioned, and configured instance of a set of network services that, in turn, are based on network functions.
Physical Connection [cmdb_ci_ni_physical_link]	Network Link [cmdb_ci_network_link]	Physical Connection. Represents the physical port connections on the network interface cards in your networks.
Logical Connection [cmdb_ci_ni_logical_path]	Network Circuit [cmdb_ci_network_circuit]	Logical Connection. Represents the logical or virtual port connections on the network interface cards. A logical connection typically represents the multiple physical connections on an interface card.

Nutanix extension classes

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

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

See the full release notes for all CMDB CI Class Models.

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Nutanix Enterprise Cloud platform

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

Classes

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

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

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

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

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

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Class	Extends	Description
Nutanix Host [cmdb_ci_nutanix_host]	Virtualization Server [cmdb_ci_virtualization_server]	Physical host on which all the virtual machines run.
Nutanix Virtual Machine Instance [cmdb_ci_nutanix_vm_instance]	Virtual Machine Instance [cmdb_ci_vm_instance]	A virtual machine that runs on Nutanix infrastructure.

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

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

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

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

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

Class columns

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

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

Nutanix Cluster [cmdb_ci_nutanix_cluster] class

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

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Nutanix Cluster [cmdb_ci_nutanix_cluster] class (continued)

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

Nutanix Controller VM [cmdb_ci_nutanix_controller_vm] class

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

Nutanix Storage Container [cmdb_ci_nutanix_storage_container] class

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

The following classes have no added columns:

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

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

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Nutanix Cluster [cmdb_ci_nutanix_cluster] class

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

Nutanix Controller VM [cmdb_ci_nutanix_controller_vm] class

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

Nutanix Storage Container [cmdb_ci_nutanix_storage_container] class

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

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Nutanix Storage Container [cmdb_ci_nutanix_storage_container] class (continued)

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

The following classes have no added columns:

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

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

Nutanix Cluster [cmdb_ci_nutanix_cluster] class

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

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Nutanix Cluster [cmdb_ci_nutanix_cluster] class (continued)

Added columns	Description
	For example: 5.10.3.1

Nutanix Controller VM [cmdb_ci_nutanix_controller_vm] class

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

Nutanix Storage Container [cmdb_ci_nutanix_storage_container] class

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

The following classes have no added columns:

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

Related topics

CMDB schema model

OpenStack extension classes

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

The CMDB CI Class Models app adds class models that extend the CMDB class hierarchy, including class descriptions, identification rules, identifier entries, and, if applicable, dependent relationships. You can use the added classes just like any other CMDB class. Applications such

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as Discovery and Service Mapping Patterns can use the class extensions to populate CIs and discover technologies and software.

See the full release notes for all CMDB CI Class Models.

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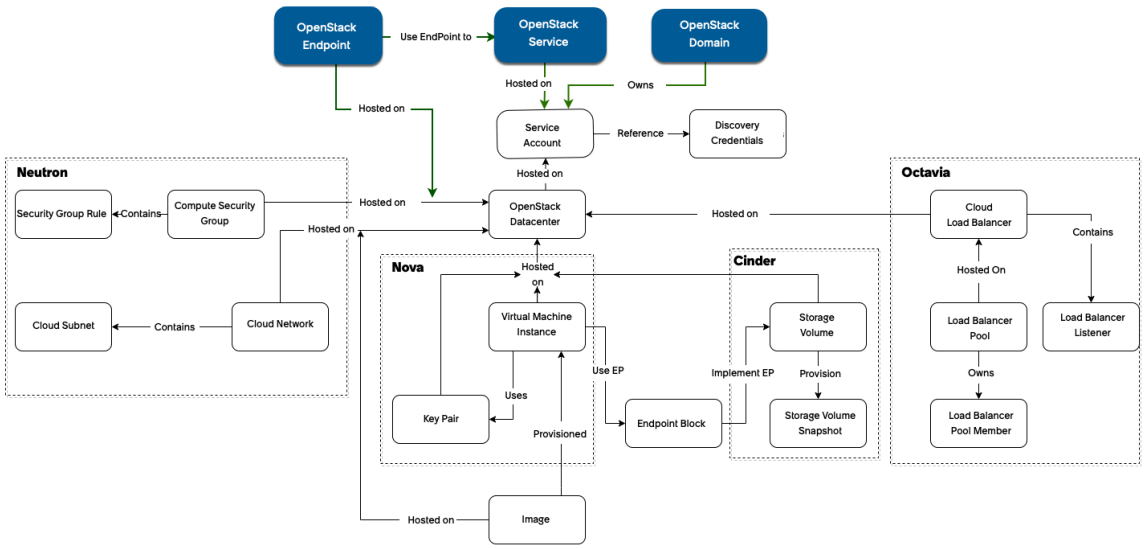
OpenStack

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

OpenStack classes integrated with the CMDB class hierarchy



Classes

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

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

Class	Extends	Description
OpenStack Services [cmdb_ci_cloud_openstack_service]	Virtual Machine Object [cmdb_ci_vm_object]	An OpenStack web service that can be accessed via a URL.
OpenStack Endpoint [cmdb_ci_cloud_openstack_endpoint]	Virtual Machine Object [cmdb_ci_vm_object]	The access point of a Service.

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Class	Extends	Description
OpenStack Domain [cmdb_ci_cloud_openstack_domain]	Virtual Machine Object [cmdb_ci_vm_object]	A collection of users, groups, and projects.

Class columns

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

OpenStack Services [cmdb_ci_cloud_openstack_service] class

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

OpenStack Endpoint [cmdb_ci_cloud_openstack_endpoint] class

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

OpenStack Domain [cmdb_ci_cloud_openstack_domain] class

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

Related topics

CMDB schema model

Operational Technology (OT) extension classes

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

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

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See the full release notes for all CMDB CI Class Models.

Operational Technology (OT) data model

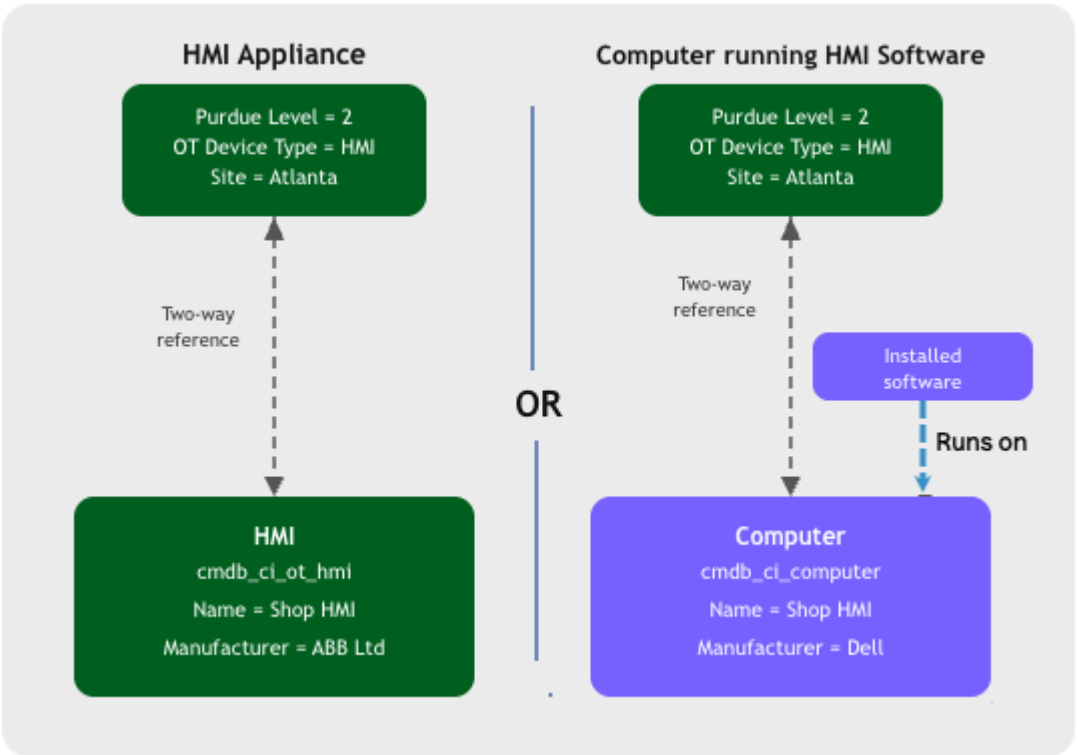
The Operational Technology (OT) data model was created to enable management of "OT Device" data. Operational Technology that controls industrial equipment can be based on IT class hardware (computers, servers, network gear, and so on), or on specific hardware profiles not included in the ServiceNow IT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

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

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

   In the following example, HMI might be software installed on an IT class CI or might be a proprietary appliance similar to a POS device.

   - An HMI CI with an OT Device detail record describing its "OT Device type" also as HMI.
   - A computer CI with an OT Device detail record describing its "OT Device type" as HMI.



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

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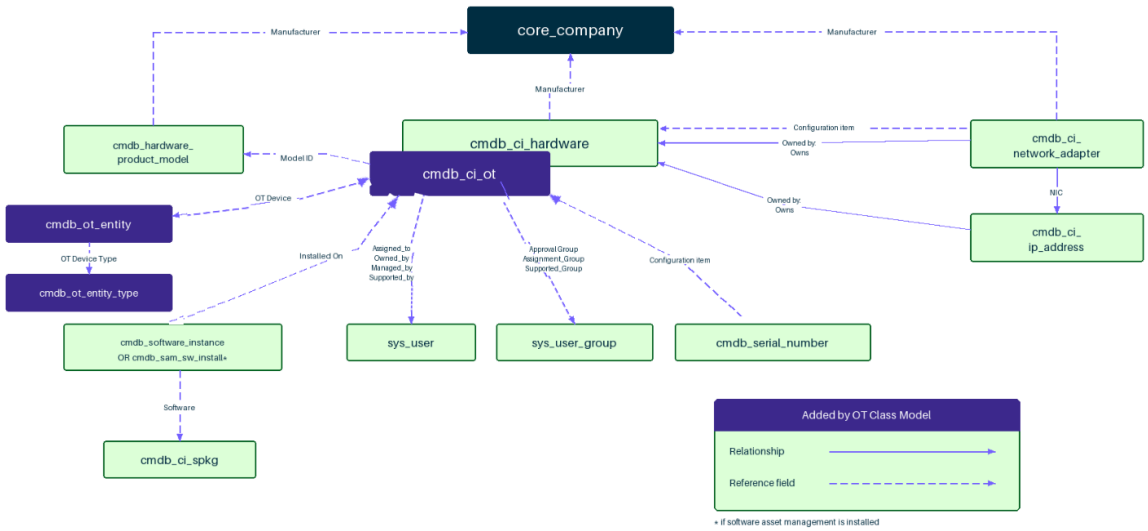
For more details on the OT data model, see Implementing the CSDM framework for Operational Technology.

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

- Service Graph Connector for Microsoft Excel
- IT Discovery for Operational Technology (OT) Networks

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

Operational Technology (OT) schema structure



Classes

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

CMDB CI Class Models: Release 1.69.0 adds the following classes for OT.

Class	Description
Firmware Installation [cmdb_firmware_install]	Firmware associated with the OT device.
Key Value [cmdb_key_value]	Additional information related to the OT device that's populated with the available OT integrations and captured as Key value pairs.
Software Instance [cmdb_sam_sw_install]	Captures the software installed on the OT device if Software Asset Management isn't available.

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Class	Description
	Note: If Software Asset Management is installed and entitled, the software installed data is available in the Software Installation related list.

CMDB CI Class Models: Release 1.59.0 adds the following classes for OT.

Class	Extends	Description
OT System Service [cmdb_ci_ot_system_service]	cmdb_ci_ot_system	Category of technology and systems that are used to manage, control, and monitor physical processes, machinery, and industrial operations.

CMDB CI Class Models: Release 1.56.0 adds the following classes for OT.

Class	Extends	Description
Quality Inspection Control System [cmdb_ci_ot_qics]	cmdb_ci_ot_control	Control systems that assist specifically in quality and inspection functions.

CMDB CI Class Models adds the following classes for OT.

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

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

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Class	Extends	Description
		data to the outside world using OPC.
OT Control Module [cmdb_ci_ot_control_module]	cmdb_ci_ot_control	Module such as a PLC or DCS connected to an OT Control System.
OT Control System [cmdb_ci_ot_control]	cmdb_ci_ot	Base Class for industrial control systems (ICS), usually at Purdue Model Level 1 or 2.
OT Supervisory System [cmdb_ci_ot_supervisory]	cmdb_ci_ot	Base class for supervisory systems, usually at Purdue Model Level 2 or 3.
PLC [cmdb_ci_ot_plc]	cmdb_ci_ot_control	Programmable Logic Controller. Used to control OT Devices.
Protocol Converter [cmdb_ci_protocol_converter]	cmdb_ci_hardware_network_ge	Device used to convert standard or proprietary protocol of one device to the protocol suitable for the other device or tools to achieve the interoperability.
RTU [cmdb_ci_ot_rtu]	cmdb_ci_ot_control	Remote Terminal Unit. Special purpose data acquisition and control unit supports DCS and SCADA remote stations
SCADA Client [cmdb_ci_ot_scada_client]	cmdb_ci_ot_supervisory	Supervisory Control and Data Acquisition. Client that enables an operator to manage a SCADA server.
SCADA Server [cmdb_ci_ot_scada_server]	cmdb_ci_ot_control	Supervisory Control and Data Acquisition. System capable of gathering and processing data and applying operational controls over long distance.

Class columns

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

Operational Technology (OT) [cmdb_ci_ot] class

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

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OT Control System [cmdb_ci_ot_control_system] class

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

OT Control Module [cmdb_ci_ot_control_module] class

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

OT Field Device [cmdb_ci_ot_field_device] class

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

OT System Service [cmdb_ci_ot_system_service] class

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

Form view

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

Class	Description
base hardware [cmdb_ci_hardware]	Base class for hardware.
base computer [cmdb_ci_computer]	An extension of the Hardware table, capturing computer properties.
base server [cmdb_ci_server]	Base class for all types of servers.
linux server [cmdb_ci_linux_server]	Server running Linux software.
windows server [cmdb_ci_win_server]	A server running Microsoft Windows Server operating system.
IoT Device base class [cmdb_ci_iot]	Parent table that contains Internet of Things device types.

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Class	Description
IP Firewall and extended classes [cmdb_ci_ip_firewall]	Contains all network firewalls.
IP Router [cmdb_ci_ip_router]	Specialization of the Network Gear [cmdb_ci_netgear] table.
IP Switch [cmdb_ci_ip_switch]	Specialization of the Network Gear [cmdb_ci_netgear] table.
Protocol Converter [cmdb_ci_protocol_converter]	Device used to convert standard or proprietary protocol of one device to the protocol suitable for the other device or tools to achieve the interoperability.

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

Roles and Access Control Logic (ACLs)

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

Admin (cmdb_ot_admin)

Can create, read, update, and delete OT records. Can edit the OT Device Type on the OT Device form and manage specific configurations on the OT entity tables. Cannot edit or delete IT CI records in related tables (for example, IP Address or Network Adapter).

Editor (cmdb_ot_editor)

- Can create, read, update, and delete OT Device records. Cannot edit or delete IT CI records in related tables (for example, IP Address or Network Adapter).
- When the OT Enhanced Access Control plugin is enabled, edit or delete access to OT devices for the cmdb_ot_editor role should be granted only if the user meets the Can Edit Equipment Model User Criteria for the site referenced by the device.
- Can create, update, or delete cmdb_rel_ci records only if they have access to either the record's parent reference CI or its child reference CI.

Viewer (cmdb_ot_viewer)

Can read OT Device records.

Note:
For the cmdb_ci_ot and cmdb_ot_entity tables:

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

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

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Key relationship structures

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

OT Entity

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

Attribute	Description
Business criticality	Business criticality assigned in the discovery source.
OT Device	Reference to the CI that is on the OT network.
OT Device type	The function of the OT Device, regardless of CI class. • For a dedicated HMI appliance, the CI is in the cmdb_ci_ot_hmi class, and the OT Device type should be HMI. • For a computer performing the function of an HMI, the CI is in the cmdb_ci_computer class and the OT Device type should be HMI
Purdue level	Purdue level of the OT Device.
Zone	Zone assigned to the OT Device, usually used in the context of a zone/conduit model.
IRE criterion attribute (ire_criterion)	Acts as a criterion attribute for an OT entity-related entry.

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

OT Entity Type

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

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

Attribute	Description
Label	Display name of a specific OT Device type.
Name	Value used to identify a specific OT Device type.
OT table	Value used for auto-populating the Type field for the OT entity record [cmdb_ot_entity] of an OT Class CI.

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Attribute	Description
Parent	Parent type of a specific type, which is a reference to a record in the same table [cmdb_ot_entity_type].

OT Class Mapping Template

The OT Class Mapping Template [ot_class_mapping_template] table extends the Application File [sys_metadata] and is used by OT Service Graph Connectors (SGCs) to classify a device into the correct CI class based on the source data.

Each SGC can extend the OT Class Mapping Template table and create a child class in the SGC application. Doing so defines the SGC-specific device classification details. For example, the Excel SGC Class Mapping [excel_sgc_class_mapping] table is a child of the OT Class Mapping Template created in the Service Graph Connector for Microsoft Excel application scope, which stores the classification details specific for the Service Graph Connector for Microsoft Excel.

Note:
The OT Class Mapping Template doesn't store any classification detail records. The child tables specific to each SGC store the classification records for an SGC to use.

With the template, you can also use the OT device naming strategy. An extension point is created in the Industrial Core plugin with the default device naming strategy, which is the device name and site name. For more information about the Industrial Core plugin, see Industrial Core plugin. To implement the device naming strategy, you must do the following.

- Identify the required naming strategies per device class and the available data for naming.
- Implement naming strategies by creating script includes that implement the extension point's function.

For more information about how to implement the device naming strategy, see the **Creating and using the OT device naming strategy** section in Industrial Core plugin.

The OT Class Mapping Template table attributes include:

Attribute	Description
Source Class	The class of the source CI.
Target CMDB class	The expected ServiceNow class that for the CI.
OT Device type	The category type that the OT Device is classified as. The Device type is also the function that the Device plays on the OT network. For example: An IT Device, such as a server, can be converted to an OT Device, and the function it plays on the network is an HMI. Therefore, its class is **server** and its Device type is **HMI**.

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Attribute	Description
	Note: In some cases, there are OT Devices with no OT function or OT Devices where the Device type is unknown. For OT Devices with no OT function, select **No OT Function**. For OT Devices where the Device type is unknown, select **Unknown**.
Allow OS classification	When set to **True**, if an operating system is found on the CI, the target is switched away from this table's target class to a ServiceNow class that matches its OS. For example, if Historian is the target class but Windows Server OS is found in the payload, the CI is classified as a Windows Server CI and its OT device type is set to Historian.
Active	When checked, the class mapping is set to **Active** and considered during device classification.
Allow Custom Device Naming	When this field is enabled, you can define how the unique device names are generated for the **Device Naming Strategy** field.
Device Naming Strategy	Helps define and choose the method that should be used to generate unique device names when the **Allow Custom Device Naming** field is enabled.

Serial number

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

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

Network adapter

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

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

IP Address

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

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

Network adapter and IP address

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

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

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

Backup Storage Information

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

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Attributes	Description
Backup Configuration Status	Indicates whether the CI has been configured in the backup service or appliance with relevant policies.
Discovery Source	Discovery source of the backup record.
Backup Service	Reference to the Common Service Data Model Technical Service hosting external and internal backup system, services, or appliances
Managed By	Email ID of the user responsible for managing the backup.
Latest Successful Execution	Date and time of the most recent data backup that was successfully executed for a device.
Latest Execution Attempt	Date and time of the most recent data backup that was attempted for a device.
Next Execution Attempt	Date and time when the next data backup is going to be attempted for a device.
Latest Execution Log	Detailed log entries for all device data backup that were executed.
Backup Source ID	Backup service record for a device, which identifies the device in external or internal backup services. Backup source id can include host_id, vcenter_id, instance_id, db_id.
Job Definition ID	Identification number assigned to a data backup job.
Recovery Point Objective	Amount of time that can elapse between backups and the amount of data lost.
Execution Mode	Indicates whether the backup is configured to run automatically on a periodic basis, or if it is manually executed on an as-needed basis.
Backup Source	Details of the backed up CI. This table holds the backup status details for the referenced CI.
Job Definition Name	Name assigned to a data backup job.
Managed By Group	Primary support group responsible for managing the backup.
Domain	ID of the domain to which the instance belongs.

Use the Backup Job Execution History [cmdb_backup_job_execution_history] class to create a history of records for all backup executions. The Backup Job Execution History table includes the following attributes:

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Attributes	Description
Backup Job Information	Details of the backup job you created.
Backup End Time	The time when the backup job ended.
Completion Status	The current completion status of the backup job.
Mark for Archival	Select to archive backup job execution history after 90 days.

For more information, see Operational Technology Backup Management data model.

Key reference structures

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

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

Identification rules

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

1. Identifier entry that uses the identification specified in Serial Number [cmdb_serial_number] as the lookup table. The Serial Number table is a many-to-one reference from the serial number back to the server CI.

   Optional conditions to filter the records during identification and reconciliation.

   Note:
   For lookup identification rules, you must complete the mandatory conditions under **Advanced Configuration**.

2. Identifier entry that is specified in the Serial Number attribute in the CI.
3. Identifier entry that is specified in the Mac Address attribute in the Network Adapter table.

   Optional conditions to filter the records during identification and reconciliation.

4. Identifier entry for the Name attribute.

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- If Serial Number and MAC Address are not available, then the Name (which is usually the system reported hostname) attribute is used.
- If both Serial Number and Name are not available, and only MAC Address is available, use MAC Address as the name of the CI. Using the MAC Address as the name of the CI ensures that you don't create an empty CI.

5. Identifier entry that uses a product instance identifier (PID) on the CI.

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

Reclassifying IT devices on your OT network

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

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Under **Hardware** in the **CI Classes** menu, select the **Operational Technology (OT)** class.
3. Under the **Class Info** menu, select **Identification Rule**.
4. Under **Identifier Entries**, select **Add**.
5. In the New Identifier Entry pop-up dialog box, choose **Use attributes from another table (Lookup table)** and select **Next**.
6. In the Create Identifier Entry dialog box, complete the following steps:
   a. Select **Hardware table** from **Search On Table** drop-down list.
   b. Enter **400** in the **Priority** field.
   c. Select **Network Adapter** from the **LookUP Table** from drop-down list.
   d. Select **Mac Address** from the **Criterion Attributes** drop-down list.
   e. Select **Save**.

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

Related entries

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

- Backup Storage Information [cmdb_backup_storage_information]
- External system metadata [cmdb_key_value_v2]
- OT Device [cmdb_ot_entity]
- Firmware Installation [cmdb_firmware_install]
- Key Value [cmdb_key_value]
- Software Instance [cmdb_software_instance]

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

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- Backup Storage Information [cmdb_backup_storage_information]
- OT Device [cmdb_ot_entity]
- Firmware Installation [cmdb_firmware_install]
- Key Value [cmdb_key_value]
- Software Instance [cmdb_software_instance]

OT Device Network Connection data model

The OT Device Network Connection data model leverages the OT Device Network Connection [sn_ot_device_network_connection] table to identify source CIs and destination CIs. Identifying this data allows you to identify the device-to-device connections in your OT environment.

Note:
The OT Device Network Connection table is available with the Industrial Core plugin. For more information about the Industrial Core plugin, see Industrial Core plugin.

The OT Device Network Connection [sn_ot_device_network_connection] table references the CI relationships [cmdb_rel_ci] table with the Connects to :: Connected by relationship type. The device-to-device connections in CI relationships and the metadata of how the source and destination communicate are stored.

Note:
This data is populated with the available OT integrations and cannot be manually created.

The OT Device Network Connection table is populated using data from the following CMDB tables.

Note:
The OT Device Network Connection data model also includes a performance script that helps map IP addresses to managed networks and subnets, and creates records in each table.

Allocated IP Address [cmdb_ci_allocated_ip_address]

The following attributes in the Allocated IP Address [cmdb_ci_allocated_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Managed Network	managed_network
Is Broadcast	is_broadcast
Is Conflict	is_conflict
Is DHCP	is_dhcp
Is DNS	is_dns
Is Managed	is_managed
Is Reserved	is_reserved
Name	name

IP Network Subnet [cmdb_ci_ip_network_subnet]

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The following attributes in the IP Network Subnet [cmdb_ci_ip_network_subnet] table are populated by collected data:

Attribute label	Attribute name
Name	name
Parent Pool	parent_pool
CIDR	cidr
Managed Network	managed_network

Managed Network [cmdb_ci_managed_network]

The following attributes in the Managed Network [cmdb_ci_managed_network] table are populated by collected data:

Attribute label	Attribute name
Name	name
Contained by CI	contained_by_ci

The OT Device Network Connection table also uses the following Identification Reconciliation Engine (IRE) rule. The IRE rule on the OT Device Network Connection table can help Service Graph Connectors align with a standardized way to create connection records.

- Identifier name: OT Device Network Connection
- Applies to: sn_ot_device_network_connection
- Independent: true
- Identifier entries:
  - Source IP Address
  - Destination IP Address
  - Destination Port
  - Source Managed Network
  - Destination Managed Network

Checking the MID Server status

The OT Service Graph Connectors require a connection to a MID Server to communicate with the external applications. The SGOTTroubleShootHelper [sn_cmdb_ci_class.SGOTTroubleShootHelper] script validates the MID Server status and verifies the following cases.

- The MID Server is up and running.
- The MID Server is validated.
- The MID Server user is assigned the mid_server role.
- The MID Server has a value in the ip_address attribute.

The SGOTTroubleShootHelper script includes the validateMIDSelection function, which contains the MID Server checks for the OT Service Graph Connectors. The following table describes the

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use cases for the validateMIDSelection function and the return messages you may see based on the outcome.

Possible MID Server validation messages

Use Case	Message
The Connection and Credential Alias sys_ids are missing, so the validation can't proceed.	Provide Connection and Credential Alias sys_id.
A Connection and Credential Alias aren't found for the sys_id.	No Connection and Credential Alias Found for the sys_id.
The connection isn't configured to use a MID Server, so validation is skipped.	Invalid MID selection choice for the Connection associated with the specified Connection and Credential Alias named {Connection name}
There's an invalid MID Server selection choice for the connection.	Invalid MID selection choice for the HTTP connection associated with the specified Connection and Credential Alias named {Connection name}
The MID Server validation fails due to an error.	Error occurred during MID Server selection validation: {Error}
The query for getting the associated username and its associated user account sys_id based on the MID Server sys_id.	
The MID Server sys_id is missing from the input, so validation cannot proceed.	Provide MID Server sys_id.
If the username isn't populated in the mid.instance.username parameter.	MID Server username is empty in mid.instance.username configuration parameter.
The MID Server username configuration parameter is missing for the specified MID Server.	No mid.instance.username configuration parameter found for the MID Server with sys_id: {midServerId}
The query used to get the mid_server user sys_id based on the username.	
A user record isn't found for your given username.	No user found for username: {username}
The MID Server username is found successfully.	User found for username: {username}
Your sys_id or username can't be retrieved due to an error.	Exception occurred while fetching MID Server username or user sys_id: {error}
A query runs to check that you're assigned the mid_server role.	

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Possible MID Server validation messages (continued)

Use Case	Message
Your sys_id is missing, so role validation can't proceed.	The MID Server role validation failed as user is not found.
You aren't assigned the mid_server role.	The MID Server User does not have 'mid_server' role.
The MID Server user is assigned the mid_server role.	The MID Server User has 'mid_server' role.
The MID Server user role can't be checked because of an error.	Error occurred while checking MID Server user role: {error}
The IP address, Running status, and Validation status are under validation.	
The MID Server sys_id is missing from the input, so validation can't proceed.	Provide MID Server sys_id.
The MID Server record is missing from the ServiceNow system.	No MID Server record found for sys_id: {midServerId}
The MID Server's IP address isn't set, so it can't be used for connections.	IP Address field is not populated for the MID Server.
The MID Server isn't running.	MID Server status is not 'Up'.
The MID Server isn't validated.	MID Server is not validated.
The MID Server is active and validated.	MID Server is active and validated.
The MID Server failed due to an error.	Error occurred while validating MID Server status and IP address: {error}
You select a specific MID Server.	
The Connection and Credential Alias details aren't found as part of the input parameter.	No Connection and Credential Alias found for the sys_id.
A MID Server isn't selected for the Connection.	No MID Server selected for the Connection: {connectionName}
A MID Server agent record isn't found for the selected MID Server in the HTTP Connection.	No MID Server agent record found for sys_id: {midServerId}
All MID Server validation checks are successful.	MID Server with name {midServerName} is validated and running.
The MID Server validation failed for the selected MID Server. The final message only includes the failed validation checks, separated by a new line.	Validation checks failed for following MID Servers with reasons 1.Old Crucible MID Server (153.113):

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Possible MID Server validation messages (continued)

Use Case	Message
	No mid.instance.username configuration parameter found for the MID Server with sys_id: fc4a4cfe3b6f22909b96dfd0c5e45a6c Unable to retrieve the MID Server user sys_id because the specified MID Server username is not found MID Server Role validation failed User sys_id is null IP Address field is not populated for the MID Server MID Server status is not 'Up'
The MID Server validation failed due to an error.	Error occurred during specific MID Server validation: {error}
The **Auto Select MID Server** field is selected.	
The Connection and Credential Alias details aren't found as part of the input parameter.	No Connection and Credential Alias found for the sys_id.
A validated and running MID Server isn't found for the Connection. This excludes the role and ip_address validation checks.	No validated and running MID Server found for Connection: {connectionName}
The MID Server is running, validated, and passes all validation checks.	Following MID Servers are in a running and validated state: with running and validated state: 1. {midServerName} MID Server is active and validated.
The MID Server validation failed for the selected MID Server. The final message only includes the failed validation checks, separated by a new line.	Validation checks failed for following MID Servers with reasons 1.Old Crucible MID Server (153.113): No mid.instance.username configuration parameter found for the MID Server with sys_id: fc4a4cfe3b6f22909b96dfd0c5e45a6c Unable to retrieve the MID Server user sys_id because the specified MID Server username is not found MID Server role validation failed, user sys_id is null

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Possible MID Server validation messages (continued)

Use Case	Message
	IP Address field is not populated for the MID Server MID Server status is not 'Up'
The MID Server validation failed due to an error.	Error occurred during auto-select MID Server validation: {error}
You select a specific MID Server cluster.	
The Connection and Credential Alias details aren't found as part of the input parameter.	No Connection and Credential Alias found for the sys_id.
A MID Server cluster isn't associated with the Connection.	No MID Cluster associated with the Connection: {connectionName}
A MID Server isn't associated with the MID Server cluster.	No MID Server is associated with the MID cluster referenced to the Connection: {connectionName}
The MID Server is running, validated, and passes all validation checks.	Following MID Servers associated with MID Cluster are in running and validated state: 1. {midServerName} MID Server is active and validated.
The MID Server validation failed for the selected MID Server. The final message only includes the failed validation checks, separated by commas.	Validation checks failed for following MID Servers with reasons 1.Old Crucible MID Server (153.113): No mid.instance.username configuration parameter found for the MID Server with sys_id: fc4a4cfe3b6f22909b96dfd0c5e45a6c Unable to retrieve the MID Server user sys_id because the specified MID Server username is not found MID Server role validation failed User sys_id is null IP Address field is not populated for the MID Server MID Server status is not 'Up'
The MID Server validation failed due to an error.	Error occurred during MID Server cluster validation:

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Possible MID Server validation messages (continued)

Use Case	Message
	{error}

Deprecated classes

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

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

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

1. Navigate to **System Definition** > **Script Includes**
2. Find the record named **OTDevicesMigrationUtils**.
3. Navigate to **Definition** > **Script Includes** > **.**
4. In the background window, copy and paste the provided script.
5. Select the appropriate scope and run the script.

Working through issues

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

Request apps on the Store

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

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

Related topics

CMDB schema model

Red Hat Virtualization (RHV) extension classes

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

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

Starting with version 1.28.0, Discovery and Service Mapping Patterns supports both OLVM and RHV discovery. For more information, see Oracle Linux Virtualization Manager and Red Hat Virtualization discovery. Note that the RHV patterns, tables, and related items have been renamed to oVirt. For the full list of name changes, see the Zurich release ITOM Visibility release notes.

See the full release notes for all CMDB CI Class Models.

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Red Hat Virtualization (RHV)

Red Hat Virtualization (RHV) is a virtualization product that is based on the Kernel-based Virtual Machine (KVM) hypervisor. RHV uses the SPICE protocol and Virtual Desktop Server Manager (VDSM) with a RHEL-based centralized management server. The RHV solution is based on two primary software components: Red Hat Virtualization Manager (RHV-M) and Red Hat Virtualization Hypervisors or hosts: Red Hat Enterprise Linux or RHV Host (RHV-H).

Note:
The Discovery application uses patterns to find RHV components. Discovering some of these resources may require updating to the latest version of the Discovery and Service Mapping Patterns application from the ServiceNow Store. For more information, see Oracle Linux Virtualization Manager and Red Hat Virtualization discovery

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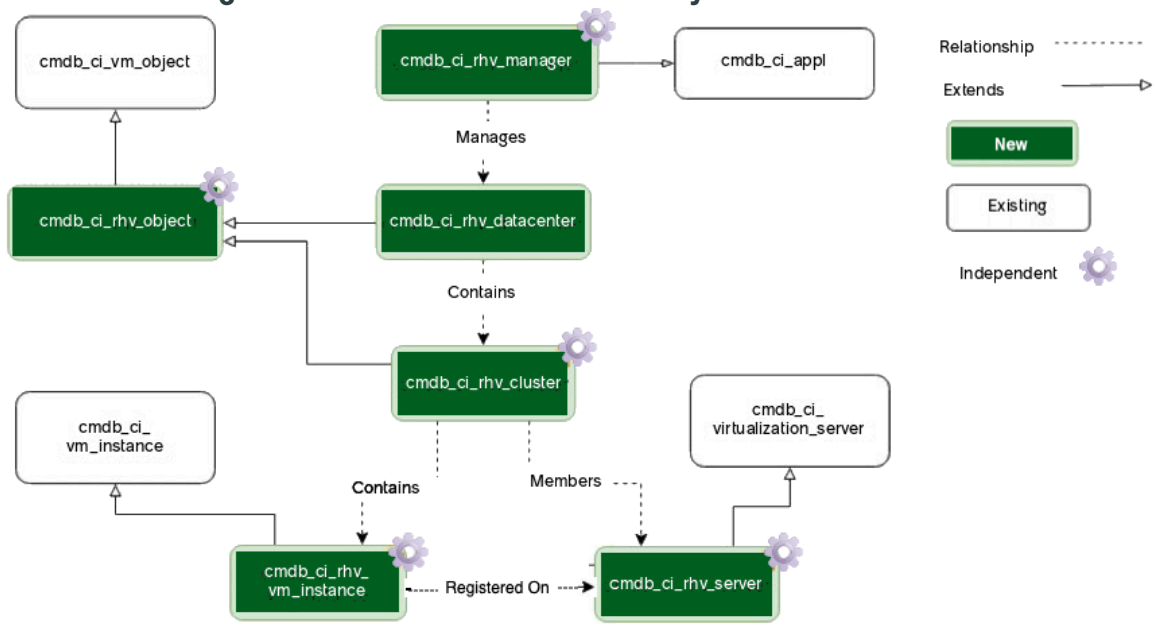
RHV classes integrated with the CMDB class hierarchy



Classes

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

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

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

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

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

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

Class columns

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

RHV Server [cmdb_ci_rhv_server] class

Added columns	Description
url	URL used to access the object.

RHV Object [cmdb_ci_rhv_object] class

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

RHV Manager [cmdb_ci_rhv_manager] class

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

RHV Cluster [cmdb_ci_rhv_cluster] class

Added columns	Description
cpu_type	CPU type.
cpu_architecture	CPU architecture.

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RHV Cluster [cmdb_ci_rhv_cluster] class (continued)

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

RHV Virtual Machine Instance [cmdb_ci_rhv_vm_instance] class

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

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

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RHV Datacenter [cmdb_ci_rhv_datacenter] class

Added columns	Description
quota_mode	Quota mode policy.

Related topics

Oracle Linux Virtualization Manager and Red Hat Virtualization discovery

CMDB schema model

Transport Layer Security (TLS) extension classes

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

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

See the full release notes for all CMDB CI Class Models.

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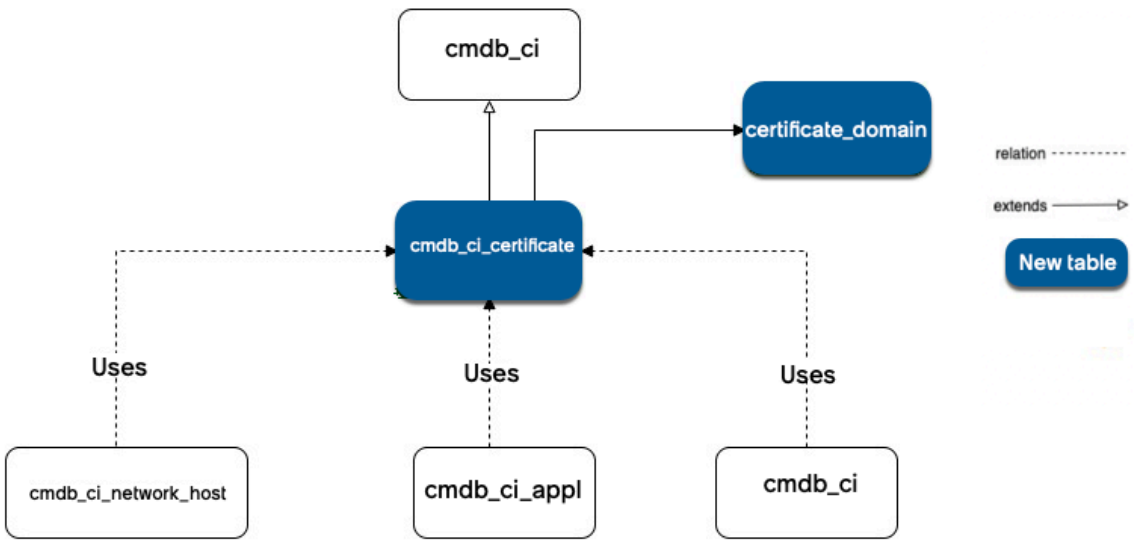
Transport Layer Security (TLS)

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

TLS certificate classes integrated with the CMDB class hierarchy



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Scoped apps certification class

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

Classes

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

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

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

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

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

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

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

Class columns

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

Unique Certificate [cmdb_ci_certificate] class

Added columns	Description
Certificate file	Certificate in an encoded form.
Fingerprint	Hash value of the certificate.
Fingerprint algorithm	Algorithm used to hash the certificate.

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Unique Certificate [cmdb_ci_certificate] class (continued)

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

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Unique Certificate [cmdb_ci_certificate] class (continued)

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

Certificate Domain [certificate_domain] class

Added columns	Description
Domain	Fully qualified domain name.

CMDB CI Class Models: Release 1.3.0 adds no columns.

Related topics

CMDB schema model

VMware NSX load balancer extension classes

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

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

See the full release notes for all CMDB CI Class Models.

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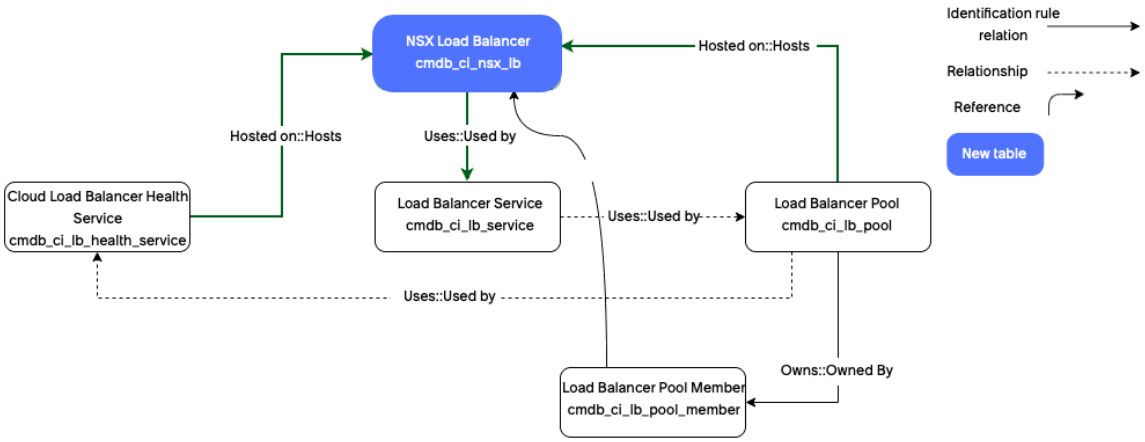
VMware NSX load balancer

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

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

VMware NSX load balancer classes integrated with the CMDB class hierarchy



Classes

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

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

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

Class columns

The VMware NSX Advanced load balancer discovery pattern introduces one new table with one identification rule and entry. The table uses only the columns inherited from its parent.

Related topics

CMDB schema model

Baseline CMDB

Baseline CMDB provides capabilities that help you understand and control the changes that have been made to your configuration items (CIs) in the CMDB.

- You can create a baseline, which is a snapshot of your configuration items in the CMDB. You can review the changes that have been made to that configuration item since a previous baseline. Multiple baselines may be created and the system tracks the changes that have been made per baseline.

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Creating a baseline captures the attributes of the CI as well as all first-level relationships for the CI. Any changes to the base CI or to any related CIs are captured and displayed. Newly created CIs are not automatically added to a baseline.

- Associate a configuration item with a task, a change or change task, and to propose changes to the CI after the change is complete. You can record changes, and these changes are not applied to the CI immediately but are delayed until the change is complete.

  When the change is complete, you can choose to apply the proposed changes which makes all changes previously proposed and associates the changes with the task.

  For information about planning and implementing a baseline CMDB, see the CMDB Baseline life-cycle best practices and Diff Formatter troubleshooting [KB0829681] knowledge base article.

Create a CMDB baseline

You can create a baseline for a CI to track updates to the CI over time.

Before you begin

Role required: ecmdb_admin and itil

Procedure

1. Navigate to **All** > **Configuration** > **Baselines** > **Baselines**.
2. Click **New**.
3. Enter a **Name** for the baseline.
   By default, the cmdb_ci table is selected so that the record creates the baseline for all configuration items in the system.
4. **Optional:** To limit the baseline to specific CIs, select a different **Table** or choose **Conditions** that a CI must meet for it to have a baseline entry.

   Example
   For example, you might create a baseline for the Database table with the condition **[Location] [is] [<configured location>].**
5. Click **Submit**.
   The creation of a baseline is time consuming and occurs in the background. A message at the top of the record list notifies you that your baseline has been scheduled and you will receive an email when the process is complete.

Display baseline differences

You can see the changes that have been made to a CI or any first level related CIs by configuring the CI form layout to display the CMDB Baseline diff field. This field is labeled Baseline differences on the form.

Before you begin

Role required: itil

About this task

Changes are displayed only for the cmdb_ci table and child tables. You can change the *com.cmdb.baseline.max_changes* system property to limit the number of relationships and changes that appear in a baseline diff section on a CI form (set to 100 by default).

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Procedure

1. Open a CI record.
2. Select the baseline you want to see for this CI from the choice list.
   The field displays the details of any changes that were made to the current record for the selected baseline, or indicates that no changes were made.
3. To add a relationship to the CI, click the green plus icon in the **Related Items** toolbar.
   The new relationship appears below the toolbar. For more information about the Related Items toolbar and how to control the display, see CI relations formatter.
4. Update a related CI and see the changes displayed as **Basic attribute changes** in the current CI record.

What to do next

To improve performance and prevent memory issues when showing large amounts of baseline differences data on CI forms, complete the following steps:

1. Set the system property *com.cmdb.baseline.entry.attachment* to true.
2. Manually run once the *CMDB Baseline convert XML to attachment* fix script. For information about running a fix script, see Run fix scripts.

Properties for baseline CMDB

Use the baseline CMDB properties to configure how many changes and relationships for a CI can appear in the baseline diff for the CI.

These properties are available for baseline CMDB. To view and edit these properties, the admin role is required.

Properties for Baseline CMDB

Property	Description
Maximum number of changes and relationships for a CI that can appear in the baseline diff for the CI. com.cmdb.baseline.max_changes	• Type: integer • Default value: 100 • Location: **Configuration** > **CMDB Properties** > **Baseline Properties**
com.cmdb.baseline.entry.attachment	Lets you manually run the *CMDB Baseline convert XML to attachment* fix script. Setting this property to true and then running the *CMDB Baseline convert XML to attachment* fix script, enables improved performance when showing large amounts of baseline differences data on CI forms. When false, the CMDB Baseline Diff component uses legacy methods which might fail to load large amounts of baseline differences data. • Type: true | false • Default value: false

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Properties for Baseline CMDB (continued)

Property	Description
	• Location: Add to System Properties [sys_properties] table. • Learn more: Baseline CMDB

Service Graph Workspace store app

The Service Graph Workspace is an efficient, central, and modernized way for you to work. Use Service Graph Workspace to search and explore the CMDB, examine health and recent activities, and access insightful dashboards and tools to support tasks in your organization.

Get started

Explore	Configure	Reference
Learn about the different views in Service Graph Workspace and how to use each to perform your assigned tasks.	Setup and configure Service Graph Workspace.	Additional information about components such as properties, and class-specific criteria for the Cloud vs Non-cloud resources chart.

Exploring Service Graph Workspace

Learn more about Service Graph Workspace, its different views and insight dashboards, when using key CMDB features such as CMDB Health, CMDB Data Manager, and CMDB 360.

Service Graph Workspace overview

The Service Graph Workspace is an efficient, central, and modernized way for you to work with the underlying graph database that includes CIs, services, and related data such as company and location data. Use Service Graph Workspace to search and explore the CMDB, examine health and recent activity, and access various insight dashboards and tools to support tasks in your organization.

Guided Tour

Administrators assigned to the guided tour admin role (guided_tour_admin) can use the Guided Tour Designer to create step-by-step walkthroughs that can guide users through the Service Graph Workspace. For more information, see Guided Tours.

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General interaction and additional information

- Service Graph Workspace leverages many Performance Analytics capabilities and features, such as indicator sources. Throughout the Service Graph Workspace views, you can select the various cards to drill down to Performance Analytics KPI Details panes that show trends for the associated data. On a KPI Details pane, you can modify different settings to change the scope of the data. You can also select **Show Records** to list the records associated with the chart.
- Lists throughout the Service Graph Workspace have a filter icon that you can select to show the filter definition used for the list.
- You can open your Configurable Workspace experience in UI Builder to access and edit your Service Graph Workspace experience.
- See List of workspaces for a list of all Workspaces that ServiceNow® provides.
- Service Graph Workspace doesn't support domain separation.

Personas

The Service Graph Workspace is intended to support the following personas in performing their tasks:

Persona	Description	Role
CMDB administrator	Manages the configuration of CMDB, data ingestion, governance, and reporting, to ensure that the CMDB supports the needs of their organization.	sn_cmdb_admin
Data owner	Owns and manages data in CMDB. This persona is primarily focused on managing data that they own. However, this persona may also be associated with data owned by a group that the data owner user belongs to such as a Change and Managed by groups.	sn_cmdb_editor
Analyst	Investigates and analyzes data in support of their organization. Visits the workspace to search and browse CMDB data and to access insight reports.	sn_cmdb_user

CI details

When you drill down to CI details, how those details appear depends on system settings:

CI Form

By default, the system property *sn_cmdb_ws.explore_ci.record.enabled* is set to **true**, enabling the experience of the CI Form feature for viewing CI details. Using CI Form, you're navigated to a centralized location with a comprehensive set of CI details organized by sections. Use the forms provided by CI Form to examine and edit CI attributes, relationships, tags, services and offerings, CMDB Health and CMDB 360 data associated with the CI, related lists, and activities. When updating CIs in CI Form, IRE rules are applied to avoid potential issues such as duplicate CIs.

For more information, see:

- Components installed with Service Graph Workspace: *sn_cmdb_ws.explore_ci.record.enabled* system property.
- Manage CI details using CI Form in Service Graph Workspace.

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CI details pane

If *sn_cmdb_ws.explore_ci.record.enabled* is set to **false**, then the CI details pane is used for viewing CI details. When you drill down to a CI record in Service Graph Workspace views and pages, the following details for the CI appear:

- CI Timeline - Last 14 days: A timeline of CI activities such as change requests.

  Note:
  A CI timeline in Service Graph Workspace fails to load when the number of any of the following activities exceeds its threshold:
  - History: 200
  - Incidents: 100
  - Requests: 50
  - Total Events: 200

  Select the **Open CI Timeline** link in the error message to open the CI timeline in the base system, which shows activities for the CI, up to the specified threshold numbers.

- CI Health: A summary of the health of the CI, showing related items such as critical incidents, incomplete attributes, and stale relationships for the CI.

  Role required: itil (for accessing incidents)

- Details: CI attributes, grouped into categories such as Key attributes, Asset attributes, Discovery attributes, Operational attributes, and More attributes.

  Note:
  Use the *CMDB - Workspace* form view for a CI class to configure which attributes appear.

- Activity: An activity stream to track what's changed in the CI record.
- Infrastructure Relationships: List of the infrastructure CIs related to the CI.
- Service Relationships: List of business applications, service offerings, and application services that the CI may be related to.

On the CI details pane, you can:

- Select **Open Dependency View** to open the Dependency Views map and display a graphic infrastructure view of the specific CI record.
- Select **View CMDB 360 Data** to show CMDB 360 details at the CI attribute level for the specific CI record.
- Select **Save** to save any changes made to attributes for the CI record.
- Select the More Actions icon (...) for additional functions:
  - Select **Create Change** to create a new change request for the CI record.
  - Select **Create Incident** to create a new incident for the CI record.
  - Select **Delete** to delete the CI record.

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UI activity	Additional requirements
CI Details Accessible to: CMDB Admin, CMDB Editor, CMDB User	
CI Health Accessible to: • Incidents card: sn_incident_read to view • Change requests card: sn_change_read to view • For remaining cards: At least sn_cmdb_user	itil
Related Open Changes Accessible to: CMDB Admin, CMDB Editor, CMDB User	sn_change_read role
Related Incidents Accessible to: CMDB Admin, CMDB Editor, CMDB User	sn_incident_read role
Related Alerts Accessible to: CMDB Admin, CMDB Editor, CMDB User	Event Management (com.glideapp.itom.snac) plugin evt_mgmt_user role Set up Event Management
Related Application Services Accessible to: CMDB Admin, CMDB Editor, CMDB User	app_service_user role
View CMDB 360 Data Accessible to: CMDB Admin, CMDB Editor, CMDB User	Enable and configure CMDB 360
Save Accessible to: CMDB Admin	
More Actions/Delete	

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UI activity	Additional requirements
Accessible to: CMDB Admin	

Shared pages

For information about the shared pages, see the Dev site as follows:

- CI Service Relationships
- CI Infrastructure Relationships

What to explore next

To learn more about configuring and using Service Graph Workspace, see:

- Views:
  - Data Owner Home view in Service Graph Workspace
  - Governance view in Service Graph Workspace
  - Explore and Search view in Service Graph Workspace
  - Insights view in Service Graph Workspace
  - Tasks view in Service Graph Workspace
  - Lists view in Service Graph Workspace
  - SGC Central (if installed)
  - CMDB success advisor (if installed)
- Configuring Service Graph Workspace
- Resume a disabled Cloud vs Non-cloud resources scheduled job
- Edit a related table from CMDB performance insights in Service Graph Workspace
- Edit a scheduled data import from CMDB performance insights in Service Graph Workspace
- Components installed with Service Graph Workspace

Data Owner Home view in Service Graph Workspace

Data Owner Home view in Service Graph Workspace provides a filtered view for data owner users who own, manage, or support CIs. It provides those users with a simple method to browse their CIs, view health, related activity associated with their CIs, understand what their CIs support, and access to actions they're authorized to use for their CIs.

Access

Navigate to **Workspaces** > **Service Graph Workspace**, and then, in the navigation panel, select the Data Owner Home icon.

Role required: sn_cmdb_editor or sn_cmdb_admin

The Data Owner Home view shows users CIs that they own or manage, related health, related records, and related services and offerings. This view also provides AI-assisted insights, recommended actions, and important notifications. Service instance owners can view and manage their Service Instances.

As a data owner, you can view the following types of information:

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- Health of your CIs
- Data sources used to populate your CIs
- Tasks assigned to you with respect to your CIs
- Insights, actions and tools available which are relevant to your CIs

Data owners can view their data in tabs and panels as described in this topic.

CMDB data

Shows CMDB data details.

Data sources and updates:

Provides summaries of related data sources, CI health, and tasks associated with the CIs, in the following cards:Counts of the data sources used to populate the CIs in the view, new and updated records and data ingestion issues affecting the CIs:

- Data sources: Total number of data sources used to update the user's CIs, derived from the *`Discovery source`* field values.
- Data ingestion issues: Count of errors reported in Service Graph Connector log files, filtered to count only serious errors. Data is collected on a daily, weekly? schedule?
- New CIs: Count of CIs created in the last 24 hours, owned or managed by the logged-in data owner.
- Updated CIs: Count of CIs updated in the last 24 hours, owned or managed by the logged-in data owner.

Health:

Shows the following health counts for CIs:

- Completeness: Number of CIs missing required attributes, and number of CIs missing recommended attributes (counting unique CIs)
- Correctness: Number of duplicate CIs, number of orphan CIs, and number of stale CIs
- Compliance: Number of CIs with audit failures

CI list view

A list of the CIs associated with a selected card and filtered according to the filter settings on the page.

Related activity

Shows cards for open incidents, changes, and problems, providing summaries from the Incident, Change Request, and Problem tables, and summaries from other tables related to the data owner CIs.

Actions & Insights

A panel providing a set of recommended actions and insights related to the a list of CIs and the user's association with those CIs. This panel contains the following cards:

Actions

Open tasks that are associated with the CIs in the list.

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Health

Details about the overall health score for owned CIs. The card shows a breakdown of counts by the main health KPIs:

- Completeness: Number of CIs missing mandatory fields, # of CIs missing recommended fields
- Correctness: Number of stale, orphan & duplicate CIs
- Compliance: Number of non-compliant CIs

If the CMDB Health Dashboard jobs aren't running then health scores aren't available. In which case, a notification appears to inform your that health scores aren't available until you activate those jobs.

Related activity summary

Lists related items, Incident, Change Request, and Problem by default, based on the user role and on records in the Explore CI Related Item Configurations [sn_cmdb_ws_explore_ci_related_item_config] table. For each related item in the view, there is a summary for the related table.

Recommended tools

Provides links to tools that are relevant to the data owner, such as Unified Map.

Data Ingestion

Available to users with the sn_cmdb_admin role (i.e. CMDB Administrators).

Use the Data Owner Home view

You can perform the following actions on the Data Owner Home view:

- Filter the data that shows in the CMDB data cards, by:
  - Association: Select **CIs I own** to show only those CIs that you own (CIs in which *owned_by* is equal to the data owner user). Select **CIs I manage** to show only those CIs that you manage or that are managed by a group that you're a member of (CIs in which *managed_by* is equal to one of the groups that the data owner user belongs to). Or, select **All association types** to show both types.
  - Classes: Select a CI class derived from the CIs specified by the association filter, or **All classes**. This filter is applied on top of the association filter.
- Personalize the list of the CIs included in the view. You can specify conditions that limit which CIs are included, you can sort and group the list, and select a CI from the list to show it in CI Form. For more information about CI Form, see Manage CI details using CI Form in Service Graph Workspace.
- Select related items to open a list view of the associated records.
- Select the Related items settings icon in the Related activity tab and select and arrange which related items categories appear in the cards in the Related activity tab.
- Select **CMDB Health Settings** in the Health card on the CMDB data tab to configure CMDB Health preferences. For more information, see Configuring CMDB Health.
- Select a tool in the Recommended tools card in the Insights & Actions pane.
- In the CIs list, select an action such as Edit, Export, New, or select the More Actions icon and then select **Personalize fields**.

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- An Administrator can configure which related items appear in the Related activity summary card in the Actions & Insights panel.

  A user with the sn_cmdb_ws.config_editor role can access the Explore CI Related Item Configurations [sn_cmdb_ws_explore_ci_related_item_config] table to delete, update, or add records for other related items such as alerts.

Ingestion view in Service Graph Workspace

The Overview page in the Ingestion view in Service Graph Workspace provides a centralized dashboard view for administrators to monitor the installation, performance, and error handling of Service Graph Connectors.

Access

Navigate to **Workspaces** > **Service Graph Workspace**, and then in the navigation panel, select the Ingestion icon.

Role required: sgc_admin, cmdb_inst_admin, or admin

Overview page features

Use the Overview page to monitor and troubleshoot your Service Graph Connectors connections through dedicated sections, filters, indicators, and visual reports and gain insights on the performance of Service Graph Connectors.

Feature description

Feature	Description
Connections overview	Displays the current state of your configured Service Graph Connector connections, including status, execution results, and error summaries.
Ingested and processed data	Displays key metrics related to the data imported and processed from third-party applications.
Data processing performance	Displays how many configuration items (CIs) were added or updated over time, in addition to the number of processing errors.
Filters	Enables narrowing the data shown in graphs and metrics based on connector type, connection, data source, or date range.
Indicators	Enables viewing of high-level metrics that reflect the volume and quality of imported data and help identify issues such as incomplete or failed import set processing.
Reports	Enables real-time visualizations that provide insights into data ingestion, processing trends, and error categorization across your Service Graph Connector connections.

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Connections overview

Displays the current state of your configured Service Graph Connector connections, including status, execution results, and error summaries.

Connections overview section

Card	Description	Card summary table
Connection status	Percentage of connections tested successfully based on connection status, with the count of success, error, and unknown statuses.	The connection status summary table displays the following details: **Connection** Displays the name of the configured Service Graph Connector. Each entry links to more details about the connection. **Connector type** Displays the Service Graph Connector type as the integration source or platform for the connection. **Connection status** Displays the current state of each connection. Valid values include: **Success** All connections were configured and tested without errors. **Error** Connection configuration issues encountered during setup. **Error summary** Provides a short description of the most recent connection error, if any. **Updated on** Displays the timestamp of the last connection status update for each connection in the following format: `YYYY-MM-DD HH:MM:SS`.
Processing status	Percentage of connections for which all data import runs in the last import execution were successful, with the count of success and error statuses.	The processing status summary table displays the following details: **Connection** Displays the name of the configured Service Graph Connector. Each entry links to more details about the connection.

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Connections overview section (continued)

Card	Description	Card summary table
	Note: Only import sets that encountered errors during their last execution are counted as processing errors and shown on the card.	**Last processing status** Indicates the result of the most recent processing run. Valid values include: **Success** All scheduled jobs completed without errors. **Error** One or more jobs encountered issues during processing. **Activated schedules** Indicates the number of scheduled jobs that are activated for importing the data using the connection. **Processed** Indicates the total number of import set runs that were executed for the connection. **Success** Indicates how many of the processed import set runs completed successfully. **Error** Displays the number of import set runs that ended in an error, including those import sets that were canceled. **Error summary** Provides a short description of the most recent error, if any. The summary includes error type and cause. A **View details** link may be available for diagnosing a processing error. To learn more, see Diagnose a processing error in SGC Central. **Last processed on** Displays the timestamp of the last processing activity for the import set of the connection, including both successful and failed runs in the following format: `YYYY-MM-DD HH:MM:SS`.
Ongoing executions	Number of connections where data import execution is in progress.	The ongoing execution status summary table displays the following details: **Connection**

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Connections overview section (continued)

Card	Description	Card summary table
		Displays the name of the configured Service Graph Connector. Each entry links to more details about the connection. **Activated schedules** Indicates the number of scheduled jobs that are activated for importing the data using the connection. **In progress** Displays how many scheduled jobs are currently running for the connection. **Processed** Displays the number of completed executions, where data has been collected and processed according to the configured scheduled job. **Processing time** Indicates the total duration taken by the most recent completed import set execution in the following format `YYYY-MM-DD HH:MM:SS`.

Ingested and processed data

Displays key metrics related to the data imported and processed from third-party applications.

Ingested and processed data section

Card	Description	Indicators
Import sets	Number of import sets processed by data sources based on the selected filters, with the count of success, partial, and error statuses. Select the **View all import sets** link to view a complete list of processed import sets.	SGC.Integrations.ImportSet SGC.Fully.successful.ImportSet SGC.Part.success.ImportSet SGC.Fully.error.ImportSet
Imported rows	Count of rows imported across all import sets based on the selected filters. Select the **View all latest import set rows ingested** link to view a complete list of import set rows ingested.	SGC.Integrations.Importset.rows.ingested

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Ingested and processed data section (continued)

Card	Description	Indicators
CIs	Total CIs processed based on the selected filters, with the count of added and updated CIs. Select the **View all inserted and updated records** link to view a complete list of inserted and updated CIs.	None
Partial or incomplete CIs	Total CIs that are partial payloads based on the selected filters, with the count of partial and incomplete categories. Select the **View all partial and incomplete records** link to view a complete list of partial and incomplete CIs.	None

Data processing performance

Displays how many configuration items (CIs) were added or updated over time, in addition to the number of processing errors.

Data processing performance section

Card	Description	Indicators
CIs and errors trends	Daily trends for CIs that were added, updated, and any data processing errors occurred during data import process based on the selected filters.	Records added Records updated Errors
Processing time	Top 10 connections by the latest import set processing time. Select the **View all latest import sets** link to view a complete list of import sets.	None
Processing errors	Top 10 connections with the highest number of data processing errors, with a breakup by data source, connection, and credential issues. Select the **View all latest errors** link to view a complete list of processing errors.	None

Filters

Enables narrowing the data shown in graphs and metrics based on connector type, connection, data source, or date range.

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Name	Type	Description
Connector type	List	Filters a list of installed Service Graph Connectors.
Connection	List	Filters a list of connection records for the Service Graph Connectors.
Data source	List	Filters a list of data sources for the Service Graph Connectors.
Date range	Date	Filters the SGC Central dashboard data based on the date range selected.

Indicators

Enables viewing of high-level metrics that reflect the volume and quality of imported data and help identify issues such as incomplete or failed import set processing.

Records added

Total number of records that were inserted into the system on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_audit table. The score is calculated by counting the number of records updated on the specified day, based on operations that were marked as inserted in the audit log.

Records updated

Total number of records that were updated in the system on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_audit table. The score is calculated by counting the number of records updated on the specified day, based on operations that were marked as Updated in the audit log.

Records added or updated

Total number of records that were added or updated in the system on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_audit table. The score is calculated by counting the number of records inserted or updated on the specified day, based on operations that were marked as Inserted or Updated in the audit log.

Errors

Total number of errors categorized under credentials, data source, or connection issues that occurred during integration executions on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_error table. The score is calculated by counting the number of errors on the specified day.

SGC.processing.errors

Number of processing errors categorized under data source issues that occurred during integration executions on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_error table. The score is calculated by counting the number of errors on the specified day.

SGC.connection.errors

Total number of errors categorized under credentials or connection issues that occurred during integration executions on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_error table. The score is calculated by counting the number of errors on the specified day.

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SGC.Integrations.ImportSet

Total number of import sets that were either completed successfully or encountered errors during their transformation process on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_import_set table. The score is calculated by counting the total number of import sets on the specified day.

SGC.Fully.successful.ImportSet

Total number of import sets that were completed successfully during their transformation process on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_import_set table. The score is calculated according to this formula: `Count of import sets with Errors = 0`.

SGC.Fully.error.ImportSet

Total number of import sets that completed with errors during their transformation process on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_import_set table. The score is calculated according to this formula: `Count of import sets with Errors ≠ 0 and Rows = Errors`.

SGC.Part.success.ImportSet

Total number of import sets that completed with some errors where the number of rows processed differs from the number of errors reported on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_import_set table. The score is calculated according to this formula: `Count of import sets with Errors ≠ 0 and Rows ≠ Errors`.

SGC.Integrations.Importset.rows.ingested

Total number of rows ingested for the import sets on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution table. The score is calculated according to this formula: `Sum of rows ingested`.

SGC.Integrations.Processing Rate

Average processing rate of import sets based on the total number of rows processed and the total processing time (in hours) for the import sets that either completed successfully or encountered errors on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution table. The score is calculated according to this formula: `Sum of rows processed/Total time (in hours)`.

Reports

Enables real-time visualizations that provide insights into data ingestion, processing trends, and error categorization across your Service Graph Connector connections.

Title	Type	Source table	Description
Affected CIs and errors	Relative compare ( )	CMDB Integration Execution Error [sn_cmdb_int_util_cmdb_integration_execution_error]	Displays configuration items (CIs) added, updated, and cumulative errors occurred during data import over time.
Error breakdown	Column ( )	CMDB Integration Execution Error [sn_cmdb_int_util_cmdb_integration_execution_error]	Displays the count of errors grouped over time

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Title	Type	Source table	Description
Import set rows ingested	Single score (42)	CMDB Integration Execution Import Set [sn_cmdb_int_util_cmdb_integration_execution_import_set]	Displays the number of import set rows ingested in a day.
Import set processing rate	Single score (42)	CMDB Integration Execution [sn_cmdb_int_util_cmdb_integration_execution]	Displays the average rate at which an import set processes data within an hour.
Records added or updated	Single score (42)	CMDB Integration Execution Audit [sn_cmdb_int_util_cmdb_integration_execution_audit]	Displays the number of records that were added or updated in CI classes.
Total import sets	Single score (42)	CMDB Integration Execution Import Set [sn_cmdb_int_util_cmdb_integration_execution_import_set]	Displays the number of import sets initiated by data sources in the given time frame and the count of import sets categorized by their status.
Updated classes	Column ( )	CMDB Integration Execution Audit [sn_cmdb_int_util_cmdb_integration_execution_audit]	Displays the breakdown of updated and ingested CIs for a class.

Governance view in Service Graph Workspace

Governance view in Service Graph Workspace provides administrators with important information, actions, and links to tools that are used to manage, monitor, and administer data ingestion and other CMDB functions.

The Governance view in Service Graph Workspace provides the data and tools described in this topic.

Access

Navigate to **Workspaces** > **Service Graph Workspace**, and then, in the navigation panel, select the Governance icon.

Role required: sn_cmdb_admin

Important actions

Important actions of various categories that require your attention or action. There are several task categories such as:

- Health tasks generated by CMDB Health: In health-related cards, such as Duplicate CIs, Orphan CIs, stale CIs, and De-Duplication tasks, select **View CIs** or **View Tasks** to show the list of associated CIs or important tasks. In the CI list view page, you can select **CMDB Health Dashboard** to open the CMDB Health Dashboard. In de-duplication-related cards generated

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by IRE, you can access the De-duplication dashboard and de-duplication libraries, to process de-duplication tasks in bulk.

- Data attestation and life cycle approval tasks generated by the CMDB Data Manager: In data attestation-related cards, such as Reassignment Requests and Unassigned Overdue cards, select **View Tasks** to drill down to the associated important tasks.

Important actions are stored in the CMDB WS Imp Action Card Config [sn_cmdb_ws_imp_action_card_config] table that is accessible for editing only to users with the sn_cmdb_admin role. Authorized users can modify attributes of an important action such as *Active* and *Filter conditions*, but can't modify the *Type*, *Persona*, and *Table* attributes.

- Important action cards show per the logged in user role, as specified in the CMDB WS Imp Action Card Config [sn_cmdb_ws_imp_action_card_config] table.
- A card appears only if there is at least one record that meets the card's filter condition.
- If you drill down a Health-related card and modify an associated CI, any resulting impact to health KPIs might appear only after the next cycle of the CMDB Health Dashboard jobs.

For information about managing the cards in the Important actions tile, see Modify important actions on the Governance view of Service Graph Workspace.

What's new

Counts of newly created CIs within a recent time interval. The New CIs total counts all CI types including applications, hardware, and Service instances, which also appear in separate cards in the tile. By default, historical data is aggregated for the **Last 24 hours**, which you can set to a different time interval such as **Last 7 days**.

Select a card to drill down to a Performance Analytics KPI Details pane that shows the trend for the respective item.

Counts in the What's new cards are based on the following tables:

Count	Table
New CIs	Configuration Item [cmdb_ci]
New application	Application [cmdb_ci_appl]
New hardware	Hardware [cmdb_ci_hardware]
New Service instances	Service Instance [cmdb_ci_service_auto]

Recent activity trends

The following cards show recent activities in the CMDB:

Recent CI activity

A 7-day chart showing metrics and trend line related to CIs such as the number of new CIs and updated CIs.

Recent service instance activity

A 7-day chart showing metrics and trend line related to Application services such as the total number of Service instances, new and updated Service instances, and the number of Service instances with outages.

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CMDB Health

Health metrics for CIs and relationships. Select the percentage numbers to navigate to the CMDB Health and CMDB Relationship Health dashboards. KPIs health scores calculated by CMDB Health for CIs. Select a percentage number for a KPI to navigate to the KPIs tile on the CMDB Health Dashboard. For more information, see CMDB Health KPIs and metrics.

If the CMDB Health Dashboard jobs aren't running, then there won't be any health reporting until those jobs run. Select **Go to CMDB Health Dashboard jobs** to configure CMDB Health and to activate those jobs.

Additional requirements CMDB Health asset, sn_cmdb_editor, or itil role.

CMDB success advisor

Supports targeted business outcomes by improving CMDB data quality across Data Foundations and individual applications including Hardware Asset Management (HAM). For more information, see CMDB success advisor.

Management tools

Provides links that you can use to access CMDB dashboards, tools, and list views. The links are grouped by categories as described below.

Note:
Some links are conditionally available based on installation of applications, active plugins, and your assigned role. For a link that doesn't appear, make sure that all the requirements for the link are met.

Manage:

- CI Class Manager: Centrally view, create, or edit class definitions and class settings for Identification and Reconciliation (IRE) and for CMDB Health.

  Additional role requirement: sn_cmdb_editor, personalize_dictionary, or itil.

- Data Manager: Centrally create, edit, review, publish, and track Data Manager policies and the tasks generated by the policies.
- CMDB Groups: Show a list view of current CMDB groups where you can create new CMDB groups, and manage the existing CMDB groups. A CMDB group is a collection of CIs to which you can apply CI actions collectively to all the CIs in the group. For example, CMDB Health can monitor CIs in a Health-type CMDB group, and report the aggregated health for the group as a whole.
- Dynamic CI Groups: Show a list view of current dynamic CI groups where you can create new dynamic CI groups, and manage the existing ones. Dynamic CI Groups act as application services (Service instances) that are populated with members of the CMDB group that is associated with the dynamic CI group. For more information about dynamic CI groups, see Application services.
- De-duplication Template Library: Create and manage de-duplication templates and libraries to process de-duplication tasks in bulk.
- De-duplication Dashboard: Show counts and insights for duplicate CIs in the CMDB, and run and track de-duplication templates to process de-duplication tasks in bulk.
- CMDB Coverage Dashboard: Show details of CMDB discovery completeness by correlating IP addresses from IPAM systems with discovered configuration items (CIs).

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Optimize:

- CMDB Health: View the CMDB Health dashboards and configure the CMDB health KPIs and metrics that CIs are evaluated by in CMDB Health dashboards.

  Additional requirements:

  - Set up and configure CMDB Health
  - Roles: asset, sn_cmdb_editor, or itil

- CMDB Data Foundations Dashboard: View the CMDB Data Foundations dashboard where you can explore potential risks in the CMDB implementation, and verify that important data is valid and properly configured.

  Additional requirements:

  - Set up CSDM and CMDB Data Foundations Dashboards
  - Roles: asset, sn_cmdb_admin, sn_cmdb_admin, itil_admin, or admin
  - Plugin: com.snc.cmdb.getwell

- CSDM Data Foundations Dashboard: View the CSDM Data Foundations dashboard where you can explore key CSDM metrics on a single page to assist you in getting the full benefit from your implementation.

  Additional requirements:

  - Set up CSDM and CMDB Data Foundations Dashboards
  - Roles: app_service_admin, app_service_user, asset, cmdb_read, sn_cmdb_admin, portfolio_admin, service_viewer, technology_service_owner, or itil_admin.
  - Plugin: com.snc.cmdb.getwell

- De-Duplication Tasks: Process a de-duplication task by using the Duplicate CI Remediator wizard which guides you through the duplicate CI reconciliation process.

  Additional role requirement: sn_cmdb_editor or itil.

- CMDB Remediation Rules: Rules associated with a CMDB Health task that was created for a failed CMDB Health test. A CMDB remediation rule runs a remediation workflow to remediate an issue reported by CMDB Health.

Visualize:

- Dependency Views: Provides a graphic infrastructure view for a CI and any applications or business services that it is part of and that it supports.

  Additional role requirement: dependency_views.

- Query Builder: Easily build complex infrastructure and service queries, that span multiple CMDB classes, non-CMDB tables, and that can involve many CIs that are connected by different relationships.

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Additional role requirement: cmdb_query_builder_read.

- Unified Map: A graphical hierarchical map of the CMDB and its CIs, and the connections between them. Unified Map combines some of the capabilities of Dependency Views and of Service Mapping into a single map experience in Service Graph Workspace.

Create:

- Create CI: Create a new CI while enforcing Identification and Reconciliation Engine (IRE) processes and other requirements that result in a valid and unique CI.
- Create Service Instance: Create an application service (service instance).

Additional role requirement: service_admin.

Explore and Search view in Service Graph Workspace

Search through CMDB tables without having detailed knowledge of the CMDB data model by using contexts that are mapped to CI classes as navigation. Use natural language with the AI-driven search to search the CMDB and related data.

Access

Navigate to **Workspaces** > **Service Graph Workspace**, and then in the navigation panel, select the Explore and Search icon.

Role required: sn_cmdb_user, sn_cmdb_editor, or sn_cmdb_admin

Explore

Explore classes and CIs using one of the following exploration modes:

Contexts

The top-level contexts expand into a hierarchy of contexts (where classes are grouped by categories). As you expand navigation entries, the next level of contexts appears.

This option is available only if the Service Graph Workspace - Content store app is installed. The Service Graph Workspace - Content app automatically installs all its dependent apps, such as the Data Model Navigator store app. The Service Graph Workspace - Content store app and its dependent apps enable the **Explore by contexts** option, and provide the contexts definitions and the quick class filters used in the CI list views.

Classes

The top-level contexts expand into lists of classes.

If the Service Graph Workspace - Content store app isn't installed, then **Explore by classes** is the only mode of exploration available. In this case, existing CMDB groups definitions in which type = **CMDB Workspace** are used to organize the navigation panel. For more information, see CMDB groups.

In either exploration mode, you can drill-down to see a list of CIs that belongs to the selected context or CMDB group.

In the CIs list view you can:

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- Use the class quick filters to filter the list of the CIs by fields. Only filters that are common to all the CI classes in the list, appear (if there are none, then no class quick filters appear).
- Select a CI to open it in CI Form. For more information, see Manage CI details using CI Form in Service Graph Workspace.

Search

Select the Search tab to search through the service graph data. Search provides the following modes of operation where depending on system configurations and usage, each mode might produce different search results:

AI search

Lets you access a Now Assist AI-driven search using natural language. Now Assist analyzes your search utterance to determine the optimum search method, shows the results, and then lets you refine the search using natural language in the Now Assist panel.

To use this AI search, the Now Assist skill Search result classifier, must be activated. The Search result classifier skill is available starting with Now Assist for CMDB version 3.0 store app, which must be installed.

For more information, see Search the Service Graph database using natural language.

Intelligent Search

Lets you use Natural Language Query (NLQ) search capabilities provided by Intelligent Search for CMDB.

If the Now Assist store app and the Search result classifier skill requirements for AI search aren't met, the system defaults to using Intelligent Search to search service graph data.

Intelligent Search

Accessible to: CMDB Admin, CMDB Editor, CMDB User.

Lets you use Natural Language Query (NLQ) search capabilities provided by Intelligent Search for CMDB. Use the input field to construct a search string using everyday language. As you type, a dynamic list of relevant suggestions appears, with items matching single words or part phrases in the typed-in text, such as table names.

You can:

- Select **Search tips** to see tips about constructing search strings. See details about the usage, examples for single and multi-table search, advanced filtering, and relationships in Intelligent Search.
- Select **Search** to either run the query if the search string is already fully converted into a valid CMDB query, or to open the Refine your query dialog box.

  - If the search string has no ambiguities with the table name or relationships, then the query runs and the results appear in a list view format.

    Only the first 100 results of the query appear in the results pane.

    - Select **Load More Results** to view the next set of 100 results.
    - Select **Load All Results** to view the rest of the query results, up to the number specified by the glide.cmdb.query.max_results_limit system property (10,000 by default).

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If the constructed CMDB query contains more than a single table, then the **View in Query Builder** button appears. Select the button to open the CMDB Query Builder with your query fully constructed on the Query Builder canvas. You can use the Query Builder to continue editing the query.

- If there are any ambiguities with table names or relationship types in the search string, then the search string can't be converted into a valid CMDB query. In this case, the Refine your query dialog box appears letting you select from suggested CI classes and continue to parse your search string into a valid CMDB query. Those suggested CI classes are based on phrases in your search string. Use the drop-down lists to select the CI classes that match your intended search and then select **View search results** to run the query.
- If Intelligent Search is unable to convert your search string into a valid CMDB query, then selecting **Search** doesn't generate any query results. Instead, a feedback form appears. Fill out the form and select **Submit Feedback** to record your feedback for your CMDB Admin to review.

- Use the Sample searches list to get you started in running a pre-defined search. This list consists of more common searches, or searches that are more difficult to construct such as searches that involve service instances (application services).
- Use the Your recent searches list to rerun a previous search.
- Select **Results Feedback** to submit feedback on the search results for your CMDB Admin to review.

For more details about using NLQ with Intelligent Search, see Intelligent Search for CMDB.

Alternatively, you can select **Use conditional search instead** to use a basic condition builder functionality where you can specify conditions to search for CIs of a specific class.

You can:

- Select **New condition set** to add a condition phrase.
- Select **Related List Condition** to add a condition phrase for related lists.
- Select **Search** to search through the CMDB.
- Add and then adjust the *sn_cmdb_ws.list.record_count_limit* system property to limit the record count summation and so to minimize the performance impact of that operation. The record count shows on the Conditional search page, for example, above the results list. For more information about adding and modifying that system property, see Components installed with Service Graph Workspace.

In the results list, select a CI to see its details in CI Form.

UI activity	Additional requirements
• Mapped Application Service • Application Service • Application Service Group • Dynamic CI Group • Tag Based Service	app_service_user role

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UI activity	Additional requirements
• Business Service • Technical Service • Application Service Outage	service_viewer role

Insights view in Service Graph Workspace

View insightful dashboards that show aggregated counts, state, and health for key features such as CMDB Health, Service Instances, and CMDB 360.

Access

Navigate to **Workspaces** > **Service Graph Workspace**, and then in the navigation panel, select the Insights icon. Only dashboards that you have access to, appear in the Insights navigation panel and specific widgets on dashboards might require additional access privileges.

Role required: Any role containing sn_cmdb_user (sn_cmdb_user, sn_cmdb_editor, sn_cmdb_admin)

Insights dashboards

- CMDB Health
- CMDB Get Well
- CSDM Get Well
- Feature adoption
- Performance
- Service instance
- CMDB 360

CMDB Health insights dashboard in Service Graph Workspace

Use the CMDB Health Dashboard in the Insights view in Service Graph Workspace as a central location to view detailed health reports and aggregations for your CMDB at a glance. You can also use the provided functions to remediate issues that CMDB Health detected, to improve CMDB health.

Access

1. Navigate to **Workspaces** > **Service Graph Workspace**.
2. In the navigation panel, select the Insights icon.
3. On the Insights page navigation pane, select **CMDB Health**.

Role required: Any role containing sn_cmdb_user (sn_cmdb_user, sn_cmdb_editor, sn_cmdb_admin)

Once you configure CMDB Health and the CMDB Health Dashboard jobs are enabled, the CMDB Health Dashboard shows meaningful data that is automatically collected, calculated, and aggregated on a recurring schedule.

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For information about the CMDB Health Dashboard, see View CMDB Health Dashboard, and for information about enabling the CMDB Health Dashboard jobs, see Configuring CMDB Health.

CMDB Data Foundation insights dashboard in Service Graph Workspace

Access the CMDB Data Foundation insights dashboard in Service Graph Workspace to monitor foundational key health-related metrics in CMDB.

Access

1. Navigate to **Workspaces** > **Service Graph Workspace**.
2. In the navigation panel, select the Insights icon.
3. On the Insights page navigation pane, select **CMDB Data Foundation**.

Role required: sn_cmdb_admin, asset, or itil_admin

For additional information, see:

- Monitor health in CSDM and CMDB Data Foundations Dashboards.
- CMDB Data Foundations dashboard.

CSDM Data Foundation insights dashboard in Service Graph Workspace

Access the CSDM Data Foundation insights dashboard in Service Graph Workspace to see key CSDM indicators which can help you get the full benefit from your ServiceNow AI Platform products.

Access

1. Navigate to **Workspaces** > **Service Graph Workspace**.
2. In the navigation panel, select the Insights icon.
3. On the Insights page navigation pane, select **CSDM Data Foundation**.

Role required: sn_cmdb_admin, app_service_admin, app_service_user, asset, cmdb_read, itil_admin, portfolio_admin, service_viewer, or technology_service_owner

- For general information about the CSMD and CMDB Data Foundations Dashboards, see Monitor health in CSDM and CMDB Data Foundations Dashboards.
- For information about the CSDM Data Foundations dashboard, see CSDM Data Foundations dashboard.

Feature adoption insights dashboard in Service Graph Workspace

Use the Feature adoption insights page in Service Graph Workspace to see and increase the level of adoption of key CMDB features and service instances to improve the overall health of the CMDB. Explore how tools and features can maximize the health and efficiency of your CMDB and use direct links to install and start using features immediately.

Access

1. Navigate to **Workspaces** > **Service Graph Workspace**.
2. In the navigation panel, select the Insights icon.
3. On the Insights page navigation pane, select **Feature adoption**.

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Role required: Any role containing sn_cmdb_user (sn_cmdb_user, sn_cmdb_editor, sn_cmdb_admin)

CMDB feature adoption

Shows dial charts for the overall adoption levels of all three categories of CMDB tools and features:

Data ingestion

Tools and features that support and ensure ingestion of high-quality data into the CMDB.

Data governance

Tools and features that let you manage the CMDB data after it has been ingested.

Search and analytics

Tools and features that provide meaningful and helpful insights into the CMDB data.

Select each dial chart in the tile to access its tab and associated cards with further details about the features in the category. Pay special attention to categories with low levels of adoption and those features that aren't yet implemented in the instance and which you should consider for adoption.

Each category tab shows cards for the features in the category and the following general cards:

- Overall adoption level for the tab: The calculated overall level of adoption for the tab. Calculations are specific for each tab, and can be based, for example, on the level of adoption of some or all the features in the tab.
- Adoption progress: Installation, activation, or usage status per feature in the tab. Select a feature link to access a relevant resource such as the feature's landing page with an overview dashboard or an installation location.

Depending on adoption level, a card might contain any of the following resource links:

- **Learn more**: Link to documentation to learn and explore the benefits and usage of the feature.
- **View demo**: Link to a short demo about the feature.
- **Get started**: Link to a landing page where you can start immediately utilizing the feature.
- **Install app**: Link to the ServiceNow Store where you can immediately install the app.

Cards use different methods to examine the instance and determine if the card's feature is installed, activated, and being used. For example, some cards check for the installation status of plugins and some cards rely on data in the specific feature tables. Many counts and aggregation data that appear on cards is based on Performance Analytics indicators built on top of the Base Aggregate Data [sn_cmdb_ws_base_aggregate_data] table.

- If the result is that the card's feature is installed or being used, then the card shows charts and counts about the level of usage. In which case, the card's label might slightly adjust.
- If the result is that the card's feature isn't installed or isn't in use, then links are provided to resources where you can explore, install, and start using the feature.

Most of the cards scheduled jobs run every 24 hours, therefore, depending on the type of data, some card data is based on recent but not current data. The Last updated timestamp in the cards reflects the collection time for the data that was used for the card. Also, immediately after getting started with a feature, a card won't reflect on the latest status or usage of the feature, until up to 24 hours when the card's scheduled job runs (for the CIs processed by IRE based on source card, the associated scheduled job, CMDB Workspace - Populate aggregates Monthly, runs monthly).

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The following sections provide details for each card, including the calculation script used for the card.

CMDB feature adoption: Data ingestion

The overall adoption level for data ingestion maps to the following findings in the instance:

- Low (red): Less than 80% of CIs are processed by Identification and Reconciliation Engine (IRE)
- Moderate (amber): 80—90% of CIs are processed by IRE
- High (green): Over 90% of CIs are processed by IRE

Data ingestion contains the following features and aggregations:

CIs processed by IRE

Determines the percentage of CIs that are processed by IRE, by checking the Source [sys_object_source] table. CIs that aren't processed by IRE introduce a data integrity risk.

The percentage of CIs that are being processed by IRE determines both, the level of adoption for this feature card and the overall adoption level for the entire data ingestion category.

Service Graph Connectors

Determines the installation and usage status of Getting started with Service Graph Connectors, by checking:

- If the ITOM Licensing plugin (com.snc.itom.license) is active
- If there is at least one Service Graph Connector installed in the instance

If Service Graph Connectors are installed and are in use, then the card shows a count of those connectors.

> **Note:**
> The count of Service Graph connectors that appears on the card might be slightly different than the number of connectors that show on the ServiceNow Store site because the counting methods that are used are different.

IntegrationHub ETL

Determines whether the IntegrationHub ETL store app is installed and used, based on records in the CMDB Integration Studio Application Data Sources [cmdb_inst_application_feed] table. If IntegrationHub ETL is in use, then the card shows a count of ETL transform maps in IntegrationHub ETL (demo ETL transform maps aren't counted).

Select **View ETL transform maps** to open IntegrationHub ETL where you can examine existing ETL transform maps and create new ones.

CIs processed by IRE based on source

Chart showing CIs processed by IRE, grouped by Service Graph Connectors, ServiceNow Discovery, a combination of both, and others, for the past six months.

The following discovery sources are counted as ServiceNow Discovery:

- ServiceNow
- ServiceWatch

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- ACC-Visibility
- AgentClientCollector
- CredentiallessDiscovery

Point to the chart to show monthly aggregation data.

This card is hidden if there are no CIs processed by IRE.

CMDB application for APIs and CLI

Determines whether the CMDB application for APIs and CLI store app is installed.

This card appears only if the store app isn't installed, providing helpful resources for exploration and adoption.

CMDB feature adoption: Data governance

The overall adoption level for data governance maps to the following findings in the instance:

- Low (red): Less than 33% of features are used
- Moderate (amber): 33—66% of features are used
- High (green): Over 66% of features are used

The overall level of adoption of data governance is based on whether CMDB Data Manager features are used.

CMDB Data Manager/CIs used in Data Manager policies

Determines usage by checking if either of the following conditions is true:

- There are any user-created Delete, Retire, or Archive policies (by searching table CMDB Data Manager Policy and Attributes [cmdb_data_manager_policy_and_attributes])
- There are any CIs processed by these user-created Delete, Retire, or Archive policies, in the last 90 days (by searching table CMDB Data Management Policy Executions [cmdb_data_management_policy_execution])

If CMDB Data Manager is in use, shows a chart with CIs that were processed by these policies in the past six months, by month, and by policy type.

Data attestation/CIs used in data attestation

Determines usage by checking if either of the following conditions is true:

- There are any user-created Attestation policies (by searching table CMDB Data Manager Policy and Attributes [cmdb_data_manager_policy_and_attributes])
- There are any CIs processed by these user-created Attestation policies, in the last 90 days (by searching table CMDB Data Management Policy Executions [cmdb_data_management_policy_execution])

If data attestation is in use, shows a chart with CIs that were processed by attestation policy tasks in the past six months, by month.

Data synchronization

Checks if there is at least one class for which the *managed_by_group* attribute is globally set so that all class CIs are synchronized on the same value.

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For information about synchronizing group assignment attributes using the CI Class Manager, see Set the group for a CI or an entire class of CIs and Synchronizing group assignment attributes.

Principal classes

Checks if the Principal Class filter is configured with at least one principal class. The Principal Class filter limits the number of CIs that appear in list views, to show only CIs of principal classes. Reducing the amount of data in list views to only relevant data, improves performance and efficiency.

For more information about managing the Principal Class filter in CI Class Manager, see Update class list in the Principal Class filter.

CMDB feature adoption: Search & analytics

The overall adoption level for search & analytics maps to the following findings in the instance:

- Low (red): Less than 33% of features are used
- Moderate (amber): 33—66% of features are used
- High (green): Over 66% of features are used

Search & analytics contains the following features and aggregations:

CMDB Query Builder/Query Builder queries

Determines if the CMDB Query Builder is in use, by checking if either of the following conditions is true:

- There are any records in the Saved Queries [qb_saved_query] table in which *Source* is **QB**
- There are any queries executed or queries executed with reports, in the last 90 days

If CMDB Query Builder is in use, shows a chart with counts of query executions and query executions in reports, for the past six months, by month.

Point to the chart to see monthly aggregation data.

Intelligent search

Determines if Intelligent Search for CMDB is in use by checking the NLQ Query Logs [nlq_query_log] table for any records where *source* is **CMDB_WS**, from the past 90 days. If Intelligent Search is in use, shows counts of Intelligent Search queries for the past six months, by month.

CMDB 360 — Records in Multisource

Total number of raw CMDB 360 records in the CMDB 360 data store that contains records for each discovery source report, per each CI attribute. This card is identical to the Total CMDB 360 records card in the Discovery Sources tile in the CMDB 360 view.

This card appears only if CMDB 360 is enabled, which is determined by checking the ITOM Discovery License (com.snc.itom.discovery.license) plugin and the system property glide.identification_engine.multisource_enabled.

CMDB 360 queries

Count of CMDB 360 queries that exist in the CMDB Multisource Queries [cmdb_multisource_query] table.

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This card appears only if CMDB 360 is enabled, which is determined by checking the ITOM Discovery License (com.snc.itom.discovery.license) plugin and the system property glide.identification_engine.multisource_enabled.

CMDB Data Foundation dashboard

Determines if the CMDB and CSDM Data Foundations Dashboards store app (which includes the CMDB Data Foundation dashboard) is installed.

This card appears only if the store app isn't installed, providing helpful resources for exploration and adoption. However, the feature is still included in calculating the search & analytics overall level of adoption.

CMDB Health Dashboard

Determines if CMDB Health is in use by checking if at least one CMDB Health Dashboard job is enabled.

This card appears only if the feature isn't in use, providing helpful resources for exploration and adoption. However, the feature is still included in calculating the search & analytics overall level of adoption.

Performance insights dashboard in Service Graph Workspace

Use the Performance insights page in Service Graph Workspace to analyze performance of key CMDB components such as Identification and Reconciliation Engine (IRE), and duplicate CIs. You can review and follow recommendations to improve performance.

Access

1. Navigate to **Workspaces** > **Service Graph Workspace**.
2. In the navigation panel, select the Insights icon.
3. On the Insights page navigation pane, select **Performance insights**.

Role required: sn_cmdb_admin

CMDB performance insights

CMDB performance insights helps you understand the ways in which your configurations impact the performance of your CMDB. You can use the charts and tools within CMDB performance insights to troubleshoot, debug, or diagnose performance issues. CMDB performance insights also analyzes your CMDB and Service Graph Connectors on your instance to generate recommendations on how you can improve the performance of your CMDB. The CMDB performance insights tile itself can show up to two of those recommendations.

Select **View performance insights** to access the CMDB performance insights data.

The Payloads & CIs tab contains the following tiles:

Partial payloads

Partial payloads occur when the data source didn't provide enough information to uniquely identify the CI, preventing IRE from processing the CI.

- Total partial payload count:

  Shows the total number of partial payloads that exist in your instance. Large numbers of partial payloads in your instance can cause performance deterioration of the CMDB.

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For more information about partial payloads, see Identification and Reconciliation engine (IRE).

- Discovery source:

  Breaks down the number of partial payloads by discovery sources. You can drill down on slices in this pie chart to see the list of partial payloads with errors, filtered by discovery source.

  You can drill down on specific partial payloads to better understand the error that you're experiencing. When you drill down on a partial payload, you can see the full payload item, which you can review to troubleshoot and address the specific errors.

  For more information about error types, see Using identification simulation.

Related records

Data about related records that are missing references. A record is missing a reference when the *Referenced* field for that record is empty.

- Related records missing reference:

  Shows the total number of records that do not reference a CI in the *Referenced* field in the Related table. You can see a full list of the Related tables and the associated *Referenced* fields in the Related Entries [cmdb_related_entry] table.

  For more information about Related tables, see Overview of CMDB.

- Related records missing reference by table:

  Breaks down the number of CMDB records missing references, by table. You can drill down on slices in this chart to see the list of specific records filtered by table.

  Before you can drill down on a slice of this pie chart, you must have any user roles required to view the table.

  You can also select **New** from the list view to create a new related entry table record. For more information about creating or editing a related entry table record, see Edit a related table from CMDB performance insights.

Duplicate and stale CIs

A CI is flagged as duplicate during identification and reconciliation. A CI is flagged as stale if it has not been updated within the Effective Duration time period specified in the CMDB Health staleness rule for the CI class.

- CIs:

  Shows the number of CIs that are either duplicate or stale.

- Stale records by class:

  Breaks down the number of stale CIs based on the CI class. You can drill down on slices in this pie chart to see the list of specific CI records filtered by class.

  For more information about stale CIs, see CMDB Health KPIs and metrics.

- Duplicate records by class:

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Breaks down the number of duplicate CIs based on the CI class. You can drill down on slices in this pie chart to see the list of specific CI records.

For more information about duplicate CIs, see Duplicate CIs remediation.

Relationship records missing parent or child

Shows the trend line and number of relationship records in the CI Relationships [cmdb_rel_ci] table that are missing a parent or child CI. CIs that are missing a parent or child are considered invalid records and can have a performance impact on your instance.

Recommendations

Recommendations on this panel include a link to the related documentation and typically enable direct access to the associated tool, feature, or system property. Expand or minimize the panel by selecting the light bulb icon.

The first two recommendations appear on the CMDB performance insights tile of the Insights view.

You can only see a recommendation if you have the roles needed to access the feature, tool, or system property. Users with the sn_cmdb_admin role can hide recommendations or adjust the order in which recommendations appear. Users can use the **Active** and **Order** fields in the CMDB WS Imp Action Card Config [sn_cmdb_ws_imp_action_card_config] table to configure those elements.

The Service Graph connectors tab contains the following tiles:

Note:

- The Service Graph connectors tab only appears if your instance has at least one Service Graph Connector and you have the cmdb_inst_admin role.
- To edit data source or scheduled data import records in Service Graph Workspace, you may need to set **Application scope** to the **Application** of the data source or data import.

Connectors data source

Configurations on your Service Graph Connector data sources affect the ingestion and processing of incoming data. Changing your Service Graph Connector data source configurations can streamline data handling, making your CMDB more efficient and reducing impacts on the performance of your instance.

- Sources with batch processing turned off:

  Shows the percentage of Service Graph Connector data sources in the Data Sources [sys_data_source] table with disabled **Use Batch Import**. It also lists the total number of data sources, and the number of data sources with enabled or disabled batch processing.

  To enable batch processing, access the record of a specific data source from the list view and select **Use Batch Import**. For more information about batch processing, see Data source fields.

  You can also select **Edit** to update a data source from the list view. For more information about editing a data source, see Edit a data source from CMDB performance insights.

- Sources with concurrent import turned off:

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Shows the percentage of scheduled data imports of Service Graph Connector data sources in the Scheduled Data Imports [scheduled_import_set] table with **Concurrent Import** turned off. It also lists the total number of scheduled data imports, and the number of scheduled data imports with **Concurrent Import** turned on or off.

To enable concurrent import, access the record of a specific scheduled data import from the list view and select **Concurrent Import**. For more information about concurrent import, see Concurrent imports.

You can also select **Edit** to update a scheduled data import from the list view. For more information about editing a scheduled data import, see Edit a scheduled data import from CMDB performance insights.

- Sources with non-custom size partition method:

  Shows the percentage of scheduled data imports of Service Graph Connector data sources in the Scheduled Data Imports [scheduled_import_set] table that use a non-custom size partition method. It also lists the total number of scheduled data imports, and the number of scheduled data imports that use a non-custom size partition method.

  To use a custom size partition method, access the record of a specific scheduled data import from the list view. Ensure that **Concurrent Import** is selected. From the **Partition Method** drop-down menu that appears, select **Custom size**. For more information about partition methods, see Schedule a data import.

  You can also select **Edit** to update a new scheduled data import from the list view. For more information about editing a scheduled data import, see Edit a scheduled data import from CMDB performance insights.

Connectors execution trends

Aggregates Service Graph Connectors with outlier connector executions, where the number of imported rows or the rate of processing is significantly higher or lower than the 30-day trend.

- Connectors with processing rate outliers:

  Shows the number of Service Graph Connectors that are considered outliers with connector execution processing rates outside the expected trend lines within the past 30 days.

- Connectors with import count outliers:

  Shows the number of Service Graph Connectors that are considered outliers with connector execution import counts outside the expected trend lines within the past 30 days.

You can drill down the cards in the Connectors execution trends tile to access the Service Graph connector execution trends window. In that windows, a Service Graph Connector is available in the connectors drop-down menu only if it has an execution record.

Click the tabs on the Service Graph connector execution trends window to view the following charts and the Connector Execution list view of executed connector import sets:

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- Processing rate:

  Models the trend line of processing rates for connector executions. Shows the rate at which a connector processes rows of data over a period of time.

  There are two zones, which are the Confidence Band and the Prediction Band. Service Graph Connectors with connection executions that have processing rates outside of the Prediction Band are considered outliers. These zones don't appear when you select more than one Service Graph Connector.

- Import count:

  Models the trend line of rows processed for connector executions. Shows the number of rows a connector processes over a period of time.

  There are two zones, which are the Confidence Band and the Prediction Band. Service Graph Connectors with connector executions that have import row counts outside of the Prediction Band are considered outliers.

On both charts, you can select outlier and non-outlier Service Graph Connectors to see the trend lines against each other.

For more information about processing data with Service Graph Connectors, see Getting started with Service Graph Connectors.

Cloud vs Non-cloud insights dashboard in Service Graph Workspace

Charts showing counts and details for resources that are hosted on various cloud services versus those resources that aren't, with breakdown by key CI classes such as applications, databases, and datacenters.

Resources can be deployed on cloud services such as the Microsoft Azure Cloud, or on the local instance or other non-cloud solutions. For some ongoing operations in the organization, it might be necessary to have those details that can be difficult to obtain.

The following conditions must be met for the Cloud vs Non-cloud resources charts to appear and to show meaningful data:

- The table Cloud Service Accounts [cmdb_ci_cloud_service_account] must exist.
- The Logical Datacenter [cmdb_ci_logical_datacenter] table must contain at least one record for a cloud datacenter.
- The Datacenter Types [sn_cmdb_ws_datacenter_type] table must contain at least one record for a datacenter that is classified as cloud storage in the organization. In the base system, this table is pre-populated with several records for common cloud services such as the Azure Datacenter [cmdb_ci_azure_datacenter] class. The chart calculates and shows data only for cloud services for which there's a record in the Datacenter Types [sn_cmdb_ws_datacenter_type] table.

  For details about adding datacenters in your organization, with the cloud or non-cloud classification, see Configure datacenters for Cloud vs Non-cloud resources in Service Graph Workspace.

The following cloud vs Non-cloud charts are available:

- CI classes bar chart:

  Each bar in the CI classes chart represents a pair of a CI class and a storage type (cloud, non-cloud), such as the bar for Applications/Cloud. For each bar, there's a scheduled job that

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runs every 24 hours to collect and calculate the data for the bar. The running time depends on the amount and complexity of the data that a job collects, which can be different for each scheduled job. Also, the schedules of the jobs are staggered so that they don't all run at the same time and exhaust resources. For details about the class-specific criteria used for the chart calculations, see Class criteria in Cloud vs Non-cloud resources chart in Service Graph Workspace.

If there's a CI class/type pair that isn't important in the organization, you can exclude that pair from the CI classes chart. For more details, see Configure classes for Cloud vs Non-cloud resources in Service Graph Workspace.

On the CI classes chart, you can:

- Select a bar to open the Cloud vs Non-cloud resources pane. Then, select either of the following tabs to drill down into further details for the bar:

  Cloud vs Non-cloud CIs

  Shows a bar chart for CIs stored on a cloud service and those CIs that aren't, per CI class. For each CI class, select the cloud or the non-cloud bar to show the CIs that are associated with the selected bar, in a list view. You can then select a CI from the list to further drill down to the CI details pane.

  CI Classes by Cloud Providers

  Pie charts per CI class with more granular details for those CIs that are hosted on cloud providers. Pie slices have randomly-selected colors, and they show a breakdown by cloud providers for various CI classes. For each pie, select a slice to show the CIs that are associated with the pie slice, in a list view. You can then select a CI from the list to further drill down to the CI details pane.

- Select **Latest updates** to see updated status for the scheduled jobs that produce the data for the chart. Status is color-coded to indicate whether the job has completed successfully (green), or failed to complete (red). You can also see the *Active* state of each scheduled job. If you have administrative privileges, you can activate/deactivate selected jobs or select **Activate/Deactivate (all)** to toggle the state of all jobs at once.

- Application Services pie chart:

  The Application Services pie chart uses the Service Configuration Item Associations [svc_ci_assoc] table and checks the cloud/non-cloud status of application service CIs in the CI classes chart. Application services in the Application Services pie chart are classified as follows:

  - Cloud: All of the CIs in the application service have been determined to be hosted on a cloud service.
  - Non-cloud: All of the CIs in the application service have been determined not to be hosted on a cloud service.
  - Hybrid: The application service contains a mixture of CIs where some are hosted and some aren't hosted on cloud services.
  - Unknown: The cloud/non-cloud classification couldn't be determined because some of the application service CIs aren't classified as cloud or non-cloud CIs.

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Note:
Because classification of Application Services depends on the classification of CIs in the CI classes chart, there might be some discrepancy between the two charts. This can occur if an application service CI changed its cloud/non-cloud status, and the Application Services chart hasn't refreshed yet to reflect that change.

Select the Application Services chart to access the list views of the associated application services, grouped by cloud/non-cloud classifications. From those list views, you can drill down to the Dependency Views map for application services.

The scheduled jobs associated with the charts are set up with several hard-coded limits that if exceeded, result in failure conditions that are reflected in the job status. Timing out is set to two hours and the maximum number of records to collect is set to 500,000. If a job exceeds any of those limits, it's automatically stopped.

A scheduled job that can't complete for 3 (default) consecutive days is automatically disabled for future runs. You can manage the disabling of scheduled jobs, in the following ways:

- Modify the default number of consecutive days that are counted by adding the *sn_cmdb_ws.insight.category.disable_after_failure* system property to the System Properties [sys_properties] table and then setting its value. For more details, see Add a system property.
- Resume a disabled Cloud vs Non-cloud resources scheduled job.

Service instances insights dashboard in Service Graph Workspace

Use the Service instances page in Service Graph Workspace to see counts, trends, and health of Service instances (application services) in your organization.

Access

1. Navigate to **Workspaces** > **Service Graph Workspace**.
2. In the navigation panel, select the Insights icon.
3. On the Insights page navigation pane, select **Service instances**.

Role required: Any role containing sn_cmdb_user (sn_cmdb_user, sn_cmdb_editor, sn_cmdb_admin)

Service instance

Shows a count of Service instances in your organization, based on records in the Service Instance [cmdb_ci_service_auto] table. The chart shows the trend of total number of Service instances per day, for the past seven days.

Select the tile to access the Service instance dashboard where you can monitor the adoption level and health of Service instances. For more details, see Use Application Services dashboard to monitor health.

CMDB 360 insights dashboard in Service Graph Workspace

The CMDB 360 insights dashboard provides aggregations and analysis of CMDB 360 data, where you can track activities and identify potential issues of discovery sources.

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Access

1. Navigate to **Workspaces** > **Service Graph Workspace**.
2. In the navigation panel, select the Insights icon.
3. On the Insights page navigation page, select **CMDB 360**.

Role required: sn_cmdb_editor or sn_cmdb_admin

The CMDB 360 insights page provides aggregations and analysis of CMDB 360 data which you can use to track activities and identify potential issues of discovery sources. You can also create different types of your own queries and associated schedules and reports to explore CMDB data.

Note:
Most cards on the CMDB 360 insights dashboard support non-CMDB tables in their aggregation, or can be configured to provide support. However, the CIs not reported by discovery sources card, for example, doesn't apply to non-CMDB tables. Creating queries for non-CMDB tables is also supported. For information about support for non-CMDB tables, see IRE support for non-CMDB tables.

- For concepts and other background information about CMDB 360, see CMDB 360/Multisource CMDB.
- For information about all CMDB 360 dashboard settings, see Configure the CMDB 360 dashboard in CMDB Workspace or in Service Graph Workspace.
- For information about using the CMDB 360 view, see CMDB 360 experience in CMDB Workspace and in Service Graph Workspace.

Tasks view in Service Graph Workspace

The Task view in Service Graph Workspace provides task owners access for tracking and managing their tasks such as CMDB Health related tasks, certification, attestation, and lifecycle tasks generated by the CMDB Data Manager.

Access

Navigate to **Workspaces** > **Service Graph Workspace**, and then in the navigation panel, select the Tasks icon. In the Tasks view navigation panel, select **Certification**, **Attestation**, or **Lifecycle** to access the different task type pages.

Role required: data_manager_user, sn_cmdb_user, sn_cmdb_editor, or sn_cmdb_admin

Task overview

The Task overview page shows charts with overall counts of tasks that you own, grouped by status and by policy type. Counts include attestation, certification, life-cycle, and health tasks as applicable. The Overdue tasks card for example, is a count of all open tasks, including those from CMDB Data Manager that are assigned to you, or to an assigned group in the *Managed by Group* attribute which you are a member of. For CMDB Admins, tasks that aren't assigned to anyone are also included.

Task overview provides the following cards:

Overdue tasks

Overdue tasks, which are most urgent for you to review.

In-progress tasks

Tasks that have started, but not yet completed.

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Not started tasks

Tasks that haven't started.

Completed tasks

Completed tasks. The Closed card counts all tasks that are in a closed state ('Closed Complete', 'Closed Canceled', 'Closed Incomplete', and 'Rejected')?

Excluded records

Records such as CIs that are set to be excluded for the tasks.

Certification tasks

Lists any Data Certification tasks assigned to you or to an assignment group that you belong to in accordance with CMDB Data Manager policies. For managers, tasks of direct reports are included, and for user group managers, tasks of members in the group are also included.

This card shows records from the CMDB Data Management Task [cmdb_data_management_task] table, in which *policy.cmdb_policy_type* = **Certification** (in addition to other filters).

Review and process these tasks by checking audit results for the associated CIs and attribute values. For more information about reviewing Data Certification tasks, see Review certification tasks.

Attestation tasks

Lists any attestation tasks assigned to you or to an assignment group that you belong to in accordance with CMDB Data Manager Attestation policies. For managers, tasks of direct reports are included, and for user group managers, tasks of members in the group are also included.

This card shows records from the CMDB Data Management Task [cmdb_data_management_task] table, in which *policy.cmdb_policy_type* = **Attestation** (in addition to other filters).

Review and process these attestation tasks by checking the physical existence of IT infrastructure or applications associated with the CIs in the tasks. For information about reviewing and processing attestation tasks, see Review CMDB Data Manager attestation tasks in CMDB Workspace or in Service Graph Workspace.

Life-cycle tasks

Lists life-cycle tasks (policy type is *Retire*, *Archive*, *Delete*, or *Delete related entry*), generated by the CMDB Data Manager, assigned to you or to an assignment group that you belong to in accordance with CMDB Data Manager policies. The list includes tasks that are in a closed state ('Closed Complete', 'Closed Canceled', 'Closed Incomplete', and 'Rejected'). For managers, tasks of direct reports are included, and for user group managers, tasks of members in the group are also included.

For information about reviewing and processing life-cycle tasks, see Review CMDB Data Manager tasks.

Lists view in Service Graph Workspace

The Lists view in Service Graph Workspace provides access to CIs within the CMDB hierarchy and to records in tables that aren't descendants of the Configuration Item [cmdb_ci] table, but are important in the CMDB ecosystem.

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Access

Navigate to **Workspaces** > **Service Graph Workspace**, and then in the navigation panel, select the Lists icon.

Role required: sn_cmdb_user, sn_cmdb_editor, or sn_cmdb_admin

Default lists

Provides lists of records from the associated list tables as specified in the Platform table UX List Menu Configuration [sys_ux_list_menu_config] table, in the Service Graph Workspace record. By default, the list contains related tables that are referenced in commonly used CI classes, and tables that a CMDB Admin might need to update records in.

Initially, the default lists are:

- CMDB Groups:
  - Source table: CMDB Groups [cmdb_group]
  - More information: CMDB groups
- CI Identifier:
  - Source table: Identifiers [cmdb_identifier]
  - More information: Identifiers in identification rule sets which are defined for different classes of CIs. For more information, see Create a CI identification rule
- Relationships:
  - Source table: CI Relationship [cmdb_rel_ci]
  - More information: CI relationships in the CMDB
- Tags:
  - Source table: Key Value [cmdb_key_value]
  - More information: To manage a tag, select a tag, and then in CI Form select Tags and in the Tags card select **Manage**. For more information, see Manage CI details using CI Form in Service Graph Workspace
- Switch Forwarding Rules:
  - Source table: Switch Forwarding Rule [dscy_swtch_fwd_rule]
  - More information: Network switch and router discovery
- Switch Partitions:
  - Source table: Switch Partition [dscy_swtch_partition]
  - More information: Network switch and router discovery
- Switch Ports:
  - Source table: Switch Port [cmdb_switch_port]
  - More information: Layer 2 discovery
- Switchports:

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- Source table: Switchport [dscy_switchport]
- More information: Network switch and router discovery

- TCP Connections:
  - Source table: TCP Connection [cmdb_tcp]
  - More information: TCP connection discovery

Users with the sn_cmdb_editor or sn_cmdb_admin roles, can select **New** to add a record to the list table.

My lists

Custom and shared lists where you can select **Create new list** to create a new custom list associated with the logged on user. For more information, see Create a custom list in the Lists view in Service Graph Workspace.

Configuration identifiers framework

Configuration identifiers provide a framework that lets you customize some behaviors of a Service Graph Workspace feature, enabling different settings for that feature, on different workspaces. Most importantly, you can use this customization framework when integrating a Service Graph Workspace feature into another workspace.

Configuration identifier

A configuration identifier (also referred to as config identifier) is a configuration element within the configuration identifiers framework. A config identifier contains custom settings for a Service Graph Workspace feature, that is applicable to a specific workspace. A config identifier contains settings and table-driven configurations used in a UX application such as a workspace. Using config identifiers lets you for example, integrate Service Graph Workspace Unified Map into another workspace, with the integrated Unified Map being customized for the workspace. Config identifiers are stored in the Config identifiers [sn_cmdb_ws_config_identifier] table.

A config Identifier acts as the parent record for a set of configurations that are specific to a workspace and therefore overrides default behavior only for that workspace.

Default config identifier

Initially, the Config identifiers [sn_cmdb_ws_config_identifier] table in Service Graph Workspace, contains a single config identifier named 'Default' and which is workspace-agnostic. This Default config identifier has its *Default* column set to **Yes**, a setting that can't be modified. Only a single config identifier can be set to **Yes**, therefore, any additional config identifiers that you create are set to **No**.

The default config identifier contains default settings for Service Graph Workspace features. Any subsequent Config Identifier that you configure, is set for a specific workspace. When integrating a Service Graph Workspace feature into another workspace and there are no entries in the table-driven configuration for that feature, look-up uses the settings in the default configuration identifier.

Key roles

The following roles are needed in order to use the configuration identifiers framework:

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- sn_cmdb_ws.config_editor: Can modify child config tables, such as sn_cmdb_ws_config_property.
- sn_cmdb_ws.config_admin: Can modify both sn_cmdb_ws_config_identifier and child config tables.
- sn_cmdb_admin: Role required to modify default config records under the default identifier or the default identifier itself.

For more information about these roles, see Components installed with Service Graph Workspace.

Examples of Service Graph Workspace features using the configuration identifiers framework for feature settings

- Unified Map:
  - Configure how many nodes can appear on a map
  - Configure the default or maximum number of levels on maps
  - Configure endpoint de-duplication on maps
  - Configure which attributes to display in the Attributes panel
  - Create a class profile of visible layers for classes
  - Configure CIs to appear based on life cycle stage value
- Create CI:
  - Request additional attributes for new CIs
  - Limit the class list for new CIs created in a workspace

Configuring Service Graph Workspace

Plan and configure your implementation of Service Graph Workspace.

1. Set up Service Graph Workspace

   Request the store app and enable demo data.

2. Configure any of the following options to show the most relevant data in your organization:
   - Modify important actions on the Governance view of Service Graph Workspace
   - Configure datacenters for Cloud vs Non-cloud resources in Service Graph Workspace
   - Configure classes for Cloud vs Non-cloud resources in Service Graph Workspace
   - Request additional attributes for new CIs
   - Limit the class list for new CIs created in a workspace
   - Create a custom list in the Lists view in Service Graph Workspace

Set up Service Graph Workspace

Set up and access CMDB Workspace and then switch to using Service Graph Workspace.

Use the sections in this topic to try and then switch into using Service Graph Workspace:

1. Request and install the latest CMDB Workspace store app.
2. Optionally, enable demo data for the app.

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3. Review the prerequisites for CMDB Workspace.
4. From within CMDB Workspace, switch into using Service Graph Workspace.

> **Note:**
> CMDB Workspace and Service Graph Workspace can't be active at the same time. You can use only one of those at any given time.

Request apps on the Store

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

> **Note:**
> The CMDB Workspace store app is automatically installed when installing or upgrading the product.

Enable demo data

Enable demo data to install demo data-specific scheduled jobs that if the needed requirement is met, generates and populates demo data in CMDB Workspace and Service Graph Workspace cards such as:

- Cloud vs Non-cloud resources chart: If Cloud Service Accounts [cmdb_ci_cloud_service_account] table exists
- Cards in the CMDB 360 view: If CMDB 360 is enabled
- Cards in the Insights view, CMDB Feature Adoption tile:
  - CIs processed by IRE
  - CIs processed by IRE based on source
  - Data Manager
  - Data attestation
  - Query Builder
  - Intelligent Search
- Cards in the What's new tile in the Service Graph Workspace landing page.

To populate Service Graph Workspace dashboards with demo data:

1. When installing the CMDB Workspace store app, check **Load demo data**.
2. Access the *[Demo] – CMDB Workspace demo data* scheduled job and select **Execute Now**.

> **Note:**
> As a general practice, don't enable demo data in a production instance to prevent demo data mixing with real production data.

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Prerequisites

- Plugins:
  - Recommended: CSDM Activation (com.snc.cmdb.csdm.activation)

    Allows for legacy *`Lifecycle Status`* field mappings and synchronization to legacy status fields. For details about use and customization of retirement definitions when this plugin isn't activated, see Retirement definitions.
  - Required (activated by default): CMDB CSDM Support (com.snc.cmdb.csdm)
  - Required (activated by default): CMDB Page Templates (sn_cmdb_pg_templts)
  - Required (activated by default): CMDB NLQ Search Connected (sn-cmdb-nlq-search)

  For details about activating a plugin, see Activate a plugin.
- Roles: To access the Service Graph Workspace, you must, at a minimum, have one of the following roles, which are essential for interacting with the Service Graph Workspace. Depending on which of these roles is assigned to you, you might only have access to some of the features available in the Service Graph Workspace:
  - sn_cmdb_admin
  - sn_cmdb_editor
  - sn_cmdb_user

  Note:
  As you drill down in the Service Graph Workspace, there are some dashboards and list views that require specific roles in addition to the key CMDB Admin, CMDB Editor, or CMDB User roles.
- Features: Service Graph Workspace provides access to a wide range of applications and features. However, for Service Graph Workspace to provide meaningful reports, overviews, and trends, you must set up and configure some of those features. Setup for such features is listed under Additional requirements.

Switch to Service Graph Workspace

After installing CMDB Workspace, administrators can try out Service Graph Workspace and also let users try Service Graph Workspace. After experimenting with the features that Service Graph Workspace provides, you can switch into permanently using Service Graph Workspace instead of CMDB Workspace. Once switching, CMDB Workspace is turned off, and using Service Graph Workspace applies to all users.

To switch to Service Graph Workspace and turn off CMDB Workspace:

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the Home view in CMDB Workspace, select **Try new workspace** or **Retry new workspace** in the Try the new Service Graph Workspace banner.

   This lets CMDB administrators experience using Service Graph Workspace.
3. Select **Show banner** in the Let other users try the new Service Graph Workspace.

   This shows a banner for all CMDB users, where they can select **Try new workspace** to also experience the use of Service Graph Workspace.

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4. In the Data Governance view in Service Graph Workspace, select **Switch now** in the Make the permanent switch to Service Graph Workspace banner.

   This sets the system to permanently use Service Graph Workspace instead of CMDB Workspace.

For information about the different views in Service Graph Workspace, see Exploring Service Graph Workspace.

Access Service Graph Workspace

Use either of the following methods:

- Navigate to **All** > **Workspaces** > **Service Graph Workspace**.
- Select **All** in the navigation filter, and then enter `service graph workspace`.

Modify important actions on the Governance view of Service Graph Workspace

Modify the appearance order and other properties of the important action cards that appear on the Governance view of Service Graph Workspace.

Before you begin

Role required: sn_cmdb_admin

About this task

The task cards that appear in the Important actions tile on the Governance view of Service Graph Workspace, are stored in the CMDB WS Imp Action Card Config [sn_cmdb_ws_imp_action_card_config] table. You can edit some attributes of these cards, including the setting that controls whether a specific card appears at all. Cards in the Important actions tile are available only for the CMDB Admin [sn_cmdb_admin] and the CMDB Editor [sn_cmdb_editor] user roles and each is configured per one of those roles.

There is some overlap in the task cards that appear for a CMDB Admin and for a CMDB Editor, however, the filters in those task cards are different. Typically, for CMDB Admins, the card filter also includes unassigned tasks that a CMDB Admin needs to assign.

Only editing is possible, you can't add or delete action records in this table.

Procedure

1. Navigate to **All**.
2. In the navigation filter, enter `sn_cmdb_ws_imp_action_card_config.list`.
3. In the list view of the table, edit the table row that you want to modify or click the row to open the record form.

Field	Description
Persona	The logged on user (such as CMDB Admin) for which this card appears. You can't edit this field.
Type	Tasks group that this task belongs to, such as Duplicate CIs.

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Field	Description
	You can't edit this field.
Table	The table used in the card filter. You can't edit this field.
Active	Determines whether the card for this action appears in Service Graph Workspace.
Order	Numeric value that determines the order of each card within the rest of the cards in the Important actions tile. Cards with lower order numbers appear before cards with higher order numbers.
Filter condition	Filters for the tasks that are included for the card.
List columns	Columns that appear in the list view when you click a card to show its associated tasks.
List groupby	Attribute to group by the card's associated tasks in the card's list view. The card's list view appears when you click a card to show its associated tasks.

4. Select **Update**.

Configure datacenters for Cloud vs Non-cloud resources in Service Graph Workspace

The Cloud vs Non-cloud resources chart in the insights view in Service Graph Workspace determines which CIs and service instances (application services) are stored on a cloud and which aren't in the organization. In addition to base system classifications, you can add cloud vs. non-cloud classifications that reflect specific datacenter deployments in the organization.

Before you begin

Role required: sn_cmdb_admin

About this task

The Datacenter Types [sn_cmdb_ws_datacenter_type] table stores datacenter classes with a classification of being used as a cloud storage or not in the organization. The calculations for the Cloud vs Non-cloud resources chart in the Insights view in Service Graph Workspace, reflects on the datacenters in that table and their classifications.

CIs are counted as non-cloud mainly if either of the following conditions is met:

- The CI is not associated with any datacenter.
- The CI is associated with a datacenter that is classified as non-cloud in the Datacenter Types table.

In the base system, the Datacenter Types table contains several common datacenters. For example, the Azure Datacenter [cmdb_ci_azure_datacenter] class is classified as 'Cloud'. Therefore, the Cloud vs Non-cloud resources chart includes in its calculations and bars the Azure Datacenter [cmdb_ci_azure_datacenter] class.

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Procedure

1. Select **All**.
2. In the Filter navigator, enter `sn_cmdb_ws_datacenter_type.list` to access the Datacenter Types table.
3. Select **New** and fill out the Datacenter Type form for a datacenter that is used in the organization.

Field	Description
Datacenter class	A child class of the Logical Datacenter [cmdb_ci_logical_datacenter] class which is used in the organization.
Type	Classification that reflects whether the specified **Datacenter class** is being used as cloud storage or not.
Cloud Provider	Custom label for the cloud provider.

4. Select **Submit**.

Configure classes for Cloud vs Non-cloud resources in Service Graph Workspace

Include or exclude pairs of CI Class/Type in the Cloud vs Non-cloud resources chart that appears in the Insights view in Service Graph Workspace.

Before you begin

Role required: sn_cmdb_admin

About this task

The CMDB Insight Query Categories [sn_cmdb_ws_insight_query_category] table contains the pairs of *CI Class*/*Type* for the Cloud vs Non-cloud resources chart that appears in the Insights view in Service Graph Workspace. The *Active* setting in a record determines if the respective *CI Class*/*Type* pair appears in the chart. By default, all pairs are configured to appear in the chart.

A *CI Class*/*Type* pair appears or doesn't appear according to its *Active* setting and regardless of the status of its associated scheduled job.

Procedure

1. Select **All**.
2. In the Filter navigator, enter `sn_cmdb_ws_insight_query_category.list` to access the CMDB Insight Query Categories table.
3. Set *Active* to **true** or **false** for a CI Class/Type pair.
   For example, set *Active* to **false** for the **Applications**/**Non-cloud** pair. This setting will exclude from the chart all CIs in the Applications class which are determined to be non-cloud.

Request additional attributes for new CIs

Integrate a request for specific CI attributes when manually creating a new CI in your workspace. Then, when creating a new CI in the respective workspace, users can enter values for the requested attributes, as appropriate for the new CI.

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About this task

Creating a new CI is an experience in Service Graph Workspace which you might be integrating into another workspace. Within Service Graph Workspace, there are default settings for some of the behaviors of the create CI experience. However, you can use configuration identifiers to customize some of those default settings for Service Graph Workspace or other workspaces. For example, you can customize the list of attributes that is requested for the new CI.

Requests for additional attributes for new CIs are stored in the CI additional attributes config [sn_cmdb_ws_ci_additional_attributes] table which is part of the configuration identifiers framework. Therefore, to manage requests for additional attributes in your workspace, you must use config identifiers. By default, the CI additional attributes config table contains a single entry for Service Graph Workspace, that applies to the entire CMDB hierarchy. Any workspace or class without a direct config identifier for additional attributes, uses the default entry.

For more information:

- About configuration identifiers, see Configuration identifiers framework.
- About the experience of manually creating a new CI in Service Graph Workspace, see Create a CI manually in Service Graph Workspace.

Before you begin

Role required: sn_cmdb_ws.config_editor

Procedure

1. Navigate to **All** and in the navigation filter, enter `sn_cmdb_ws_ci_additional_attributes.list` to access the CI additional attributes config table.
2. On the table list view page, select **New** and fill out the form.

Field	Description
Config identifier	Name of a configuration identifier from the Config identifier [sn_cmdb_ws_config_identifier] table. The default value of 'Default' is used as a fallback for any workspace without its own config identifiers.
CI class	Class for which the specified additional attributes will be requested when creating a new CI.
Active	Option to activate or deactivate the request for the additional attributes when creating a new CI.
Additional attributes	List of class attributes that will be requested when creating a new CI of the **CI class**.
Apply to hierarchy	Apply the request for additional attributes to all classes descending from the specified **CI class**.

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Field	Description
Feature	Pre-set to 'Create CI'.

3. Select **Submit**.

Result

When manually creating a new CI for the specified **CI class** in the respective workspace, users are requested to enter values for the specified **Additional attributes** on the Additional attributes page.

Limit the class list for new CIs created in a workspace

Limit the selection of classes for a new CI being manually created in your workspace, to only those classes that are relevant to that workspace. When then creating a new CI in the respective workspace, users can only select a class that is authorized as an option.

About this task

Creating a new CI is an experience in Service Graph Workspace which you might be integrating into another workspace. Within Service Graph Workspace, there are default settings for some of the behaviors of the create CI experience. However, you can use configuration identifiers to customize some of those default settings for Service Graph Workspace or other workspaces. For example, you can customize the list of classes to choose from, for the new CI.

By default, when creating a new CI in Service Graph Workspace, the list of classes to choose from for the new CI, contains almost all classes in the CMDB hierarchy. For your workspace, it might be important to reduce that list to specific classes or hierarchy branches.

Settings for specific classes available for new CIs are stored in the CI class config [sn_cmdb_ws_ci_class_config] table which is part of the configuration identifiers framework. Therefore, to manage the list of classes for new CIs in your workspace, you must use config identifiers. To manage that list, you must create a config identifier for each class or hierarchy branch that you want to include or exclude in the class drop-down list. By default, the CI class config table contains a single entry for the Configuration Item [cmdb_ci] class, which is derived by the entire CMDB hierarchy. Any class or workspace without direct config identifiers for inclusion or exclusion, uses the default entry.

For more information:

- About configuration identifiers, see Configuration identifiers framework.
- About the experience of manually creating a new CI in Service Graph Workspace, see Create a CI manually in Service Graph Workspace.

Before you begin

Role required: sn_cmdb_ws.config_editor

Procedure

1. Navigate to **All** and in the navigation filter, enter `sn_cmdb_ws_ci_class_config.list` to access the CI class config table.
2. On the table list view page, select **New** and fill out the form.

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Field	Description
Config identifier	Name of a configuration identifier from the Config identifier [sn_cmdb_ws_config_identifier] table. The default value of 'Default' is used as a fallback for any workspace without its own config identifiers.
CI class	Class to be included or excluded from the list of classes available for a new CI.
Active	Option to activate or deactivate the setting in the experience of creating a new CI.
Feature	Pre-set to 'Create CI'.
Apply to hierarchy	Apply the class setting to all classes descending from the specified **CI class**.
Operation	Include or exclude the **CI class** in the list of classes for a new CI.

3. Select **Submit**.

Result
When manually creating a new CI in the respective workspace, the specified **CI class** is included in the **Class** drop-down list on the Select class page only if it is set to be available.

Create a custom list in the Lists view in Service Graph Workspace

Create your own lists of classes that you can then navigate in the Lists view in Service Graph Workspace to explore data.

Before you begin
Role required: admin

Procedure
1. Navigate to **Workspaces** > **Service Graph Workspace** and then in the navigation panel, select the Lists icon.
2. In Lists view, select the My lists tab and then select **Create new list**.
3. Fill out the fields in the New List dialog box.

   Select either of the following tabs and then fill out the fields that appear. Drop-down selections are limited to what you have access to:

   - Start from existing: Create another version of an existing list.
   - Create your own: Create a new list that is based on an existing table.

Field	Description
Name the new list	Display name for the new list.

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Field	Description
Select a list	Select an existing list, that the new list will be based on.
Select a source	System table that you want to use for your custom list.The system only displays tables that your role has access to. After you select a list, additional fields are displayed on the pop-up.
Select columns	Columns that are picked from the selected system table to be included in the new custom list. Select an empty space in the field to open the list of values that you can choose from. Options are based on the table in **Select a source** and some columns might be preselected based on the selected list.
Add Filters	Condition builder to create filters for the data included and how data should be sorted.

4. Select **Create**.

Create a CI manually in Service Graph Workspace

Create a CI in Service Graph Workspace, while applying Identification and Reconciliation Engine (IRE) processes and other requirements for the CI's class. IRE identification rules enforce the new CI to be unique and to comply with other class requirements.

About this task

Creating specialty CIs such as a service instance (application service), isn't supported in this Create CI experience. Typically, such CIs aren't discoverable and you must create them manually using specific wizards, such as the Application service (service instance) wizard.

You can access the Create CI experience in either of the following ways:

- Selecting the **Create CI** link in the Management tools, Create section on the Governance view of Service Graph Workspace which lets you then select a class for the new CI.
- Drilling down a class group bar in the CI Summary tab on the CI overview tile, in which case the class you are drilling down from becomes the class for the new CI. This option is available only if you drill down a class that isn't excluded for the Create CI experience. For information about excluding classes for the Create CI experience in Service Graph Workspace, see Limit the class list for new CIs created in a workspace.

As you progress through the procedure, fields appear dynamically according to your selections and entries on the current or previous pages.

To manually create a new CI without applying IRE processes (Core UI), see Populating the CMDB. For more information about mandatory attributes, IRE processes, dependent CIs, and the CI relationship editor (Core UI), see:

- Set a CI attribute to be mandatory
- Identification rules
- CMDB classifications and class dependency
- CI relationship editor

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Before you begin

Configure any customizations to the create CI experience before creating new CIs:

- Complete any request by an administrator for additional non-mandatory attributes. For information about how an administrator can use configuration identifiers to incorporate requests for attributes into the flow of creating a new CI, see Request additional attributes for new CIs.
- Complete any settings for limiting the list of classes available to choose from, for a new CI. For information about how an administrator can use configuration identifiers to create a custom list of classes for a new CI, see Limit the class list for new CIs created in a workspace.

If you want additional actions to be performed after creating a CI, such as creating a record that references the new CI, implement the ManualCreateCIExtPoint extension point:

- In the `getAppId()` function, add the sys_id of the application containing the workspace from the UX Application [sys_ux_page_registry] table.
- In the `postInsertCI()` function, define the additional actions you want to perform.

Your extension point implementation runs after a new CI is created in the application specified in `getAppId()`. You can create additional implementations as needed for additional applications. For more information about extension points, see Using extension points to extend application functionality.

Role required: cmdb_manual_ci_ire_access (contained in the sn_cmdb_editor role by default)

Procedure

1. Navigate to **Workspaces** > **Service Graph Workspace**.
2. On the Governance view of Service Graph Workspace, use one of the following options:

   - Select the **Create CI** link, and then:
     a. On the **Select class** page, select the class for the new CI from the **Class** drop-down list. Classes without a valid identification rule are grayed out in the list and you can't select them.
     b. Select **Continue**.
   - On the CI overview tile, select the CI Summary tab, and then:
     a. Select the group bar with the class that you want to create the new CI in.
     b. Scroll down to the list view for the class group, and select the class in which you want to create the new CI.
     c. On the class list view page, select the **Create CI** button.

     Note:
     If you selected a class that is excluded from the Create CI experience, the **New** button appears. Select **New** to manually create a new CI without applying IRE processes (Core UI).

   Continue to fill out the rest of the Create a new CI pages as described in the following steps.

3. **Required attributes**:
   Configure attributes that are either mandatory for the new CI's class, or which the identification rule for the new CI's class requires. Also, if the new CI is a dependent CI, configure the dependency relationship.

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- In the Dependent-upon CI section, select a CI that the new CI depends on.

  Dependent-upon class: Select the class of the dependent-upon CI.

  Dependent-upon CI: Select the search icon and in the Dependent-upon CI dialog box, select a CI by selecting its link in the Name column.

- In the Identifier entries section, select criterion attributes and set their values to uniquely identify the CI.

  Criterion attributes: In the drop-down list, select one or more criterion attributes sets. This drop-down list omits criterion attributes that are based on the *Product instance identifier* attribute.

- In the criterion attribute fields section scroll down the page if needed and enter values for the criterion attributes fields for the CI.

Select **Continue**. If the new CI is detected as a duplicate of an existing CI, then the CI already exists dialog box appears. Select **Review existing CI** and then decide whether to change the existing or the new CI to prevent the duplication and to continue creating the CI.

4. **Additional attributes**:

   Enter values for attributes, such as *Operational status*, that your administrator is requesting in addition to the required attributes from previous pages.

   Select **Continue**.

5. **Relationship definition**:

   Review any existing relationships and decide whether to add a relationship for the new CI. For dependent CIs, a dependent relationship was already created in an earlier step.

   a. Select **Add**.

   b. On the Add relationships page, select a **Relationship type**.

      The Parent/Child notations in each relationship type denotes whether the new CI will have the role of a child or a parent in the new relationship.

   c. In the Configuration Item list, select the CIs that the new CI will have the relationship with. Whichever parent/child role you selected for the new CI, the selected CIs will have the other role.

   d. Select **Add**.

   Note:
   Creating relationships to the User and the Group tables is supported, however, those relationships aren't processed by IRE.

   On the Relationship definition page, select **Continue**.

6. **Review**:
   Review all the details of the new CI. Select **Create** to approve and create the new CI, or **Back** to change definitions.

7. In the New CI created dialog box, select **Done** to exit the operation, **Review new CI** to open the form view for the new CI, or **Create another CI**.

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Result
In the new CI, *Discovery source* is set to **Manual via IRE**.

What to do next
You can view the new CI or other CIs, using CI Form in Service Graph Workspace. For more information about using the CI Form, see Manage CI details using CI Form in Service Graph Workspace.

Manage CI details using CI Form in Service Graph Workspace

Use CI Form in Service Graph Workspace or in another workspace, to view, edit, and manage details of a CI such as its attributes, related lists, and CMDB 360 records. When updating CIs, IRE rules are applied to avoid potential issues such as duplicate CIs. CI Form supports derivation of form configurations throughout the CMDB hierarchy.

The CI Form feature is a centralized location with a comprehensive set of CI details, organized in sections. Anywhere Service Graph Workspace provides a function to view a CI record, such as a list or a chart, CI Form is used for the selected CI when you select that function. Use the forms provided by CI Form to examine and edit CI attributes, relationships, tags, services and offerings, CMDB Health and CMDB 360 data associated with the CI, related lists, and activities.

General operations you can perform in CI Form:

- Select the Now Assist for CMDB CI Summarization skill: Requires that Now Assist for CMDB is set up. For more information, see Configure the CI summarization skill.
- Select **Open map** to open the CI map in Unified Map. This function isn't available for a non-operational CI. For information about using the *Life cycle stage* attribute to define a CI's operational state, see Configure CIs to appear based on life cycle stage value.

In general, a CMDB Admin and a CMDB Editor can view and edit CI records, and a CMDB User can view CI details on the form.

Explore CI view

By default, CI Form uses the Explore CI view, which is stored in the UI Views [sys_ui_view] table. The Explore CI view defines the structure of the view, its sections and attributes, and related lists that appear on the form. The system provides predefined Explore CI forms for many CMDB classes. Those forms are derived by child classes, which don't have their own form definition, throughout the CMDB hierarchy.

The various sections in Explore CI view are described in this topic.

Configuration

You can control the use and content of CI Form as follows:

- Set system property *sn_cmdb_ws.explore_ci.record.enabled*:

  This property toggles the use of CI Form when viewing CI records in Service Graph Workspace, or in another workspace, if applicable. This property is set to **true** by default, enabling the experience of CI Form. For more information about this property, see Components installed with Service Graph Workspace.

- Configure the Explore CI view:

  Select the More Actions icon (...) on the form and then select an option to modify the Explore CI view:

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- Select **Configure attributes** to modify the Summary and Attributes sections on the form, in Form Builder. For example, to add sections, modify section titles or the attributes included in sections: Requires the personalize_form user role.

  For more information about Form Builder and Table Builder, see Forms in Table Builder and Add fields to a form layout in Table Builder.

- Select **Configure resources** to modify the Resources section on the form. For example, to add or remove subsections or items within subsections: Requires the personalize_list user role.

Highlighted attributes

Several key attributes are preconfigured to be highlighted on a CI form when specific conditions are met. Those highlights are meant to draw your attention to specific states, which are either healthy, or that indicate a problem and require your attention. Attribute highlight definitions are stored in the Highlighted Values [sys_highlighted_value] ServiceNow AI Platform table, which you can search for records where *Table* is prefixed by 'cmdb_ci'. For example, the *operational_status* attribute is configured as follows:

- If the attribute value is '**Operational**', then the attribute appears with a green highlight.
- If the attribute value is anything other than '**Operational**', then the highlight is red.

To see those preconfigured highlight records that are used in CI Form and in various other Service Graph Workspace features, navigate to **All** > **Workspace Experience** > **Administration** > **Highlighted Values**.

For more information about configuring attribute highlights in the ServiceNow AI Platform, see Highlight list fields.

Summary

By default, the Summary tile shows the most meaningful CI attributes and appears at the top of all other form sections. You can select **Show more** or **Show less** to adjust the page layout. The Summary tile shows attributes such as *Created*, key ownership attributes such as *Managed by*, and other important attributes such as *Discovery source* and *Operational status*. The attributes that appear in this section map to the first section defined in the Explore CI view.

By default, the Important attributes tile shows CI attributes such as *Operating System* and *Serial number*. The attributes that appear in this tile map to the *Important attributes* section defined in the Explore CI view, if one exists.

Role requirements for operations in this section:

- Editing attributes by selecting the Edit icon: Permitted for attributes that you have permission to
- Modifying this section in the Explore CI view: personalize_form

Attributes

This section shows all the UI sections that are configured in the Explore CI view for the class, excluding:

- The first section (which populates the Summary tile).
- The Important attributes section, if one exists (which populates the Important attributes tile).

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Select **Attributes** to access the subsections within. By default, the Discovery and the Operational attribute subsections map to the Discovery and the Operational sections in the Explore CI view. The All subsection shows all the CI attributes. Mandatory attributes are noted on the form by an "*" and must be set with a value.

When updating CI attributes, any Identification and Reconciliation Engine (IRE) rules that exist for the CI class are applied to help prevent potential problems with the update. IRE processes detect potential issues such as CI duplication and a dependent CI missing valid parent relationships. In these situations, the update is paused and you're presented with mitigation options to avoid the issue. Applying IRE processes might result in a partial update of attributes as reconciliation rules might block updates to some attributes and enable updates of others.

If there are no IRE rules for the class, the CI is updated directly without using IRE processes.

A CI that is updated in CI Form, has its *discovery_source* attribute set to **Manual via IRE** unless you set it to a different value.

More information:

- Identification and Reconciliation engine (IRE)
- Reconciliation rules
- Identification rules
- Mandatory attributes

Role requirements for operations in this section:

- Updating attributes: sn_cmdb_editor
- Modifying this section in the Explore CI view: personalize_form

Tags

This section shows the list of tags, stored as key/value pairs in the Key Values [cmdb_key_value] table. These tags are typically associated with CIs and resources for cloud providers such as Amazon Web Services and Google Cloud Platform, and in general are referred to as cloud tags. Cloud tags are used in ITOM applications, such as Tag Governance, and function as key dependencies in Tag-based discovery in Service Mapping. Discovery and Service Graph Connectors automatically populate cloud tags, which can then be grouped and managed as needed in an organization.

The Tags section in CI Form doesn't contain details about Platform tags, which are another type of tags that are stored in the *Tags* column that exists in most platform tables.

To manage tags, select **Manage** in the Tags tile, and then, in the Manage tags dialog box you can:

- Enter a **Key** and a **Value** pair, and then select the Add new tag ('+') icon.
- Select the Delete tag icon for a tag.
- Modify the **Key** or the **Value** fields for a tag.
- Select **Save** to save any changes to tags.

Managing tags requires the sn_cmdb_editor user role.

More information:

- Tag-based discovery in Service Mapping
- Data collected for Amazon AWS Cloud Discovery
- Data collected for Microsoft Azure Cloud Discovery

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Resources

This section shows resources linked to the CI, and maps to the Related Lists specified in the Explore CI view. By default, resources include tables such as File Systems [cmdb_ci_file_system], Software Installed [cmdb_ci_spkg], and Network Adapters [cmdb_ci_network_adapter].

In this section, you can:

- Select **Manage** to add or remove records from a resource list, which is applicable to related lists that have many-to-many relationships. If you're authorized to update in the Service Graph Workspace scope, then you're navigated to a list selector for the resource where you can add or remove multiple items. If you aren't authorized, then you're navigated to the Core UI experience.
- Select one or more related items and then select the **Delete** button, which is visible only if you have delete access to any of the related list tables.
- Select **New** to add a related list item. The **New** button is available for all the resource tables that you have access to.

  Important notes about creating a new related list item:

  - If the related list table is within the cmdb_ci hierarchy, has an IRE identification rule, and isn't an excluded table, then you're navigated to the Create CI experience in Service Graph Workspace or another workspace if applicable. In the Create CI experience, some CI attributes are pre-populated with the proper values for the class. For example, in the Required attributes section for dependent CIs, the **Dependent-upon CI** attribute is pre-populated with the parent of the current CI. Relationships and resources are also pre-populated according to the CI class definitions.

    For information about the Create CI experience, see Create a CI manually in Service Graph Workspace.
  - If the related list table doesn't have an IRE identification rule, then you're navigated to a basic list view page instead of CI Form.
  - The system automatically creates the matching reference back to the current class. For example, for a dependent CI the system creates the file system and the necessary relationship to connect the file system to the computer CI.
  - For some resources such as CI IPs, **New** isn't available and the **Dependent-upon CI** isn't pre-populated. This behavior applies to CIs with scripted relationships.
  - After creating a new related list item, select the Refresh List icon to show the new record in the list on the Resource section.
- Configure the Resources section in the Explore CI view by selecting the More actions icon and then selecting **Configure resources**. Use the related lists slushbucket to add or remove resources and then select **Save**: Requires the personalize_list role.

Role requirements for operations in this section:

- Configuring resources in the Explore CI view: personalize_list
- Creating, updating, or deleting records in related tables included as Resources for a CI record: Requires create, update, and delete access to the resource table.

Activity

This section shows related items such as open incidents and the activity stream for the CI on the following tabs:

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Related items

Pie charts that by default include Open incidents (Incidents table), Open changes (Change Request table), and Open problems (Problem table), broken down by priority or state.

In this tab, you can:

- Select a chart to drill down to the records associated with different chart sections. Depending on configuration, records open in Service Graph Workspace or in another workspace.
- Configure the list of tables for which charts appear, which is stored in the Explore CI Related Item Configurations [sn_cmdb_ws_explore_ci_related_item_config] table. You can add records to that table, or modify behavior settings such as where a record opens when selected: Requires the sn_cmdb_ws.config_editor role.
- Configure your preferences for which of the available charts appear when you log in. Select the Related Item Settings icon in the Related Items tab and in the Related item settings dialog box, select any charts that you prefer to hide.

CI history

History of the activities related to the CI, such as value changes in the CI attributes, listed in chronological order.

More information:

- Problem Management
- Incident Management
- Change Management

Role requirements for operations in this section:

- Accessing the Explore CI Related Item Configurations [sn_cmdb_ws_explore_ci_related_item_config] table to configure the list of charts that appear in the Related Items tab: sn_cmdb_ws.config_editor
- Configuring your preferences for which related item charts appear by selecting the Related Item Settings icon in the Related Items tab: Any logged in user

Relationships

This section shows the CI relationships, which include:

- Total relationships: Total number of relationships for this CI
- Duplicate relationships: Total number of duplicate relationship for this CI
- Stale relationships: Total number of stale relationship for this CI

In this section, you can:

- Switch between the following view types:
  - Tree view: Shows the downstream and upstream relationships in a tree format. You can expand and collapse any level that you want to see more or less details for.
  - Flat view: Shows the CI relationships in a flat view. You can adjust the number of levels of relationships to show, or filter to show only specific CIs.

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- Select **Edit relationships** to open Unified Map for the CI in edit mode and with the following map settings:
  - Home node set to the current CI.
  - Relationship levels set to 1 level.
  - Layers set to show Business, Service Instances, Applications, and infrastructure.
  - Layout is set to Vertical.

  This function isn't available for a non-operational CI. For information about using the *Life cycle stage* attribute to define a CI's operational state, see Configure CIs to appear based on life cycle stage value.

  If the CI class is a Service Instance [cmdb_ci_service_auto] or a derived class, then you must either use Service Mapping (if installed) to edit a map for a Service Instance, or edit dependency relationships in Unified Map.
- Select **Refresh** after saving changes in Unified Map, to reflect your updates in the Relationship section.

More information about relationships and about editing relationships in Unified Map:

- CI relationships in the CMDB
- Edit relationships in Unified Map
- CI relationship editor
- Service Mapping
- Unified Map

Role requirements for operations in this section: **Edit relationships** requires sn_cmdb_editor

Services and Offerings

This section shows cards with counts of the following services and offerings associated with the CI:

- Service Instance: Any CI related to the Service Instance [cmdb_ci_service_auto] table where *Service Classification* is **Application Service**.
- Business Service Offering: Any Service Instance (*Service Classification* is **Application Service**) that this CI is related to, and which has a relationship to Service_Offering where *Service Classification* is **Business Service**.
- Technology Management Offering: Any Service Instance (*Service Classification* is **Application Service**) that this CI is related to, and which has a relationship to Service_Offering where *Service Classification* is **Technical Service** or the CI is related to a Dynamic CI Group, which is part of a Technical Service Offering.
- Technology Management Service: Parent of a Technology Management Offering.

Select a tile to drill down to the specific records associated with the tile.

More information:

- CSDM terms
- Service Delivery domain in the CSDM model
- Access CSDM features

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- CSDM implementation stage — Walk
- Application services

Health

This section shows aggregations from the latest CMDB Health test results for the Completeness, Correctness, Compliance, and Relationship KPIs, and the aggregated state of attestation. Color codes are used to denote pass/fail scores.

This section shows meaningful details only if CMDB Health is set up and the associated dashboard jobs are running.

More information:

- CMDB Health
- CMDB Health KPIs and metrics
- CIs attestation
- Configuring CMDB Health

CMDB 360

This section shows discovery sources data from the CMDB 360 data store for the CI. It shows the CI attributes and for each attribute, its current CMDB value, and any values that were reported by discovery sources for that attribute.

This section appears only if CMDB 360 is enabled and configured.

More information:

- CMDB 360/Multisource CMDB
- CMDB 360 experience in CMDB Workspace and in Service Graph Workspace
- Configure the CMDB 360 dashboard in CMDB Workspace or in Service Graph Workspace

Resume a disabled Cloud vs Non-cloud resources scheduled job

Reactivate a scheduled job to resume data collection for the Cloud vs Non-cloud resources chart that appears in the Insights view in Service Graph Workspace.

Before you begin

Role required: cmdb_query_builder (contained in the sn_cmdb_user, sn_cmdb_editor, sn_cmdb_admin user roles)

About this task

The Cloud vs Non-cloud resources chart in Service Graph Workspace uses several scheduled jobs that gather and calculate the data for the charts. Each bar in the CI classes chart represents a pair of a CI class and a storage type (cloud, non-cloud) such as Applications/Cloud. Each bar is associated with its own scheduled job. When a scheduled job exceeds its limits of time and amount of collected data, it is automatically stopped. A job that can't complete for 3 (default) consecutive days is automatically disabled for future runs.

Use the following procedure to later resume that disabled scheduled job.

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Procedure

1. Select **All**.
2. In the Filter navigator, enter `sysauto_query_builder.list` and open the Scheduled Email of Query Builders table.
3. In the **Scheduled Email of Query Builders** list view, set **Active** to **true** for the scheduled job to resume.

Edit a related table from CMDB performance insights in Service Graph Workspace

Edit a related table on the Related Entries [cmdb_related_entry] table directly from the CMDB performance insights tool in the Service Graph Workspace Insights view. Update the related table to correctly reference another CI in the Referenced field when a reference is missing from the related table.

Before you begin
Role required: sn_cmdb_admin (CMDB Admin) and any role needed to access a related table.

About this task
A record is missing a reference when the **Referenced** field for that record is empty. CMDB performance insights enables you to easily edit related tables that are missing a reference after you drill down on a slice of the Related records missing reference chart.

You can see the full list of related tables and associated referenced fields in the Related Entries [cmdb_related_entry] table.

Procedure

1. Navigate to **Workspaces** > **Service Graph Workspace**, and then on the navigation panel, select the Insights icon.
2. On the Insights page navigation pane, select **Performance insights**.
3. On the CMDB performance insights page, navigate to the Related records tile on the **Payloads & CIs** tab and then select a slice of the chart in the Related records missing reference by table card.
4. Select a check box next to a record and then select **Edit**.
5. Specify applicable CMDB CI references and then select **Update**.

Edit a data source from CMDB performance insights in Service Graph Workspace

Edit a data source for your Service Graph Connectors to specify the data that an import set should ingest. Consider configuring a batch process to make ingestion more efficient and improve performance.

Before you begin
Role required: sn_cmdb_admin (CMDB Admin) and import_admin.

Procedure

1. Navigate to **Workspaces** > **Service Graph Workspace**, and then on the navigation panel, select the Insights icon.
2. On the Insights page navigation pane, select **Performance insights**.
3. On the CMDB performance insights page, select the Sources with batch processing turned off card on the Service Graph connectors tab.
4. On the Data sources list view, select a check box next to a record.

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5. Select **Edit**.
6. Configure the data source.
   For more information about data sources, see:
   - Create a data source
   - Data source fields
7. Select **Update**.

Edit a scheduled data import from CMDB performance insights in Service Graph Workspace

Edit a scheduled data import directly from CMDB performance insights for your Service Graph Connectors. Consider enabling Concurrent Import with a custom size partition to split incoming data into multiple import sets and transform the import sets concurrently to reduce processing time.

Before you begin

Role required: sn_cmdb_admin (CMDB Admin) and one of these roles:

- import_scheduler
- import_admin

Procedure

1. Navigate to **Workspaces** > **Service Graph Workspace**, and then on the navigation panel, select the Insights icon.
2. On the Insights page navigation pane, select **Performance insights**.
3. On the CMDB performance insights page, on the Service Graph connectors tab, select the Sources with concurrent import turned off card or the Sources with non-custom size partition method card.
4. In the Scheduled Import sets list view, select a check box next to a record.
5. Select **Edit**.
6. Configure the scheduled data import.
   You may need to change your application scope to create or edit a scheduled data import from Service Graph Workspace.

   For more information about updating a scheduled data import, see Schedule a data import.
7. Select **Update**.

Service Graph Workspace reference

Reference topics provide additional information about components such as properties, installed with Service Graph Workspace and class-specific criteria for the Cloud vs Non-cloud resources chart.

Class criteria in Cloud vs Non-cloud resources chart in Service Graph Workspace

The Cloud vs Non-cloud resources chart provides counts for several key classes. The chart uses different classes and relationship criteria for each class to determine which resources count as cloud and which count as non-cloud.

The Cloud vs Non-cloud resources chart shows in the CI overview tile in the Service Graph Workspace store app.

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Virtual Machine Instance [cmdb_ci_vm_instance]:

- Cloud:

  Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Datacenter class (one of the configured cloud datacenters) -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Datacenter class (one of the configured non-cloud datacenters)

- Total: Equals the record count in the Virtual Machine Instance [cmdb_ci_vm_instance] table (unless there are Virtual Machine Instance records without any relationships)

Server [cmdb_ci_server]:

- Cloud:

  Server [cmdb_ci_server] -> (Virtualized by::Virtualizes) -> Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Datacenter (one of the configured cloud datacenters) -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  Server [cmdb_ci_server] -> Virtual Machine Instance [cmdb_ci_vm_instance] -> Datacenter class (one of the configured non-cloud datacenters)

  OR

  Server [cmdb_ci_server] has no relationships with Virtual Machine Instance [cmdb_ci_vm_instance]

- Total: Equals the record count in the Server [cmdb_ci_server] table (unless there are Server records without any relationships)

Application [cmdb_ci_appl]:

- Cloud:

  Application [cmdb_ci_appl] -> (Runs on::Runs) -> Server [cmdb_ci_server]-> (Virtualized by::Virtualizes) -> Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Datacenter (one of the configured cloud datacenters) -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

  OR

  Application [cmdb_ci_appl] -> (Hosted on::Hosts) -> Datacenter class (one of the configured cloud datacenters)-> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  Application [cmdb_ci_appl] -> Server [cmdb_ci_server] -> Virtual Machine Instance [cmdb_ci_vm_instance] -> Datacenter Datacenter class (one of the configured non-cloud datacenters)

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OR

Application [cmdb_ci_appl] -> Server [cmdb_ci_server] -> no relationship with Virtual Machine Instance [cmdb_ci_vm_instance]

- Total: Equals the sum of Cloud + Non-Cloud (not the record count in the Application [cmdb_ci_appl] table)

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]:

- Cloud:

  Kubernetes Cluster [cmdb_ci_kubernetes_cluster] -> (Hosted on::Hosts) -> Datacenter (cloud logical data center) -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  Kubernetes Cluster [cmdb_ci_kubernetes_cluster] -> Datacenter (non-cloud logical datacenter)

  OR

  Kubernetes Cluster [cmdb_ci_kubernetes_cluster] -> no relationship with -> Datacenter

- Total: Equals the record count in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table (unless there are Kubernetes Cluster records without any relationships)

Database Instance [cmdb_ci_db_instance]:

- Cloud:

  Database Instance [cmdb_ci_db_instance] -> (Runs on::Runs) -> Server -> (Virtualized by::Virtualizes) -> Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Logical Datacenter (one of the configured cloud datacenters)-> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

  OR

  Database Instance [cmdb_ci_db_instance] -> Logical Datacenter [cmdb_ci_logical_datacenter] (one of the configured cloud datacenters)-> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  Database Instance [cmdb_ci_db_instance] -> Server [cmdb_ci_server] -> Virtual Machine Instance [cmdb_ci_vm_instance] -> datacenter (non-cloud logical datacenter)

  OR

  Database Instance [cmdb_ci_db_instance] -> Server [cmdb_ci_server] with no relationship -> Virtual Machine Instance [cmdb_ci_vm_instance]

- Total: Sum of Cloud + Non-cloud (can be less than total number of records, subtracting the badly created records)

Storage Volume [cmdb_ci_storage_volume]:

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• Cloud: cmdb_ci_storage_volume -> (Hosted on::Hosts) -> Logical Datacenter [cmdb_ci_logical_datacenter] (one of the configured cloud datacenters)-> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account] • Non-Cloud: cmdb_ci_storage_volume -> Logical Datacenter [cmdb_ci_logical_datacenter] (one of the configured non-cloud datacenters) OR cmdb_ci_storage_volume -> no relationships with Datacenter
Cloud Object Storage [cmdb_ci_cloud_object_storage]: • Cloud: Cloud Object Storage [cmdb_ci_cloud_object_storage] -> (Hosted on::Hosts) -> Logical Datacenter [cmdb_ci_logical_datacenter] -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account] (requires CMDB CI Class Models) • Non-Cloud: N/A (This table can never have non cloud records)
Service Accounts [cmdb_ci_cloud_service_account]: • Cloud: datacenter_type attribute is populated with correct datacenter class • Non-Cloud: N/A (This table can never have non-cloud records)

Components installed with Service Graph Workspace

Several types of components are installed with the activation of the CMDB Workspace (sn_cmdb_ws) plugin, which includes Service Graph Workspace. This includes properties, tables, user roles, and scheduled jobs.

> **Note:**
> The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

In addition, the CMDB Workspace plugin adds the CMDB Group type 'CMDB Workspace'. For components associated with the CMDB Data Manager, see Components related to CMDB Data Manager.

Properties installed

The following properties are installed by the Configuration Management (CMDB) (com.snc.cmdb) plugin which is included in base systems.

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Property	Description
sn_cmdb_ws.ci_overview.managed_by_me.enabled	Shows/hides the My CIs section of CI Overview on the CMDB Workspace landing page, for users with sn_cmdb_editor role. • Type: true | false • Default: true • Location: Add to System Properties [sys_properties] table.
sn_cmdb_ws.total_cis.enabled	Shows/hides the Total CIs section on the CMDB Workspace landing page. • Type: true | false • Default: true • Location: Add to System Properties [sys_properties] table.
sn_cmdb_ws.ms.discovery_source_not_reporting_max_days	Number of days after which if one or more discovery sources stop reporting CIs, that CI is included in the CIs not reported by discovery sources chart in the CMDB 360 view. • Type: integer • Default: 7 • Location: Navigate to **Workspaces** > **CMDB Workspace** and then select **CMDB 360**. Select Settings and configure **Number of days since CIs were last discovered by a discovery source** in the Potential issues section. • Learn more: Configure the CMDB 360 dashboard in CMDB Workspace or in Service Graph Workspace.
sn_cmdb_ws.ms.report_max_limit	Maximum number of records that appear as list views when drilling down from the following charts:

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Property	Description
	• CIs not reported by discovery sources • Data mismatch • CIs by number of discovery sources • CIs with a single source Details: • Type: integer • Default: 100,000 • Location: Navigate to **Workspaces** > **CMDB Workspace** and then select **CMDB 360**. Select Settings and configure **Maximum number of records to process** in the Global section. • Learn more: Configure the CMDB 360 dashboard in CMDB Workspace or in Service Graph Workspace.
sn_cmdb_ws.unifiedmap.map_search_filter.default_levels	Initial default number of levels from the home node, up and down the CMDB hierarchy, to show on a map. Up the hierarchy goes from all parents to their parents up to the specified level. Down the hierarchy goes from all children to their children up to the specified level. • Type: integer • Default: 3 • Location: Add to System Properties [sys_properties] table. Editing affects all users and requires the sn_cmdb_admin user role.
sn_cmdb_ws.unifiedmap.map_search_filter.max_levels	Maximum number of levels from the home node, up and down the CMDB hierarchy, to show on a map. Up the hierarchy goes from all parents to their parents up to the specified level. Down the hierarchy goes from all

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Property	Description
	children to their children up to the specified level. • Type: integer • Default: 25 • Location: System Properties [sys_properties] table Editing affects all users and requires the sn_cmdb_admin user role.
sn_cmdb_ws.list.record_count_limit	The maximum number of results that the system counts for when using conditional search to search for CIs on the Home view in CMDB Workspace. This count shows for example, at the top of the search results list. • Type: integer • Default: 100,000 • Location: Add to System Properties [sys_properties] table. • More information: CMDB Workspace store app For example, if a limit of 100,000 is reached, the count shows "100,000 +" to indicate that counting stopped at 100,000 and that there are additional uncounted results. Increasing the value of this property directly results in greater impact on performance. However, if a precise count is needed, set this limit to a number that isn't reached by the anticipated count.
sn_cmdb_ws.explore_ci.record.enabled	Enables the use of the CI Form feature when selecting CIs to view in CMDB Workspace or in another workspace. When false, the system shows CI records in a basic list view instead of CI Form. You might need to temporarily disable the

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Property	Description
	CI Form experience if its not yet ready to be used. For example, you might need to migrate previous custom configurations to CI Form to prepare it for use. • Type: true | false • Default: true • Location: Add to System Properties [sys_properties] table. • More information: Manage CI details in CI Form

Roles installed

The following roles are installed by the Configuration Management (CMDB) (com.snc.cmdb) plugin which is included in base systems. These roles are required for access and interaction with the CMDB Workspace, and are included for completeness.

Note:
On an instance that has been upgraded directly from Xanadu or Yokohama to the Zurich release: To correctly configure some of the user roles as described below, such as CMDB Admin and CMDB Editor, you must run the '*Remove CMDB Roles from ITIL roles and Add CUD access to sn_cmdb_admin/sn_cmdb_editor roles*' scheduled job. For more information about this scheduled job and its use, see Zurich release notes.

Role title [name]	Description	Role containment
CMDB Admin [sn_cmdb_admin]	Provides the highest level of access to tools and UIs within CMDB Workspace, including full access to the Configuration Item [cmdb_ci] table. A CMDB Admin, for example, can set policies in the CI Class Manager and service instance (application service) requirements. CMDB Admin can also modify default config records under the default identifier or the default identifier itself.	Contains: • data_manager_admin • canvas_admin • sn_cmdb_editor • cmdb_ms_admin • cmdb_dedup_admin
CMDB Editor [sn_cmdb_editor]	Provides access to tools and UIs within CMDB Workspace including full access to the Configuration Item [cmdb_ci] table.	Contains: • sn_cmdb_user • cmdb_ms_editor

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Role title [name]	Description	Role containment
	A CMDB Editor has writing privileges to CMDB Data Manager tasks and to CIs but can't change policies such as in the CMDB Data Manager or in the CI Class Manager.	
CMDB User [sn_cmdb_user]	Provides read-only access to the CMDB data and to basic UIs such as CMDB reports and dashboards, within CMDB Workspace.	Contained by: itil (indirectly) Contains roles: • canvas_user • data_manager_user • cmdb_ms_user
Multisource CMDB Admin [cmdb_ms_admin]	Provides full access to data, dashboard configurations, and queries related to Multisource CMDB and CMDB 360.	Contains: cmdb_ms_editor
Multisource CMDB Editor [cmdb_ms_editor]	Provides access to CMDB 360 records and enables users to create and edit CMDB 360 queries.	Contains: cmdb_ms_user
Multisource CMDB User [cmdb_ms_user]	Provides read-only access to multisource data, CMDB 360 queries, and to related UIs such as CMDB 360 reports and dashboards, and Multisource Report Builder.	Contains: cmdb_read
Workspace Config Admin [sn_cmdb_ws.config_admin]	Provides an administrator full access to the Config identifiers [sn_cmdb_ws_config_identifier] table and its descendent config tables. Can modify non-default config or config identifier records. Since config tables contain properties which belong to different applications, Workspace Config Admins should only modify records related to their application.	Contains: sn_cmdb_ws.config_editor
Workspace Config Editor [sn_cmdb_ws.config_editor]	Provides editing access to child config tables such as the Workspace Config Properties [sn_cmdb_ws_config_property] table. Can modify non-default config records. Since config tables contain properties which belong to	

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Role title [name]	Description	Role containment
	different applications, Workspace Config Editors should only modify records related to their application.	
[cmdb_manual_ci_ire_access]	Provides access to the experience of manual CI creation in CMDB Workspace and in other workspaces.	

Scheduled jobs installed

Scheduled job	Description
CMDB Workspace Collection	Updates the information in all the 7-Day Activity charts such as the CI Activity in Last 7 Days chart.
Multisource Dashboard Analytics Population	Runs daily to calculate the aggregate statistics of CMDB 360 data and populates the CMDB 360 dashboard landing page.
Multisource Dashboard Collection	Collects CMDB 360 data and then invokes the *`Multisource Dashboard Analytics Population`* scheduled job.
Multisource Dashboard Data Generator (Demo data)	Demo job that populates CMDB 360 tables with simulated data, to showcase the CMDB 360 dashboard landing page. Runs on demand.
insight – cloud non-cloud aggregate	Runs every 30 minutes to collect data for the Cloud and non-cloud resources chart.
Insight - Cloud Applications	Collects cloud data for the cmdb_ci_appl table.
Insight - Non-cloud Applications	Collects non-cloud data for the cmdb_ci_appl table.
Insight - Cloud Object Storage	Collects cloud data for the cmdb_ci_cloud_object_storage table.
Insight - Cloud Service Account	Collects cloud data for the cmdb_ci_cloud_service_account table.
Insight - Cloud DB Instances	Collects cloud data for the cmdb_ci_db_instance table.
Insight - Non-cloud DB Instances	Collects non-cloud data for the cmdb_ci_db_instance table.
Insight - Cloud Kubernetes Cluster	Collects cloud data for the cmdb_ci_kubernetes_cluster table.

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Scheduled job	Description
Insight - Non-cloud Kubernetes Cluster	Collects non-cloud data for the cmdb_ci_kubernetes_cluster table.
Insight - Cloud Servers	Collects cloud data for the cmdb_ci_server table.
Insight - Non-cloud Servers	Collects non-cloud data for the cmdb_ci_server table.
Insight - Cloud Storage Volume	Collects cloud data for the cmdb_ci_storage_volume table.
Insight - Non-cloud Storage Volume	Collects non-cloud data for the cmdb_ci_storage_volume table.
Insight - Cloud VM Instances	Collects cloud data for the cmdb_ci_vm_instance table.
Insight - Non-cloud VM Instances	Collects non-cloud data for the cmdb_ci_vm_instance table.
CMDB Workspace – Populate aggregates Daily	Runs daily to collect the latest data from the instance for cards such as the CI Summary chart in the CMDB Workspace landing page, and the following cards in the Insights view: • CIs processed by IRE • CIs used in Data Manager policies • CIs used in data attestation • Query Builder queries • Intelligent search Populates the Base Aggregate Data [sn_cmdb_ws_base_aggregate_data] table with the collected data. Once collection completes, invokes the *CMDB Workspace Aggregates Daily Collection* scheduled job.
CMDB Workspace – Populate aggregates Monthly	Runs monthly to collect data from the instance for cards such as the following, in the Insights view: • CIs processed by IRE based on source • CIs processed by IRE Once collection completes, invokes the *CMDB Workspace Aggregates Monthly Collection* scheduled job.
CMDB Workspace Aggregates Daily Collection	A Performance Analytics job that stores the latest data generated by the *CMDB Workspace – Populate aggregates Daily* scheduled job. The stored data is then shown in respective cards in the Insights view.
CMDB Workspace Aggregates	A Performance Analytics job that stores the latest data generated by the *CMDB Workspace – Populate aggregates Monthly*

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Scheduled job	Description
Monthly Collection	scheduled job. The stored data is then shown in respective cards in the Insights view.
[Demo] — CMDB Workspace Collection	Supports demo data for CMDB Workspace charts in various views such as the Home view. Installed only if **Load demo data** was checked when the CMDB Workspace store app was installed or upgraded.
[Demo] — CMDB Workspace demo data	Activates demo data for CMDB Workspace charts in views such as the Insights view, and CMDB 360 view (if CMDB 360 is enabled). Populates the Base Aggregate Data [sn_cmdb_ws_base_aggregate_data] table with random numbers that illustrate trend lines in charts in the Home and Insights views. It then runs demo data collection scheduled jobs. Installed only if **Load demo data** was checked when the CMDB Workspace store app was installed or upgraded.
[Demo] CMDB Workspace Aggregates Daily Collection	A Performance Analytics job that supports demo data for CMDB Workspace charts in various views such as the Insights view and which is installed only if **Load demo data** was checked when the CMDB Workspace store app was installed or upgraded. Stores the demo data generated by the *`CMDB Workspace - Populate aggregates Daily`* scheduled job. The demo data is then shown in respective cards in the Insights view.
[Demo] CMDB Workspace Aggregates Monthly Collection	A Performance Analytics job that supports demo data for CMDB Workspace charts in various views such as the Insights view and which is installed only if **Load demo data** was checked when the CMDB Workspace store app was installed or upgraded. Stores the demo data generated by the *`CMDB Workspace - Populate aggregates Monthly`* scheduled job. The demo data is then shown in respective cards in the Insights view.
CMDB Workspace Collection On Demand With Lookback	Collects historical data (past 30 days) for some indicators such as the Integration outliers. Runs automatically during install or upgrade and isn't configured with any recurring schedule.
PopulateDuplicate Task Group Daily	Runs daily to populate the following tables: • Group Task Mapping [sn_cmdb_ws_reconcile_duplicate_task_group_m2m] • Remediate Duplicate Task Groups [sn_cmdb_ws_reconcile_duplicate_task_group] Reads de-duplication task data records and calculates the root cause analysis for the duplication.

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Scheduled job	Description
	Used in support of Now Assist for CMDB.

Tables installed

Table	Description
CMDB Group Metadata [sn_cmdb_ws_group_metadata]	CMDB group data with count of CIs in each group.
CMDB Group Query Metadata [sn_cmdb_ws_group_query_metadata]	Encoded queries with count of CIs in each encoded quer subgroup.
NLQ Sample Search [sn_cmdb_ws_nlq_sample_search]	Sample searches that appear when selecting the search box of an Intelligent Search for CMDB widget.
NLQ Sample Search Table [sn_cmdb_ws_nlq_sample_search_table]	References the actual tables associated with sample searches that appear when selecting the search box of a Intelligent Search for CMDB widget.
NLQ Excluded Table [sn_cmdb_ws_nlq_excluded_table]	Tables with ambiguous names that should be excluded from Intelligent Search. These tables won't appear in suggestions, and other tables with similar names are give higher priority in search results.
Important Actions Configuration [sn_cmdb_ws_imp_action_card_config]	Configuration of appearance and behavior of Important action cards that appear on the landing page of the CMD Workspace. Editing in this table is accessible only to user with the sn_cmdb_admin role. Authorized users can mod attributes of an important action such as Active and Filter conditions, but can't modify the Type, Persona, and Table attributes.
Quick Links [sn_cmdb_ws_quick_links]	Quick links that appear on the CMDB Workspace landing page.
CIs by Number of Sources [sn_cmdb_ws_ms_cis_by_number_of_sources]	CIs grouped by the number of discovery sources they we discovered by. Records appear as a list view when clickin on the CIs by number of discovery sources bar chart in th CMDB 360 view.
CIs With a Single Source [sn_cmdb_ws_ms_cis_with_single_source]	CIs reported by only one discovery source. Records appe as a list view when selecting the CIs with a single discove source chart in the CMDB 360 view.
CMDB Workspace Multisource Class Metadata [sn_cmdb_ws_ms_class_metadata]	Class configuration settings such as class selections and weights, that CMDB Admins can modify from the CMDB 3 view. Used by CMDB 360 analytics population queries to

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Table	Description
	store a sample set of coverage data for the CIs by numbe sources and CIs with a single source drill-downs cards.
Multisource Data Mismatch Records [sn_cmdb_ws_ms_data_mismatch]	Data mismatch records found from attribute discrepancie from various data sources. Records appear as a list view when selecting the Data mismatch chart in the CMDB 36 view.
CMDB Workspace Multisource Data Mismatch Configurations [sn_cmdb_ws_ms_data_mismatch_config]	Data mismatch settings, such as the selection of classes, attributes, conditions, and weights, that CMDB Admins ca modify in the CMDB 360 view. Used by CMDB 360 analyt population queries to store a sample set of data mismatc records in the sn_cmdb_ws_ms_data_mismatch table.
Discovery sources not reporting CIs [sn_cmdb_ws_ms_discovery_sources_not_reporting]	Data for when one or more discovery sources stop reporting CIs after the specific X number of days (X can be set in the CMDB 360 view and is stored in the sn_cmdb_ws.ms.discovery_source_not_reporting_max_d system property). Records appear as a list view when selecting the CIs not reported by discovery sources char the CMDB 360 view.
Multisource Workspace Settings Weight Type [sn_cmdb_ws_ms_settings_weight_type]	Weight type (automatic or manual) for data mismatch and coverage settings in CMDB 360 view.
Datacenter Types [sn_cmdb_ws_datacenter_type]	Classifications of datacenter classes which are considere cloud or non-cloud in the organization, which is used for Cloud and non-cloud resources chart.
CMDB Insight Query Categories [sn_cmdb_ws_insight_query_category]	Class categories and their status for inclusion in the Clou and non-cloud resources chart.
CMDB Insight Data [sn_cmdb_ws_insight_data]	Legacy table for storing data for the Cloud and non-cloud resources chart. Starting with CMDB Workspace version 3.4, the CMDB Product Insight Data [sn_cmdb_ws_product_insight_data table is used instead.
Base Aggregate Data [sn_cmdb_ws_base_aggregate_data]	Aggregation data for CMDB Workspace cards and parent table to other aggregation tables. When processing for a count completes, *State* of the existing record for that count is set to **retired** and a new record for that count is created with the updated count value. Cards in CMDB Workspace views show values only for counts where *Sta* = **ready**. Read only.
Service Graph Connector	Details about all Service Graph Connectors that are currently available in the ServiceNow Store (excluding

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Table	Description
[sn_cmdb_ws_service_graph_connector]	any Innovation Lab connectors). Data is used to provide a current count for the Service Graph Connectors card in th Insights view. Read only.
Rating Configuration [sn_cmdb_ws_rating_config]	Start and end values for different ratings of a category. Fo example, start and end values for low, moderate, and high adoption level ratings for the data governance category in the Insights view. Read only.
Feature Category [sn_cmdb_ws_feature_category]	Metadata of the feature card for most of the features at CMDB Workspace level. Read only.
CMDB Product Insight Data [sn_cmdb_ws_product_insight_data]	Aggregated count for each class and datacenter class, us for cards in the Insights view. Read only.
Feature Category Runtime Attributes [sn_cmdb_ws_feature_category_runtime_attribute]	Runtime attributes related to performance insights, that c be used when running various scheduled jobs. Read only.
Integration Aggregate Data [sn_cmdb_ws_integration_aggregate_data]	Integration outlier information related to performance insights. Details for each Integration with execution recor which contain processing rate or rows outliers. Read only.
Partial Payload Items [sn_cmdb_ws_partial_payload_item]	Extracted partial payload information related to performa insights. Includes discovery source, error, and class, associated with each partial payload item. Read only.
Application Service Insights Data [sn_cmdb_ws_app_svc_insight_data]	Service instances (application services) details such as classification (cloud vs. non-cloud, hybrid, or unknown) a count of CIs associated with the service instance. Read only.
Table Attributes [sn_cmdb_ws_node_map_table_attributes]	Set of extended properties, per class, that appear in the Attributes pane in the contextual side panel for a selecte in Unified Map.

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Table	Description
	This table leverages the use of the configuration identifie framework. For more information, see Configure which attributes to display in the Attributes panel.
Node Map Related Items [sn_cmdb_ws_node_map_related_item]	Categorization and order of related items, per class, that appear in the **Related items** panel, in CI badges, and on timeline in Unified Map. This table leverages the use of the configuration identifie framework. For more information, see Configure how to display relate items on the map.
Node Map References [sn_cmdb_ws_node_map_reference]	Reference relationships that appear as a dotted line relationship in Unified Map. This table leverages the use of the configuration identifie framework. For more information, see Configure display of connectio to a referenced class.
Class Icons [sn_cmdb_ws_class_icon]	Maps ServiceNow platform UI Builder (UIB) icon values (f example 'serverbox-outline') to CMDB class display name that they are used for (for example 'Network Disk') in Unifi Map.
Node Map Profiles [sn_cmdb_ws_node_map_profiles]	Class profiles that include default filters and some Unifie Map settings, per class. A class profile is applied if no filt preset is in effect, to the initial map and when setting the filter preset to `Default view`. Specifying a class profile can be especially useful for Service Mapping data with the Mapped Application Serv class. This table leverages the use of the configuration identifie framework. For more information, see Create a class profile of visible layers for classes.
CMDB Data Management Certification Task To Document [sn_cmdb_ws_dm_certification_task_to_document]	Mappings between certification tasks and each of their associated CI records targeted for certification.
CMDB Certification Attribute Status [sn_cmdb_ws_dm_certification_attribute_status]	Flattened failed attribute status JSON. Used for reporting certification exceptions.

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Table	Description
CMDB Data Management Task Execution Context [sn_cmdb_ws_dm_task_execution_context]	Mappings between tasks and a policy's' execution contex
Remediate Duplicate Task Groups [sn_cmdb_ws_reconcile_duplicate_task_group]	Groupings of de-duplication tasks, the CI class affected, discovery source associated with the de-duplication task and the CI identification rule that was used to discover th CIs. Used in support of Now Assist for CMDB. • sn_cmdb_admin role has create/write/delete privileges • sn_cmdb_user OR dedup_admin roles have read privileges
Group Task Mapping [sn_cmdb_ws_reconcile_duplicate_task_group_m2m]	Reference to the Remediate Duplicate Task Groups table and a root cause analysis summary of the reason that the Cis were added to the de-duplication task Used in support of Now Assist for CMDB. • sn_cmdb_admin role has create/write/delete privileges • sn_cmdb_user OR dedup_admin roles have read privileges
Config identifiers [sn_cmdb_ws_config_identifier]	Parent table of the configuration identifiers framework. By default, contains the 'Default' config identifier with defaul settings for various CMDB Workspace features. Stores any additional config identifiers, configured with custom settings for a CMDB Workspace feature, that is applicable to a specific workspace. For information about the configuration identifiers framework, see Configuration identifiers framework.
Workspace Config Properties [sn_cmdb_ws_config_property]	Collection of properties that control different behaviors ir Unified Map. This table leverages the use of the configuration identifie framework.
CI additional attributes config [sn_cmdb_ws_ci_additional_attributes]	Settings of requests for specific CI attributes when using CMDB Workspace feature of manually creating a new CI. This table leverages the use of the configuration identifie framework. For more information, see Request additional attributes fo new CIs.

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Table	Description
CI class configs [sn_cmdb_ws_ci_class_config]	Settings that limit the selection of classes for a new CI wh using the CMDB Workspace feature of creating manually new CI. This table leverages the use of the configuration identifie framework. For more information, see Limit the class list for new CIs created in a workspace.

CMDB Workspace store app

The CMDB Workspace is an efficient, central, and modernized way for you to work. Use CMDB Workspace to search and explore the CMDB, examine health and recent activities, and access CMDB dashboards and tools to support tasks in your organization.

Watch the following video to get started with CMDB Workspace. Depending on the version of your CMDB Workspace, some UI elements and features might differ.

https://player.vimeo.com/video/1108218170?h=1c80a14180&badge=0&autopause=0&player_id=0&app_id=58479

Get started

Explore	Configure	Reference
Learn about the different views in CMDB Workspace and how to use each to perform your assigned tasks.	Setup and configure CMDB Workspace.	Additional information about components such as properties, and class-specific criteria for the Cloud vs Non-cloud resources chart.

Troubleshoot and get help

- Now Assist for Configuration Management Database (CMDB)
- Ask questions and explore other resources for in the ServiceNow Community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring CMDB Workspace

Learn more about CMDB Workspace, its different views, and its benefits when using key CMDB features such as CMDB Health, CMDB Data Manager, and CMDB 360.

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CMDB Workspace overview

The CMDB Workspace is an efficient, central, and modernized way for you to work. Use CMDB Workspace to search and explore the CMDB, examine health and recent activity, and access various CMDB dashboards and tools to support tasks in your organization.

General interaction and additional information

- CMDB Workspace leverages many Performance Analytics capabilities and features, such as indicator sources. Throughout the CMDB Workspace views, you can select the various cards to drill down to Performance Analytics KPI Details panes that show trends for the associated data. On a KPI Details pane, you can modify different settings to change the scope of the data. You can also select **Show Records** to list the records associated with the chart.
- Lists throughout the CMDB Workspace have a filter icon that you can select to show the filter definition used for the list.
- You can open your Configurable Workspace experience in UI Builder to access and edit your CMDB Workspace experience.
- See List of workspaces for a list of all Workspaces that ServiceNow® provides.
- CMDB Workspace doesn't support domain separation.

CI details

When you drill down to CI details, how those details appear depends on system settings:

CI Form

By default, the system property *sn_cmdb_ws.explore_ci.record.enabled* is set to **true**, enabling the experience of the CI Form feature for viewing CI details. Using CI Form, you're navigated to a centralized location with a comprehensive set of CI details organized by sections. Use the forms provided by CI Form to examine and edit CI attributes, relationships, tags, services and offerings, CMDB Health and CMDB 360 data associated with the CI, related lists, and activities. When updating CIs in CI Form, IRE rules are applied to avoid potential issues such as duplicate CIs.

For more information, see:

- Components installed with CMDB Workspace: *sn_cmdb_ws.explore_ci.record.enabled* system property.
- Manage CI details in CI Form.

CI details pane

If *sn_cmdb_ws.explore_ci.record.enabled* is set to **false**, then the CI details pane is used for viewing CI details. When you drill down to a CI record in CMDB Workspace views and pages, the following details for the CI appear:

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- CI Timeline - Last 14 days: A timeline of CI activities such as change requests.

  Note:
  A CI timeline in CMDB Workspace fails to load when the number of any of the following activities exceeds its threshold:

  - History: 200
  - Incidents: 100
  - Requests: 50
  - Total Events: 200

  Select the **Open CI Timeline** link in the error message to open the CI timeline in the base system, which shows activities for the CI, up to the specified threshold numbers.

- CI Health: A summary of the health of the CI, showing related items such as critical incidents, incomplete attributes, and stale relationships for the CI.

  Role requirement: sn_cmdb_user or itil (for accessing incidents).

- Details: CI attributes, grouped into categories such as Key attributes, Asset attributes, Discovery attributes, Operational attributes, and More attributes.

  Note:
  Use the *CMDB - Workspace* form view for a CI class to configure which attributes appear.

- Activity: An activity stream to track what's changed in the CI record.
- Infrastructure Relationships: List of the infrastructure CIs related to the CI.
- Service Relationships: List of business applications, service offerings, and application services that the CI may be related to.

On the CI details pane, you can:

- Select **Open Dependency View** to open the Dependency Views map and display a graphic infrastructure view of the specific CI record.
- Select **View CMDB 360 Data** to show CMDB 360 details at the CI attribute level for the specific CI record.
- Select **Save** to save any changes made to attributes for the CI record.
- Select the More Actions icon (...) for additional functions:
  - Select **Create Change** to create a new change request for the CI record.
  - Select **Create Incident** to create a new incident for the CI record.
  - Select **Delete** to delete the CI record.

UI activity	Additional requirements
CI Details	

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UI activity	Additional requirements
Accessible to: CMDB Admin, CMDB Editor, CMDB User	
CI Health Accessible to: • Incidents card: sn_incident_read to view • Change requests card: sn_change_read to view • For remaining cards: At least sn_cmdb_user	itil
Related Open Changes Accessible to: CMDB Admin, CMDB Editor, CMDB User	sn_change_read role
Related Incidents Accessible to: CMDB Admin, CMDB Editor, CMDB User	sn_incident_read role
Related Alerts Accessible to: CMDB Admin, CMDB Editor, CMDB User	Event Management (com.glideapp.itom.snac) plugin evt_mgmt_user role Set up Event Management
Related Application Services Accessible to: CMDB Admin, CMDB Editor, CMDB User	app_service_user role
View CMDB 360 Data Accessible to: CMDB Admin, CMDB Editor, CMDB User	Enable and configure CMDB 360
Save Accessible to: CMDB Admin	
More Actions/Delete Accessible to: CMDB Admin	

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Shared pages

For information about the shared pages, see the Dev site as follows:

- CI Service Relationships
- CI Infrastructure Relationships

What to explore next

To learn more about configuring and using CMDB Workspace, see:

- CMDB views:
  - Home view in CMDB Workspace
  - My Work view in CMDB Workspace
  - CMDB 360 view in CMDB Workspace
  - Insights view in CMDB Workspace
  - Management view in CMDB Workspace
  - SGC Central view in CMDB Workspace (if installed)
- Configuring CMDB Workspace
- Resume a disabled Cloud vs Non-cloud resources scheduled job
- Edit a related table from CMDB performance insights
- Edit a scheduled data import from CMDB performance insights
- Components installed with CMDB Workspace

Home view in CMDB Workspace

Home view is the default view in CMDB Workspace. It shows important tasks that you should tend to, various counts for activities in CMDB such as new CIs, CMDB Health aggregations, and various charts. The Home view also provides several links with immediate access to key CMDB tools.

For Administrators, banners appear letting administrators try out Service Graph Workspace and also configuring the system to let users try Service Graph Workspace. For information about switching into permanently using Service Graph Workspace, see Set up Service Graph Workspace.

Access

Role requirements: sn_cmdb_admin (CMDB Admin), sn_cmdb_editor (CMDB Editor), or sn_cmdb_user (CMDB User).

To access the Home view, navigate to **Workspaces** > **CMDB Workspace** and then select **Home** in the CMDB Workspace menu bar.

Now Assist for CMDB

Select the Now Assist icon to access Now Assist for CMDB skills, agents, and agentic workflows.

For more information, see Now Assist for Configuration Management Database (CMDB).

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Intelligent Search

Accessible to: CMDB Admin, CMDB Editor, CMDB User.

Lets you use Natural Language Query (NLQ) search capabilities provided by Intelligent Search for CMDB. Use the input field to construct a search string using everyday language. As you type, a dynamic list of relevant suggestions appears, with items matching single words or part phrases in the typed-in text, such as table names.

You can:

- Select **Search tips** to see tips about constructing search strings. See details about the usage, examples for single and multi-table search, advanced filtering, and relationships in Intelligent Search.
- Select **Search** to either run the query if the search string is already fully converted into a valid CMDB query, or to open the Refine your query dialog box.
  - If the search string has no ambiguities with the table name or relationships, then the query runs and the results appear in a list view format.

    Only the first 100 results of the query appear in the results pane.
    - Select **Load More Results** to view the next set of 100 results.
    - Select **Load All Results** to view the rest of the query results, up to the number specified by the glide.cmdb.query.max_results_limit system property (10,000 by default).

    If the constructed CMDB query contains more than a single table, then the **View in Query Builder** button appears. Select the button to open the CMDB Query Builder with your query fully constructed on the Query Builder canvas. You can use the Query Builder to continue editing the query.
  - If there are any ambiguities with table names or relationship types in the search string, then the search string can't be converted into a valid CMDB query. In this case, the Refine your query dialog box appears letting you select from suggested CI classes and continue to parse your search string into a valid CMDB query. Those suggested CI classes are based on phrases in your search string. Use the drop-down lists to select the CI classes that match your intended search and then select **View search results** to run the query.
  - If Intelligent Search is unable to convert your search string into a valid CMDB query, then selecting **Search** doesn't generate any query results. Instead, a feedback form appears. Fill out the form and select **Submit Feedback** to record your feedback for your CMDB Admin to review.
- Use the Sample searches list to get you started in running a pre-defined search. This list consists of more common searches, or searches that are more difficult to construct such as searches that involve application services.
- Use the Your recent searches list to rerun a previous search.
- Select **Results Feedback** to submit feedback on the search results for your CMDB Admin to review.

For more details about using NLQ with Intelligent Search, see Intelligent Search for CMDB.

Alternatively, you can select **Use conditional search instead** to use a basic condition builder functionality where you can specify conditions to search for CIs of a specific class.

You can:

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- Select **New condition set** to add a condition phrase.
- Select **Related List Condition** to add a condition phrase for related lists.
- Select **Search** to search through the CMDB.
- Add and then adjust the *sn_cmdb_ws.list.record_count_limit* system property to limit the record count summation and so to minimize the performance impact of that operation. The record count shows on the Conditional search page, for example, above the results list. For more information about adding and modifying that system property, see Components installed with CMDB Workspace.

In the results list, select a CI to see its details.

UI activity	Additional requirements
• Mapped Application Service • Application Service • Application Service Group • Dynamic CI Group • Tag Based Service	app_service_user role
• Business Service • Technical Service • Application Service Outage	service_viewer role

Important actions

Accessible to: CMDB Admin and CMDB Editor.

Important actions of various categories that require your attention or action. There are several task categories such as:

- Health tasks generated by CMDB Health: In health-related cards, such as Duplicate CIs, Orphan CIs, stale CIs, and De-Duplication tasks, select **View CIs** or **View Tasks** to show the list of associated CIs or important tasks. In the CI list view page, you can select **CMDB Health Dashboard** to open the CMDB Health Dashboard. In de-duplication-related cards generated by IRE, you can access the De-duplication dashboard and de-duplication libraries, to remediate de-duplication tasks in bulk.
- Data attestation and life cycle approval tasks generated by the CMDB Data Manager: In data attestation-related cards, such as Reassignment Requests and Unassigned Overdue cards, select **View Tasks** to drill down to the associated important tasks.

Important actions are stored in the CMDB WS Imp Action Card Config [sn_cmdb_ws_imp_action_card_config] table that is accessible for editing only to users with the sn_cmdb_admin role. Authorized users can modify attributes of an important action such as *Active* and *Filter conditions*, but can't modify the *Type*, *Persona*, and *Table* attributes.

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- Important action cards show per the logged in user role, as specified in the CMDB WS Imp Action Card Config [sn_cmdb_ws_imp_action_card_config] table.
- A card appears only if there is at least one record that meets the card's filter condition.
- If you drill down a Health-related card and modify an associated CI, any resulting impact to health KPIs might appear only after the next cycle of the CMDB Health dashboard jobs.

For information about managing the cards in the Important actions tile, see Modify important actions on the Home view of CMDB Workspace.

What's new

Accessible to: CMDB Admin, CMDB Editor, CMDB User.

Counts of newly created CIs within a recent time interval. The New CIs total counts all CI types including applications, hardware, and application services, which also appear in separate cards in the tile. By default, historical data is aggregated for the **Last 24 hours**, which you can set to a different time interval such as **Last 7 days**.

Select a card to drill down to a Performance Analytics KPI Details pane that shows the trend for the respective item.

Counts in the What's new cards are based on the following tables:

Count	Table
New CIs	Configuration Item [cmdb_ci]
New application	Application [cmdb_ci_appl]
New hardware	Hardware [cmdb_ci_hardware]
New application services	Service Instance [cmdb_ci_service_auto]

CI overview

The following tabs provide summaries about CIs:

CI Summary

Accessible to: CMDB Admin, CMDB Editor, CMDB User (without tabs).

A chart of all CIs in the CMDB, grouped by up to 20 CMDB groups. The CMDB groups in the chart are specified as groups of closely-related classes. On this chart, you can:

- Select a bar to drill down to the classes in the group and their CIs.
- Drill down a CI to show the CI form with a timeline, health overview, and several types of attributes such as key and discovery attributes.
- Drill down a class to access the Create CI experience to create a new CI in the selected class. For more information about the Create CI experience which applies Identification and Reconciliation Engine (IRE) processes, see Create a CI manually in CMDB Workspace.
- Add custom class groups by creating CMDB groups with the following settings:

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- Group type is set to 'CMDB Workspace'.
- Populated by encoded queries.

Such custom class groups will appear after the next time that the *CMDB Workspace - Group* and *Encoded Query Counts* scheduled jobs run and update the CMDB Workspace.

Note:

In systems with a very large number of CIs, for example a billion or more CIs, the set of queries that populate the CI Overview widget might run for an unreasonable length of time. In that case, you can choose to switch the default queries with a set of simpler queries that can handle such load and properly load the CI Overview widget. However, the results yielded from the simpler queries aren't as complete or accurate as the results of the original queries. A fundamental difference between the original and the simpler queries is that the simpler queries use only Common Service Data Model (CSDM) attributes for CI status (such as *life_cycle_stage*), while the default queries also use the legacy *operational_status* and *status* attributes. In an environment that hasn't migrated to CSDM, the simple queries yield fewer results.

You can examine (read access only) the simple query in the *Simple Condition* column in the *cmdb_group_contains_encoded_query* table.

To use the simpler set of queries, set the *sn_cmdb_ws.ci_overview.enable_simple_condition* system property to **true** (**false** by default).

My CIs

Accessible to: CMDB Admin, CMDB Editor.

A chart of CIs with *Managed By Group* being one of the groups you are a part of. CIs are grouped by up to 20 common class categories such as *Applications*, *Devices*, and *Servers*. If there are more than 20 classes to show, then all remaining classes are lumped into one additional bar on the chart.

Select a class bar to drill down into the CIs for the class. Then drill down to a CI's form with a timeline, health overview, and several types of attributes such as key and discovery attributes.

Use the sn_cmdb_ws.ci_overview.managed_by_me.enabled property to show or hide this chart.

Cloud vs Non-cloud resources

Charts showing counts and details for resources that are hosted on various cloud services versus those resources that aren't, with breakdown by key CI classes such as applications, databases, and datacenters. Resources can be deployed on cloud services such as the Microsoft Azure Cloud, or on the local instance or other non-cloud solutions. For some ongoing operations in the organization, it might be necessary to have those details that can be difficult to obtain.

The following conditions must be met for the Cloud vs Non-cloud resources charts to appear and to show meaningful data:

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- The table Cloud Service Accounts [cmdb_ci_cloud_service_account] must exist.
- The Logical Datacenter [cmdb_ci_logical_datacenter] table must contain at least one record for a cloud datacenter.
- The Datacenter Types [sn_cmdb_ws_datacenter_type] table must contain at least one record for a datacenter that is classified as cloud storage in the organization. In the base system, this table is pre-populated with several records for common cloud services such as the Azure Datacenter [cmdb_ci_azure_datacenter] class. The chart calculates and shows data only for cloud services for which there's a record in the Datacenter Types [sn_cmdb_ws_datacenter_type] table.

  For details about adding datacenters in your organization, with the cloud or non-cloud classification, see Configure datacenters for Cloud vs Non-cloud resources.

The following cloud vs Non-cloud charts are available:

- CI classes bar chart:

  Each bar in the CI classes chart represents a pair of a CI class and a storage type (cloud, non-cloud), such as the bar for Applications/Cloud. For each bar, there's a scheduled job that runs every 24 hours to collect and calculate the data for the bar. The running time depends on the amount and complexity of the data that a job collects, which can be different for each scheduled job. Also, the schedules of the jobs are staggered so that they don't all run at the same time and exhaust resources. For details about the class-specific criteria used for the chart calculations, see Class criteria in Cloud vs Non-cloud resources chart.

  If there's a CI class/type pair that isn't important in the organization, you can exclude that pair from the CI classes chart. For more details, see Configure classes for Cloud vs Non-cloud resources.

  On the CI classes chart, you can:

  - Select a bar to open the Cloud vs Non-cloud resources pane. Then, select either of the following tabs to drill down into further details for the bar:

    Cloud vs Non-cloud CIs

    Shows a bar chart for CIs stored on a cloud service and those CIs that aren't, per CI class. For each CI class, select the cloud or the non-cloud bar to show the CIs that are associated with the selected bar, in a list view. You can then select a CI to see its details.

    CI Classes by Cloud Providers

    Pie charts per CI class with more granular details for those CIs that are hosted on cloud providers. Pie slices have randomly-selected colors, and they show a breakdown by cloud providers for various CI classes. For each pie, select a slice to show the CIs that are associated with the pie slice, in a list view. You can then select a CI to see its details.

  - Select **Latest updates** to see updated status for the scheduled jobs that produce the data for the chart. Status is color-coded to indicate whether the job has completed successfully (green), or failed to complete (red).

- Application Services pie chart:

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The Application Services pie chart uses the Service Configuration Item Associations [svc_ci_assoc] table and checks the cloud/non-cloud status of application service CIs in the CI classes chart. Application services in the Application Services pie chart are classified as follows:

- Cloud: All of the CIs in the application service have been determined to be hosted on a cloud service.
- Non-cloud: All of the CIs in the application service have been determined not to be hosted on a cloud service.
- Hybrid: The application service contains a mixture of CIs where some are hosted and some aren't hosted on cloud services.
- Unknown: The cloud/non-cloud classification couldn't be determined because some of the application service CIs aren't classified as cloud or non-cloud CIs.

Note:
Because classification of Application Services depends on the classification of CIs in the CI classes chart, there might be some discrepancy between the two charts. This can occur if an application service CI changed its cloud/non-cloud status, and the Application Services chart hasn't refreshed yet to reflect that change.

Select the Application Services chart to access the list views of the associated application services, grouped by cloud/non-cloud classifications. From those list views, you can drill down to the Dependency Views map for application services.

The scheduled jobs associated with the charts are set up with several hard-coded limits that if exceeded, result in failure conditions that are reflected in the job status. Timing out is set to two hours and the maximum number of records to collect is set to 500,000. If a job exceeds any of those limits, it's automatically stopped.

A scheduled job that can't complete for 3 (default) consecutive days is automatically disabled for future runs. You can manage the disabling of scheduled jobs, in the following ways:

- Modify the default number of consecutive days that are counted by adding the *sn_cmdb_ws.insight.category.disable_after_failure* system property to the System Properties [sys_properties] table and then setting its value. For more details, see Add a system property.
- Resume a disabled scheduled job.

UI activity	Additional requirements
• Mapped Application Service view • Application Service • Dynamic CI Group • Tag Based Service	app_service_user role

My work

Accessible to: CMDB Admin, CMDB Editor, CMDB User.

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All open tasks from CMDB Data Manager that are assigned to you, or to an assigned group in the *Managed by Group* attribute which you are a member of. For CMDB Admins, also tasks that aren't assigned to anyone so that CMDB Admins can assign those unassigned tasks. Tasks can be, for example, attestation tasks and life cycle-related tasks.

Select **Open tasks** and **Overdue tasks** to review and process the tasks.

CMDB Health

Accessible to: CMDB Admin, CMDB Editor, CMDB User.

KPIs health scores calculated by CMDB Health for CIs. Select a percentage number for a KPI to navigate to the KPIs tile on the CMDB Health Dashboard.

For more information, see CMDB Health, CMDB Health KPIs and metrics.

UI activity	Additional requirements
CMDB Health	asset or itil role Configuring CMDB Health

Quick links

A list of links to key CMDB dashboards and tools. You can add a link to the list of quick links that are available to you.

- Dependency Views: Provides a graphic infrastructure view for a CI and any application or business services that it's part of and that it supports.
- Query Builder: Easily build complex infrastructure and service queries, that span multiple CMDB classes, non-CMDB tables, and that can involve many CIs that are connected by different relationships.
- Data Manager: Centrally create, edit, review, publish, and track Data Manager policies and the tasks generated by the policies.
- CI Class List: List view of CMDB CIs grouped by common classes.
- Unified Map: Graphical map showing the hierarchy of CIs and the relationships between them, and application services. Directly from the map, you can access attributes of CIs and relationships, and related items such as changes, incidents, and problems for a CI.
- CMDB Health Dashboard: View CMDB Health reports and configure the CMDB health KPIs and metrics that CIs are evaluated by in CMDB Health dashboards.
- Relationship Health Dashboard: View the Relationship Health Dashboard with CMDB Health scores for CI relationship.
- Create CI: Create a new CI while enforcing Identification and Reconciliation Engine (IRE) processes and other requirements that result in a valid and unique CI.
- Data Certification Dashboard: View Data Certification instances, tasks and status such as past due certification tasks. Drill down to specific tasks to reassign them for faster resolution.
- CMDB Coverage Dashboard: Show details of CMDB discovery completeness by correlating IP addresses from IPAM systems with discovered configuration items (CIs).

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UI activity	Accessibility	Additional requirements
Dependency View	CMDB Admin, CMDB Editor, CMDB User	dependency_views role
Query Builder	CMDB Admin, CMDB Editor, CMDB User	cmdb_query_builder_read role
Data Manager	CMDB Admin	
Add or edit a custom quick link	CMDB Admin, CMDB Editor, CMDB User	

Cloud vs Non-cloud resources chart

The Cloud vs Non-cloud resources chart appears on the Home view in CMDB Workspace.

Charts showing counts and details for resources that are hosted on various cloud services versus those resources that aren't, with breakdown by key CI classes such as applications, databases, and datacenters. Resources can be deployed on cloud services such as the Microsoft Azure Cloud, or on the local instance or other non-cloud solutions. For some ongoing operations in the organization, it might be necessary to have those details that can be difficult to obtain.

The following conditions must be met for the Cloud vs Non-cloud resources charts to appear and to show meaningful data:

- The table Cloud Service Accounts [cmdb_ci_cloud_service_account] must exist.
- The Logical Datacenter [cmdb_ci_logical_datacenter] table must contain at least one record for a cloud datacenter.
- The Datacenter Types [sn_cmdb_ws_datacenter_type] table must contain at least one record for a datacenter that is classified as cloud storage in the organization. In the base system, this table is pre-populated with several records for common cloud services such as the Azure Datacenter [cmdb_ci_azure_datacenter] class. The chart calculates and shows data only for cloud services for which there's a record in the Datacenter Types [sn_cmdb_ws_datacenter_type] table.

  For details about adding datacenters in your organization, with the cloud or non-cloud classification, see Configure datacenters for Cloud vs Non-cloud resources.

The following cloud vs Non-cloud charts are available:

- CI classes bar chart:

  Each bar in the CI classes chart represents a pair of a CI class and a storage type (cloud, non-cloud), such as the bar for Applications/Cloud. For each bar, there's a scheduled job that runs every 24 hours to collect and calculate the data for the bar. The running time depends on the amount and complexity of the data that a job collects, which can be different for each scheduled job. Also, the schedules of the jobs are staggered so that they don't all run at the same time and exhaust resources. For details about the class-specific criteria used for the chart calculations, see Class criteria in Cloud vs Non-cloud resources chart.

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If there's a CI class/type pair that isn't important in the organization, you can exclude that pair from the CI classes chart. For more details, see Configure classes for Cloud vs Non-cloud resources.

On the CI classes chart, you can:

- Select a bar to open the Cloud vs Non-cloud resources pane. Then, select either of the following tabs to drill down into further details for the bar:

  Cloud vs Non-cloud CIs

  Shows a bar chart for CIs stored on a cloud service and those CIs that aren't, per CI class. For each CI class, select the cloud or the non-cloud bar to show the CIs that are associated with the selected bar, in a list view. You can then select a CI from the list to further drill down to the CI details pane.

  CI Classes by Cloud Providers

  Pie charts per CI class with more granular details for those CIs that are hosted on cloud providers. Pie slices have randomly-selected colors, and they show a breakdown by cloud providers for various CI classes. For each pie, select a slice to show the CIs that are associated with the pie slice, in a list view. You can then select a CI from the list to further drill down to the CI details pane.

- Select **Latest updates** to see updated status for the scheduled jobs that produce the data for the chart. Status is color-coded to indicate whether the job has completed successfully (green), or failed to complete (red). You can also see the *Active* state of each scheduled job. If you have administrative privileges, you can activate/deactivate selected jobs or select **Activate/Deactivate (all)** to toggle the state of all jobs at once.

- Application Services pie chart:

  The Application Services pie chart uses the Service Configuration Item Associations [svc_ci_assoc] table and checks the cloud/non-cloud status of application service CIs in the CI classes chart. Application services in the Application Services pie chart are classified as follows:

  - Cloud: All of the CIs in the application service have been determined to be hosted on a cloud service.
  - Non-cloud: All of the CIs in the application service have been determined not to be hosted on a cloud service.
  - Hybrid: The application service contains a mixture of CIs where some are hosted and some aren't hosted on cloud services.
  - Unknown: The cloud/non-cloud classification couldn't be determined because some of the application service CIs aren't classified as cloud or non-cloud CIs.

  Note:
  Because classification of Application Services depends on the classification of CIs in the CI classes chart, there might be some discrepancy between the two charts. This can occur if an application service CI changed its cloud/non-cloud status, and the Application Services chart hasn't refreshed yet to reflect that change.

  Select the Application Services chart to access the list views of the associated application services, grouped by cloud/non-cloud classifications. From those list views, you can drill down to the Dependency Views map for application services.

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The scheduled jobs associated with the charts are set up with several hard-coded limits that if exceeded, result in failure conditions that are reflected in the job status. Timing out is set to two hours and the maximum number of records to collect is set to 500,000. If a job exceeds any of those limits, it's automatically stopped.

A scheduled job that can't complete for 3 (default) consecutive days is automatically disabled for future runs. You can manage the disabling of scheduled jobs, in the following ways:

- Modify the default number of consecutive days that are counted by adding the *sn_cmdb_ws.insight.category.disable_after_failure* system property to the System Properties [sys_properties] table and then setting its value. For more details, see Add a system property.
- Resume a disabled scheduled job.

My Work view in CMDB Workspace

Use the My Work view in CMDB Workspace to manage your tasks. Tasks in this view are related to data compliance such as attestation, certification, and other life-cycle tasks.

For CMDB administrators, lists of tasks can also contain unassigned tasks, for reassignment. For managers, tasks of direct reports are included, and if you are a manager of a user group, then tasks of members in that group are also included.

Access

Role requirements: sn_cmdb_admin (CMDB Admin), sn_cmdb_editor (CMDB Editor), or sn_cmdb_user (CMDB User).

To access the My Work view, navigate to **Workspaces** > **CMDB Workspace** and then select **My Work** in the CMDB Workspace menu bar.

Task status

The Task status section provides overall counts of tasks by their status. Counts in each status card are for attestation, certification, and life-cycle tasks as applicable. Total tasks for example, is a count of all open tasks from CMDB Data Manager that are assigned to you, or to an assigned group in the *Managed by Group* attribute which you are a member of. For CMDB Admins, also tasks that aren't assigned to anyone are included. The Closed card counts all tasks that are in a closed state ('Closed Complete', 'Closed Canceled', 'Closed Incomplete', and 'Rejected').

Select a status card to show the associated tasks in the various lists such as **Attestation tasks** and **Certification** tabs in the My tasks section. For example, when you select the In progress status card in the Task status section, the **Attestation tasks** list shows attestation tasks that are in progress and the **All other tasks** list shows all non-attestation and non-certification tasks that are in progress.

Certification tasks

The **Certification tasks** tab in the My tasks section lists any Data Certification tasks assigned to you or to an assignment group that you belong to in accordance with CMDB Data Manager policies. For managers, tasks of direct reports are included, and for user group managers, tasks of members in the group are also included. Review and process these tasks by checking audit results for the associated CIs and attribute values. For more information about reviewing Data Certification tasks, see Review certification tasks.

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Attestation tasks

The **Attestation tasks** tab in the My tasks section lists any attestation tasks assigned to you or to an assignment group that you belong to in accordance with CMDB Data Manager Attestation policies. For managers, tasks of direct reports are included, and for user group managers, tasks of members in the group are also included. Review and process these attestation tasks by checking the physical existence of IT infrastructure or applications associated with the CIs in the tasks. For information about reviewing and processing attestation tasks, see Review CMDB Data Manager attestation tasks in CMDB Workspace or in Service Graph Workspace.

The **Overdue tasks** tab lists those tasks that are overdue so you can review those tasks at a higher priority.

Life-cycle tasks

The **All other tasks** tab in the My tasks section lists any tasks, aside from attestation and certification tasks, assigned to you or to an assignment group that you belong to in accordance with CMDB Data Manager policies. The list includes tasks that are in a closed state ('Closed Complete', 'Closed Canceled', 'Closed Incomplete', and 'Rejected'). For managers, tasks of direct reports are included, and for user group managers, tasks of members in the group are also included. For information about reviewing and processing life-cycle tasks, see Review CMDB Data Manager tasks.

CMDB 360 view in CMDB Workspace

The CMDB 360 dashboard provides aggregations and analysis of CMDB 360 data. CMDB 360 collects data about all the discovery sources reporting attribute values for CIs. Use the CMDB 360 view in CMDB Workspace to track activities and identify potential issues of discovery sources. You can also create your own queries and associated schedules and reports to explore CMDB 360 data.

- For concepts and other background information about CMDB 360, see CMDB 360/Multisource CMDB.
- For information about all CMDB 360 dashboard settings, see Configure the CMDB 360 dashboard in CMDB Workspace or in Service Graph Workspace.
- For information about using the CMDB 360 view, see CMDB 360 experience in CMDB Workspace and in Service Graph Workspace.

Note:
Most cards on the CMDB 360 dashboard support non-CMDB tables in their aggregation, or can be configured to provide support. However, the CIs not reported by discovery sources card, for example, doesn't apply to non-CMDB tables. Creating queries for non-CMDB tables is also supported. For information about support for non-CMDB tables, see IRE support for non-CMDB tables.

Access

Requirements:

- Role requirement: sn_cmdb_user (CMDB user) or any role containing sn_cmdb_user
- Additional requirement: Enable and configure CMDB 360

To access the CMDB 360 view in the CMDB Workspace, navigate to **Workspaces** > **CMDB Workspace**. In the CMDB Workspace menu bar, select **CMDB 360**.

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Insights view in CMDB Workspace

Use the Insights view in CMDB Workspace to see and increase the level of adoption of key CMDB features and application services to improve the overall health of the CMDB. Explore how tools and features can maximize the health and efficiency of your CMDB and use direct links to install and start using features immediately.

Access

Role requirement: sn_cmdb_user (CMDB User), or a user role containing sn_cmdb_user (sn_cmdb_admin, sn_cmdb_editor).

To access the Insights view, navigate to **Workspaces** > **CMDB Workspace** and then select **Insights** in the CMDB Workspace menu bar.

The Insights view includes the following tiles:

- CMDB feature adoption
- CMDB performance insights
- Application services
- Cloud vs Non-cloud resources

CMDB feature adoption

Shows dial charts for the overall adoption levels of all three categories of CMDB tools and features:

Data ingestion

Tools and features that support and ensure ingestion of high-quality data into the CMDB.

Data governance

Tools and features that let you manage the CMDB data after it has been ingested.

Search and analytics

Tools and features that provide meaningful and helpful insights into the CMDB data.

Select each dial chart in the tile to access its tab and associated cards with further details about the features in the category. Pay special attention to categories with low levels of adoption and those features that aren't yet implemented in the instance and which you should consider for adoption.

Each category tab shows cards for the features in the category and the following general cards:

- Overall adoption level for the tab: The calculated overall level of adoption for the tab. Calculations are specific for each tab, and can be based, for example, on the level of adoption of some or all the features in the tab.
- Adoption progress: Installation, activation, or usage status per feature in the tab. Select a feature link to access a relevant resource such as the feature's landing page with an overview dashboard or an installation location.

Depending on adoption level, a card might contain any of the following resource links:

- **Learn more**: Link to documentation to learn and explore the benefits and usage of the feature.
- **View demo**: Link to a short demo about the feature.
- **Get started**: Link to a landing page where you can start immediately utilizing the feature.
- **Install app**: Link to the ServiceNow Store where you can immediately install the app.

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Cards use different methods to examine the instance and determine if the card's feature is installed, activated, and being used. For example, some cards check for the installation status of plugins and some cards rely on data in the specific feature tables. Many counts and aggregation data that appear on cards is based on Performance Analytics indicators built on top of the Base Aggregate Data [sn_cmdb_ws_base_aggregate_data] table.

- If the result is that the card's feature is installed or being used, then the card shows charts and counts about the level of usage. In which case, the card's label might slightly adjust.
- If the result is that the card's feature isn't installed or isn't in use, then links are provided to resources where you can explore, install, and start using the feature.

Most of the cards scheduled jobs run every 24 hours, therefore, depending on the type of data, some card data is based on recent but not current data. The Last updated timestamp in the cards reflects the collection time for the data that was used for the card. Also, immediately after getting started with a feature, a card won't reflect on the latest status or usage of the feature, until up to 24 hours when the card's scheduled job runs (for the CIs processed by IRE based on source card, the associated scheduled job, CMDB Workspace - Populate aggregates Monthly, runs monthly).

The following sections provide details for each card, including the calculation script used for the card.

CMDB feature adoption: Data ingestion

The overall adoption level for data ingestion maps to the following findings in the instance:

- Low (red): Less than 80% of CIs are processed by Identification and Reconciliation Engine (IRE)
- Moderate (amber): 80—90% of CIs are processed by IRE
- High (green): Over 90% of CIs are processed by IRE

Data ingestion contains the following features and aggregations:

CIs processed by IRE

Determines the percentage of CIs that are processed by IRE, by checking the Source [sys_object_source] table. CIs that aren't processed by IRE introduce a data integrity risk.

The percentage of CIs that are being processed by IRE determines both, the level of adoption for this feature card and the overall adoption level for the entire data ingestion category.

Service Graph Connectors

Determines the installation and usage status of Getting started with Service Graph Connectors, by checking:

- If the ITOM Licensing plugin (com.snc.itom.license) is active
- If there is at least one Service Graph Connector installed in the instance

If Service Graph Connectors are installed and are in use, then the card shows a count of those connectors.

> **Note:**
> The count of Service Graph connectors that appears on the card might be slightly different than the number of connectors that show on the ServiceNow Store site because the counting methods that are used are different.

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IntegrationHub ETL

Determines whether the IntegrationHub ETL store app is installed and used, based on records in the CMDB Integration Studio Application Data Sources [cmdb_inst_application_feed] table. If IntegrationHub ETL is in use, then the card shows a count of ETL transform maps in IntegrationHub ETL (demo ETL transform maps aren't counted).

Select **View ETL transform maps** to open IntegrationHub ETL where you can examine existing ETL transform maps and create new ones.

CIs processed by IRE based on source

Chart showing CIs processed by IRE, grouped by Service Graph Connectors, ServiceNow Discovery, a combination of both, and others, for the past six months.

The following discovery sources are counted as ServiceNow Discovery:

- ServiceNow
- ServiceWatch
- ACC-Visibility
- AgentClientCollector
- CredentiallessDiscovery

Point to the chart to show monthly aggregation data.

This card is hidden if there are no CIs processed by IRE.

CMDB application for APIs and CLI

Determines whether the CMDB application for APIs and CLI store app is installed.

This card appears only if the store app isn't installed, providing helpful resources for exploration and adoption.

CMDB feature adoption: Data governance

The overall adoption level for data governance maps to the following findings in the instance:

- Low (red): Less than 33% of features are used
- Moderate (amber): 33—66% of features are used
- High (green): Over 66% of features are used

The overall level of adoption of data governance is based on whether CMDB Data Manager features are used.

Note:
Historical data might not be available for all past 90 days because CMDB Workspace version 3.4, which relies on Performance Analytics indicators to collect and save historical usage data, was deployed less than 90 days ago. This situation might result in a discrepancy between actual usage and what the card shows.

CMDB Data Manager/CIs used in Data Manager policies

Determines usage by checking if either of the following conditions is true:

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- There are any user-created Delete, Retire, or Archive policies (by searching table CMDB Data Manager Policy and Attributes [cmdb_data_manager_policy_and_attributes])
- There are any CIs processed by these user-created Delete, Retire, or Archive policies, in the last 90 days (by searching table CMDB Data Management Policy Executions [cmdb_data_management_policy_execution])

If CMDB Data Manager is in use, shows a chart with CIs that were processed by these policies in the past six months, by month, and by policy type.

Data attestation/CIs used in data attestation

Determines usage by checking if either of the following conditions is true:

- There are any user-created Attestation policies (by searching table CMDB Data Manager Policy and Attributes [cmdb_data_manager_policy_and_attributes])
- There are any CIs processed by these user-created Attestation policies, in the last 90 days (by searching table CMDB Data Management Policy Executions [cmdb_data_management_policy_execution])

If data attestation is in use, shows a chart with CIs that were processed by attestation policy tasks in the past six months, by month.

Data synchronization

Checks if there is at least one class for which the *managed_by_group* attribute is globally set so that all class CIs are synchronized on the same value.

For information about synchronizing group assignment attributes using the CI Class Manager, see Set the group for a CI or an entire class of CIs and Synchronizing group assignment attributes.

The Data synchronization card is available starting with CMDB Workspace v3.6.

Principal classes

Checks if the Principal Class filter is configured with at least one principal class. The Principal Class filter limits the number of CIs that appear in list views, to show only CIs of principal classes. Reducing the amount of data in list views to only relevant data, improves performance and efficiency.

For more information about managing the Principal Class filter in CI Class Manager, see Update class list in the Principal Class filter.

The Principal class card is available starting with CMDB Workspace v3.6.

CMDB feature adoption: Search & analytics

The overall adoption level for search & analytics maps to the following findings in the instance:

- Low (red): Less than 33% of features are used
- Moderate (amber): 33—66% of features are used
- High (green): Over 66% of features are used

Search & analytics contains the following features and aggregations:

CMDB Query Builder/Query Builder queries

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Determines if the CMDB Query Builder is in use, by checking if either of the following conditions is true:

- There are any records in the Saved Queries [qb_saved_query] table in which *Source* is **QB**
- There are any queries executed or queries executed with reports, in the last 90 days

> **Note:**
> Historical data might not be available for all past 90 days because CMDB Workspace version 3.4, which relies on Performance Analytics indicators to collect and save historical usage data, was deployed less than 90 days ago. This situation might result in a discrepancy between actual usage and what the card shows.

If CMDB Query Builder is in use, shows a chart with counts of query executions and query executions in reports, for the past six months, by month.

Point to the chart to see monthly aggregation data.

Intelligent search

Determines if Intelligent Search for CMDB is in use by checking the NLQ Query Logs [nlq_query_log] table for any records where *source* is **CMDB_WS**, from the past 90 days. If Intelligent Search is in use, shows counts of Intelligent Search queries for the past six months, by month.

> **Note:**
> Historical data might not be available for all past 90 days because CMDB Workspace version 3.4, which relies on Performance Analytics indicators to collect and save historical usage data, was deployed less than 90 days ago. This situation might result in a discrepancy between actual usage and what the card shows.

CMDB 360 — Records in Multisource

Total number of raw CMDB 360 records in the CMDB 360 data store that contains records for each discovery source report, per each CI attribute. This card is identical to the Total CMDB 360 records card in the Discovery Sources tile in the CMDB 360 view.

This card appears only if CMDB 360 is enabled, which is determined by checking the ITOM Discovery License (com.snc.itom.discovery.license) plugin and the system property glide.identification_engine.multisource_enabled.

CMDB 360 queries

Count of CMDB 360 queries that exist in the CMDB Multisource Queries [cmdb_multisource_query] table.

This card appears only if CMDB 360 is enabled, which is determined by checking the ITOM Discovery License (com.snc.itom.discovery.license) plugin and the system property glide.identification_engine.multisource_enabled.

CMDB Data Foundation dashboard

Determines if the CMDB and CSDM Data Foundations Dashboards store app (which includes the CMDB Data Foundation dashboard) is installed.

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This card appears only if the store app isn't installed, providing helpful resources for exploration and adoption. However, the feature is still included in calculating the search & analytics overall level of adoption.

CMDB Health Dashboard

Determines if CMDB Health is in use by checking if at least one CMDB Health Dashboard job is enabled.

This card appears only if the feature isn't in use, providing helpful resources for exploration and adoption. However, the feature is still included in calculating the search & analytics overall level of adoption.

CMDB performance insights

CMDB performance insights is available starting with CMDB Workspace v3.6 and only appears for users with the sn_cmdb_admin (CMDB Admin) role.

CMDB performance insights helps you understand the ways in which your configurations impact the performance of your CMDB. You can use the charts and tools within CMDB performance insights to troubleshoot, debug, or diagnose performance issues. CMDB performance insights also analyzes your CMDB and Service Graph Connectors on your instance to generate recommendations on how you can improve the performance of your CMDB. The CMDB performance insights tile itself can show up to two of those recommendations.

Select **View performance insights** to access the CMDB performance insights data.

The Payloads & CIs tab contains the following tiles:

Partial payloads

Partial payloads occur when the data source didn't provide enough information to uniquely identify the CI, preventing IRE from processing the CI.

- Total partial payload count:

  Shows the total number of partial payloads that exist in your instance. Large numbers of partial payloads in your instance can cause performance deterioration of the CMDB.

  For more information about partial payloads, see Identification and Reconciliation engine (IRE).

- Discovery source:

  Breaks down the number of partial payloads by discovery sources. You can drill down on slices in this pie chart to see the list of partial payloads with errors, filtered by discovery source.

  You can drill down on specific partial payloads to better understand the error that you're experiencing. When you drill down on a partial payload, you can see the full payload item, which you can review to troubleshoot and address the specific errors.

  For more information about error types, see Using identification simulation.

Related records

Data about related records that are missing references. A record is missing a reference when the *Referenced* field for that record is empty.

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- Related records missing reference:

  Shows the total number of records that do not reference a CI in the *Referenced* field in the Related table. You can see a full list of the Related tables and the associated *Referenced* fields in the Related Entries [cmdb_related_entry] table.

  For more information about Related tables, see Overview of CMDB.

- Related records missing reference by table:

  Breaks down the number of CMDB records missing references, by table. You can drill down on slices in this chart to see the list of specific records filtered by table.

  Before you can drill down on a slice of this pie chart, you must have any user roles required to view the table.

  You can also select **New** from the list view to create a new related entry table record. For more information about creating or editing a related entry table record, see Edit a related table from CMDB performance insights.

Duplicate and stale CIs

A CI is flagged as duplicate during identification and reconciliation. A CI is flagged as stale if it has not been updated within the Effective Duration time period specified in the CMDB Health staleness rule for the CI class.

- CIs:

  Shows the number of CIs that are either duplicate or stale.

- Stale records by class:

  Breaks down the number of stale CIs based on the CI class. You can drill down on slices in this pie chart to see the list of specific CI records filtered by class.

  For more information about stale CIs, see CMDB Health KPIs and metrics.

- Duplicate records by class:

  Breaks down the number of duplicate CIs based on the CI class. You can drill down on slices in this pie chart to see the list of specific CI records.

  For more information about duplicate CIs, see Duplicate CIs remediation.

Relationship records missing parent or child

Shows the trend line and number of relationship records in the CI Relationships [cmdb_rel_ci] table that are missing a parent or child CI. CIs that are missing a parent or child are considered invalid records and can have a performance impact on your instance.

Recommendations

Recommendations on this panel include a link to the related documentation and typically enable direct access to the associated tool, feature, or system property. Expand or minimize the panel by selecting the light bulb icon.

The first two recommendations appear on the CMDB performance insights tile of the Insights view.

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You can only see a recommendation if you have the roles needed to access the feature, tool, or system property. Users with the sn_cmdb_admin role can hide recommendations or adjust the order in which recommendations appear. Users can use the **Active** and **Order** fields in the CMDB WS Imp Action Card Config [sn_cmdb_ws_imp_action_card_config] table to configure those elements.

The Service Graph connectors tab contains the following tiles:

Note:

- The Service Graph connectors tab only appears if your instance has at least one Service Graph Connector and you have the cmdb_inst_admin role.
- To edit data source or scheduled data import records from CMDB Workspace, you may need to set **Application scope** to the **Application** of the data source or data import.

Connectors data source

Configurations on your Service Graph Connector data sources affect the ingestion and processing of incoming data. Changing your Service Graph Connector data source configurations can streamline data handling, making your CMDB more efficient and reducing impacts on the performance of your instance.

- Sources with batch processing turned off:

  Shows the percentage of Service Graph Connector data sources in the Data Sources [sys_data_source] table with disabled **Use Batch Import**. It also lists the total number of data sources, and the number of data sources with enabled or disabled batch processing.

  To enable batch processing, access the record of a specific data source from the list view and select **Use Batch Import**. For more information about batch processing, see Data source fields.

  You can also select **Edit** to update a data source from the list view. For more information about editing a data source, see Edit a data source from CMDB performance insights.

- Sources with concurrent import turned off:

  Shows the percentage of scheduled data imports of Service Graph Connector data sources in the Scheduled Data Imports [scheduled_import_set] table with **Concurrent Import** turned off. It also lists the total number of scheduled data imports, and the number of scheduled data imports with **Concurrent Import** turned on or off.

  To enable concurrent import, access the record of a specific scheduled data import from the list view and select **Concurrent Import**. For more information about concurrent import, see Concurrent imports.

  You can also select **Edit** to update a scheduled data import from the list view. For more information about editing a scheduled data import, see Edit a scheduled data import from CMDB performance insights.

- Sources with non-custom size partition method:

  Shows the percentage of scheduled data imports of Service Graph Connector data sources in the Scheduled Data Imports [scheduled_import_set] table that use a non-custom size partition method. It also lists the total number of scheduled data imports, and the number of scheduled data imports that use a non-custom size partition method.

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To use a custom size partition method, access the record of a specific scheduled data import from the list view. Ensure that **Concurrent Import** is selected. From the **Partition Method** drop-down menu that appears, select **Custom size**. For more information about partition methods, see Schedule a data import.

You can also select **Edit** to update a new scheduled data import from the list view. For more information about editing a scheduled data import, see Edit a scheduled data import from CMDB performance insights.

Connectors execution trends

Aggregates Service Graph Connectors with outlier connector executions, where the number of imported rows or the rate of processing is significantly higher or lower than the 30-day trend.

- Connectors with processing rate outliers:

  Shows the number of Service Graph Connectors that are considered outliers with connector execution processing rates outside the expected trend lines within the past 30 days.

- Connectors with import count outliers:

  Shows the number of Service Graph Connectors that are considered outliers with connector execution import counts outside the expected trend lines within the past 30 days.

You can drill down the cards in the Connectors execution trends tile to access the Service Graph connector execution trends window. In that windows, a Service Graph Connector is available in the connectors drop-down menu only if it has an execution record.

Click the tabs on the Service Graph connector execution trends window to view the following charts and the Connector Execution list view of executed connector import sets:

- Processing rate:

  Models the trend line of processing rates for connector executions. Shows the rate at which a connector processes rows of data over a period of time.

  There are two zones, which are the Confidence Band and the Prediction Band. Service Graph Connectors with connection executions that have processing rates outside of the Prediction Band are considered outliers. These zones don't appear when you select more than one Service Graph Connector.

- Import count:

  Models the trend line of rows processed for connector executions. Shows the number of rows a connector processes over a period of time.

  There are two zones, which are the Confidence Band and the Prediction Band. Service Graph Connectors with connector executions that have import row counts outside of the Prediction Band are considered outliers.

On both charts, you can select outlier and non-outlier Service Graph Connectors to see the trend lines against each other.

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For more information about processing data with Service Graph Connectors, see Getting started with Service Graph Connectors.

Cloud vs Non-cloud resources

Charts showing counts and details for resources and application services that are hosted on various cloud services versus those that aren't. Resources and application services can be deployed on cloud services such as the Microsoft Azure Cloud, or on the local instance or other non-cloud solutions. For some ongoing operations in the organization, it might be necessary to have those details which can be difficult to obtain.

For details about the charts, see 'Cloud vs Non-cloud resources' in the Home view in CMDB Workspace topic.

Application services

Shows a count of application services in your organization, based on records in the Service Instance [cmdb_ci_service_auto] table. The chart shows the trend of total number of application services per day, for the past seven days.

Select the tile to access the Application Services dashboard where you can monitor the adoption level and health of application services. For details about the Application Services dashboard, see Use Application Services dashboard to monitor health.

Management view in CMDB Workspace

The Management view provides CMDB Admins with quick access to key management tools and deep insights into CMDB health and activities. The view provides and details such as duplicate CIs and recent activities in the CMDB.

Access

Role requirement: sn_cmdb_admin (CMDB Admin)

To access the Management view, navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.

CMDB Data Manager

The following cards show details about CIs and policies associated with CMDB Data Manager:

Rejected CIs

CIs set as rejected during a review of attestation tasks.

Excluded CIs

Manage exclusion lists for CMDB Data ManagerCIs set as excluded from CMDB Data Manager policies.

Draft policies

Draft Data Manager policies that were created but not published.

CI Correctness

Cards in this section show health state for the sub metrics of the CMDB Health correctness KPI. Counts are based on testing CIs against pre-defined data integrity rules such as:

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- Identification rules (to detect duplicate CIs)
- Orphan CI rules
- Staleness CI rules

You can set the time interval used in calculations for these counts.

For more information about the correctness KPI, and the duplicate, orphan, and stale sub metrics, see CMDB Health KPIs and metrics.

Recent activity trends

The following cards show recent activities in the CMDB:

Recent CI Activity

A 7-day chart showing metrics and trend line related to CIs such as the number of new CIs and updated CIs.

Recent Application Service Activity

A 7-day chart showing metrics and trend line related to Application Services such as the total number of Application Services, new and updated Application Services, and the number of Application Services with outages.

Management tools

Provides links that you can use to access CMDB dashboards, tools, and list views. The links are grouped by categories as described below.

Note:
Some links are conditionally available based on installation of applications, active plugins, and your assigned role. For a link that doesn't appear, make sure that all the requirements for the link are met.

Manage:

- CI Class Manager: Centrally view, create, or edit class definitions and class settings for Identification and Reconciliation (IRE) and for CMDB Health.

  Additional role requirement: itil or personalize_dictionary.
- Data Manager: Centrally create, edit, review, publish, and track Data Manager policies and the tasks generated by the policies.
- De-duplication Template Library: Create and manage de-duplication templates and libraries to remediate de-duplication tasks in bulk.
- De-duplication Dashboard: Show counts and insights for duplicate CIs in the CMDB, and run and track de-duplication templates to remediate de-duplication tasks in bulk.
- CMDB Groups: Show a list view of current CMDB groups where you can create new CMDB groups, and manage the existing CMDB groups. A CMDB group is a collection of CIs to which you can apply CI actions collectively to all the CIs in the group. For example, CMDB Health can monitor CIs in a Health-type CMDB group, and report the aggregated health for the group as a whole.
- Dynamic CI Groups: Show a list view of current dynamic CI groups where you can create new dynamic CI groups, and manage the existing ones. Dynamic CI Groups act as application services that are populated with members of the CMDB group that is associated with the dynamic CI group. For more information about dynamic CI groups, see Application services.

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Optimize:

- CMDB Health: View the CMDB Health dashboards and configure the CMDB health KPIs and metrics that CIs are evaluated by in CMDB Health dashboards.

  Additional requirements:

  - Set up and configure CMDB Health
  - Roles: asset or itil

- CMDB Data Foundations Dashboard: View the CMDB Data Foundations dashboard where you can explore potential risks in the CMDB implementation, and verify that important data is valid and properly configured.

  Additional requirements:

  - Set up CSDM and CMDB Data Foundations Dashboards
  - Roles: asset, Itil_admin, or admin
  - Plugin: com.snc.cmdb.getwell

- CSDM Data Foundations Dashboard: View the CSDM Data Foundations dashboard where you can explore key CSDM metrics on a single page to assist you in getting the full benefit from your implementation.

  Additional requirements:

  - Set up CSDM and CMDB Data Foundations Dashboards
  - Roles: app_service_admin, app_service_user, asset, cmdb_read, itil_admin, portfolio_admin, service_viewer, or technology_service_owner
  - Plugin: com.snc.cmdb.getwell

- De-Duplication Tasks: Remediate a de-duplication task by using the Duplicate CI Remediator wizard which guides you through the duplicate CI reconciliation process.

  Additional role requirement: itil.

- CMDB Remediation Rules: Rules associated with a CMDB Health task that was created for a failed CMDB Health test. A CMDB remediation rule runs a remediation workflow to remediate an issue reported by CMDB Health.

Visualize:

- Dependency Views: Provides a graphic infrastructure view for a CI and any applications or business services that it is part of and that it supports.

  Additional role requirement: dependency_views.

- Query Builder: Easily build complex infrastructure and service queries, that span multiple CMDB classes, non-CMDB tables, and that can involve many CIs that are connected by different relationships.

  Additional role requirement: cmdb_query_builder_read.

Create: New Technical Service

Additional role requirement: service_admin.

Configuration identifiers framework

Configuration identifiers provide a framework that lets you customize some behaviors of a CMDB Workspace feature, enabling different settings for that feature, on different workspaces. Most

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importantly, you can use this customization framework when integrating a CMDB Workspace feature into another workspace.

Configuration identifier

A configuration identifier (also referred to as config identifier) is a configuration element within the configuration identifiers framework. A config identifier contains custom settings for a CMDB Workspace feature, that is applicable to a specific workspace. A config identifier contains settings and table-driven configurations used in a UX application such as a workspace. Using config identifiers lets you for example, integrate CMDB Workspace Unified Map into another workspace, with the integrated Unified Map being customized for the workspace. Config identifiers are stored in the Config identifiers [sn_cmdb_ws_config_identifier] table.

A config Identifier acts as the parent record for a set of configurations that are specific to a workspace and therefore overrides default behavior only for that workspace.

Default config identifier

Initially, the Config identifiers [sn_cmdb_ws_config_identifier] table in CMDB Workspace, contains a single config identifier named 'Default' and which is workspace-agnostic. This Default config identifier has its *Default* column set to **Yes**, a setting that can't be modified. Only a single config identifier can be set to **Yes**, therefore, any additional config identifiers that you create are set to **No**.

The default config identifier contains default settings for CMDB Workspace features. Any subsequent Config Identifier that you configure, is set for a specific workspace. When integrating a CMDB Workspace feature into another workspace and there are no entries in the table-driven configuration for that feature, look-up uses the settings in the default configuration identifier.

Key roles

The following roles are needed in order to use the configuration identifiers framework:

- sn_cmdb_ws.config_editor: Can modify child config tables, such as sn_cmdb_ws_config_property.
- sn_cmdb_ws.config_admin: Can modify both sn_cmdb_ws_config_identifier and child config tables.
- sn_cmdb_admin: Role required to modify default config records under the default identifier or the default identifier itself.

For more information about these roles, see Components installed with CMDB Workspace.

Examples of CMDB Workspace features using the configuration identifiers framework for feature settings

- Unified Map:
  - Configure how many nodes can appear on a map
  - Configure the default or maximum number of levels on maps
  - Configure endpoint de-duplication on maps
  - Configure which attributes to display in the Attributes panel
  - Create a class profile of visible layers for classes
  - Configure CIs to appear based on life cycle stage value
- Create CI:

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- Request additional attributes for new CIs
- Limit the class list for new CIs created in a workspace

Configuring CMDB Workspace

Plan and configure your implementation of CMDB Workspace.

Configuration overview

1. Set up CMDB Workspace

   Request the store app and enable demo data.

2. Configure any of the following options to show the most relevant data in your organization:
   - Modify important actions on the Home view of CMDB Workspace
   - Add a quick link to the Home view of CMDB Workspace
   - Configure datacenters for Cloud vs Non-cloud resources
   - Configure classes for Cloud vs Non-cloud resources

Set up CMDB Workspace

Set up and access the CMDB Workspace store app.

Request apps on the Store

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

Note:
The CMDB Workspace store app is automatically installed when installing or upgrading the product.

Enable demo data

Enable demo data to install demo data-specific scheduled jobs that if the needed requirement is met, generates and populates demo data in CMDB Workspace cards such as:

- Cloud vs Non-cloud resources chart in the CMDB Workspace landing page and the Insights view: If Cloud Service Accounts [cmdb_ci_cloud_service_account] table exists
- Cards in the CMDB 360 view: If CMDB 360 is enabled
- Cards in the Insights view, CMDB Feature Adoption tile:
  - CIs processed by IRE
  - CIs processed by IRE based on source
  - Data Manager
  - Data attestation
  - Query Builder
  - Intelligent Search
- Cards in the What's new tile in the CMDB Workspace landing page.

To populate CMDB Workspace dashboards with demo data:

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1. When installing the CMDB Workspace store app, check **Load demo data**.
2. Access the *[Demo] – CMDB Workspace demo data* scheduled job and select **Execute Now**.

Note:
As a general practice, don't enable demo data in a production instance to prevent demo data mixing with real production data.

Prerequisites

- Plugins:
  - Recommended: CSDM Activation (com.snc.cmdb.csdm.activation)

    Allows for legacy *Lifecycle Status* field mappings and synchronization to legacy status fields. For details about use and customization of retirement definitions when this plugin isn't activated, see Retirement definitions.
  - Required (activated by default): CMDB CSDM Support (com.snc.cmdb.csdm)
  - Required (activated by default): CMDB Page Templates (sn_cmdb_pg_templts)
  - Required (activated by default): CMDB NLQ Search Connected (sn-cmdb-nlq-search)

  For details about activating a plugin, see Activate a plugin.
- Roles: To access the CMDB Workspace, you must, at a minimum, have one of the following roles, which are essential for interacting with the CMDB Workspace. Depending on which of these roles is assigned to you, you might only have access to some of the features available in the CMDB Workspace:
  - sn_cmdb_admin
  - sn_cmdb_editor
  - sn_cmdb_user

  Note:
  As you drill down in the CMDB Workspace, there are some dashboards and list views that require specific roles in addition to the key CMDB Admin, CMDB Editor, or CMDB User roles.
- Features: CMDB Workspace provides access to a wide range of applications and features. However, for CMDB Workspace to provide meaningful reports, overviews, and trends, you must set up and configure some of those features. Setup for such features is listed under Additional requirements.

Access the CMDB Workspace

Navigate to **Workspaces** > **CMDB Workspace** to access CMDB Workspace.

Home view is the default view of CMDB Workspace and you can also use other views to access CMDB features:

- Home view in CMDB Workspace: View various CMDB Health aggregations, use Intelligent Search to search through the CMDB, see what changed in the CMDB, and access important tasks. This is the default view for CMDB Workspace.
- My Work view: Manage CMDB Data Manager tasks such as attestation tasks, that are assigned to you.

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- CMDB 360 view: View aggregations and analysis of CMDB 360 data on a dashboard, and create CMDB 360 queries.
- Management view: View recent key activities and health indicators for the CMDB, and access management tools and dashboards (accessible only to CMDB admins) that support your management tasks.
- Insights view: View level of adoption of key CMDB tools, features, and application services. Explore benefits and install those tools and features to maximize the efficiency of your CMDB functionality.

Modify important actions on the Home view of CMDB Workspace

Modify the appearance order and other properties of the important action cards that appear on the Home view of the CMDB Workspace.

Before you begin

Role required: sn_cmdb_admin

About this task

The task cards that appear in the Important tasks tile on the landing page of the CMDB Workspace, are stored in the CMDB WS Imp Action Card Config [sn_cmdb_ws_imp_action_card_config] table. You can edit some attributes of these cards, including the setting that controls whether a specific card appears at all. Cards in the Important actions tile are available only for the CMDB Admin [sn_cmdb_admin] and the CMDB Editor [sn_cmdb_editor] user roles and each is configured per one of those roles.

There is some overlap in the task cards that appear for a CMDB Admin and for a CMDB Editor, however, the filters in those task cards are different. Typically, for CMDB Admins, the card filter also includes unassigned tasks that a CMDB Admin needs to assign.

Only editing is possible, you can't add or delete action records in this table.

Procedure

1. Navigate to **All**.
2. In the navigation filter, enter `sn_cmdb_ws_imp_action_card_config.list`.
3. In the list view of the table, edit the table row that you want to modify or click the row to open the record form.

Field	Description
Persona	The logged on user (such as CMDB Admin) for which this card appears. You can't edit this field.
Type	Tasks group that this task belongs to, such as Duplicate CIs. You can't edit this field.
Table	The table used in the card filter. You can't edit this field.

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Field	Description
Active	Determines whether the card for this action appears in CMDB Workspace.
Order	Numeric value that determines the order of each card within the rest of the cards in the Important actions tile. Cards with lower order numbers appear before cards with higher order numbers.
Filter condition	Filters for the tasks that are included for the card.
List columns	Columns that appear in the list view when you click a card to show its associated tasks.
List groupby	Attribute to group by the card's associated tasks in the card's list view. The card's list view appears when you click a card to show its associated tasks.

4. Click **Update**.

Add a quick link to the Home view of CMDB Workspace

For an immediate access to tools or data that you need, add your own quick link to the Home view of CMDB Workspace.

Before you begin
Role required: sn_cmdb_admin, sn_cmdb_editor, or sn_cmdb_user

About this task
Quick links are stored in the Quick Links [sn_cmdb_ws_quick_links] table including those that are included in the base system. Only the user that added a quick link has access to that link, and can subsequently edit or delete that added link.

Procedure
1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the Quick links section, click the '+' icon.
3. Enter the **URL** and **Display text** for the link and then click **Add**.

   A valid URL must start with "http:" or "https:". To link to a tool in the instance such as the CI Class Manager, enter the full URL to the tool's landing page.

4. Click **Done**.

Result
The new link is available only for the user that created the link, in the Quick links section in the landing page of the CMDB Workspace.

What to do next
Click on the Edit quick links icon to edit, delete, or reposition an added link. Then use the up and down arrows to move a link within the list, and click the Edit icon next to a link that you want to modify or delete from the list.

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Configure datacenters for Cloud vs Non-cloud resources

The Cloud vs Non-cloud resources chart in CMDB Workspace determines which CIs and application services are stored on a cloud and which aren't in the organization. In addition to base system classifications, you can add cloud versus non-cloud classifications that reflect specific datacenter deployments in the organization.

Before you begin

Role required: sn_cmdb_admin

About this task

The Datacenter Types [sn_cmdb_ws_datacenter_type] table stores datacenter classes with a classification of being used as a cloud storage or not in the organization. The calculations for the Cloud vs Non-cloud resources chart in the CI overview tile in CMDB Workspace, reflects on the datacenters in that table and their classifications.

CIs are counted as non-cloud mainly if either of the following conditions is met:

- The CI is not associated with any datacenter.
- The CI is associated with a datacenter that is classified as non-cloud in the Datacenter Types table.

In the base system, the Datacenter Types table contains several common datacenters. For example, the Azure Datacenter [cmdb_ci_azure_datacenter] class is classified as 'Cloud'. Therefore, the Cloud vs Non-cloud resources chart includes in its calculations and bars the Azure Datacenter [cmdb_ci_azure_datacenter] class.

Procedure

1. Select **All**.
2. In the Filter navigator, enter `sn_cmdb_ws_datacenter_type.list` to access the Datacenter Types table.
3. Click **New** and fill out the Datacenter Type form for a datacenter that is used in the organization.

Field	Description
Datacenter class	A child class of the Logical Datacenter [cmdb_ci_logical_datacenter] class which is used in the organization.
Type	Classification that reflects whether the specified **Datacenter class** is being used as cloud storage or not.
Cloud Provider	Custom label for the cloud provider.

4. Click **Submit**.

Configure classes for Cloud vs Non-cloud resources

Include or exclude pairs of *`CI Class`*/*`Type`* in the Cloud vs Non-cloud resources chart in CMDB Workspace.

Before you begin

Role required: sn_cmdb_admin

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About this task

The CMDB Insight Query Categories [sn_cmdb_ws_insight_query_category] table contains the pairs of *CI Class*/*Type* for the Cloud vs Non-cloud resources chart in the CI overview tile in CMDB Workspace. The *Active* setting in a record determines if the respective *CI Class*/*Type* pair appears in the chart. By default, all pairs are configured to appear in the chart.

A *CI Class*/*Type* pair appears or doesn't appear according to its *Active* setting and regardless of the status of its associated scheduled job.

Procedure

1. Select **All**.
2. In the Filter navigator, enter `sn_cmdb_ws_insight_query_category.list` to access the CMDB Insight Query Categories table.
3. Set *Active* to **true** or **false** for a CI Class/Type pair.
   For example, set *Active* to **false** for the **Applications**/**Non-cloud** pair. This setting will exclude from the chart all CIs in the Applications class which are determined to be non-cloud.

Request additional attributes for new CIs

Integrate a request for specific CI attributes when manually creating a new CI in your workspace. Then, when creating a new CI in the respective workspace, users can enter values for the requested attributes, as appropriate for the new CI.

About this task

Creating a new CI is an experience in CMDB Workspace which you might be integrating into another workspace. Within CMDB Workspace, there are default settings for some of the behaviors of the create CI experience. However, you can use configuration identifiers to customize some of those default settings for CMDB Workspace or other workspaces. For example, you can customize the list of attributes that is requested for the new CI.

Requests for additional attributes for new CIs are stored in the CI additional attributes config [sn_cmdb_ws_ci_additional_attributes] table which is part of the configuration identifiers framework. Therefore, to manage requests for additional attributes in your workspace, you must use config identifiers. By default, the CI additional attributes config table contains a single entry for CMDB Workspace, that applies to the entire CMDB hierarchy. Any workspace or class without a direct config identifier for additional attributes, uses the default entry.

For more information:

- About configuration identifiers, see Configuration identifiers framework.
- About the experience of manually creating a new CI in CMDB Workspace, see Create a CI manually in CMDB Workspace.

Before you begin

Role required: sn_cmdb_ws.config_editor

Procedure

1. Navigate to **All** and in the navigation filter, enter `sn_cmdb_ws_ci_additional_attributes.list` to access the CI additional attributes config table.
2. On the table list view page, select **New** and fill out the form.

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Field	Description
Config identifier	Name of a configuration identifier from the Config identifier [sn_cmdb_ws_config_identifier] table. The default value of 'Default' is used as a fallback for any workspace without its own config identifiers.
CI class	Class for which the specified additional attributes will be requested when creating a new CI.
Active	Option to activate or deactivate the request for the additional attributes when creating a new CI.
Additional attributes	List of class attributes that will be requested when creating a new CI of the **CI class**.
Apply to hierarchy	Apply the request for additional attributes to all classes descending from the specified **CI class**.
Feature	Pre-set to 'Create CI'.

3. Select **Submit**.

Result

When manually creating a new CI for the specified **CI class** in the respective workspace, users are requested to enter values for the specified **Additional attributes** on the Additional attributes page.

Limit the class list for new CIs created in a workspace

Limit the selection of classes for a new CI being manually created in your workspace, to only those classes that are relevant to that workspace. When then creating a new CI in the respective workspace, users can only select a class that is authorized as an option.

About this task

Creating a new CI is an experience in CMDB Workspace which you might be integrating into another workspace. Within CMDB Workspace, there are default settings for some of the behaviors of the create CI experience. However, you can use configuration identifiers to customize some of those default settings for CMDB Workspace or other workspaces. For example, you can customize the list of classes to choose from, for the new CI.

By default, when creating a new CI in CMDB Workspace, the list of classes to choose from for the new CI, contains almost all classes in the CMDB hierarchy. For your workspace, it might be important to reduce that list to specific classes or hierarchy branches.

Settings for specific classes available for new CIs are stored in the CI class config [sn_cmdb_ws_ci_class_config] table which is part of the configuration identifiers framework. Therefore, to manage the list of classes for new CIs in your workspace, you must use config identifiers. To manage that list, you must create a config identifier for each class or hierarchy branch that you want to include or exclude in the class drop-down list. By default, the CI class config table contains a single entry for the Configuration Item [cmdb_ci] class, which is derived

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by the entire CMDB hierarchy. Any class or workspace without direct config identifiers for inclusion or exclusion, uses the default entry.

For more information:

- About configuration identifiers, see Configuration identifiers framework.
- About the experience of manually creating a new CI in CMDB Workspace, see Create a CI manually in CMDB Workspace.

Before you begin
Role required: sn_cmdb_ws.config_editor

Procedure

1. Navigate to **All** and in the navigation filter, enter `sn_cmdb_ws_ci_class_config.list` to access the CI class config table.
2. On the table list view page, select **New** and fill out the form.

Field	Description
Config identifier	Name of a configuration identifier from the Config identifier [sn_cmdb_ws_config_identifier] table. The default value of 'Default' is used as a fallback for any workspace without its own config identifiers.
CI class	Class to be included or excluded from the list of classes available for a new CI.
Active	Option to activate or deactivate the setting in the experience of creating a new CI.
Feature	Pre-set to 'Create CI'.
Apply to hierarchy	Apply the class setting to all classes descending from the specified **CI class**.
Operation	Include or exclude the **CI class** in the list of classes for a new CI.

3. Select **Submit**.

Result
When manually creating a new CI in the respective workspace, the specified **CI class** is included in the **Class** drop-down list on the Select class page only if it is set to be available.

Create a CI manually in CMDB Workspace

Create a new CI in CMDB Workspace, while applying Identification and Reconciliation Engine (IRE) processes and other requirements for the CI's class. IRE identification rules enforce the new CI to be unique and to comply with other class requirements.

About this task
Creating specialty CIs such as an application service, isn't supported in this Create CI experience. Typically, such CIs aren't discoverable and you must create them manually using specific wizards, such as the Application service wizard.

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You can access the Create CI experience in either of the following ways:

- Selecting the **Create CI** quick link on the Home view of CMDB Workspace which lets you then select a class for the new CI.
- Drilling down a class group bar in the CI Summary tab on the CI overview tile, in which case the class you are drilling down from becomes the class for the new CI. This option is available only if you drill down a class that isn't excluded for the Create CI experience. For information about excluding classes for the Create CI experience in CMDB Workspace, see Limit the class list for new CIs created in a workspace.

As you progress through the procedure, fields appear dynamically according to your selections and entries on the current or previous pages.

To manually create a new CI without applying IRE processes (Core UI), see Populating the CMDB. For more information about mandatory attributes, IRE processes, dependent CIs, and the CI relationship editor (Core UI), see:

- Set a CI attribute to be mandatory
- Identification rules
- CMDB classifications and class dependency
- CI relationship editor

Before you begin

Configure any customizations to the create CI experience before creating new CIs:

- Complete any request by an administrator for additional non-mandatory attributes. For information about how an administrator can use configuration identifiers to incorporate requests for attributes into the flow of creating a new CI, see Request additional attributes for new CIs.
- Complete any settings for limiting the list of classes available to choose from, for a new CI. For information about how an administrator can use configuration identifiers to create a custom list of classes for a new CI, see Limit the class list for new CIs created in a workspace.

If you want additional actions to be performed after creating a CI, such as creating a record that references the new CI, implement the ManualCreateCIExtPoint extension point:

- In the `getAppId()` function, add the sys_id of the application containing the workspace from the UX Application [sys_ux_page_registry] table.
- In the `postInsertCI()` function, define the additional actions you want to perform.

Your extension point implementation runs after a new CI is created in the application specified in `getAppId()`. You can create additional implementations as needed for additional applications. For more information about extension points, see Using extension points to extend application functionality.

Role required: cmdb_manual_ci_ire_access (contained in the sn_cmdb_editor role by default)

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. On the Home view of CMDB Workspace, use one of the following options:

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- Select the **Create CI** quick link, and then:
  a. On the **Select class** page, select the class for the new CI from the **Class** drop-down list. Classes without a valid identification rule are grayed out in the list and you can't select them.
  b. Select **Continue**.
- On the CI overview tile, select the CI Summary tab, and then:
  a. Select the group bar with the class that you want to create the new CI in.
  b. Scroll down to the list view for the class group, and select the class in which you want to create the new CI.
  c. On the class list view page, select the **Create CI** button.

  Note:
  If you selected a class that is excluded from the Create CI experience, the **New** button appears. Select **New** to manually create a new CI without applying IRE processes (Core UI).

Continue to fill out the rest of the Create a new CI pages as described in the following steps.

3. On the Home view of CMDB Workspace, select the **Create CI** quick link and then fill out all the Create a new CI pages as described in the following steps.
4. **Select class**:

   Select the class for the new CI from the **Class** drop-down list. Classes without a valid identification rule are grayed out in the list and you can't select them.

   Select **Continue**.

5. **Required attributes**:
   Configure attributes that are either mandatory for the new CI's class, or which the identification rule for the new CI's class requires. Also, if the new CI is a dependent CI, configure the dependency relationship.

   - In the Dependent-upon CI section, select a CI that the new CI depends on.

     Dependent-upon class: Select the class of the dependent-upon CI.

     Dependent-upon CI: Select the search icon and in the Dependent-upon CI dialog box, select a CI by selecting its link in the Name column.

   - In the Identifier entries section, select criterion attributes and set their values to uniquely identify the CI.

     Criterion attributes: In the drop-down list, select one or more criterion attributes sets. This drop-down list omits criterion attributes that are based on the *`Product instance identifier`* attribute.

   - In the criterion attribute fields section scroll down the page if needed and enter values for the criterion attributes fields for the CI.

   Select **Continue**. If the new CI is detected as a duplicate of an existing CI, then the CI already exists dialog box appears. Select **Review existing CI** and then decide whether to change the existing or the new CI to prevent the duplication and to continue creating the CI.

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6. **Additional attributes**:

   Enter values for attributes, such as *Operational status*, that your administrator is requesting in addition to the required attributes from previous pages.

   Select **Continue**.

7. **Relationship definition**:

   Review any existing relationships and decide whether to add a relationship for the new CI. For dependent CIs, a dependent relationship was already created in an earlier step.

   a. Select **Add**.

   b. On the Add relationships page, select a **Relationship type**.

      The Parent/Child notations in each relationship type denotes whether the new CI will have the role of a child or a parent in the new relationship.

   c. In the Configuration Item list, select the CIs that the new CI will have the relationship with. Whichever parent/child role you selected for the new CI, the selected CIs will have the other role.

   d. Select **Add**.

   Note:
   Creating relationships to the User and the Group tables is supported, however, those relationships aren't processed by IRE.

   On the Relationship definition page, select **Continue**.

8. **Review**:
   Review all the details of the new CI. Select **Create** to approve and create the new CI, or **Back** to change definitions.
9. In the New CI created dialog box, select **Done** to exit the operation, **Review new CI** to open the form view for the new CI, or **Create another CI**.

Result

In the new CI:

- *Discovery source* is set to **Manual via IRE**.
- **Operational status** is set to **Design** until the new CI is fully configured and ready to be used. You can modify the CI's status, for example, to **Operational** if appropriate.

In the new CI, *Discovery source* is set to **Manual via IRE**.

What to do next

You can view the new CI or other CIs, using CI Form in CMDB Workspace. For more information about using the CI Form, see Manage CI details in CI Form.

Manage CI details in CI Form

Use CI Form in CMDB Workspace or in another workspace, to view, edit, and manage a comprehensive set of details of a CI such as its attributes, related lists, and CMDB 360 records. When updating CIs, IRE rules are applied to avoid potential issues such as duplicate CIs. CI Form supports derivation of form configurations throughout the CMDB hierarchy.

The CI Form feature is a centralized location with a comprehensive set of CI details, organized in sections. Anywhere CMDB Workspace provides a function to view a CI record, such as a list or a

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chart, CI Form is used for the selected CI when you select that function. Use the forms provided by CI Form to examine and edit CI attributes, relationships, tags, services and offerings, CMDB Health and CMDB 360 data associated with the CI, related lists, and activities.

General operations you can perform in CI Form:

- Select the Now Assist for CMDB CI Summarization skill: Requires that Now Assist for CMDB is set up. For more information, see Configure the CI summarization skill.
- Select **Open map** to open the CI map in Unified Map. This function isn't available for a non-operational CI. For information about using the *Life cycle stage* attribute to define a CI's operational state, see Configure CIs to appear based on life cycle stage value.

In general, a CMDB Admin and a CMDB Editor can view and edit CI records, and a CMDB User can view CI details on the form.

Explore CI view

By default, CI Form uses the Explore CI view, which is stored in the UI Views [sys_ui_view] table. The Explore CI view defines the structure of the view, its sections and attributes, and related lists that appear on the form. The system provides predefined Explore CI forms for many CMDB classes. Those forms are derived by child classes, which don't have their own form definition, throughout the CMDB hierarchy.

The various sections in Explore CI view are described in this topic.

Configuration

You can control the use and content of CI Form as follows:

- Set system property *sn_cmdb_ws.explore_ci.record.enabled*:

  This property toggles the use of CI Form when viewing CI records in CMDB Workspace, or in another workspace, if applicable. This property is set to **true** by default, enabling the experience of CI Form. For more information about this property, see Components installed with CMDB Workspace.

- Configure the Explore CI view:

  Select the More Actions icon (...) on the form and then select an option to modify the Explore CI view:

  - Select **Configure attributes** to modify the Summary and Attributes sections on the form, in Form Builder. For example, to add sections, modify section titles or the attributes included in sections: Requires the personalize_form user role.

    For more information about Form Builder and Table Builder, see Forms in Table Builder and Add fields to a form layout in Table Builder.

  - Select **Configure resources** to modify the Resources section on the form. For example, to add or remove subsections or items within subsections: Requires the personalize_list user role.

Highlighted attributes

Several key attributes are preconfigured to be highlighted on a CI form when specific conditions are met. Those highlights are meant to draw your attention to specific states, which are either healthy, or that indicate a problem and require your attention. Attribute highlight definitions are

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stored in the Highlighted Values [sys_highlighted_value] ServiceNow AI Platform table, which you can search for records where *Table* is prefixed by 'cmdb_ci'. For example, the *operational_status* attribute is configured as follows:

- If the attribute value is '**Operational**', then the attribute appears with a green highlight.
- If the attribute value is anything other than '**Operational**', then the highlight is red.

To see those preconfigured highlight records that are used in CI Form and in various other CMDB Workspace features, navigate to **All** > **Workspace Experience** > **Administration** > **Highlighted Values**.

For more information about configuring attribute highlights in the ServiceNow AI Platform, see Highlight list fields.

Summary

By default, the Summary tile shows the most meaningful CI attributes and appears at the top of all other form sections. You can select **Show more** or **Show less** to adjust the page layout. The Summary tile shows attributes such as *Created*, key ownership attributes such as *Managed by*, and other important attributes such as *Discovery source* and *Operational status*. The attributes that appear in this section map to the first section defined in the Explore CI view.

By default, the Important attributes tile shows CI attributes such as *Operating System* and *Serial number*. The attributes that appear in this tile map to the *Important attributes* section defined in the Explore CI view, if one exists.

Role requirements for operations in this section:

- Editing attributes by selecting the Edit icon: Permitted for attributes that you have permission to
- Modifying this section in the Explore CI view: personalize_form

Attributes

This section shows all the UI sections that are configured in the Explore CI view for the class, excluding:

- The first section (which populates the Summary tile).
- The Important attributes section, if one exists (which populates the Important attributes tile).

Select **Attributes** to access the subsections within. By default, the Discovery and the Operational attribute subsections map to the Discovery and the Operational sections in the Explore CI view. The All subsection shows all the CI attributes. Mandatory attributes are noted on the form by an "*" and must be set with a value.

When updating CI attributes, any Identification and Reconciliation Engine (IRE) rules that exist for the CI class are applied to help prevent potential problems with the update. IRE processes detect potential issues such as CI duplication and a dependent CI missing valid parent relationships. In these situations, the update is paused and you're presented with mitigation options to avoid the issue. Applying IRE processes might result in a partial update of attributes as reconciliation rules might block updates to some attributes and enable updates of others.

If there are no IRE rules for the class, the CI is updated directly without using IRE processes.

A CI that is updated in CI Form, has its *discovery_source* attribute set to **Manual via IRE** unless you set it to a different value.

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More information:

- Identification and Reconciliation engine (IRE)
- Reconciliation rules
- Identification rules
- Mandatory attributes

Role requirements for operations in this section:

- Updating attributes: sn_cmdb_editor
- Modifying this section in the Explore CI view: personalize_form

Tags

This section shows the list of tags, stored as key/value pairs in the Key Values [cmdb_key_value] table. These tags are typically associated with CIs and resources for cloud providers such as Amazon Web Services and Google Cloud Platform, and in general are referred to as cloud tags. Cloud tags are used in ITOM applications, such as Tag Governance, and function as key dependencies in Tag-based discovery in Service Mapping. Discovery and Service Graph Connectors automatically populate cloud tags, which can then be grouped and managed as needed in an organization.

The Tags section in CI Form doesn't contain details about Platform tags, which are another type of tags that are stored in the *Tags* column that exists in most platform tables.

To manage tags, select **Manage** in the Tags tile, and then, in the Manage tags dialog box you can:

- Enter a **Key** and a **Value** pair, and then select the Add new tag ('+') icon.
- Select the Delete tag icon for a tag.
- Modify the **Key** or the **Value** fields for a tag.
- Select **Save** to save any changes to tags.

Managing tags requires the sn_cmdb_editor user role.

More information:

- Tag-based discovery in Service Mapping
- Data collected for Amazon AWS Cloud Discovery
- Data collected for Microsoft Azure Cloud Discovery

Resources

This section shows resources linked to the CI, and maps to the Related Lists specified in the Explore CI view. By default, resources include tables such as File Systems [cmdb_ci_file_system], Software Installed [cmdb_ci_spkg], and Network Adapters [cmdb_ci_network_adapter].

In this section, you can:

- Select **Manage** to add or remove records from a resource list, which is applicable to related lists that have many-to-many relationships. If you're authorized to update in the CMDB Workspace scope, then you're navigated to a list selector for the resource where you can add or remove multiple items. If you aren't authorized, then you're navigated to the Core UI experience.

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- Select one or more related items and then select the **Delete** button, which is visible only if you have delete access to any of the related list tables.
- Select **New** to add a related list item. The **New** button is available for all the resource tables that you have access to.

  Important notes about creating a new related list item:

  - If the related list table is within the cmdb_ci hierarchy, has an IRE identification rule, and isn't an excluded table, then you're navigated to the Create CI experience in CMDB Workspace or another workspace if applicable. In the Create CI experience, some CI attributes are pre-populated with the proper values for the class. For example, in the Required attributes section for dependent CIs, the **Dependent-upon CI** attribute is pre-populated with the parent of the current CI. Relationships and resources are also pre-populated according to the CI class definitions.

    For information about the Create CI experience, see Create a CI manually in CMDB Workspace.
  - If the related list table doesn't have an IRE identification rule, then you're navigated to a basic list view page instead of CI Form.
  - The system automatically creates the matching reference back to the current class. For example, for a dependent CI the system creates the file system and the necessary relationship to connect the file system to the computer CI.
  - For some resources such as CI IPs, **New** isn't available and the **Dependent-upon CI** isn't pre-populated. This behavior applies to CIs with scripted relationships.
  - After creating a new related list item, select the Refresh List icon to show the new record in the list on the Resource section.
- Configure the Resources section in the Explore CI view by selecting the More actions icon and then selecting **Configure resources**. Use the related lists slushbucket to add or remove resources and then select **Save**: Requires the personalize_list role.

Role requirements for operations in this section:

- Configuring resources in the Explore CI view: personalize_list
- Creating, updating, or deleting records in related tables included as Resources for a CI record: Requires create, update, and delete access to the resource table.

Activity

This section shows related items such as open incidents and the activity stream for the CI on the following tabs:

Related items

Pie charts that by default include Open incidents (Incidents table), Open changes (Change Request table), and Open problems (Problem table), broken down by priority or state.

In this tab, you can:

- Select a chart to drill down to the records associated with different chart sections. Depending on configuration, records open in CMDB Workspace or in another workspace.
- Configure the list of tables for which charts appear, which is stored in the Explore CI Related Item Configurations [sn_cmdb_ws_explore_ci_related_item_config]

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table. You can add records to that table, or modify behavior settings such as where a record opens when selected: Requires the sn_cmdb_ws.config_editor role.

- Configure your preferences for which of the available charts appear when you log in. Select the Related Item Settings icon in the Related Items tab and in the Related item settings dialog box, select any charts that you prefer to hide.

CI history

History of the activities related to the CI, such as value changes in the CI attributes, listed in chronological order.

More information:

- Problem Management
- Incident Management
- Change Management

Role requirements for operations in this section:

- Accessing the Explore CI Related Item Configurations [sn_cmdb_ws_explore_ci_related_item_config] table to configure the list of charts that appear in the Related Items tab: sn_cmdb_ws.config_editor
- Configuring your preferences for which related item charts appear by selecting the Related Item Settings icon in the Related Items tab: Any logged in user

Relationships

This section shows the CI relationships, which include:

- Total relationships: Total number of relationships for this CI
- Duplicate relationships: Total number of duplicate relationship for this CI
- Stale relationships: Total number of stale relationship for this CI

In this section, you can:

- Switch between the following view types:
  - Tree view: Shows the downstream and upstream relationships in a tree format. You can expand and collapse any level that you want to see more or less details for.
  - Flat view: Shows the CI relationships in a flat view. You can adjust the number of levels of relationships to show, or filter to show only specific CIs.
- Select **Edit relationships** to open Unified Map for the CI in edit mode and with the following map settings:
  - Home node set to the current CI.
  - Relationship levels set to 1 level.
  - Layers set to show Business, Service Instances, Applications, and infrastructure.
  - Layout is set to Vertical.

  This function isn't available for a non-operational CI. For information about using the *Life cycle stage* attribute to define a CI's operational state, see Configure CIs to appear based on life cycle stage value.

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If the CI class is a Service Instance [cmdb_ci_service_auto] or a derived class, then you must either use Service Mapping (if installed) to edit a map for a Service Instance, or edit dependency relationships in Unified Map.

- Select **Refresh** after saving changes in Unified Map, to reflect your updates in the Relationship section.

More information about relationships and about editing relationships in Unified Map:

- CI relationships in the CMDB
- Edit relationships in Unified Map
- CI relationship editor
- Service Mapping
- Unified Map

Role requirements for operations in this section: **Edit relationships** requires sn_cmdb_editor

Services and Offerings

This section shows cards with counts of the following services and offerings associated with the CI:

- Service Instance: Any CI related to the Service Instance [cmdb_ci_service_auto] table where *`Service Classification`* is **Application Service**.
- Business Service Offering: Any Service Instance (*`Service Classification`* is **Application Service**) that this CI is related to, and which has a relationship to Service_Offering where *`Service Classification`* is **Business Service**.
- Technology Management Offering: Any Service Instance (*`Service Classification`* is **Application Service**) that this CI is related to, and which has a relationship to Service_Offering where *`Service Classification`* is **Technical Service** or the CI is related to a Dynamic CI Group, which is part of a Technical Service Offering.
- Technology Management Service: Parent of a Technology Management Offering.

Select a tile to drill down to the specific records associated with the tile.

More information:

- CSDM terms
- Service Delivery domain in the CSDM model
- Access CSDM features
- CSDM implementation stage — Walk
- Application services

Health

This section shows aggregations from the latest CMDB Health test results for the Completeness, Correctness, Compliance, and Relationship KPIs, and the aggregated state of attestation. Color codes are used to denote pass/fail scores.

This section shows meaningful details only if CMDB Health is set up and the associated dashboard jobs are running.

More information:

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- CMDB Health
- CMDB Health KPIs and metrics
- CIs attestation
- Configuring CMDB Health

CMDB 360

This section shows discovery sources data from the CMDB 360 data store for the CI. It shows the CI attributes and for each attribute, its current CMDB value, and any values that were reported by discovery sources for that attribute.

This section appears only if CMDB 360 is enabled and configured.

More information:

- CMDB 360/Multisource CMDB
- CMDB 360 experience in CMDB Workspace and in Service Graph Workspace
- Configure the CMDB 360 dashboard in CMDB Workspace or in Service Graph Workspace

Resume a disabled Cloud vs Non-cloud resources scheduled job

Reactivate a scheduled job to resume data collection for the Cloud vs Non-cloud resources chart in CMDB Workspace.

Before you begin

Role required: cmdb_query_builder (contained in the sn_cmdb_user, sn_cmdb_editor, sn_cmdb_admin user roles)

About this task

The Cloud vs Non-cloud resources chart in CMDB Workspace Home view uses several scheduled jobs that gather and calculate the data for the charts. Each bar in the CI classes chart represents a pair of a CI class and a storage type (cloud, non-cloud) such as Applications/Cloud. Each bar is associated with its own scheduled job. When a scheduled job exceeds its limits of time and amount of collected data, it is automatically stopped. A job that can't complete for 3 (default) consecutive days is automatically disabled for future runs.

Use the following procedure to later resume that disabled scheduled job.

Procedure

1. Click **All**.
2. In the Filter navigator, enter `sysauto_query_builder.list` and open the Scheduled Email of Query Builders table.
3. In the **Scheduled Email of Query Builders** list view, set **Active** to **true** for the scheduled job to resume.

Edit a related table from CMDB performance insights

Edit a related table on the Related Entries [cmdb_related_entry] table directly from the CMDB performance insights tool in the CMDB Workspace Insights view. Update the related table to correctly reference another CI in the Referenced field when a reference is missing from the related table.

Before you begin

Role required: sn_cmdb_admin (CMDB Admin) and any role needed to access a related table.

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About this task

A record is missing a reference when the **Referenced** field for that record is empty. CMDB performance insights enables you to easily edit related tables that are missing a reference after you drill down on a slice of the Related records missing reference chart.

You can see the full list of related tables and associated referenced fields in the Related Entries [cmdb_related_entry] table.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**, and then in the CMDB Workspace menu bar, select **Insights**.
2. On the CMDB performance insights tile, select **View performance insights**.
3. Navigate to the Related records tile of the **Payloads & CIs** tab and then select a slice of the chart in the Related records missing reference by table card.
4. Select a check box next to a record and then select **Edit**.
5. Specify applicable CMDB CI references and then select **Update**.

Related topics

Overview of CMDB

Insights view in CMDB Workspace

Edit a data source from CMDB performance insights

Edit a data source for your Service Graph Connectors to specify the data that an import set should ingest. Consider configuring a batch process to make ingestion more efficient and improve performance.

Before you begin

Role required: sn_cmdb_admin (CMDB Admin) and import_admin.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace menu bar, select **Insights**.
3. On the CMDB performance insights tile, select **View performance insights**.
4. Select the Sources with batch processing turned off card in the Service Graph connectors tab.
5. On the Data sources list view, select a check box next to a record.
6. Select **Edit**.
7. Configure the data source.
   For more information about data sources, see:
   - Create a data source
   - Data source fields
8. Select **Update**.

Edit a scheduled data import from CMDB performance insights

Edit a scheduled data import directly from CMDB performance insights for your Service Graph Connectors. Consider enabling **Concurrent Import** with a custom size partition to split incoming data into multiple import sets and transform the import sets concurrently to reduce processing time.

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Before you begin

Role required: sn_cmdb_admin (CMDB Admin) and one of these roles:

- import_scheduler
- import_admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace menu bar, select **Insights**.
3. On the CMDB performance insights tile, select **View performance insights**.
4. In the Service Graph connectors tab, click the Sources with concurrent import turned off card or the Sources with non-custom size partition method card.
5. In the Scheduled Import sets list view, select a check box next to a record.
6. Select **Edit**.
7. Configure the scheduled data import.
   You may need to change your application scope to create or edit a scheduled data import from CMDB Workspace.

   For more information about updating a scheduled data import, see Schedule a data import.
8. Select **Update**.

Related topics

Insights view in CMDB Workspace

CMDB Workspace reference

Reference topics provide additional information about components such as properties, installed with CMDB Workspace and class-specific criteria for the Cloud vs Non-cloud resources chart.

Class criteria in Cloud vs Non-cloud resources chart

The Cloud vs Non-cloud resources chart provides counts for several key classes. The chart uses different classes and relationship criteria for each class to determine which resources count as cloud and which count as non-cloud.

The Cloud vs Non-cloud resources chart shows in the CI overview tile in the CMDB Workspace store app.

Virtual Machine Instance [cmdb_ci_vm_instance]: • Cloud: Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Datacenter class (one of the configured cloud datacenters) -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account] • Non-Cloud:

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Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Datacenter class (one of the configured non-cloud datacenters)

- Total: Equals the record count in the Virtual Machine Instance [cmdb_ci_vm_instance] table (unless there are Virtual Machine Instance records without any relationships)

Server [cmdb_ci_server]:

- Cloud:

  Server [cmdb_ci_server] -> (Virtualized by::Virtualizes) -> Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Datacenter (one of the configured cloud datacenters) -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  Server [cmdb_ci_server] -> Virtual Machine Instance [cmdb_ci_vm_instance] -> Datacenter class (one of the configured non-cloud datacenters)

  OR

  Server [cmdb_ci_server] has no relationships with Virtual Machine Instance [cmdb_ci_vm_instance]

- Total: Equals the record count in the Server [cmdb_ci_server] table (unless there are Server records without any relationships)

Application [cmdb_ci_appl]:

- Cloud:

  Application [cmdb_ci_appl] -> (Runs on::Runs) -> Server [cmdb_ci_server]-> (Virtualized by::Virtualizes) -> Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Datacenter (one of the configured cloud datacenters) -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

  OR

  Application [cmdb_ci_appl] -> (Hosted on::Hosts) -> Datacenter class (one of the configured cloud datacenters)-> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  Application [cmdb_ci_appl] -> Server [cmdb_ci_server] -> Virtual Machine Instance [cmdb_ci_vm_instance] -> Datacenter Datacenter class (one of the configured non-cloud datacenters)

  OR

  Application [cmdb_ci_appl] -> Server [cmdb_ci_server] -> no relationship with Virtual Machine Instance [cmdb_ci_vm_instance]

- Total: Equals the sum of Cloud + Non-Cloud (not the record count in the Application [cmdb_ci_appl] table)

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]:

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- Cloud:

  Kubernetes Cluster [cmdb_ci_kubernetes_cluster] -> (Hosted on::Hosts) -> Datacenter (cloud logical data center) -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  Kubernetes Cluster [cmdb_ci_kubernetes_cluster] -> Datacenter (non-cloud logical datacenter)

  OR

  Kubernetes Cluster [cmdb_ci_kubernetes_cluster] -> no relationship with -> Datacenter

- Total: Equals the record count in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table (unless there are Kubernetes Cluster records without any relationships)

Database Instance [cmdb_ci_db_instance]:

- Cloud:

  Database Instance [cmdb_ci_db_instance] -> (Runs on::Runs) -> Server -> (Virtualized by::Virtualizes) -> Virtual Machine Instance [cmdb_ci_vm_instance] -> (Hosted on::Hosts) -> Logical Datacenter (one of the configured cloud datacenters)-> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

  OR

  Database Instance [cmdb_ci_db_instance] -> Logical Datacenter [cmdb_ci_logical_datacenter] (one of the configured cloud datacenters)-> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  Database Instance [cmdb_ci_db_instance] -> Server [cmdb_ci_server] -> Virtual Machine Instance [cmdb_ci_vm_instance] -> datacenter (non-cloud logical datacenter)

  OR

  Database Instance [cmdb_ci_db_instance] -> Server [cmdb_ci_server] with no relationship -> Virtual Machine Instance [cmdb_ci_vm_instance]

- Total: Sum of Cloud + Non-cloud (can be less than total number of records, subtracting the badly created records)

Storage Volume [cmdb_ci_storage_volume]:

- Cloud:

  cmdb_ci_storage_volume -> (Hosted on::Hosts) -> Logical Datacenter [cmdb_ci_logical_datacenter] (one of the configured cloud datacenters)-> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account]

- Non-Cloud:

  cmdb_ci_storage_volume -> Logical Datacenter [cmdb_ci_logical_datacenter] (one of the configured non-cloud datacenters)

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OR cmdb_ci_storage_volume -> no relationships with Datacenter
Cloud Object Storage [cmdb_ci_cloud_object_storage]: • Cloud: Cloud Object Storage [cmdb_ci_cloud_object_storage] -> (Hosted on::Hosts) -> Logical Datacenter [cmdb_ci_logical_datacenter] -> (Hosted on::Hosts) -> Cloud Service Account [cmdb_ci_cloud_service-account] (requires CMDB CI Class Models) • Non-Cloud: N/A (This table can never have non cloud records)
Service Accounts [cmdb_ci_cloud_service_account]: • Cloud: datacenter_type attribute is populated with correct datacenter class • Non-Cloud: N/A (This table can never have non-cloud records)

Components installed with CMDB Workspace

Several types of components are installed with the activation of the CMDB Workspace (sn_cmdb_ws) plugin, including properties, tables, user roles, and scheduled jobs.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

In addition, the CMDB Workspace plugin adds the CMDB Group type 'CMDB Workspace'. For components associated with the CMDB Data Manager, see Components related to CMDB Data Manager.

Properties installed

The following properties are installed by the Configuration Management (CMDB) (com.snc.cmdb) plugin which is included in base systems.

Property	Description
sn_cmdb_ws.ci_overview.managed_by_me.enabled	Shows/hides the My CIs section of CI Overview on the CMDB Workspace landing page, for users with sn_cmdb_editor role.

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Property	Description
	• Type: true | false • Default: true • Location: Add to System Properties [sys_properties] table.
sn_cmdb_ws.total_cis.enabled	Shows/hides the Total CIs section on the CMDB Workspace landing page. • Type: true | false • Default: true • Location: Add to System Properties [sys_properties] table.
sn_cmdb_ws.ms.discovery_source_not_reporting_max_days	Number of days after which if one or more discovery sources stop reporting CIs, that CI is included in the CIs not reported by discovery sources chart in the CMDB 360 view. • Type: integer • Default: 7 • Location: Navigate to **Workspaces** > **CMDB Workspace** and then select **CMDB 360**. Select Settings and configure **Number of days since CIs were last discovered by a discovery source** in the Potential issues section. • Learn more: Configure the CMDB 360 dashboard in CMDB Workspace or in Service Graph Workspace.
sn_cmdb_ws.ms.report_max_limit	Maximum number of records that appear as list views when drilling down from the following charts: • CIs not reported by discovery sources • Data mismatch

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Property	Description
	• CIs by number of discovery sources • CIs with a single source Details: • Type: integer • Default: 100,000 • Location: Navigate to **Workspaces** > **CMDB Workspace** and then select **CMDB 360**. Select Settings and configure **Maximum number of records to process** in the Global section. • Learn more: Configure the CMDB 360 dashboard in CMDB Workspace or in Service Graph Workspace.
sn_cmdb_ws.unifiedmap.map_search_filter.default_levels	Initial default number of levels from the home node, up and down the CMDB hierarchy, to show on a map. Up the hierarchy goes from all parents to their parents up to the specified level. Down the hierarchy goes from all children to their children up to the specified level. • Type: integer • Default: 3 • Location: Add to System Properties [sys_properties] table. Editing affects all users and requires the sn_cmdb_admin user role.
sn_cmdb_ws.unifiedmap.map_search_filter.max_levels	Maximum number of levels from the home node, up and down the CMDB hierarchy, to show on a map. Up the hierarchy goes from all parents to their parents up to the specified level. Down the hierarchy goes from all children to their children up to the specified level.

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Property	Description
	• Type: integer • Default: 25 • Location: System Properties [sys_properties] table Editing affects all users and requires the sn_cmdb_admin user role.
sn_cmdb_ws.list.record_count_limit	The maximum number of results that the system counts for when using conditional search to search for CIs on the Home view in CMDB Workspace. This count shows for example, at the top of the search results list. • Type: integer • Default: 100,000 • Location: Add to System Properties [sys_properties] table. • More information: CMDB Workspace store app For example, if a limit of 100,000 is reached, the count shows "100,000 +" to indicate that counting stopped at 100,000 and that there are additional uncounted results. Increasing the value of this property directly results in greater impact on performance. However, if a precise count is needed, set this limit to a number that isn't reached by the anticipated count.
sn_cmdb_ws.explore_ci.record.enabled	Enables the use of the CI Form feature when selecting CIs to view in CMDB Workspace or in another workspace. When false, the system shows CI records in a basic list view instead of CI Form. You might need to temporarily disable the CI Form experience if its not yet ready to be used. For example,

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Property	Description
	you might need to migrate previous custom configurations to CI Form to prepare it for use. • Type: true | false • Default: true • Location: Add to System Properties [sys_properties] table. • More information: Manage CI details in CI Form

Roles installed

The following roles are installed by the Configuration Management (CMDB) (com.snc.cmdb) plugin which is included in base systems. These roles are required for access and interaction with the CMDB Workspace, and are included for completeness.

Note:
On an instance that has been upgraded to the Zurich release, to correctly configure some of the user roles as described below, such as CMDB Admin and CMDB Editor, you must run the '*Remove CMDB Roles from ITIL roles and Add CUD access to sn_cmdb_admin/sn_cmdb_editor roles*' scheduled job. For more information about this scheduled job and its use, see the Zurich Configuration Management Database (CMDB) release notes.

Role title [name]	Description	Role containment
CMDB Admin [sn_cmdb_admin]	Provides the highest level of access to tools and UIs within CMDB Workspace, including full access to the Configuration Item [cmdb_ci] table. A CMDB Admin, for example, can set policies in the CI Class Manager and application service requirements. CMDB Admin can also modify default config records under the default identifier or the default identifier itself.	Contains: • data_manager_admin • canvas_admin • sn_cmdb_editor • cmdb_ms_admin • cmdb_dedup_admin
CMDB Editor [sn_cmdb_editor]	Provides access to tools and UIs within CMDB Workspace including full access to the Configuration Item [cmdb_ci] table. A CMDB Editor has writing privileges to CMDB Data Manager tasks and to CIs but can't change policies such as in the CMDB	Contains: • sn_cmdb_user • cmdb_ms_editor

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Role title [name]	Description	Role containment
	Data Manager or in the CI Class Manager.	
CMDB User [sn_cmdb_user]	Provides read-only access to the CMDB data and to basic UIs such as CMDB reports and dashboards, within CMDB Workspace.	Contained by: itil (indirectly) Contains roles: • canvas_user • data_manager_user • cmdb_ms_user
Multisource CMDB Admin [cmdb_ms_admin]	Provides full access to data, dashboard configurations, and queries related to Multisource CMDB and CMDB 360.	Contains: cmdb_ms_editor
Multisource CMDB Editor [cmdb_ms_editor]	Provides access to CMDB 360 records and enables users to create and edit CMDB 360 queries.	Contains: cmdb_ms_user
Multisource CMDB User [cmdb_ms_user]	Provides read-only access to multisource data, CMDB 360 queries, and to related UIs such as CMDB 360 reports and dashboards, and Multisource Report Builder.	Contains: cmdb_read
Workspace Config Admin [sn_cmdb_ws.config_admin]	Provides an administrator full access to the Config identifiers [sn_cmdb_ws_config_identifier] table and its descendent config tables. Can modify non-default config or config identifier records. Since config tables contain properties which belong to different applications, Workspace Config Admins should only modify records related to their application.	Contains: sn_cmdb_ws.config_editor
Workspace Config Editor [sn_cmdb_ws.config_editor]	Provides editing access to child config tables such as the Workspace Config Properties [sn_cmdb_ws_config_property] table. Can modify non-default config records. Since config tables contain properties which belong to different applications, Workspace Config Editors should only modify records related to their application.	

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Role title [name]	Description	Role containment
[cmdb_manual_ci_ire_access]	Provides access to the experience of manual CI creation in CMDB Workspace and in other workspaces.	

Scheduled jobs installed

Scheduled job	Description
CMDB Workspace Collection	Updates the information in all the 7-Day Activity charts such as the CI Activity in Last 7 Days chart.
Multisource Dashboard Analytics Population	Runs daily to calculate the aggregate statistics of CMDB 360 data and populates the CMDB 360 dashboard landing page.
Multisource Dashboard Collection	Collects CMDB 360 data and then invokes the *`Multisource Dashboard Analytics Population`* scheduled job.
Multisource Dashboard Data Generator (Demo data)	Demo job that populates CMDB 360 tables with simulated data, to showcase the CMDB 360 dashboard landing page. Runs on demand.
insight – cloud non-cloud aggregate	Runs every 30 minutes to collect data for the Cloud and non-cloud resources chart.
Insight - Cloud Applications	Collects cloud data for the cmdb_ci_appl table.
Insight - Non-cloud Applications	Collects non-cloud data for the cmdb_ci_appl table.
Insight - Cloud Object Storage	Collects cloud data for the cmdb_ci_cloud_object_storage table.
Insight - Cloud Service Account	Collects cloud data for the cmdb_ci_cloud_service_account table.
Insight - Cloud DB Instances	Collects cloud data for the cmdb_ci_db_instance table.
Insight - Non-cloud DB Instances	Collects non-cloud data for the cmdb_ci_db_instance table.
Insight - Cloud Kubernetes Cluster	Collects cloud data for the cmdb_ci_kubernetes_cluster table.
Insight - Non-cloud Kubernetes Cluster	Collects non-cloud data for the cmdb_ci_kubernetes_cluster table.

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Scheduled job	Description
Insight - Cloud Servers	Collects cloud data for the cmdb_ci_server table.
Insight - Non-cloud Servers	Collects non-cloud data for the cmdb_ci_server table.
Insight - Cloud Storage Volume	Collects cloud data for the cmdb_ci_storage_volume table.
Insight - Non-cloud Storage Volume	Collects non-cloud data for the cmdb_ci_storage_volume table.
Insight - Cloud VM Instances	Collects cloud data for the cmdb_ci_vm_instance table.
Insight - Non-cloud VM Instances	Collects non-cloud data for the cmdb_ci_vm_instance table.
CMDB Workspace – Populate aggregates Daily	Runs daily to collect the latest data from the instance for cards such as the CI Summary chart in the CMDB Workspace landing page, and the following cards in the Insights view: • CIs processed by IRE • CIs used in Data Manager policies • CIs used in data attestation • Query Builder queries • Intelligent search Populates the Base Aggregate Data [sn_cmdb_ws_base_aggregate_data] table with the collected data. Once collection completes, invokes the *CMDB Workspace Aggregates Daily Collection* scheduled job.
CMDB Workspace – Populate aggregates Monthly	Runs monthly to collect data from the instance for cards such as the following, in the Insights view: • CIs processed by IRE based on source • CIs processed by IRE Once collection completes, invokes the *CMDB Workspace Aggregates Monthly Collection* scheduled job.
CMDB Workspace Aggregates Daily Collection	A Performance Analytics job that stores the latest data generated by the *CMDB Workspace – Populate aggregates Daily* scheduled job. The stored data is then shown in respective cards in the Insights view.
CMDB Workspace Aggregates Monthly Collection	A Performance Analytics job that stores the latest data generated by the *CMDB Workspace – Populate aggregates Monthly* scheduled job. The stored data is then shown in respective cards in the Insights view.

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Scheduled job	Description
[Demo] — CMDB Workspace Collection	Supports demo data for CMDB Workspace charts in various views such as the Home view. Installed only if **Load demo data** was checked when the CMDB Workspace store app was installed or upgraded.
[Demo] — CMDB Workspace demo data	Activates demo data for CMDB Workspace charts in views such as the Insights view, and CMDB 360 view (if CMDB 360 is enabled). Populates the Base Aggregate Data [sn_cmdb_ws_base_aggregate_data] table with random numbers that illustrate trend lines in charts in the Home and Insights views. It then runs demo data collection scheduled jobs. Installed only if **Load demo data** was checked when the CMDB Workspace store app was installed or upgraded.
[Demo] CMDB Workspace Aggregates Daily Collection	A Performance Analytics job that supports demo data for CMDB Workspace charts in various views such as the Insights view and which is installed only if **Load demo data** was checked when the CMDB Workspace store app was installed or upgraded. Stores the demo data generated by the *`CMDB Workspace - Populate aggregates Daily`* scheduled job. The demo data is then shown in respective cards in the Insights view.
[Demo] CMDB Workspace Aggregates Monthly Collection	A Performance Analytics job that supports demo data for CMDB Workspace charts in various views such as the Insights view and which is installed only if **Load demo data** was checked when the CMDB Workspace store app was installed or upgraded. Stores the demo data generated by the *`CMDB Workspace - Populate aggregates Monthly`* scheduled job. The demo data is then shown in respective cards in the Insights view.
CMDB Workspace Collection On Demand With Lookback	Collects historical data (past 30 days) for some indicators such as the Integration outliers. Runs automatically during install or upgrade and isn't configured with any recurring schedule.
PopulateDuplicate Task Group Daily	Runs daily to populate the following tables: • Group Task Mapping [sn_cmdb_ws_reconcile_duplicate_task_group_m2m] • Remediate Duplicate Task Groups [sn_cmdb_ws_reconcile_duplicate_task_group] Reads de-duplication task data records and calculates the root cause analysis for the duplication. Used in support of Now Assist for CMDB.

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Tables installed

Table	Description
CMDB Group Metadata [sn_cmdb_ws_group_metadata]	CMDB group data with count of CIs in each group.
CMDB Group Query Metadata [sn_cmdb_ws_group_query_metadata]	Encoded queries with count of CIs in each encoded quer subgroup.
NLQ Sample Search [sn_cmdb_ws_nlq_sample_search]	Sample searches that appear when selecting the search box of an Intelligent Search for CMDB widget.
NLQ Sample Search Table [sn_cmdb_ws_nlq_sample_search_table]	References the actual tables associated with sample searches that appear when selecting the search box of a Intelligent Search for CMDB widget.
NLQ Excluded Table [sn_cmdb_ws_nlq_excluded_table]	Tables with ambiguous names that should be excluded from Intelligent Search. These tables won't appear in suggestions, and other tables with similar names are give higher priority in search results.
Important Actions Configuration [sn_cmdb_ws_imp_action_card_config]	Configuration of appearance and behavior of Important action cards that appear on the landing page of the CMD Workspace. Editing in this table is accessible only to user with the sn_cmdb_admin role. Authorized users can mod attributes of an important action such as Active and Filter conditions, but can't modify the Type, Persona, and Table attributes.
Quick Links [sn_cmdb_ws_quick_links]	Quick links that appear on the CMDB Workspace landing page.
CIs by Number of Sources [sn_cmdb_ws_ms_cis_by_number_of_sources]	CIs grouped by the number of discovery sources they we discovered by. Records appear as a list view when clickin on the CIs by number of discovery sources bar chart in th CMDB 360 view.
CIs With a Single Source [sn_cmdb_ws_ms_cis_with_single_source]	CIs reported by only one discovery source. Records appe as a list view when selecting the CIs with a single discove source chart in the CMDB 360 view.
CMDB Workspace Multisource Class Metadata [sn_cmdb_ws_ms_class_metadata]	Class configuration settings such as class selections and weights, that CMDB Admins can modify from the CMDB 3 view. Used by CMDB 360 analytics population queries to store a sample set of coverage data for the CIs by numbe sources and CIs with a single source drill-downs cards.
Multisource Data Mismatch Records	Data mismatch records found from attribute discrepancie from various data sources. Records appear as a list view

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Table	Description
[sn_cmdb_ws_ms_data_mismatch]	when selecting the Data mismatch chart in the CMDB 36 view.
CMDB Workspace Multisource Data Mismatch Configurations [sn_cmdb_ws_ms_data_mismatch_config]	Data mismatch settings, such as the selection of classes, attributes, conditions, and weights, that CMDB Admins ca modify in the CMDB 360 view. Used by CMDB 360 analyt population queries to store a sample set of data mismatc records in the sn_cmdb_ws_ms_data_mismatch table.
Discovery sources not reporting CIs [sn_cmdb_ws_ms_discovery_sources_not_reporting]	Data for when one or more discovery sources stop reporting CIs after the specific X number of days (X can be set in the CMDB 360 view and is stored in the sn_cmdb_ws.ms.discovery_source_not_reporting_max_d system property). Records appear as a list view when selecting the CIs not reported by discovery sources char the CMDB 360 view.
Multisource Workspace Settings Weight Type [sn_cmdb_ws_ms_settings_weight_type]	Weight type (automatic or manual) for data mismatch and coverage settings in CMDB 360 view.
Datacenter Types [sn_cmdb_ws_datacenter_type]	Classifications of datacenter classes which are considere cloud or non-cloud in the organization, which is used for Cloud and non-cloud resources chart.
CMDB Insight Query Categories [sn_cmdb_ws_insight_query_category]	Class categories and their status for inclusion in the Clou and non-cloud resources chart.
CMDB Insight Data [sn_cmdb_ws_insight_data]	Legacy table for storing data for the Cloud and non-cloud resources chart. Starting with CMDB Workspace version 3.4, the CMDB Product Insight Data [sn_cmdb_ws_product_insight_data table is used instead.
Base Aggregate Data [sn_cmdb_ws_base_aggregate_data]	Aggregation data for CMDB Workspace cards and parent table to other aggregation tables. When processing for a count completes, *State* of the existing record for that count is set to **retired** and a new record for that count is created with the updated count value. Cards in CMDB Workspace views show values only for counts where *Sta* = **ready**. Read only.
Service Graph Connector [sn_cmdb_ws_service_graph_connector]	Details about all Service Graph Connectors that are currently available in the ServiceNow Store (excluding any Innovation Lab connectors). Data is used to provide a current count for the Service Graph Connectors card in th Insights view.

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Table	Description
	Read only.
Rating Configuration [sn_cmdb_ws_rating_config]	Start and end values for different ratings of a category. Fo example, start and end values for low, moderate, and high adoption level ratings for the data governance category i the Insights view. Read only.
Feature Category [sn_cmdb_ws_feature_category]	Metadata of the feature card for most of the features at CMDB Workspace level. Read only.
CMDB Product Insight Data [sn_cmdb_ws_product_insight_data]	Aggregated count for each class and datacenter class, us for cards in the Insights view. Read only.
Feature Category Runtime Attributes [sn_cmdb_ws_feature_category_runtime_attribute]	Runtime attributes related to performance insights, that c be used when running various scheduled jobs. Read only.
Integration Aggregate Data [sn_cmdb_ws_integration_aggregate_data]	Integration outlier information related to performance insights. Details for each Integration with execution recor which contain processing rate or rows outliers. Read only.
Partial Payload Items [sn_cmdb_ws_partial_payload_item]	Extracted partial payload information related to performa insights. Includes discovery source, error, and class, associated with each partial payload item. Read only.
Application Service Insights Data [sn_cmdb_ws_app_svc_insight_data]	Application services details such as classification (cloud non-cloud, hybrid, or unknown) and count of CIs associat with the application service. Read only.
Table Attributes [sn_cmdb_ws_node_map_table_attributes]	Set of extended properties, per class, that appear in the Attributes pane in the contextual side panel for a selecte in Unified Map. This table leverages the use of the configuration identifie framework.

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Table	Description
	For more information, see Configure which attributes to display in the Attributes panel.
Node Map Related Items [sn_cmdb_ws_node_map_related_item]	Categorization and order of related items, per class, that appear in the **Related items** panel, in CI badges, and on timeline in Unified Map. This table leverages the use of the configuration identifie framework. For more information, see Configure how to display relate items on the map.
Node Map References [sn_cmdb_ws_node_map_reference]	Reference relationships that appear as a dotted line relationship in Unified Map. This table leverages the use of the configuration identifie framework. For more information, see Configure display of connectio to a referenced class.
Class Icons [sn_cmdb_ws_class_icon]	Maps ServiceNow platform UI Builder (UIB) icon values (f example 'serverbox-outline') to CMDB class display name that they are used for (for example 'Network Disk') in Unifi Map.
Node Map Profiles [sn_cmdb_ws_node_map_profiles]	Class profiles that include default filters and some Unifie Map settings, per class. A class profile is applied if no filte preset is in effect, to the initial map and when setting the filter preset to `Default view`. Specifying a class profile can be especially useful for Service Mapping data with the Mapped Application Serv class. This table leverages the use of the configuration identifie framework. For more information, see Create a class profile of visible layers for classes.
CMDB Data Management Certification Task To Document [sn_cmdb_ws_dm_certification_task_to_document]	Mappings between certification tasks and each of their associated CI records targeted for certification.
CMDB Certification Attribute Status [sn_cmdb_ws_dm_certification_attribute_status]	Flattened failed attribute status JSON. Used for reporting certification exceptions.
CMDB Data Management Task Execution Context	Mappings between tasks and a policy's' execution contex

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Table	Description
[sn_cmdb_ws_dm_task_execution_context]	
Remediate Duplicate Task Groups [sn_cmdb_ws_reconcile_duplicate_task_group]	Groupings of de-duplication tasks, the CI class affected, discovery source associated with the de-duplication task and the CI identification rule that was used to discover th CIs. Used in support of Now Assist for CMDB. • sn_cmdb_admin role has create/write/delete privileges • sn_cmdb_user OR dedup_admin roles have read privileges
Group Task Mapping [sn_cmdb_ws_reconcile_duplicate_task_group_m2m]	Reference to the Remediate Duplicate Task Groups table and a root cause analysis summary of the reason that the Cis were added to the de-duplication task Used in support of Now Assist for CMDB. • sn_cmdb_admin role has create/write/delete privileges • sn_cmdb_user OR dedup_admin roles have read privileges
Config identifiers [sn_cmdb_ws_config_identifier]	Parent table of the configuration identifiers framework. By default, contains the 'Default' config identifier with defaul settings for various CMDB Workspace features. Stores any additional config identifiers, configured with custom settings for a CMDB Workspace feature, that is applicable to a specific workspace. For information about the configuration identifiers framework, see Configuration identifiers framework.
Workspace Config Properties [sn_cmdb_ws_config_property]	Collection of properties that control different behaviors in Unified Map. This table leverages the use of the configuration identifie framework.
CI additional attributes config [sn_cmdb_ws_ci_additional_attributes]	Settings of requests for specific CI attributes when using CMDB Workspace feature of manually creating a new CI. This table leverages the use of the configuration identifie framework. For more information, see Request additional attributes f new CIs.

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Table	Description
CI class configs [sn_cmdb_ws_ci_class_config]	Settings that limit the selection of classes for a new CI wh using the CMDB Workspace feature of creating manually new CI. This table leverages the use of the configuration identifie framework. For more information, see Limit the class list for new CIs created in a workspace.

API Insights

The ServiceNow® API Insights workspace is an all-in-one application that enables you to track all your APIs. You can also use it to start workflows related to different stages in the application programming interface (API) life cycle.

Get started

Explore Learn about the benefits of API Insights and how it is used.	Configure Plan and configure your implementation.	Analyze Administer and monitor API data
Manage Manage API data for informed decision-making.	Reference Get details about installed components.	

Troubleshoot and get help

- Ask questions and explore other resources for API Insights in the ServiceNow Community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

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Exploring API Insights

Learn about API Insights with a sample workflow and review the benefits it can provide for different users in your organization.

API Insights overview

API Insights is a centralized workspace for enterprise or software architects and Configuration Management Database (CMDB) administrators to analyze and take action on their organization's application programming interface (API) inventory.

API Insights users

Users

User	Description
Enterprise architect	Users with the sn_api_insights_ws.api_mgmt_architect role can access the API Insights workspace to search APIs, monitor team APIs, view managed APIs, track API activity, review API access requests, and manage API life cycle aspects, including APIs without interfaces, business applications, ownership, or product models.
Enterprise architect administrator	Users with the sn_api_insights_ws.api_mgmt_architect_admin role can access the API Insights workspace to search APIs, evaluate metrics on API usage, set parameters for creating an API, connect APIs to a business context, specify the group attribute for ownership, and associate a workflow for granting access to APIs.
CMDB administrator	Users with the sn_cmdb_admin role can configure and manage the API-related Service Graph Connectors. They can accept or reject clustering recommendations, search for and compare APIs, and adjust settings related to API data management within the CMDB. **Note:** A CMDB administrator needs additional roles such as ml_report_user, platform_ml_read, and cmdb_inst_admin to access some of the features and data. Additionally, the CMDB administrator needs the following security roles to access specific widgets: • sn_si.basic or evt_mgmt_user – Required for Events and Critical alerts • sn_vul.vulnerability_read – Required for Active vulnerability items • sn_msi.msi_incident_read – Required for Security incidents • sn_si.read – Required for Incidents

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API Insights example workflow

Example workflow for the API Insights users

1. A CMDB administrator with the sn_cmdb_admin role logs in to API Insights and configures the API Service Graph Connectors to import API data from various sources. Also, reviews and resolves any connection errors to ensure a smooth data import process.
2. An enterprise architect administrator with the sn_api_insights_ws.api_mgmt_architect_admin role accesses the settings page and adjusts the ownership settings according to their preferences.
3. An enterprise architect with the sn_api_insights_ws.api_mgmt_architect role navigates to the APIs missing data section to enrich API records by adding relationships and references. This includes associating business context, assigning ownership groups, linking product models, and defining API designs.
4. The enterprise architect explores the API page, which provides a centralized view of all APIs and views all APIs in one place. They drill down into specific APIs to analyze details such as ownership, deployment locations, consumer usage, security incidents, and alerts. Additionally, they assess how each API fits within the broader ecosystem, identifying key relationships and dependencies in the API relationship map.

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API Insights benefits

Benefit	Feature	Users
Implement a system of record for enterprise-wide APIs.	Workspace to view and interact with API inventory	API Insights administrator
Achieve enterprise-wide visibility of APIs.	Automated discovery and ingestion of API data from various sources into Configuration Management Database (CMDB)	API Insights administrator
Map APIs to application services and business context.	Workflow for mapping APIs to relevant application services and business context	API Insights administrator
Integrate API data from a broad ecosystem of sources into the CMDB via Service Graph Connectors.	API data ingestion using API Service Graph Connectors into CMDB	CMDB administrator
Search for relevant APIs.	API search functionality with a user-friendly interface	API Insights administrator
Enable workflow configurations for API access requests.	Customization of API access request workflows	API Insights administrator
View the usage, security, and service mapping of each API and its components.	Detailed view of API inventory, requests according to minute, unique consumers, security data, IT Operations Management (ITOM) and IT Service Management (ITSM) data, and relationship mapping	API Insights architect API Insights administrator CMDB administrator

What to explore next

To learn more about configuring and using API Insights, see:

- Configuring API Insights
- Administering and monitoring API data with API Insights
- Managing API data in API Insights
- Managing API access within API Insights
- Optimizing API organization with clustering recommendations in API Insights

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- Managing API data connections added for Service Graph Connectors in API Insights
- API Insights reference

Configuring API Insights

Complete the configuration tasks to start using the API Insights workspace.

Configuration overview

1. Configure API Insights installation.

   As an administrator with the admin role, set up API Insights by installing the application and assigning roles to users for managing API operations.

2. Configure API Insights data and imports.

   As a CMDB administrator with the sn_cmdb_admin role, set up data model recommendations for API clustering and configure settings for importing APIs into API Insights.

3. Configure settings to monitor and organize APIs in API Insights.

   As an enterprise architect administrator with the sn_api_insights_ws.api_mgmt_architect_admin role, configure API management workflows, including automating API actions and defining settings to monitor and organize APIs in API Insights.

Configuring API Insights as a system administrator

As a user with the admin role, set up the API Insights workspace by installing the application and assigning roles to users for managing API operations.

System administrator tasks overview

1. Install API Insights.

   Install the API Insights application (sn_api_insights_ws).

2. Assign roles for API Insights users

   Assign roles for using the API Insights workspace.

Install API Insights

You can install the API Insights application (sn_api_insights_ws) if you have the admin role.The application installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Confirm that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Review the API Insights application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.

Role required: admin

About this task

The following items are installed with API Insights:

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- Plugins
- Store applications
- Roles
- Tables

For more information, see Components installed with API Insights.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the API Insights application (sn_api_insights_ws) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   In the list next to the **Install** button, the versions that are available to you are displayed.
3. Select a version from the list and select **Install**.

   In the Review Installation Details dialog box, any dependencies installed with your application are listed.
4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data are the sample records that describe application features for common use cases. Load the demo data when you first install the application on a development or test instance.
6. Select **Install**.

Assign roles for API Insights users

Assign roles to control access to features, capabilities, and data in the API Insights application.

Before you begin

Set the application scope to API Insights using the application picker. For more information, see Application picker.

Role required: admin

About this task

Users with the sn_api_insights_ws.api_mgmt_architect_admin, sn_api_insights_ws.api_mgmt_architect, or sn_cmdb_admin roles can use the API Insights application. See Exploring API Insights.

Procedure

Assign roles to users and groups using the ServiceNow AI Platform user administration feature.

- To assign a role to a user, see Assign a role to a user.
- To assign a role to a group, see Assign a role to a group.

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Configuring settings to manage API data and imports in API Insights

As a CMDB administrator with the sn_cmdb_admin role, you can set up data model recommendations for API clustering, configure settings for importing APIs into the API Insights workspace, and optionally review enterprise architect administrator settings for managing APIs.

CMDB administrator tasks overview

1. Configure data model recommendations for API clustering in API Insights

   Set recommendations for clustering related API components to align the organization's data with the desired data model.

2. Configure instance API import settings in API Insights.

   Set options to import custom and ServiceNow APIs from your instance into the CMDB.

3. Optional: Configure settings to manage APIs in API Insights.

   Review and configure enterprise architect administrator settings for managing APIs. You can turn on the All settings option to access both CMDB administrator and enterprise architect administrator settings from the API Insights settings page.

4. Optional: Automate creating tag-based relationship mapping within API Insights.

   Configure and automate creating CMDB relationships between APIs and application services or business applications based on API tags.

Configure data model recommendations for API clustering in API Insights

Set recommendations for clustering API components to align the organization's data with the desired data model.

Before you begin

Role required: sn_cmdb_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Settings** tab.
3. In the Data model recommendations section, configure system-generated recommendations for clustering related API components based on your organization’s data model.

Field	Description
Proposed API clustering	Option to enable the system-generated API clustering recommendations. When selected, the system will propose clustering connections between related API components within the same API.
Cluster quality	Desired quality level for the API clustering recommendations. The cluster quality can range from 0 to 100, where a higher value represents a stronger connection between related components.

4. Select **Save**.

Configure instance API import settings in API Insights

Set options to import custom and ServiceNow APIs from your instance into the CMDB.

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Before you begin

Configure the *Import ServiceNow API to API Insights* scheduled job to automatically import configured APIs from your ServiceNow instance into the API Insights workspace at regular intervals. For more information, see Scheduled jobs.

Role required: sn_cmdb_admin

About this task

Configure API import options to bring custom and ServiceNow APIs from your ServiceNow instance into the CMDB. This feature enables you to analyze and manage ServiceNow instance APIs together with other enterprise APIs within the API Insights workspace.

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Settings** tab.
3. In the Import instance APIs section, select **Configure API import**.
4. In the Set up import section, select the options for importing scripted and outbound REST APIs, and scripted and outbound SOAP APIs into the CMDB.

API import options

Option	Description
All custom APIs	Imports all custom-developed APIs within the instance.
ServiceNow APIs	Imports predefined ServiceNow APIs within the instance.
Active in last	Imports only APIs based on recent activity, available for scripted APIs only.

   a. If you select the **ServiceNow APIs** check box, select **Select APIs** and then manage the APIs to import.

Importing ServiceNow APIs

Action	Description
Add ServiceNow APIs	On the Select ServiceNow APIs page, select **Add to import list**. Then, on the Add to import list page, select the check box for APIs from the All ServiceNow APIs list and select **Add selected**.
Remove any selected ServiceNow APIs	On the Select ServiceNow APIs page, select the check box for APIs from the Selected APIs list, and select **Remove from import list**.

   b. If you select the **Active in last** option, enter the number of days in the **Days** field to import only APIs that have been active in the specified timeframe.

5. On the Select ServiceNow APIs page, select **Done**.
6. On the Configure API import page, select **Save configuration**.

Configure settings to manage APIs in API Insights

Configure API Insights settings, including API creation tools, relationship models, ownership groups, and automated workflows, to streamline API governance and operational processes.

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Before you begin

Role required: sn_api_insights_ws.api_mgmt_architect_admin or sn_cmdb_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Settings** tab.
3. Turn on the All settings option.

> **Note:**
> This step is applicable to users with the sn_cmdb_admin role. You can skip this step if you have the sn_api_insights_ws.api_mgmt_architect_admin role.

4. In the API creation tool section, select an API creation tool from the available options.

Option	Description
None	Uses no external tool.
Digital Integration Management	Uses the Digital Integration Management application (part of the Enterprise Architecture Workspace), if enabled, to initiate the API design process by creating a digital interface record.
External tool	Uses a third-party tool for API creation, requiring the URL for the external tool (for example, `http://www.postman.com`) to be entered in the **External API authoring tool URL** field.

5. In the API-to-business application relationship model section, select a relationship model from the available options.
6. In the Ownership group section, set the ownership group responsible for managing the API.
7. In the Configure workflows section, select a workflow for automating an API action.

> **Note:**
> Workflows are created by your administrator using the Workflow Studio. See Configuring flows for API actions in API Insights.

8. Select **Save**.

Validating API specifications in API Insights

You can access API specification validation rules to verify that your API specifications are complete, consistent, and adhere to best practices.

Validation rules identify structural issues early during import or analysis, improving overall API quality. You can manage these rules to enforce standardization across API specifications and reduce errors by checking for missing or incorrect fields before APIs are published or used in production.

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Storing API specifications

The API Specification [sn_api_insights_ws_api_specification] table stores the specification documents that describe individual APIs. Each record includes the following details to identify the API to which the specification belongs and to manage multiple versions.

API specification details

Field	Description
Name	Name of the API.
Version	Version of the API.
Type	Format and version of the API specification standard being used. For example, `openapi3.0.0` for an OpenAPI specification.
State	Current status indicating whether the API specification has been validated against the applicable rules and the validation outcome. Valid values are: • **Unprocessed**: Indicates that the API specification hasn't been validated. • **Valid**: Indicates that the API specification was validated and processed successfully or with warnings. If warnings are present, details are displayed in the **Message** field. • **Invalid**: Indicates that the API specification was validated but contains errors. Error details are displayed in the **Message** field.
Specification	Full content of the API specification file. **Note:** For OpenAPI, includes the complete OpenAPI document describing endpoints, methods, and schema.
Message	Messages are generated after processing all validation rules for the specification type. They include errors or warnings with explanations.

Validation rule structure

The Specification Validation Rule [sn_api_insights_ws_spec_validation_rule] table stores validation rules for the API specifications defined in the API Specification [sn_api_insights_ws_api_specification] table.

Note:
The sn_cmdb_editor role is required to edit or delete validation rules, and the cmdb_read role to view them.

Each validation rule contains the following key components:

Validation rule components

Component	Description
Specification	API specification for which the rule is designed.
Version	Version of the API specification the rule validates. If specified, the rule applies only to those versions. To restrict validation to specific versions, specify them

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Validation rule components (continued)

Component	Description
	in the **Version** field. Separate multiple values with commas. For example, `1.0,1.1,2.0`. **Note:** If the **Version** field is left empty, the rule runs for all installed versions of the specified API specification type.
Type	Type of validation to perform. The valid values are: • **Path**: Verifies that the specific keys are present within arrays of objects, individual objects, or both, in the designated sections of the API specification document. • **Expected value**: Validates whether the specified key matches the expected values specified in the **Value** field. This validation applies only to a single key specified in the **Key** field.
Key	Part of the specification to verify. If no expected value is provided, you can enter multiple keys in the **Key** field, separated by commas.
Value	Expected values for the key specified in the **Key** field. Separate multiple values with commas.
Severity	Severity level of the validation rule outcome, either a warning or an error. **Note:** When set to warning, the API specification remains valid if the rule isn't met, indicating it is not a failure, and only a message is displayed.
Message	Explanation of the issue when the rule is triggered.
Active	Option to activate the rule. Only active rules are triggered by the *`API Specification Validation`* scheduled job.

API specification validation process

The *`API Specification Validation`* scheduled job automatically validates unprocessed API specifications against active rules based on their specification type to ensure compliance with required standards.

The validation process includes:

1. Retrieving all active validation rules from the Specification Validation Rule [sn_api_insights_ws_spec_validation_rule] table.
2. Selecting APIs marked as unprocessed in the API Specification [sn_api_insights_ws_api_specification] table.
3. Applying relevant validation rules to each selected API based on its specification type, such as OpenAPI.
4. Verifying the presence or correctness of specific fields or their values within the API specification.
5. Updating the processing status and capturing any errors or warnings.

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Predefined rules for OpenAPI specifications

By default, the application includes the following validation rules for OpenAPI specifications:

Validate tags

Verifies that each tag in the API specification includes a `name` field. If the `name` field is missing, the system returns a warning message but marks the specification as valid.

Validate required sections

Verifies that the API specification includes the required top-level sections: `info`, `paths`, and `components`. If any of these sections are missing, the system returns an error message and marks the specification as invalid.

Validate servers section

Verifies whether the API specification includes a `servers` section that defines the server endpoints. If the `servers` section is missing, the system returns an error message and marks the specification as invalid.

These predefined rules verify critical sections such as tagging, metadata, and server definitions in OpenAPI specifications.

Automating creating tag-based relationship mapping within API Insights

You can configure and automate creating CMDB relationships between APIs and application services or business applications based on API tags.

Tag-based relationship mapping enables CMDB administrators and enterprise architects to define rules that automatically create CMDB relationships between APIs and application services or business applications based on API tags. Each rule specifies how a tag on a source CI is matched to a field on a target CI, and which relationship type and direction to create. Rules are stored in the Tag Based Relationship Mapping [sn_api_insights_ws_tag_relationship_mapping] table, enabling automatic mapping of multiple APIs to application services or business contexts.

You can use tag-based relationship mapping for:

- Relating APIs to application services using a tag, such as a service name.
- Linking APIs or components to business applications by matching a tag to an external ID field.
- Standardizing relationship creation across different environments.

To create CMDB relationships between APIs and application services or business applications based on API tags, follow these steps:

1. Define tag-based mapping rules.
2. Schedule the tag-based mapping rule.

Define tag-based mapping rules

Establish relationships between APIs and application services by defining tag-based mapping rules for APIs available within the API Insights application.

Before you begin

Role required: sn_cmdb_admin or sn_api_insights_ws.api_mgmt_architect

About this task

Tag-based mapping rules enable you to automatically create relationships between APIs and application services or business applications based on tags. To define a tag-based mapping

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rule, you need to create a tag relationship mapping record that specifies the source and target CI classes and the relationship details.

Procedure

1. In the navigation filter of the application navigator, enter `sn_api_insights_ws_tag_relationship_mapping.list` and press the Enter key.
2. On the Tag Relationship Mappings page, select **New**.
3. On the form, fill in the fields.

New record form for the tag-based relationship mapping

Field	Description
Name	Name for the relationship.
Source Class	CI class including **API**, **API Component**, **API Frontend**, **API Backend**, or **Managed API** that contains the tag as the source of the relationship.
Target Class	CI class including **Application Service** or **Business Application** that the source CI is related to as the target of the relationship.
Relationship Type	Type of relationship established between the source CI and the target CI.
Tag Key	Key from the Key Value [cmdb_key_value] table that corresponds to the target CI field.
Target Match Field	Field on the target CI that matches the tag value.
Parent Class Role	CI that acts as the parent in the relationship, either source or target.
Active	Option to enable the relationship.

4. Select **Submit**.

Scheduling the tag-based mapping rules

You can use a scheduled job to automatically create CMDB relationships between APIs and application services or business applications based on API tags.

Scheduled jobs automate tasks that run at a specific time or on a recurring schedule. You need the admin role to configure and run a scheduled job. For more information on configuring a scheduled job, see Scheduled jobs.

The *`Tag based relationship mapping`* scheduled job is available to schedule applying tag-based mapping rules between APIs and application services or business applications. By default, this job is inactive. As a user with the admin role, you can configure and activate it to run at regular intervals.

For each active tag-based relationship rule, the *`Tag based relationship mapping`* scheduled job processes active rules with the following workflow:

- Uses the specified tag key to retrieve relevant source CI tags.
- Identifies target CIs where the target CI's matching field matches the tag value.

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- Creates the specified relationship type between the source and target CIs in the direction indicated by the `parent_class_role` setting.
- Avoids duplicating existing relationships.

By automating the process of creating relationships based on tags, the *`Tag-based relationship mapping`* scheduled job enables maintaining up-to-date and accurate mappings between APIs and related application services or business applications.

Configuring settings to organize APIs in API Insights

As an enterprise architect administrator with the sn_api_insights_ws.api_mgmt_architect_admin role, configure workflows for organizing APIs, including automating API actions and defining settings to enable enterprise architects manage APIs in the API Insights workspace.

Enterprise architect administrator tasks overview

1. Configure flow for automating API actions.

   Configure workflows for automating API actions within API Insights.

2. Configure settings to manage APIs in API Insights.

   Configure settings to manage APIs, including API creation tools, relationship models, ownership groups, and automated workflows, to streamline API governance and operational processes.

Configuring flows for API actions in API Insights

Configure flows in Workflow Studio for automating API actions within API Insights, streamlining processes like API access requests.

Configure flows to automate various API actions, such as granting access to APIs or processing API requests. Enterprise architect administrators with the sn_api_insights_ws.api_mgmt_architect_admin role can then select workflows that align with specific API automation tasks when they configure settings for managing APIs. See Configure settings to manage APIs in API Insights.

Predefined flow to send reminders for API access

The **API Request Reminder** subflow is available with the API Insights application that sends reminders for approving any API access requests. This flow automatically sends reminder notifications to the ownership groups specified in the flow, prompting them to review and approve pending API access requests.

Predefined flow to grant API access

The **API Grant/Reject Access Template** subflow is available with the API Insights application that grants access to any APIs. This flow automatically that identifies the API access requests and enables to grant or reject access to any APIs.

Configuring flow for API access request automation

To manage API access requests through custom flows, it's essential to configure the flow with specific input parameters. These parameters guide the flow's behavior.

To learn about creating flows, see Getting started with flows.

When creating a flow for API access request automation, you must use specific parameters that control how the flow works.

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You must include the following input parameters in the flow:

```
Input params:
request (reference from sn_api_insights_ws_request_access_task
 table) - Required
grant (string) - Required
description (string) - Optional
```

request

A required reference to a specific record in the API Requests Access Task [sn_api_insights_ws_request_access_task] table that identifies the API access request and facilitates interaction with the API Insights application.

grant

A required string input that specifies the action to be taken, such as granting or denying access.

description

An optional string input to provide additional details or context about the API access request.

Configure settings to manage APIs in API Insights

Configure API Insights settings, including API creation tools, relationship models, ownership groups, and automated workflows, to streamline API governance and operational processes.

Before you begin

Role required: sn_api_insights_ws.api_mgmt_architect_admin or sn_cmdb_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Settings** tab.
3. Turn on the All settings option.

> **Note:**
> This step is applicable to users with the sn_cmdb_admin role. You can skip this step if you have the sn_api_insights_ws.api_mgmt_architect_admin role.

4. In the API creation tool section, select an API creation tool from the available options.

Option	Description
None	Uses no external tool.
Digital Integration Management	Uses the Digital Integration Management application (part of the Enterprise Architecture Workspace), if enabled, to initiate the API design process by creating a digital interface record.
External tool	Uses a third-party tool for API creation, requiring the URL for the external tool (for example, `http://www.postman.com`) to be entered in the **External API authoring tool URL** field.

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5. In the API-to-business application relationship model section, select a relationship model from the available options.

6. In the Ownership group section, set the ownership group responsible for managing the API.

7. In the Configure workflows section, select a workflow for automating an API action.

   Note:
   Workflows are created by your administrator using the Workflow Studio. See Configuring flows for API actions in API Insights.

8. Select **Save**.

Administering and monitoring API data with API Insights

The Overview tab in the API Insights workspace provides a centralized overview of your organization's API landscape.

Depending on your role, the API Insights page on the Overview tab serves as a centralized hub to manage data ingestion integrations, monitor your APIs, and assess data quality. Whether you're setting up new connections, tracking API performance, or evaluating the integrity of incoming data, this page provides the tools and visibility you need. By offering real-time metrics and quality checks, it empowers teams across the organization to gain actionable insights.

You can use the page to:

- As CMDB administrators, you can administer data ingestion and align data model for your organization. See Administering data ingestion and model alignment with API Insights.
- As enterprise architects, you can monitor APIs while assessing overall data quality and identifying key issues like missing data elements. See Monitoring APIs and assessing data quality with API Insights.

Administering data ingestion and model alignment with API Insights

The Overview tab in the API Insights workspace provides a centralized view of data ingestion activities and integration health.

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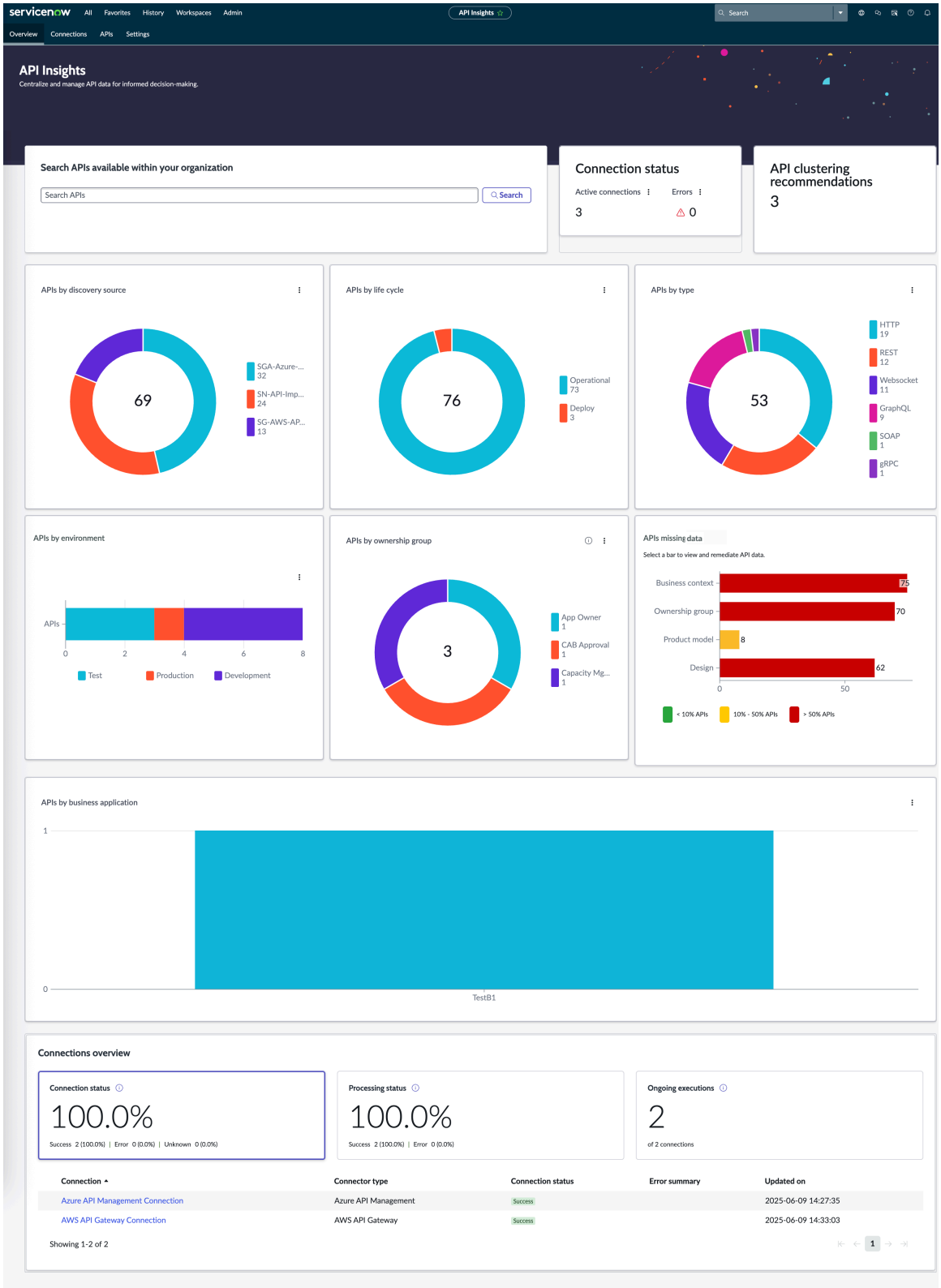

Access the API Insights Overview tab

To access the Overview tab, navigate to **Workspaces** > **API Insights**. The Overview tab opens by default.

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Required roles

CMDB administrators can access the Overview tab within the API Insights workspace to monitor incoming API data, evaluate alignment with the data model, and take action on misaligned or incomplete data to verify consistent and accurate CMDB records. They can view and resolve errors in connections when importing API data into CMDB using Service Graph Connectors and adjust data based on clustering recommendations.

Note:
As a user with the sn_cmdb_admin role, you need additional roles such as ml_report_user and cmdb_inst_admin to access some of the features and data.

Features

Access the various cards on the Overview tab to gain insights on the API data available in your organization.

Note:
Select a segment or count on a chart to open the KPI Details page and analyze how a specific metric trends over time. To learn more about the KPI Details feature, see KPI Details.

Overview tab features for CMDB administrators

Feature	Description	Required roles
Search APIs	API search within the organization to locate specific APIs for review or management.	sn_cmdb_admin
Connection status	Total count of active API connections and processing errors. Provides insight into the status of API connections and highlights any processing issues to verify reliable data ingestion. **Active connections** Total number of installed connections with active import schedules. Select the count to view installed connections. **Errors** Total number of processing errors for installed connections.	sn_cmdb_admin and cmdb_inst_admin
API clustering recommendations	Number representing the current clustering recommendation, based on the data model recommendation settings. See Configure data model recommendations for API clustering in API Insights.	sn_cmdb_admin, ml_report_user, and platform_ml_read
APIs by discovery source	Total count of discovered APIs grouped by source. Provides insight into the discovery methods of APIs across your organization.	sn_cmdb_admin
APIs by life cycle	Total count of APIs grouped by life cycle stage as Operational, Deploy, or End of Life.	sn_cmdb_admin

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Overview tab features for CMDB administrators (continued)

Feature	Description	Required roles
	Provides visibility into API readiness and maintenance status across your organization.	
APIs by type	Total count of APIs categorized by protocol or communication type. Includes technologies such as REST, GraphQL, and SOAP, providing insight into the integration styles and interoperability across your organization.	sn_cmdb_admin
APIs by environment	Count of APIs deployed in each environment. Highlights distribution across Development, Test, and Production stages, enabling monitoring of deployment progress and assessment of risk exposure.	sn_cmdb_admin
APIs by ownership group	Total count of APIs categorized by assigned ownership group. Groups APIs by managing team or function, as defined by an enterprise architect administrator with the sn_api_insights_ws.api_mgmt_architect_admin role in settings. For more information on setting an ownership group, see Configure settings to manage APIs in API Insights.	sn_cmdb_admin
APIs missing data	Count of APIs missing key attributes, including business context, ownership group, product model, or design. Each bar represents a key attribute and indicates the number of APIs missing the attribute. Color coding indicates the severity of missing data: **Red** More than 50% of APIs are missing the attribute. **Yellow** Between 10% and 50% of APIs are missing the attribute. **Green** Less than 10% of APIs are missing the attribute. Use the visual indicator to prioritize remediation efforts based on data completeness. Select a bar in the bar chart to start the remediation process. See Identifying and remediating missing API data in API Insights.	sn_cmdb_admin
APIs by business application	Count of APIs linked to business applications.	sn_cmdb_admin

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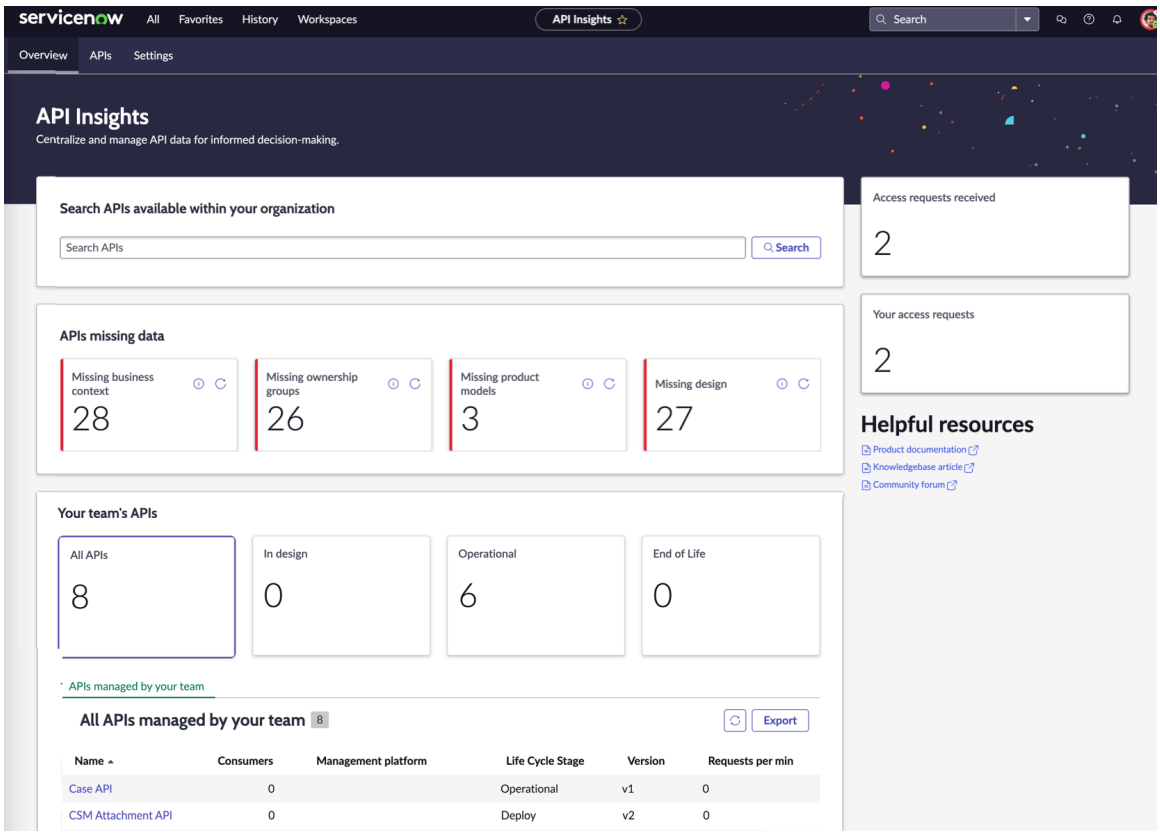
Overview tab features for CMDB administrators (continued)

Feature	Description	Required roles
	Enables tracking of API connections to business applications to improve integration after connections are established.	
Connections overview	Summary of the status and activity of API data connections using Service Graph Connectors, including counts of successful, failed, or unknown connection tests, recent import success rate, and the number of connections currently processing data imports.	sn_cmdb_admin and cmdb_inst_admin

Monitoring APIs and assessing data quality with API Insights

The Overview tab in the API Insights workspace provides a centralized view of data ingestion activities and integration health.



Access the API Insights Overview tab

To access the Overview tab, navigate to **Workspaces** > **API Insights**. The Overview tab opens by default.

Required roles

You need the sn_api_insights_ws.api_mgmt_architect or the sn_api_insights_ws.api_mgmt_architect_admin role.

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Use cases

For examples of how different people in your organization would use this workspace, see these use cases.

User	Workspace use
Enterprise architect	Search for APIs, compare APIs, request access to APIs, and address data issues.
Enterprise architect administrator	Manage API Insights settings, including API creation tools, business context relationship models, and ownership groups.

Features

Access the various cards on the Overview tab to gain insights on the API data available in your organization.

Overview tab features

Feature	Description	Required roles
Search APIs	API search within the organization to locate specific APIs for review or management.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
Access requests received	Number of access requests received indicating the need for API access management.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
Your access requests	Number of access requests created by the logged-in user, indicating the activity for API access management.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
Helpful resources	Links to product documentation, knowledge base articles, and a community forum for additional support and information.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
APIs missing data		
Missing business context	Count of APIs with no business context assigned.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
Missing ownership groups	Count of APIs with no ownership group assigned. Ownership groups enable tracking remediation and managing access requests.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin

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Overview tab features (continued)

Feature	Description	Required roles
Missing product models	Count of APIs with no product model assigned, Product models enable accurate reporting and interactions with multiple versioned APIs.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
Missing design	Count of runtime APIs, available as API configuration items (CIs), with no design representation. Linking runtime APIs with design-time APIs, available as Digital Interface records, improves usability.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
Your team's APIs		
All APIs	Total number of APIs managed by a team.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
In design	Number of APIs currently being designed.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
Operational	Number of APIs in active use.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
End of Life	Number of APIs that are retired or decommissioned.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin
APIs managed by your team		
All APIs managed by your team	Overview of the APIs managed by a team, based on the group associated with the logged-in user and the APIs linked to that group. API details include name, consumer count, management platform, life cycle stage, version, and requests per minute.	• sn_api_insights_ws.api_mgmt_architect • sn_api_insights_ws.api_mgmt_architect_admin

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Overview tab features (continued)

Feature	Description	Required roles
	Populates data corresponding to the selected card in the Your team's APIs section.	

Managing API data in API Insights

You can use the API Insights workspace to centralize and manage API data for informed decision-making.

Within the API Insights workspace, you can:

- View all APIs within your organization.

  Manage and monitor all APIs within your organization by reviewing their life cycle stages, identifying missing critical attributes, and accessing helpful resources to ensure proper API maintenance and governance.

- Search for an API.

  Search for an API or an API component available within your organization in the API Insights workspace.

- Compare APIs.

  Compare APIs available within your organization in the API Insights workspace.

- Connect to an API creation tool from API Insights.

  Initiate API creation directly from the API Insights workspace by connecting to an external API design tool of your choice.

- Request access.

  Request access to an API available within your organization in the API Insights workspace.

- Identify and remediate missing API data.

  Identify and remediate missing API data in the API Insights workspace by linking missing elements and verifying complete API records.

- Manage your team's API data.

  Improve the operational efficiency of the API ecosystem within your organization by creating a relationship for APIs that lack key attributes such as business context, ownership groups, product models, or designs.

- View details of an API.

  Gain insights into your organization's API performance, relationships, and governance from the API details page within the API Insights workspace.

- Manage application service relationships.

  Associate APIs with relevant configuration items (CIs) to ensure accurate mappings between APIs and the configuration items they support.

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- Automate creating tag-based relationships.

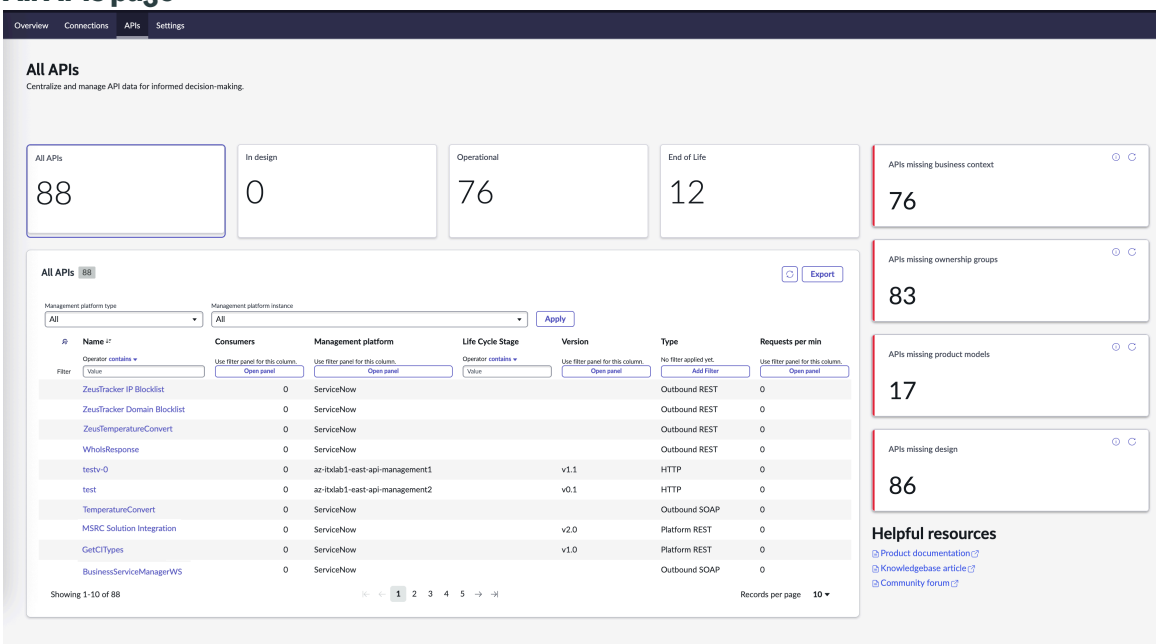
  Configure and automate creating CMDB relationships between APIs and application services or business applications based on API tags.

Viewing all APIs in API Insights

Manage and monitor all APIs within your organization by reviewing their life cycle stages, identifying missing critical attributes, and accessing helpful resources to ensure proper API maintenance and governance.

The All APIs page in the API Insights workspace provides a comprehensive overview of all APIs within an organization ensuring that APIs are properly maintained and aligned with the organization's standards for interfaces, ownership, and product models.

All APIs page



Accessing and using the All APIs page

To access the All APIs page, navigate to **Workspaces** > **API Insights**, and then select the **API** tab.

Viewing data

By default, the page displays the following data:

All APIs list

Displays the total number of APIs managed by the organization and categorizes them by their life cycle stage (All APIs, In design, Operational, End of Life). You can select the each card to view APIs by their life cycle stage in the API data table.

API data table

Lists all APIs with detailed columns for the API name, the number of consumers, management platform, life cycle stage, version, and the number of API requests processed per minute for each API listed in the table. This table provides an overview of the APIs and their status within the organization. You can select an API from the **Name** column to view API details and request access to the API managed by your team. See Request access to an API in API Insights.

Available actions and filters in the API data table

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Provides several actions and filtering options to manage and refine the displayed data. These include exporting the list in various formats, refreshing the data, and applying filters to narrow down the results by platform type, instance, or specific column criteria.

Exporting API data

Export the APIs list as a PDF, CSV, JSON, or Microsoft Excel file by selecting **Export**, and then selecting the desired file format from the File Type list. You can either download the file to your local directory or email the file by selecting a value from the Delivery Type list. After making your selections, select **Export** to complete the process.

Refreshing the API data

Manually populate the API data table on demand by selecting the refresh icon ( ).

Filtering APIs by platform and instance

Narrow down the API list based on platform type and instance.

- Use the Management Platform Type list to filter APIs by platform category.
- Use the Management Platform Instance list to refine results by a specific ServiceNow instance.

Select **Apply** to update the list based on the selected filters. If you select **ALL** in either list, APIs from all available options are included in the table.

Applying filters to API data columns

Refine the list of APIs by using column-specific filters or advanced condition sets.

Each column in the All APIs list includes lightweight, inline filtering options:

Operator

Includes the comparison operator for the filter. The operator list includes `is`, `is not`, `starts with`, `ends with`, `contains`, `does not contain`, `is empty`, `is not empty`. In the **Value** field, you can enter the text or number you want to filter on and then press the Enter key. The list refreshes when the filter is applied.

For example, selecting **contains** and entering a value in the **Value** field, filters the list to show only API records where the column contains that text.

Open panel

Opens the full filter panel for the selected column and provides a finer control over the filters to refine the data in the table according to the parameters that are most important for your analysis.

You can define custom conditions for narrowing down data by selecting a field, choosing an operator, such as equals or contains, and entering a specific value. You can add multiple conditions to refine your search further, and

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once you've set the filters, selecting **Run** updates the API data table accordingly. The **Show labels** toggle switch controls whether the labels for the fields and operators are displayed. When enabled, it shows descriptive text next to each option to help you understand their purpose, while disabling it hides the labels for a more compact view.

Add Filter

Inline filter rule added for a column so you can immediately define conditions using the operator and value fields. For example, when filtering by **Type**, you can choose REST, SOAP, gRPC, Websocket, Scripted REST, and other predefined options.

APIs missing data section

Highlights the APIs missing key attributes like business context, ownership groups, product models, and design helping to identify issues in API governance. You can select the numeric value displayed in each card to identify and resolve issues with API data. See Identifying and remediating missing API data in API Insights.

Helpful resources

Contains quick links to product documentation, knowledge base articles, and community forums, providing easy access to additional resources for API management.

Search for an API or an API component in API Insights

Search for an API or an API component available within your organization in the API Insights workspace.

Before you begin

Role required: sn_api_insights_ws.api_mgmt_architect

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. In the **Search APIs** text box on the Overview tab, enter your search phrase and select **Search**.

   Tip:
   Alternatively, after entering the search phrase, you can press the Enter key.

3. On the Search results page, select a tab to view more details.

Compare APIs in API Insights

Compare APIs available within your organization in the API Insights workspace.

Before you begin

Role required: sn_api_insights_ws.api_mgmt_architect or sn_cmdb_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. In the **Search APIs** text box on the Overview tab, enter your search phrase and select **Search**.
3. On the Search results page, select the **APIs** tab.

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4. Select the check boxes next to the Name column for APIs that you want to compare.

   Note:
   You can select up to three APIs to compare.

5. Select **Compare selected**.
6. On the Compare APIs page, compare the selected APIs based on version, type, business context also called as business application, managed by group, life cycle stage, and sources.

Connect to an API creation tool from API Insights

Initiate API creation directly from the API Insights workspace by connecting to an external API design tool of your choice.

Before you begin

The application administrator must configure an API creation tool. See Configure settings to manage APIs in API Insights.

Role required: sn_api_insights_ws.api_mgmt_architect

About this task

Search for an existing API in the API Insights workspace, and if no matches are found, initiate API creation directly from the workspace.

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. In the **Search APIs** text box on the Overview tab, enter the name or keyword of the API to search for and select **Search**.
3. On the Search results page, select the **APIs** tab to view matching APIs.
4. If no matching API is found, select **Create API** to start designing a new API.

Result

Based on the settings configured by your application administrator, the API creation tool opens, enabling you to create an API.

Request access to an API in API Insights

Request access to an API available within your organization in the API Insights workspace.

Before you begin

The application administrator must configure an ownership group and set up a workflow for managing access requests.

Role required: sn_api_insights_ws.api_mgmt_architect

About this task

Alternatively, you can request access to an API managed by your team. See Manage your team's API data in API Insights,

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. In the **Search APIs** text box on the Overview tab, enter your search phrase and select **Search**.
3. On the Search results page, select the **APIs** tab.

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4. Select the check box next to the **Name** column for the API for which you want to request access.

> **Note:**
> You can request access for only one API at a time.

5. Select **Request access**.
6. In the Request access dialog box, fill in the details.

Field	Description
Access type	Method used for authenticating and authorizing users or applications when interacting with an API or service. The available options are: **API Key** Provides authentication using a unique token included in the request. **Application** Grants access at the application level, authenticating the application itself. **Basic Auth** Uses a base64-encoded string of credentials sent in the request header for authentication. **Developer** Offers access for individual developers or development environments. **OAuth 2.0** Employs tokens to authorize access securely, allowing applications to act on behalf of a user. **Other** Includes custom methods of authentication and authorization.
Access duration in days	Length of time, measured in days, for which access to an API is granted before reauthorization is needed.
Justification for your access request	Reason or explanation for why access to the API is needed.

7. Select **Request**.

Result

The access request is submitted for approval based on the workflow settings configured by your application administrator.

Identifying and remediating missing API data in API Insights

Identify and remediate missing API data in the API Insights workspace by linking missing elements and verifying complete API records.

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Missing metadata can reduce the effectiveness of API discovery, life cycle tracking, and ownership accountability. Common missing elements include:

- Business context
- Ownership group
- Product model
- Design details

Resolving missing data ensures a more complete, accurate view of dependencies and ownership, improving impact assessments and service management.

The Overview tab of the API Insights workspace enables improve the usability, governance, and integration of APIs by highlighting any incomplete or missing data within the Configuration Management Database (CMDB).

Remediating missing API data by roles

The following roles can identify and resolve missing metadata in API:

- An enterprise architect with the sn_api_insights_ws.api_mgmt_architect role can access the Overview tab in the API Insights workspace to remediate missing API information using dedicated tiles for each type of missing data.
- A CMDB administrator with the sn_cmdb_admin role can access the Overview tab in the API Insights workspace and select a bar within the APIs missing attributes bar chart to identify and update missing metadata.

Monitoring key metrics

You can monitor the following missing data associated with APIs within your organization:

Missing business context

APIs not associated with any business context reduce the clarity and governance over which business areas are providing them.

Missing ownership groups

APIs without an assigned ownership group affect governance. Assigning ownership groups streamlines tracking remediations, managing access, and resolving issues quickly.

Missing product models

APIs without an assigned product model limit the ability to provide accurate reporting and interactions with versioned APIs.

Missing design

APIs with no design representation hinder their full integration into the system. Linking these APIs with their design-time counterparts (such as digital interface records) improves usability and operational efficiency.

Resolving missing API data

You can resolve missing API data by creating relationships for business context or references for ownership groups, product models, or designs, to establish connections between the API and other CIs within the CMDB.

You can establish the following relationships or references in API Insights to resolve missing API data:

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API-to-business context relationship

Links an API to a specific business context, defining the context in which the API is used and creating a relationship record in the CMDB.

API-to-ownership group reference

Links an API to a group responsible for its governance, access control, and maintenance, serving as a reference without creating a record in the CMDB.

API-to-product model reference

Links an API to a product model, providing information on the API's versioning, product line, and life cycle stage, serving as a reference without creating a record in the CMDB.

API-to-design reference

Links an API to its runtime or design-time interface, serving as a reference without creating a record in the CMDB.

Create a relationship or reference to remediate missing API data

Improve the operational efficiency of the API ecosystem within your organization by creating a relationship or reference for APIs that lack key attributes such as business context, ownership groups, product models, or designs.

Before you begin

Role required: sn_api_insights_ws.api_mgmt_architect, sn_cmdb_admin

About this task

Available missing data categories include:

- Missing business context
- Missing ownership groups
- Missing product models
- Missing designs

Note:
Displayed only when the Digital Integration Management plugin (sn_apm_di) is activated.

Important:
When creating relationships for a large number of APIs, you can automate creating relationships based on tags on API. For more information, see Automating creating tag-based relationship mapping within API Insights.

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the Overview tab, if not already selected by default.
3. Select a missing data category to open the list of APIs missing that attribute.
   - As a user with the sn_api_insights_ws.api_mgmt_architect role, in the APIs missing data section, select the number shown for a specific missing data category.
   - As a user with the sn_cmdb_admin role, select a category bar in the APIs missing data bar chart.
4. On the APIs missing data page, select the check boxes next to the API names.
5. Resolve missing data.

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- For resolving missing business context, select **Create relationships**.
- For resolving missing ownership groups, product model, or designs, select **Create reference**.

6. Select the check boxes next to the **Name** column for the application services.
7. Based on the type of connection needed, establish relationships or a reference.
   - For business context, select **Create relationships**.
   - For ownership groups, product model, or designs, select **Create reference**.
8. In the dialog box that appears, select **Create**.

Manage your team's API data in API Insights

Improve the operational efficiency of the API ecosystem within your organization by creating a relationship for APIs missing key attributes such as business context also called as business application ownership groups, product models, or designs.

Before you begin

Role required: sn_api_insights_ws.api_mgmt_architect

Procedure

1. Navigate to **Workspaces** > **API Insights** > **Overview**.
2. In the Your team's APIs section, select a category based on the API's life cycle stage.
   - To view all the APIs managed by your team, select **All APIs**.
   - To view the APIs managed by your team that are currently in the design phase, select **In design**.
   - To view the APIs managed by your team that are active and in use, select **Operational**.
   - To view the APIs managed by your team that have reached the end of their life cycle, select **End of Life**.
3. From the **Name** column, select an API to view more details of the API.
   See Viewing API details in API Insights.
4. **Optional:** Select **Request access** to gain access to the API.

Viewing API details in API Insights

As an enterprise architect, gain insights into your organization's API performance, relationships, and governance from the API details page within the API Insights workspace.

The API details page in the API Insights workspace provides a detailed view of an API's operational status, usage, security, and relationships within CMDB.

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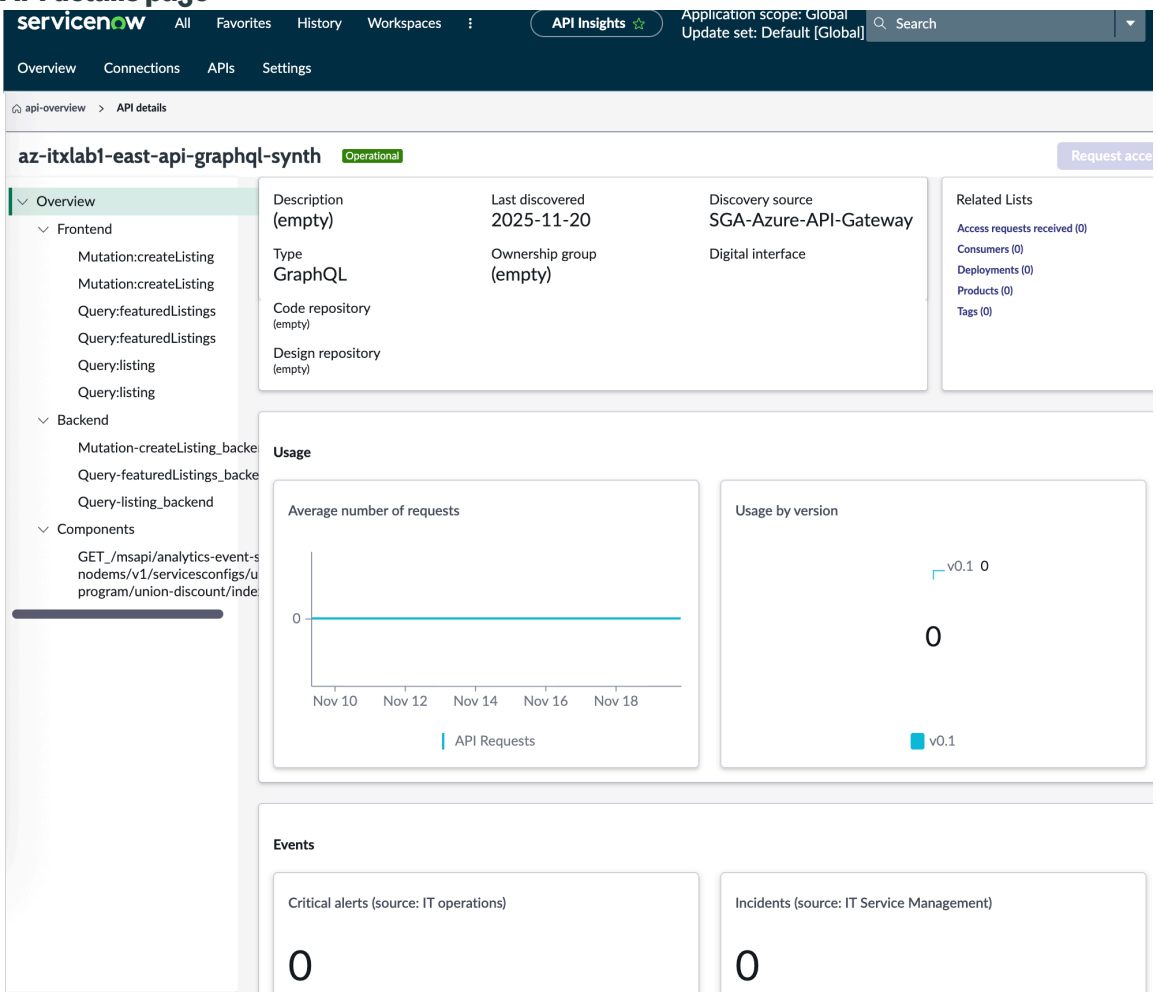
API details page



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Accessing and using the API details page

To access the API details page, navigate to **Workspaces** > **API Insights**, select the **APIs** tab, and then select an API from the **Name** column from the API data table.

Viewing data

By default, the page displays the following data:

- Header region
- Metadata region
- Related lists
- Overview panel
- Usage
- Events
- Security
- Relationship map

Header region

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Displays the name of the API, version information, the API's current life cycle stage, such as Operational, or End of Life.

The **View By** list enables you to toggle between different management platforms, if available, under which the API is managed.

The version selector enables the selection of different versions of the API to view and manage. Select **Update** to update the details based on the selected version.

Note:
The **View By** list and the version selector appear only if applicable for an API.

Metadata region

Displays the following fields.

Field	Description
Description	Brief summary or purpose of the API.
Last discovered	Last date the API was discovered or updated in the CMDB.
Discovery source	Source from where the API was discovered.
Type	Type of the API whether scripted REST API, HTTP API, platform REST API, and so on.
Ownership group	Team or group responsible for managing the API.
Digital interface	Interaction method of the API within the system.

Related Lists

Displays the following items as links with their counts.

Item	Description
Access requests received	Displays the number of access requests made for the API. Select the link displayed on the card to view access request details.
Consumers	Displays the number of consumers of the API. Select the link displayed on the card to view details for each API consumer.
Deployments	Indicates any active or past deployments of the API across environments. Select the link displayed on the card to view API deployment details.
Products	Displays the number of products associated with the API. Select the link displayed on the card to view API product details.
Tags	Displays the number of tags associated with the API. Select the link displayed on the card to view details for each tag.

Overview panel

Lists all available components of the API, organized into three subsections within the Overview panel:

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Frontend

Contains client-side operations, including GraphQL mutations and queries that interact with the UI or user-facing functionality.

Backend

Contains server-side operations, including backend-specific GraphQL mutations and queries that process business logic and data.

Components

Contain various REST API endpoints or service interfaces, each providing a specific function or resource within the API.

You can expand each subsection to view its endpoints and select any endpoint to see its details.

Usage

Displays the following cards.

Card	Description
Average number of requests	Number of API component requests over time, represented as a line graph, with the x-axis showing the date range and the y-axis displaying the request count.
Usage by version	API request distribution across different versions over the past 10 days.

Events

Displays the following cards.

Card	Description
Critical alerts	Critical alerts from IT operations related to the API enabling identifying major issues that could affect the API's performance. Select the card to display all the open alerts in the Service Operations Workspace and access more detailed information on them. For more information, see Service Operations Workspace.
Incidents	Recorded incidents, such as outages, change requests, or problems related to the API essential for tracking operational health and remediation efforts. Select the card to display all the open incidents in the Service Operations Workspace and access more detailed information on them. For more information, see Service Operations Workspace.

Security

Displays the following cards.

Card	Description
Active vulnerability items	Security vulnerabilities associated with the API enabling to track and resolve potential risks.

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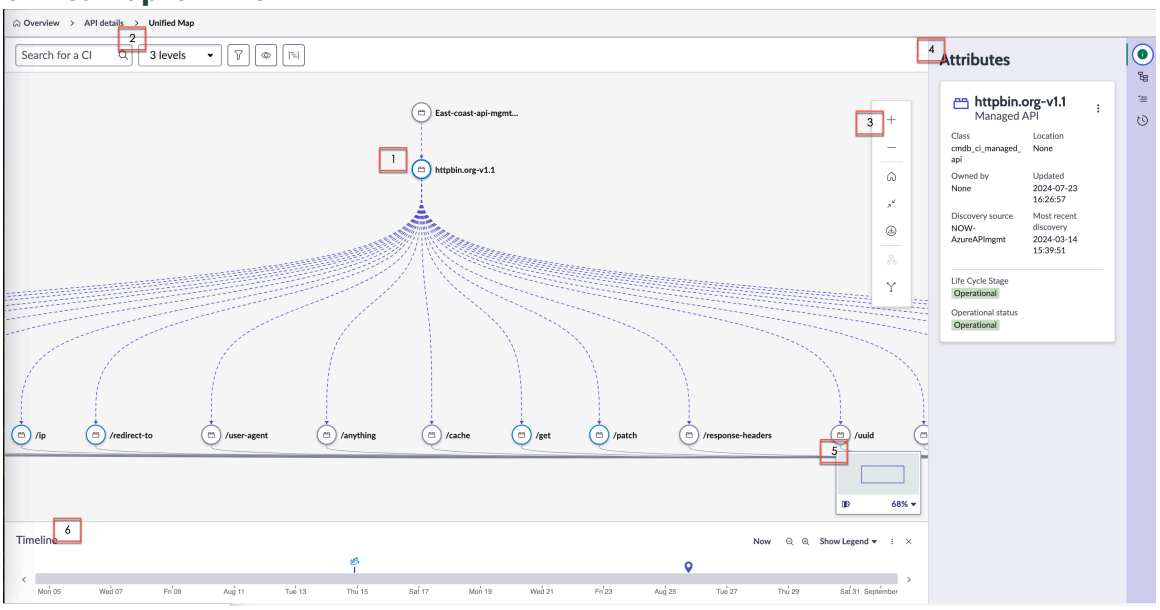
Card	Description
	Select the card to display all vulnerabilities in the Vulnerability Manager Workspace and access more detailed information on them. For more information, see Vulnerability Manager Workspace.
Security incidents	Security incidents, if enabled, providing insights into security breaches or issues that might have occurred with the API. Select the card to display all open security incidents in the Security Incident Response Workspace and access more detailed information on them. For more information, see Security Incident Response Workspace.

Relationship map

Provides a hierarchical overview of the API relationships with its components, management platforms, business applications, and designs, making it easier to understand the API's role within the broader system architecture. In addition, provides the option to manage application service relationships. See Managing application service relationships for APIs.

A relationship map is a partial unified map similar to the one used in the CMDB Workspace. To open the unified map for APIs, select **Open full map** in the Relationship map section of the API details page. To learn more, see Unified Map.

Unified map for APIs



Nodes on the map represent the API and its components in the CMDB and lines represent connections and relationships between API components. The connections help you, for example, to assess the impact of a change to a selected node by showing components that are connected to it through relationships and references. Products such as Change Management, Incident Management, and Event Management benefit from such information.

The map also shows the composition of application services useful with products such as Event Management and Incident Management. You can review historical changes.

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The following elements are available in the unified map for APIs:

1: Map

The map displays the specified API and its connections and relationships. In the example, the `httpbin.org-v1.1` is the home node and the lines represent connections and relationships with other components. Select any node to view details like related application services, change history.

2: Content controls

- Search for and select the home node, specify the number of relationship levels for application services to display, and reload the map after making changes.
- Use filters to limit the types and relationship types that appear on the map.
- Show or hide the timeline of events (related items) for the selected API

3: Toolbox

Use the toolbox to control several visual aspects of the map, such as zoom level or layout mode.

4: Contextual side panel

- The **Attributes** panel ( ) lists attributes like location and operational status for the selected API or relationship.
- The **Application services** panel ( ) lists details of application services associated with the selected API.
- The **Related items** panel ( ) shows related items such as active incidents or active problems for the selected API.
- The **Changes** panel ( ) lists changes such as changes to operational status for the selected API.

5: Mini-map navigator

Set the zoom level or move the view to an area of interest. Select the icon to show or hide the navigator.

6: Timeline

The timeline indicates events (related items) like incidents, problems, and changes for the selected API over a specified period of time. You can use the timeline to visualize the history of changes to an API and how they affect the topology of the CMDB.

Managing application service relationships for APIs

You can associate APIs with relevant configuration items (CIs) to ensure accurate mappings between APIs and the configuration items they support.

Application service relationships link APIs to business context and the CIs they depend on, providing clarity on dependencies and improving performance visibility. They enable you to monitor, track changes, and resolve issues more efficiently.

For APIs, application service relationships map how they interact with other CIs, enabling you to manage dependencies, ensure business continuity, and respond quickly to incidents.

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By understanding these relationships, you gain better control over API performance and the availability of connected CIs.

By using application service relationships, you can:

- Identify which APIs are tied to specific application services and their related CIs.
- Understand the dependencies between APIs and the CIs they support.
- Manage and monitor API performance and its impact on critical business services and CIs.

For more information, see Application services.

The available actions for handling application service relationships for APIs include:

- View application service relationships.
- Create application service relationships.
- Remove application service relationships.

Note:
When managing multiple API relationships for application services, you can automate the mapping. For more information, see Automate tag-based relationship mapping.

View application service relationships

View existing relationships between an API and application services.

Before you begin
Role required: sn_cmdb_admin, sn_api_insights_ws.api_mgmt_architect_admin, or sn_api_insights_ws.api_mgmt_architect

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **APIs** tab.
3. Select an API from the **Name** column on the API data table.
4. In the Relationship map section, select **Manage service relationships**.
5. View existing relationships between application services and the selected API on the Related application services table.

Create application service relationships

Create relationships between an API and application services.

Before you begin
Role required: sn_cmdb_admin or sn_api_insights_ws.api_mgmt_architect_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **APIs** tab.
3. Select an API from the **Name** column on the API data table.
4. In the Relationship map section, select **Manage service relationships**.
5. Select **Create relationships**.

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6. Select application services to create relationships with the selected API.
7. Select **Create**.

Remove application service relationships

Remove relationships between an API and application services.

Before you begin

Role required: sn_cmdb_admin or sn_api_insights_ws.api_mgmt_architect_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **APIs** tab.
3. Select an API from the **Name** column on the API data table.
4. In the Relationship map section, select **Manage service relationships**.
5. On the Related application services table, select the check box for an existing relationship.
6. Select **Remove relationships**.

Automating creating tag-based relationship mapping within API Insights

You can configure and automate creating CMDB relationships between APIs and application services or business applications based on API tags.

Tag-based relationship mapping enables CMDB administrators and enterprise architects to define rules that automatically create CMDB relationships between APIs and application services or business applications based on API tags. Each rule specifies how a tag on a source CI is matched to a field on a target CI, and which relationship type and direction to create. Rules are stored in the Tag Based Relationship Mapping [sn_api_insights_ws_tag_relationship_mapping] table, enabling automatic mapping of multiple APIs to application services or business contexts.

You can use tag-based relationship mapping for:

- Relating APIs to application services using a tag, such as a service name.
- Linking APIs or components to business applications by matching a tag to an external ID field.
- Standardizing relationship creation across different environments.

To create CMDB relationships between APIs and application services or business applications based on API tags, follow these steps:

1. Define tag-based mapping rules.
2. Schedule the tag-based mapping rule.

Define tag-based mapping rules

Establish relationships between APIs and application services by defining tag-based mapping rules for APIs available within the API Insights application.

Before you begin

Role required: sn_cmdb_admin or sn_api_insights_ws.api_mgmt_architect

About this task

Tag-based mapping rules enable you to automatically create relationships between APIs and application services or business applications based on tags. To define a tag-based mapping

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rule, you need to create a tag relationship mapping record that specifies the source and target CI classes and the relationship details.

Procedure

1. In the navigation filter of the application navigator, enter `sn_api_insights_ws_tag_relationship_mapping.list` and press the Enter key.
2. On the Tag Relationship Mappings page, select **New**.
3. On the form, fill in the fields.

New record form for the tag-based relationship mapping

Field	Description
Name	Name for the relationship.
Source Class	CI class including **API**, **API Component**, **API Frontend**, **API Backend**, or **Managed API** that contains the tag as the source of the relationship.
Target Class	CI class including **Application Service** or **Business Application** that the source CI is related to as the target of the relationship.
Relationship Type	Type of relationship established between the source CI and the target CI.
Tag Key	Key from the Key Value [cmdb_key_value] table that corresponds to the target CI field.
Target Match Field	Field on the target CI that matches the tag value.
Parent Class Role	CI that acts as the parent in the relationship, either source or target.
Active	Option to enable the relationship.

4. Select **Submit**.

Scheduling the tag-based mapping rules

You can use a scheduled job to automatically create CMDB relationships between APIs and application services or business applications based on API tags.

Scheduled jobs automate tasks that run at a specific time or on a recurring schedule. You need the admin role to configure and run a scheduled job. For more information on configuring a scheduled job, see Scheduled jobs.

The *`Tag based relationship mapping`* scheduled job is available to schedule applying tag-based mapping rules between APIs and application services or business applications. By default, this job is inactive. As a user with the admin role, you can configure and activate it to run at regular intervals.

For each active tag-based relationship rule, the *`Tag based relationship mapping`* scheduled job processes active rules with the following workflow:

- Uses the specified tag key to retrieve relevant source CI tags.
- Identifies target CIs where the target CI's matching field matches the tag value.

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- Creates the specified relationship type between the source and target CIs in the direction indicated by the `parent_class_role` setting.
- Avoids duplicating existing relationships.

By automating the process of creating relationships based on tags, the *`Tag-based relationship mapping`* scheduled job enables maintaining up-to-date and accurate mappings between APIs and related application services or business applications.

Managing API access within API Insights

Manage received and sent requests by granting or rejecting API access, sending reminders, or withdrawing requests in API Insights.

You can manage API access requests by performing the following actions:

- Manage requests received for API access in API Insights.
- Manage requests sent for API access in API Insights.

Manage requests received for API access in API Insights

Manage incoming received requests for API access in API Insights.

Before you begin

Role required: sn_api_insights_ws.api_mgmt_architect

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. In the Access requests received section on the Overview tab, select the displayed numeric value.
3. In the **Requests received** tab, review all incoming requests.
   You can review the details such as API name, requested by, request type, duration, and the reason for the request.

   Important:
   The **View requests** link in the API request reminder email works only if you have the sn_api_insights_ws.api_mgmt_architect or sn_api_insights_ws.api_mgmt_architect_admin role and are part of the same group that received the email to view the requests.

4. Select the check boxes next to the request names to select one or more access requests that you want to process.
5. Manage the received requests.
   - Select **Grant access** to approve access to the requested API.
   - Select **Reject request** to deny access to the requested API.

Result

A confirmation notification appears, indicating that the API request access flow process was initiated or completed successfully.

Manage requests sent for API access in API Insights

Manage your sent access requests by either sending a reminder or withdrawing the request in API Insights.

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Before you begin

Role required: sn_api_insights_ws.api_mgmt_architect

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. In the Your access requests section on the Overview tab, select the displayed numeric value.
3. In the **Requests sent** tab, view a list of access requests you have sent.
4. Select the check boxes next to the request names to select one or more sent requests that you want to process.
5. Manage the sent requests.

Optimizing API organization with clustering recommendations in API Insights

Use clustering recommendations to organize and group related API components, improving the efficiency and accuracy of API management.

The API clustering recommendations feature analyzes unlinked API components and proposes clusters likely belonging to the same API. Each recommendation includes a cluster concept, size, and quality score. By accepting a recommendation, you can link the components to an existing API or create another API record, improving data organization and management.

As a CMDB administrator, you can:

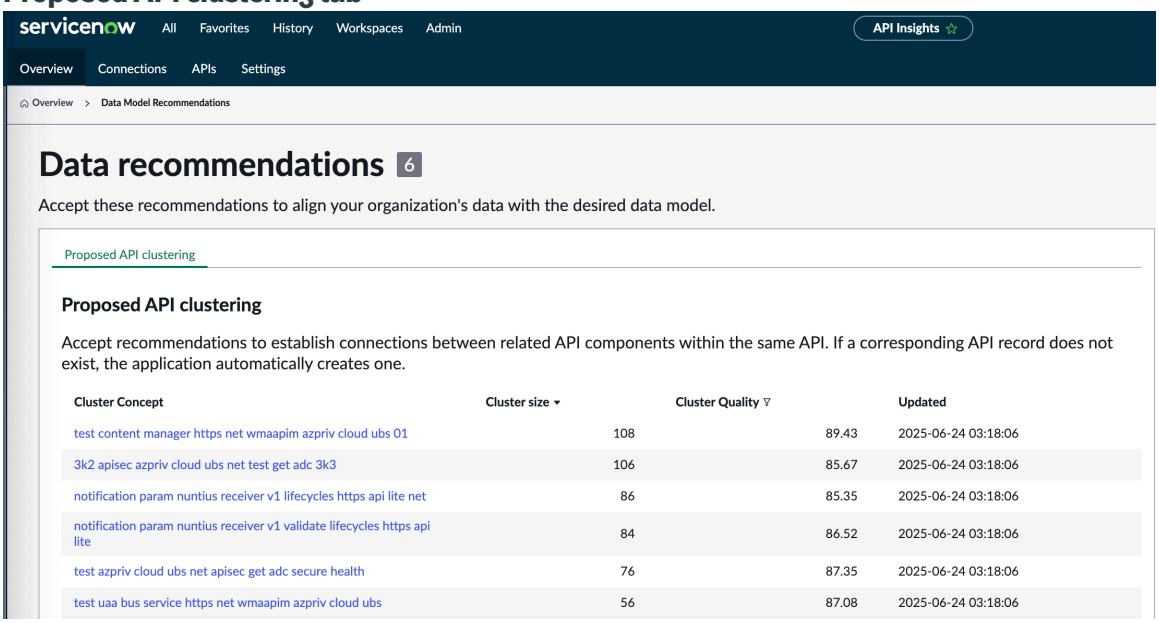
- View API clustering recommendations.
- Accept clustering recommendations.

Viewing API clustering recommendations in API Insights

Use machine learning-based suggestions to group related API components, improving the organization and mapping of APIs within the system.

The Proposed API clustering tab of the Data recommendations page in the API Insights workspace provides machine learning-generated recommendations for API clustering.

Proposed API clustering tab



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Accessing the Proposed API clustering tab

To access the Proposed API clustering tab, navigate to **Workspaces** > **API Insights**. On the **Overview** tab, select the count metric in the API clustering recommendations section. The **Proposed API clustering** tab is displayed on the Data recommendations page.

You need the following roles to access the API clustering recommendations section: sn_cmdb_admin, ml_report_user, and platform_ml_read.

Viewing data

By default, the page displays the following data:

Cluster Concept

Displays the API components that the machine learning model has grouped together based on similarities. These concepts represent the core idea or functionality that defines each cluster.

Cluster size

Indicates the total number of components within the cluster. A larger size suggests that many components are related and grouped together under the same API concept.

Cluster Quality

Reflects the confidence or strength of the relationship between components in the cluster, measured on a scale from 0 to 100. A higher quality value implies stronger relationships among the API components within the cluster.

Updated

Displays the most recent timestamp when the cluster was updated, enabling tracking the recency of the machine learning recommendations and any changes to the clusters.

Accept clustering recommendation in API Insights

Associate API components with an API record by accepting clustering recommendation in the API Insights workspace.

Before you begin

Role required: sn_cmdb_admin, ml_report_user, and platform_ml_read

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. On the **Overview** tab, select the count metric displayed in the API clustering recommendations section.
3. On the **Proposed API clustering** tab, review the list of recommendations.
4. From the **Cluster Concept** column, select a cluster concept link.
5. On the Missing API page, review the list of API components that have not yet been associated with an API record.
6. Select the check boxes next to the API components to associate with an API record.

   Note:
   You can select one or multiple components depending on your requirement.

7. Select **Accept**.

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8. Select an API record.

9. Select **Submit**.

Result
The Missing API list is refreshed with the linked components removed from the list and associated with the specified API record.

Managing API data connections added for Service Graph Connectors in API Insights

You can view the status of your API data connections, including success rates, processing status, and ongoing executions, and monitor the progress of connections added using Service Graph Connectors in API Insights.

- View the status of API data connections in API Insights.
- Monitor configuration progress of connections in API Insights.

View the status of API data connections in API Insights

View the status of your API data connections using Service Graph Connectors, including success rates, processing status, and ongoing executions.

Before you begin
Role required: sn_cmdb_admin and cmdb_inst_admin

Procedure
1. Navigate to **Workspaces** > **API Insights**.
2. In the Connections overview section of the Overview tab, access the various cards to gain insights on the performance of Service Graph Connectors.

Connections overview

Card	Description
Connections status	Percentage of connections tested successfully based on connection status, with the count of success, error, and unknown statuses.
Processing status	Percentage of connections for which all data import runs in the last import execution were successful, with the count of success and error statuses.
Ongoing executions	Number of connections where data import execution is currently in progress.

3. From the **Connection** column, select a connection.
4. On the connection record page, select a tab to view more information about the selected connection.

Connection record details

Tab	Description
Details	Connection information, such as the connection name and credentials associated with the connection.
Connection properties	Properties configured for the connection.

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Tab	Description
Data sources	Data sources associated with the connection, specifying what data is being retrieved or synchronized.
Import schedules	Scheduled imports for the connection, including parent schedule, data source, timing and frequency of data retrieval.
Errors	Error related to the connection.

Monitor configuration progress of connections in API Insights

Check progress status of API data connections in API Insights.

Before you begin

Role required: sn_cmdb_admin and cmdb_inst_admin

About this task

Service Graph Connectors are integrations that facilitate API data ingestion into the Configuration Management Database (CMDB) from various third-party sources. To learn more, see Getting started with Service Graph Connectors.

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. On the Connection status section of the Overview tab, monitor the progress of connections configured for Service Graph Connectors that import API data.
3. To view the number of installed connections, select the count metric from **Active connections**.
4. Review the list of installed and draft connections in their respective tabs.
   See Viewing API data connections for a Service Graph Connector within API Insights.
5. **Optional:** Select **Create connection** to create a connection for importing API data.
   See Create an API data connection for a Service Graph Connector within API Insights.
6. **Optional:** Select **Explore connectors** to explore available options for onboarding and maintaining Service Graph Connectors that import API data within API Insights.
   See Exploring Service Graph Connectors for API data within API Insights.

Viewing API data connections for a Service Graph Connector within API Insights

You can view installed and draft API data connections that were added using Service Graph Connectors within API Insights.

The following connection types are available for viewing:

- Installed connection (see View an installed connection within API Insights.)
- Draft connection (see View a draft connection within API Insights.)

View an installed connection within API Insights

View the details of an installed connection that was added using a Service Graph Connector within SGC Central.

Before you begin

Role required: sn_cmdb_admin and cmdb_inst_admin

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Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Connections** tab.
3. On the API connections page, select **All connections**.
4. Select the **Installed** tab.
5. Review the list of installed API data connections.
6. Select a connection from the **Connection** column to view the details, data sources, import schedules, and errors associated with the connection.

View a draft connection within API Insights

View the details and resume setting up draft connections.

Before you begin

Role required: sn_cmdb_admin and cmdb_inst_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Connections** tab.
3. On the API connections page, select **All connections**.
4. Select the **Drafts** tab.
5. Review the list of draft connections.
6. Complete setting up the draft connections.
   - Select **Configure** to continue where a Service Graph Connector was last configured within SGC Central.
   - Select **Resume setup** to set up a single instance connector for the first time.

Create an API data connection for a Service Graph Connector within API Insights

Create an API data connection added for a Service Graph Connector within API Insights.

Before you begin

Role required: sn_cmdb_admin and cmdb_inst_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Connections** tab.
3. On the API connections page, select **Create connection**.
4. On the Create connection window, select a connector type for importing API data and then follow the playbook instructions to create a connection.

Exploring Service Graph Connectors for API data within API Insights

You can explore available options for onboarding and maintaining API data using Service Graph Connectors within API Insights.

Service Graph Connectors are integrations that facilitate data ingestion into the Configuration Management Database (CMDB) from various third-party sources. To learn more, see Getting started with Service Graph Connectors and API Service Graph Connectors.

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Options for maintaining Service Graph Connectors for importing API data within API Insights include:

- Update an installed Service Graph Connector in API Insights.
- Install a Service Graph Connector with an available entitlement in API Insights.
- Install a Service Graph Connector from ServiceNow Store within API Insights.

Update an installed Service Graph Connector in API Insights

Keep a Service Graph Connector for importing API data up-to-date within API Insights.

Before you begin

Role required: sn_cmdb_admin and cmdb_inst_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Connections** tab.
3. On the API connections page, select **Explore connectors**.
4. In the Updates available section, review the updates that are available for a Service Graph Connector.
5. Update the connector.
   - Select a connector to access the connector in Application Manager and then install any updates.
   - Select **Install updates** to open Application Manager, and then view and install updates for a connector from the **Updates** tab.

   For more information, see Application Manager.

Install a Service Graph Connector with an available entitlement in API Insights

Install a Service Graph Connector for importing API data that matches an entitlement available in Application Manager from within API Insights.

Before you begin

Role required: sn_cmdb_admin and cmdb_inst_admin

Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Connections** tab.
3. On the API connections page, select **Explore connectors**.
4. In the Entitlements available section, select **Explore in Application Manager**.
5. In Application Manager, review the entitlements and install a connector for API data.
   For more information, see Application Manager.

Install a Service Graph Connector from ServiceNow Store within API Insights

Explore ServiceNow Store to request and use a Service Graph Connector with no available entitlements for importing API data from within API Insights.

Before you begin

Role required: sn_cmdb_admin and cmdb_inst_admin

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Procedure

1. Navigate to **Workspaces** > **API Insights**.
2. Select the **Connections** tab.
3. On the API connections page, select **Explore connectors**.
4. In the Available from ServiceNow Store section, select **Explore in ServiceNow Store**.
5. On ServiceNow Store, review the list of Service Graph Connectors for importing API data and install a connector.
   For more information, see the ServiceNow Store website.

API Insights reference

Reference topics provide additional information about API Insights components, API Insights properties, and domain separation.

Components installed with API Insights

Several types of components are installed with activation of the API Insights plugin, including tables, user roles, and scheduled jobs.

Roles installed

Role title [name]	Description	Contains roles
Enterprise architect administrator [sn_api_insights_ws.api_mgmt_architect_admin]	Accesses the API Insights workspace to search APIs, review data model recommendations, monitors API connections, evaluate metrics on API usage, and set parameters for data model recommendations and de-duplication tasks.	sn_api_insights_ws.api_mgmt_architect
Enterprise architect [sn_api_insights_ws.api_mgmt_architect]	Accesses the API Insights workspace to search APIs, monitor team APIs, view managed and subscribed APIs, track API activity, review API access requests, and manage API life cycle aspects, including APIs without	• task_editor • sn_incident_read • sn_vul.vulnerability_read • sn_cmdb_editor • sn_msi.msi_incident_read

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Role title [name]	Description	Contains roles
	business context, ownership, product models, or designs.	

Scheduled jobs installed

Scheduled job	Description
Gather APIs without Business App relationship	Identifies and collects APIs that do not have an associated business context also called as business application.
Import ServiceNow API to API Insights	Retrieves ServiceNow APIs from the ServiceNow registry and imports them into API Insights.
Import ServiceNow API usage to MetricBase	Collects ServiceNow API usage data and pushes it to the MetricBase application.
SyncOwnershipGroupsOfAPIVersions	Synchronizes ownership groups for API versions in API Insights.
API Specification Validation	Performs automated validation of API specifications in an instance.
Tag based relationship mapping	Applies tag-based mapping rules between APIs and application services or business applications.

Tables installed

Table	Description
APIs missing relationships [sn_api_insights_ws_apis_missing_relationships]	API records that lack a defined relationship.
API Specification [sn_api_insights_ws_api_specification]	API specification details, such as OpenAPI definitions.
Importable ServiceNow APIs [sn_api_insights_ws_importable_servicenow_api]	Details of APIs imported from ServiceNow.
Open API Specifications [sn_api_insights_ws_openapi_specifications]	OpenAPI specification records for API Insights.
Push API Specification [sn_api_insights_ws_push_api_spec]	Records for pushing API specifications.

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Table	Description
API Requests Access Task [sn_api_insights_ws_request_access_task]	Tasks related to API access requests.
Specification Validation Rule [sn_api_insights_ws_spec_validation_rule]	Validation rules that validate API specifications based on the configured rules.
API Metric Configuration [sn_api_insights_ws_api_metric_config]	Configuration that maps each discovery source to the MetricBase application used for analytics, defining the metric name, whether it applies at API or component level, and the metric type (usage, error rate, latency, cache hit).
Tag Based Relationship Mapping [sn_api_insights_ws_tag_relationship_mapping]	Relationship rules that apply tag-based mapping between APIs and application services or business applications, defining the CI types involved, the relationship type, and which CI acts as the parent.

Plugins installed

Plugin	Description
MetricBase (com.snc.clotho)	Collects, retains, analyzes, graphs, and acts on time-series data.

ServiceNow Store applications installed

Application	Description
@devsnc/sn-list-selector (sn_list-selector)	Enables selecting a set of values from a simple or multi-dimensional data source.
CMDB CI Class Models (sn_cmdb_ci_class)	Provides the single source for all new base-system CMDB CI class models defined by ServiceNow.
CMDB Workspace (sn_cmdb_ws)	Enables a workspace for working with the CMDB to search and explore the CMDB, understand its health, work on related tasks, view activity, performance and feature usage, and access various management tools to support tasks in an organization.

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Application	Description
Node map Experience Component (sn_node_map)	Enables mapping and visualizing connections between concepts.
SGC Central (sn_sgc_central)	Enables discovering, installing, and monitoring Service Graph Connectors.
Timeline component (sn_ui_timeline)	Shows events and information across a timeline to contextualize history or important information for an object.
UX Commons (sn_app_ux_commons)	Enhances component experience with common UI Builder utilities, controllers, and bundles.

API Insights properties

API Insights properties control the behavior of the application.

System properties

These system properties are available for API Insights.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

System properties for API Insights

Property	Description
sn_api_insights_ws.import_outbound_rest_api	Set the property to enable or disable the import of o Insights workspace. • Type: string • Default value: {"custom_api":false,"ser • Location: System Property [sys_properties] table
sn_api_insights_ws.import_outbound_soap_api	Set the property to enable or disable the import of o ServiceNow instance to the API Insights workspace. • Type: string • Default value: {"custom_api":false,"ser • Location: System Property [sys_properties] table
sn_api_insights_ws.import_scripted_rest_api	Set the property to enable or disable the import of s timeframe for recent activity.

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System properties for API Insights (continued)

Property	Description
	• Type: string • Default value: `{"custom_api":false,"servicenow_ap` • Location: System Property [sys_properties] table
sn_api_insights_ws.import_scripted_soap_api	Set the property to enable or disable the import of s timeframe for recent activity. • Type: string • Default value: `{"custom_api":false,"servicenow_ap` • Location: System Property [sys_properties] table
sn_api_insights_ws.ml_min_cluster_quality	Enter the minimum cluster quality to display in mach • Type: integer • Default value: `80` • Location: System Property [sys_properties] table
sn_api_insights_ws.search_api_limit	Enter the desired limit on results for API and API cor • Type: integer • Default value: `1000` • Location: System Property [sys_properties] table
sn_api_insights_ws.settings_api_to_business_app_service	Set the property to the relationship model between • Type: choice list • Default value: `CSDM` • Location: System Property [sys_properties] table
sn_api_insights_ws.settings_grant_access_workflow	Set the property to the sys ID of the workflow to be e • Type: string • Default value: `API Grant/Reject Access` • Location: System Property [sys_properties] table
sn_api_insights_ws.settings_preferred_tool	Set the preferred tool for the creation of new APIs in • Type: choice list • Default value: `Authoring tool` • Location: System Property [sys_properties] table

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System properties for API Insights (continued)

Property	Description
sn_api_insights_ws.settings_preferred_tool_url	Set the URL for the preferred API authoring tool inAP to `API Authoring Tool`. • Type: string • Default value: `http://www.postman.com` • Location: System Property [sys_properties] table
sn_api_insights_ws.settings_support_group_column	Set the column on the Configuration item [cmdb_ci] • Type: choice list • Default value: `managed_by_group` • Location: System Property [sys_properties] table
sn_api_insights_ws.show_ml_clustering_recs	Set the property to `false` to disable the clustering • Type: true | false • Default value: `true` • Location: System Property [sys_properties] table
sn_api_insights_ws.show_overview_metrics_widgets	Set the property to `true` to enable showing the Me • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table

Domain separation and API Insights

Domain separation is unsupported for API Insights. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: No support

- The domain field may exist on data tables but there is no business logic to manage the data.
- This level is not considered domain-separated.

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

Related topics

Domain separation for service providers

CMDB Identification and Reconciliation (IRE)

The Identification and Reconciliation module provides a centralized framework for identifying and reconciling data from different data sources. It helps maintain the integrity of the CMDB and some non-CMDB tables when multiple data sources are used to create and update CI records.

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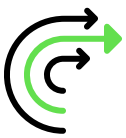
Get started

Explore Learn about benefits and how IRE helps maintain the integrity of the CMDB.	Configure Configure identification, reconciliation, and other rules.	IRE and Import Sets Apply IRE to Import Sets that are importing CIs into the CMDB.
Identification rules Create the rules that uniquely identify CIs based on CI attributes.	Reconciliation rules Create the rules that manage authorization and update priority between discovery sources.	IRE and Duplicate CIs Learn and configure how IRE detects duplicate CIs and how to process de-duplication tasks.
IRE and non-CMDB tables Apply IRE processes to supported non-CMDB tables.	Identification Simulator  Construct a validated payload and simulate running it through IRE processes.	Reference Properties and tables associated with IRE, and how domain separation is supported in IRE functions.

Troubleshoot and get help

- Ask questions and explore other resources for in the ServiceNow Community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring CMDB Identification and Reconciliation (IRE)

The Identification and Reconciliation (IRE) module provides a centralized framework for identifying and reconciling data from different data sources. It helps maintain the integrity of the CMDB and some non-CMDB tables when multiple data sources are used to create and update CI records.

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The use of multiple data sources increases the risk of introducing inconsistencies through duplicate records. To maintain the integrity of the database, it is important to correctly identify CIs and services so that new records are created only for CIs that are truly new.

The Identification and Reconciliation Engine (IRE) helps maintain the data integrity as follows:

- Prevent duplicate CIs by uniquely identifying CIs using sets of identification rules
- Reconcile CI attributes by allowing only authoritative data sources to write to the CMDB or to a supported non-CMDB table
- Reclassify CIs
- Provide a centralized framework to perform identification and reconciliation across different data sources

Data sources such as ServiceNow Event Management, Horizontal Discovery, Import Sets, Cloud Insights, Pattern Discovery, and Manual Entry, use IRE APIs to perform CI identification and reconciliation. In addition, any 3rd party data source can leverage REST/Scriptable IRE APIs to also perform CI identification and reconciliation.

Support for non-CMDB tables

IRE processes support some non-CMDB tables. You can create identification rules, reconciliation rules, and other IRE-related rules to ensure the integrity of data inserted or updated in supported non-CMDB tables. For details, see IRE support for non-CMDB tables.

Components and process

The CMDB Identification and Reconciliation functionality is supported by the Identification and Reconciliation engine (IRE), rules, and tasks. Identification rules, reconciliation rules, IRE data source rules, de-duplication tasks, and reclassification tasks determine how IRE identifies and reconciles CI.

Concepts and Components of Identification and Reconciliation

Identification

Process of uniquely identifying CIs, to determine if a CI already exists in the CMDB or if it is a newly discovered CI that must be added to the CMDB. Identification processes rely on identification rules, or on unique IDs for CIs that data sources can provide.

Reconciliation

Process of reconciling CIs and CI attributes by allowing only designated authoritative data sources to write to the CMDB at the CI table and attribute level. The CMDB is updated in real time as records are being processed. There is no staging area to verify the reconciliation activities before they are committed. Reconciliation processes rely on reconciliation rules and IRE data source rules.

Reconciliation is required only for update operations, when the identification process identifies a CI in the CMDB that matches an incoming CI in the payload. When IRE inserts a new CI, reconciliation is not applied.

De-duplication tasks

If the instance encounters duplicate CIs during the Identification and Reconciliation process, it groups each set of duplicate CIs into a de-duplication task. Review the information in these tasks to see how it was determined that these CIs are duplicates.

Reclassification tasks

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During the CI identification process, a matched CI might need to be upgraded, downgraded, or switched to another CI class. If automatic reclassification is disabled, then the system generates a reclassification task. Review the information in these tasks, and decide whether a manual reclassification of the CI is appropriate.

APIs

The Identification and Reconciliation APIs are a centralized set of APIs that can be used with different sources of data such as Discovery, Monitoring, or Import Sets. You can use it to enforce Identification and Reconciliation before data is stored in the CMDB. Data sources do not directly write to the CMDB. Instead, they call APIs first to ensure that the data being written does not introduce inconsistencies.

Identification engine APIs are accessible in scoped apps. The Configuration Management For Scoped Apps (CMDB) plugin (com.snc.cmdb.scoped) allows a scoped app in scripts to use the prefix 'sn_cmdb.IdentificationEngine.<method>' to access identification engine APIs. The Configuration Management For Scoped Apps (CMDB) plugin is activated in base systems.

- createOrUpdateCI() : A scriptable API that creates or updates a CI based on identification and reconciliation rules.
- identifyCI() : Similar to the *createOrUpdateCI* API, but does not commit the result to the database. Use this API with a given payload to find out if the identification engine will perform insert or update operations, without committing the operation.
- CreateOrUpdateCIEnhanced() : A scriptable API that provides the functionality of enhanced IRE features such as partial payload, partial commit, incomplete payload, and deduplication of payload items. You can select the enhanced features to use. However, if you enable partial payloads, then deduplication of payload items and partial commit are automatically enabled.
- identifyCIEnhanced : Similar to the *createOrUpdateCIEnahnced* API, but does not commit the result to the database. Use this API with a given payload to find out if the identification engine will perform insert or update operations, without committing the operation.
- CMDBTransformUtil : An API to be used exclusively with Import Sets to apply Identification and Reconciliation processes to data imported by Import Sets.

Predefined identification are included for many of the tables in the base system. You can customize these rules for your organization. When a new table is created in the CMDB, it derives identification and reconciliation rules from its parent table if these rules exist. To apply identification and reconciliation rules to a new table, create the rules either at the child level or at its parent level.

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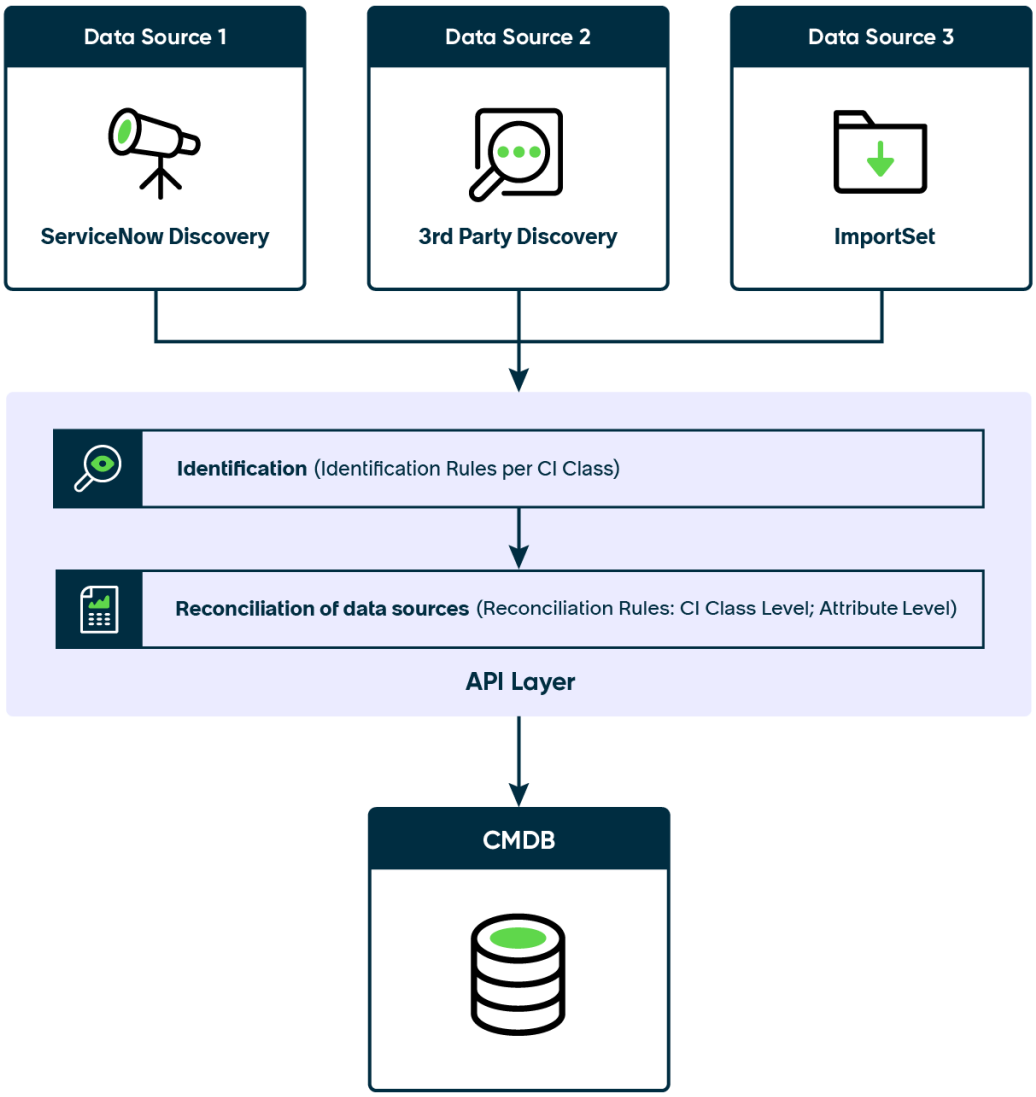
Process flow of Identification and Reconciliation



Identification and Reconciliation Engine (IRE)

Identification and Reconciliation engine (IRE) is a rule-based engine, operating as an underlying key component in Identification and Reconciliation. IRE provides a centralized framework to perform identification and reconciliation processes across different data sources. IRE uses identification rules, reconciliation rules, and IRE data source rules when processing incoming data before inserting or updating data in the CMDB. IRE processes help maintain data integrity in the CMDB.

- IRE prevents duplicate CIs by uniquely identifying CIs.
- IRE reconciles CI attributes by allowing only authoritative data sources to write to CMDB.

Identification and Reconciliation engine (IRE)

IRE is an underlying key component in Identification and Reconciliation, providing a centralized framework to perform identification and reconciliation processes across different data sources. IRE uses identification rules, reconciliation rules, and IRE data source rules when processing incoming data before inserting that data to the CMDB.

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IRE processes help maintain data integrity in the CMDB.

- IRE prevents duplicate CIs by uniquely identifying CIs.
- IRE reconciles CI attributes by allowing only authoritative data sources to write to CMDB.

ServiceNow® applications such as Service Mapping, horizontal discovery, and pattern discovery, use APIs to apply identification and reconciliation processes. You can also apply IRE processes to data imported by import sets. When using other data sources including third-party data sources, you can leverage REST or scriptable IRE APIs to perform identification and reconciliation.

Additional information:

- About properties that affect some functions of IRE: See Properties.
- About using IRE APIs: See IdentificationEngine - Scoped.
- About enabling debugging and checking on issues with a payload: See How to log the payload sent to IRE and check the issues with the payload [KB0750382].
- About the steps that IRE performs illustrating how IRE works, such as validating the payload, applying reconciliation, and committing the data to the CMDB: See [CMDB - IRE] How the CMDB Identification and Reconciliation Engine works when passing a CI (as payload) to the createOrUpdateCI() [KB0750386].
- About how to run a payload through IRE: See [CMDB IRE] How to run the CI identification on demand using the payload [KB0750383].

CI identification

The CMDB identification process relies on identification rules to uniquely identify CIs. When possible, CIs can also be uniquely identified using *source_name* and *source_native_key* values provided in the *sys_object_source_info* section of the payload, and the Source [sys_object_source] table. If identification is successful using that method, then it is not necessary to apply matching algorithms that rely on identification rules, which is a slower identification method.

You can configure the system to prioritize the use of IRE identification rules, even when *source_name* and *source_native_key* are provided and can be used for unique identification. For more information about using the *glide.identification_engine.skip_sys_object_source_matching* system property to manage this behavior, see Properties.

A unique CI identifier can be provided in the optional *sys_object_source_info* object in the IRE payload.

```
{
  "items": [
    {
      "className": "cmdb_ci_win_server",
      "values": {
        "name": "SAMLABVM52"
      },
      "sys_object_source_info": {
            "source_native_key": "16777219",
            "source_name": "SCCM",
            "source_feed": "SCCM Computer Identity",
            "source_recency_timestamp": "2019-08-26 13:00:00"
      }
     }
```

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```
    ]
}
```

Identification processes rely on CIs dependency classification to uniquely identify CIs. For example, to identify a Tomcat CI which is a dependent CI. Assuming a Windows Server CI (independent class) which is running a Tomcat application (dependent class). Relying on 'config file path' to uniquely identify the Tomcat CI, isn't sufficient because the Tomcat application can run on multiple machines with identical paths. The identification engine won't be able to choose a CI to update. Dependent relationships force the identification process to first identify the Windows Server host on which the Tomcat application is running, and only then, in the context of the host, to uniquely identify the Tomcat application itself.

Payload items identification

IRE generates identifier keys for all payload items in an incoming payload and then uses those keys when trying to match partial and incoming payloads. An identifier key is based either on:

- Combination of the *source_name* and *source_native_key* values from the *sys_object_source_info* object.
- Identification criterion attributes.

IRE stores the identifier keys associated with partial items in the CMDB IRE Partial Payloads Index [cmdb_ire_partial_payloads_index] table, and then uses those keys to try to match with identifier keys of incoming payloads.

Timestamps in key attributes

To help resolve conflicting attribute values, IRE uses timestamps in the following attributes to identify records that are older than the current record and therefore can be ignored:

- Most recent discovery (*last_discovered*) and Discovery source (*discovery_source*):

  Most recent discovery (*last_discovered*) is the timestamp of when the CI was last discovered. IRE always updates CIs' *last_discovered* and *discovery_source* attributes during payload processing, even when no other CI attributes are updated. When *last_discovered* is provided in the payload, IRE updates the CI with the provided value only if the *last_discovered* time in the payload is newer than the one in the CMDB. If *last_discovered* is not provided in the payload, IRE updates the *last_discovered* attribute with the current timestamp.

  You can use the glide.identification_engine.skip_updating_source_last_discovered_if_older and the glide.identification_engine.ire_message_listener_skip_updating_source_last_discovered_to_now system properties to modify this default behaviour.

- First discovered (*first_discovered*) is the timestamp of when the CI was first created.

  - When the CI is first created: If a value is provided in the payload, IRE inserts that value. Otherwise, IRE inserts the current timestamp.
  - In subsequent updates: If a value is provided, IRE updates the CI with the provided value. Otherwise, the attribute is not updated.

You can also use the following system properties to modify how IRE uses the *source_recency_timestamp* value in a payload to update the *last_scan* attribute in the Source [sys_object_source] table:

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- glide.identification_engine.skip_updating_last_scan_if_older
- glide.identification_engine.ire_message_listener_skip_updating_last_scan_to_now

Enhanced IRE features

The CreateOrUpdateCIEnhanced() and identifyCIEnhanced scriptable APIs provides the functionality for the following enhanced IRE features, which can be enabled or disabled as needed:

Partial payloads

IRE isolates items for which data sources did not provide enough information to uniquely identify the CI and therefore processing cannot continue. Some of these items are identified as partial items, which get stored for potential later processing. Other items are identified as incomplete items, which get stored for logging purposes only.

For example: SCCM has multiple feeds such as a disk feed and a computer feed. The disk feed might have complete information about the disk but insufficient information about the computer CI that it depends on.

API option: *partial_payloads* which is enabled by default.
When *partial_payloads* is enabled, *partial_commits* and *deduplicate_payloads* are automatically enabled regardless of their setting in options.

Partial commits

Errors in some items do not prevent committing the rest of the items in a payload. Therefore, when a payload contains items with errors, IRE still commits the remaining valid items in the payload. In this situation, some of the uncommitted items are saved as partial payloads and other uncommitted items are saved as incomplete payloads.

API option: *partial_commits* which is enabled by default.

Deduplicate payload items

IRE deduplicates duplicate items within the payload, merging those duplicates into a single payload item for processing.

API option: *deduplicate_payloads* which is enabled by default.

Generate summary

IRE generates summaries in the output payload with processing details such as the number of updates per class.

API option: *generate_summary* which is disabled by default.

Partial items

A payload item is determined to be a partial item if it doesn't contain the necessary data for unique identification and if it has one of the following errors. Unique identification requires that the payload item has the *sys_object_source_info* section with *source_name* and *source_native_key* values, or the full set of the identification criterion attributes specified for the CI class, or both.

IRE errors for a partial item:

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- MISSING_MATCHING_ATTRIBUTES –– Item does not have identification criterion attributes to use at least one identifier entry for matching.
- REQUIRED_ATTRIBUTE_EMPTY –– Unable to create a CI because a required attribute is missing.
- MISSING_DEPENDENCY –– Dependent CI is missing a dependency relation which is specified in the payload.
- INSERT_NOT_ALLOWED_FOR_SOURCE –– An IRE data source rule prevents the specified data sources from creating CIs of the specified class.

For more details about IRE error messages, see IRE error messages.

If processing fails because payload items are determined to be partial items, then the partial items are saved as partial payloads in the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table in JSON format for later potential processing. IRE uses identifier keys to attempt to match incoming payloads with stored partial payloads.

If later, a data source sends the data that was missing in the partial item, IRE matches the incoming payload with the stored partial payloads. IRE then merges any matching partial payloads with the incoming payload. To resolve any conflicting attributes, IRE uses either *source_recency_timestamp* (when *source_native_key* and *source_name* are identical), or static reconciliation rules specified for the class. The result is a complete and valid payload which IRE then processes to create or update the respective CIs.

Partial payloads older than 90 days are deleted from the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table.

Sample of a partial payload:

```
Disk feed:
{
  "items": [
    {
      "className": "cmdb_ci_computer",
      "sys_object_source_info": {
            "source_native_key": "Server001",
            "source_name": "SCCM",
            "source_feed": "DISK_FEED",
            "source_recency_timestamp": "2019-08-26 13:00:00"
      }
    },
    {
      "className": "cmdb_ci_disk",
      "values": {
        "name": "disk1"
      }
    }
  ],
  "relations": [{
              "parent": 0,
              "child": 1,
              "type": "Contains::Contained by"}
              ]
}
```

The computer item in the above payload does not have any attributes and therefore IRE can't process it. However, *source_name* and `source_native_key` are provided making it a

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partial item. Because the computer item is partial, the disk item that depends on the computer item, is a partial item too.

Sample of a subsequent payload that completes the previous partial payload by providing the missing details:

```
Server/Computer feed:
 {
  "items": [
    {
      "className": "cmdb_ci_linux_server",
      "values": { "name": 'linux001',
                  "ip_address": "100.126.38.19",
                  "mac_address": "DSWER4587" },
      "sys_object_source_info": {
            "source_native_key": "Server001",
            "source_name": "SCCM",
            "source_feed": "COMPUTER_IDENTITY",
            "source_recency_timestamp": "2019-08-26 14:00:00"
      }
    }
  ]
}
```

The computer in the partial payload and the server in the new payload match because they have identical *source_name* and *source_native_key*. Therefore, the partial payload and the new payload are merged, the operation is committed, and the partial payload is deleted from the Partial Payloads table.

There is a limit on the number of items per partial payload, which is set by the glide.identification_engine.partial_payload_items_max_size property (1000 by default). Storing associated relationships, references, and dependent items, in one partial payload, can result in reaching that limit, in which case, the payload is split into multiple partial payloads.

For more information about partial payloads, see CreateOrUpdateCIEnhanced().

Incomplete items

A payload item is determined to be an incomplete item if:

- It does not contain all the data necessary for unique identification
- It has an error that is not associated with a partial item

Unique identification is not possible if neither *source_name* and *source_native_key* within the *sys_object_source_info* object, nor the full set of identification criterion attributes specified for the CI class, is provided.

Incomplete items are saved as incomplete payloads in the CMDB IRE Incomplete Payloads [cmdb_ire_incomplete_payloads] table in JSON format. Incomplete items are stored for the purpose of logging payloads with irrecoverable errors, and are never processed again.

Adding relationships

Add relationships by using either indices, or the optional JSON internal_id element.

Use the *relations* object in the payload to add or update relationships by referring to *internal_ids* of items. Relationships can be created using main items and related items in the payload. For example:

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- Relation (parent Index, child Index, Relation Type)
- Relation (parent Internal Id, child Internal Id, Relation Type)

For more information and for code samples, see CreateOrUpdateCIEnhanced().

Adding references between payload items

Add references between two payload items by using the optional JSON *internal_id* element, which uniquely identifies payload items.

Use the *referenceItems* block to add or update references. You can add references between any two items, including main items, lookup items, and related items, in a single payload.

For more information and for code samples, see CreateOrUpdateCIEnhanced().

CI reclassification

Use the *updateWithoutUpgrade*, *updateWithoutDowngrade*, and *updateWithoutSwitch* flags in the settings block in a payload, to prevent unintentional updates to CIs' class. These flags prevent upgrading, downgrading, or switching the class of a CI that multiple data sources unintentionally might attempt while updating the same CI. For more information and for code samples, see CreateOrUpdateCIEnhanced().

Reclassification flags have precedence over any other system settings for Configure CI reclassification during IRE processing.

Adding custom before and after scripts

Use the IntegrationHub ETL to add custom Java scripts for a data source of a CMDB integration application. Those scripts provide access to the IRE input and output payloads, while processing CMDB integrations.

Before scripts provide access to a batch of input payloads that will be sent to IRE. Using a custom before script lets you:

- Skip a payload in the batch by setting the *status* to `SKIPPED`. Optionally, provide a reason for skipping the payload which will appear as a comment on the respective import set row table.
- Modify the input payload.
- Write other custom logic inside the script that uses the IRE payload.

After scripts provide access to the IRE input and output payloads. Using a custom after script lets you:

- Easily compare the input and output payloads and identify the different operations that IRE performed on each CI.
- Access the sys_ids of the CIs that IRE created or updated.
- Write other custom logic inside the script that uses the IRE output payload.

Configuring CMDB Identification and Reconciliation

Configure the necessary rules for CMDB Identification and Reconciliation (IRE) to function effectively.

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Configuration overview

- Create identification rules

  Identification rules are essential in correctly identifying CIs in the CMDB to prevent the creation of duplicate CIs. Effective identification rules help determine whether an incoming CI is added to the CMDB or used to update and existing CI.

- Create reconciliation rules

  Static and dynamic reconciliation rules determine which discovery source is authorized to update which CI attributes. Reconciliation rules are important in preventing discovery sources from overwriting each other's updates to the same attribute values.

- Create data source rules

  Data source rules prevent discovery sources from inserting new CIs for a specific class. Data source rules are useful in preventing untrusted discovery sources from creating new CIs while continuing to trust these discovery sources in updating existing CIs.

- Create dependent relationship rules

  Dependent relationship rules define the dependency structure of the CI types and the relationship types in service definitions, which help in CI identification and in the construction of business service maps.

Identification rules

The CMDB identification process relies on identification rules to uniquely identify CIs.

An identification rule applies to a CI class and consists of a single CI identifier and one or more identifier entries and related entries, each with a different priority. Each identifier entry defines a unique attribute set with a specific priority and each related entry defines rules for identifying related items. Create strong identification rules that are set with the highest priority for the strongest identifier entries and related entries.

The identification process and identification rules use the CI's attributes for identification:

Unique attributes

Designated sets of criterion attribute values of a CI that can be used to uniquely identify the CI. Unique attributes can be from the same table or from derived tables.

Required attributes

Designated attributes of a CI that cannot be empty.

Derivation across the CMDB hierarchy

If no identification rule is explicitly defined for a child class, then the child class derives its identification rule, including any associated identification entries and related entries, from its parent class. Later, an own identification rule can be explicitly defined for the child class. In that case, the identification rule that was initially derived from the parent class, including any associated identification entries and related entries, is no longer in effect at the child class. Also, you must explicitly add identification entries and related entries in the newly created identification rule at the child class.

For example: The *Hardware* class identification rule has a related entry for the *Software Instance* table. This identification rule, including its associated related entry for the *Software Instance* table, is derived by the *Computer* class. If you then create a new identification rule for the *Computer* class, it overwrites the identification rule that was derived from the *Hardware* class. Therefore, the *Hardware* class identification rule, including its

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associated related entry for the *Software Instance* table, is no longer in effect for the *Computer* class. If the same related entry is needed, you must explicitly add a related entry for the *Software Instance* table in the newly created identification rule for the *Computer* class.

Identification rule types

CI dependency is specified in the CI Class Manager by the dependent relationship rules for the CI's class:

Independent CIs

CIs, such as Server CIs, which exist on their own and are not dependent on any other CIs.

Dependent CIs

CIs which depend on a relationship to another CI and can't exist on their own in the absence of the dependent relationship. For example:

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

The steps for identifying dependent CIs can be different from the steps for identifying independent CIs. This difference is reflected in the differences between dependent identification rules and independent identification rules:

Independent identification rule

A rule that identifies a CI based on the CI's own attributes, independently of other CIs or relationship.

Dependent identification rule

A rule in which identifying a CI requires identifying a dependent CI first. A CI can have dependency on one or more CIs, and a dependent CI can have only a single parent CI with dependency. The relationship types between the CI and its dependent CIs are also included in the identification process. To help with the identification process of dependent CIs, create dependent relationships that define the dependency chain within CI types.

The payload used for identification of a dependent CI, can include a relationship with a qualifier chain. For such relationship, if there is a matching parent/child pair, the system compares the qualifier chain in the payload, with the qualifier chain of the CIs in the database. If there is a difference, the qualifier chain in the database is updated to match the qualifier chain in the payload for that relationship.

Identifier entries

You can configure an identifier entry to match a CI not only based on the CI's own attributes (field-based identification) but also based on the CI's related list (lookup-based identification) such as **Serial Numbers** or **Network Adapters**. The lookup table that is used for identification, needs to have a reference field that points to *cmdb_ci*.

There are three types of identifier entries:

Regular identifier entry

Identification is based on CI's own attributes that uniquely identify the CI.

Lookup identifier entry

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Identification uses a lookup table (related table) which can be any table that has a reference to the CI that is being identified. After you select a related lookup table, you select identifier attributes from the related table that reference either the cmdb_ci table itself, or one of its descendants.

If the lookup records don't already exist, then they are inserted in the lookup table referenced in the identifier entry.

Hybrid identifier entry

A combination of both, a regular identifier entry and a lookup identifier entry.

Example: When discovering virtual machines in a cloud environment which might contain two virtual machines with an identical set of serial numbers. A lookup identifier entry for the Hardware table such as `[Table: Serial Number, Criterion Attributes: Serial Number, Serial Number Type]` cannot uniquely identify these two virtual machines. However, a hybrid identifier entry such as `[Table: Serial Number, Criterion Attributes: Serial Number, Serial Number Type + (Name field from main Hardware table)]` can uniquely identify the two virtual machines.

Guidelines for lookup tables

Follow these guidelines when specifying a lookup table in an identifier entry.

1. Ensure that lookup tables reference the cmdb_ci table.
2. It is preferable to enforce exact count match (check box **Enforce exact count match (Lookup)**) for a stronger identification rule. During lookup identification, this option enforces matching only on exact lookup records count match. See Create a CI identification rule for more details.
3. Do not create conflicting identification rules especially for lookup-based rule.

   Example: In a CI Identifier for the Hardware class, you specify a lookup-based rule for the Network Adapter class and you also define a CI Identifier for the Network Adapter class. Duplicates might potentially be created in the Network Adapter table, because there are contradicting rules to identify a unique CI in that table:

   - One rule that looks only at criterion attributes (CI identifier rule)
   - Another rule that looks at criterion attributes and referenced sys_id (lookup rule).

Example: CI with related items that needs to be inserted - sysId is available.

```
var payload = {
    items: [{
        className:'cmdb_ci_linux_server',
       related: [{
              className:'cmdb_ci_spkg',
              values: {
                name:'package1',
                version:'version1'
                }
        }],
        values: {
            sys_id:'194876usytrr65378098'
        }
}]
};
```

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Related entries

You can define related entries which are rules that are based on related CIs. A related entry is based on a related table which can be any table (CMDB or non-CMDB) that has a reference to the CI that is being identified. Related entries let you create or update records on other tables in which the data is associated with the CI being identified by the identifier entries. Related entries are not used to directly identify CIs.

After you select a related table for the rule, the list in **Referenced field** is populated with fields from the related table that reference either the cmdb_ci table itself, or one of its descendants.

A related entry for a class is derived by child classes for which no related entries are specified.

Related topics

Relation qualifier

Create a CI identification rule

Identification rules are used to uniquely identify CIs in the CMDB, as part of Identification and Reconciliation (IRE) processes. Each CMDB class can be associated with a single identification rule.

Before you begin

You can update a CI identification rule only at the class level that the rule is defined for. You can't update a derived rule.

Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task

In a CI identification rule, specify a CI identifier, and identifier entries and related entries that uniquely identify the CI.

Review the following before creating identification rules:

- Identification rules
- General guidelines for using CMDB Identification
- Explore predefined identification rules:
  1. Navigate to **All** > **CI Class Manager**.
  2. Select **Hierarchy** and then search and select, for example, the Hardware class.
  3. In the Hardware bar, expand **Class Info** and select **Identification Rule**.
  4. Examine all the sections and tiles with the settings of the Hardware class identification rule.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to show the CI Classes list and then select the class for which to create an identification rule.
3. In the class navigation bar, expand **Class Info** and then select **Identification Rule**.
4. Select **Edit**, **Add**, or **Replace** (for a class that has derived the CI identification rule), in the Identification Rule section to create one.
5. Fill out the form, and then select **Save**.

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Field	Description
Independent/ Dependent	Designation of whether the CI identifier can identify the CI independently of other CIs, or not. **Note:** To set the rule as **Dependent**, you must specify dependent relationship rules for the selected class.
Name	Name of CI identifier.
Description	Description of the CI identifier.

6. In the Identifier Entries section, select an existing identifier entry to edit, or select **Add** to create one.
7. In the Identifier Entry dialog box, choose an option and then select **Next**.
Continue with one of the following three steps according to the option you selected:

Option	Description
Use attributes from main table <table>	Lets you select attributes from the currently selected table (regular identifier entry).
Use attributes from another table (Lookup table)	Lets you select attributes from any related table, other than the currently selected table (lookup identifier entry).
Use attributes from main and another table (Hybrid)	Lets you select attributes from both the currently selected table, and from another table (hybrid identifier entry).

8. **Use attributes from main table <'table'>** option: Set the options on the form and then select **Save**.

   Search On Table is preset to the currently selected table in the CI Classes list.

Field	Description
Active	Check box that specifies the identifier entry is active. At least one identifier entry in an identification rule must be active for the rule to apply.
Priority	Priority of the identifier entry. Identifier entries are applied based on priority. Rules with lower priority numbers are given higher priority. Identifier entries of identical priorities are applied randomly. You can keep gaps between the priority numbers, so you can assign the unused priority numbers to new entries without modifying the existing priority order.
Criterion Attributes	Set of attributes that uniquely identify the CI. Attributes can belong to the current class, or to a parent class.

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Field	Description
	Note: It is possible to add reference fields as a criterion attribute. However, such fields might not always be effective: ○ Reference fields store *sys_id*s that point to a record in another table, and thus is considered a weak criterion attribute (in terms of uniqueness) for the current table. ○ The system detects and then replaces invalid values in a reference field with 'Unknown'. For example, an invalid *Model ID* value is replaced with the value 'Unknown'. Also, if several CIs end up having that same reference field set to 'Unknown', then these CIs become duplicate CIs.
Allow null attribute	When selected, then if at least one criterion attribute is not null, attempt matching with an identifier entry even if there are criterion attributes that are null. Otherwise, all criterion attributes must have values to attempt matching with an identifier entry.
Allow fallback to parent's rules	Allows the identification rules of the CI's parent to be used if a match is not found for this identification rule. Applies only for dependent identification rules.
Advanced Options	A filter to narrow the set of records that will be searched for a matching CI. Available only if the *glide.identification_engine.enable_identifier_optional_condition* system property is set to **true** (**false** by default). In the base system, identifier entries of various classes are pre-configured with advanced options conditions. All these pre-configured conditions in regular identifier entries will automatically apply when you set this property to **true**. Therefore, to prevent unexpected behavior, review those predefined conditions in regular identifier entries before setting this property to **true**. For more details about this property, see Properties.

Note:
If criterion attributes have only two attributes and *sys_class_name* is one of them (for example [name, sys_class_name], [ip_address, sys_class_name]), then the other attribute cannot be NULL, even if **Allow null attribute** is enabled. This restriction is due to *sys_class_name* being considered a special system matching attribute.

9. **Use attributes from another table (Lookup table)** option:

   a. Set **Search On Table** to a table other than the currently selected table in the CI Classes list. The **Search On Table** must have a reference field to *cmdb_ci*, otherwise the identifier entry is considered invalid.

   b. Set the rest of the fields as described in the previous step.

   c. **Optional:** Select **Advanced options** and enter the information for a lookup identifier (scroll down if necessary).

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Advanced Option	Description
All of these conditions must be met	A filter to narrow the set of records that will be searched for a matching CI.
Enforce exact count match	For lookup identification, match a CI only on exact lookup records count match. When enforced, all lookup items for a CI in the payload must have matching records in the lookup table, that reference the same CI: **i.** Only matches CIs that have all the lookup items from the input payload referencing the CI in CMDB. **ii.** If there are multiple matches, selects the oldest created CI as the final match. When not enforced, one lookup item for a CI in the payload matching a record in the lookup table, is sufficient to consider a match: **i.** Matches any CI that has at least one of the lookup items from the input payload referencing the CI in CMDB. **ii.** If there are multiple matches, selects the CIs with the max number of lookup items from the input payload referencing the CI in CMDB. **iii.** If there are still multiple matches, selects the oldest created CI as the final match.

d. Select **Save**.

10. **Use attributes from main and another table (Hybrid)** option:

    a. Set the options on the **General Settings** tab as described in previous steps, and then select **Next**.

    b. On the **Main Table Settings** tab, select the attributes to use from the currently selected table, and then select **Next**.
    Search On Table is preset to the currently selected table in the CI Classes list.

    c. On the **Lookup Table Settings** tab, select a **Search On Table** and then in **Criterion Attributes** select attributes from the specified table. **Search On Table** must have a reference field to *cmdb_ci*, otherwise the identifier entry is considered invalid.
    You can select **Advanced options** and enter the information for a lookup identifier as described in the previous step (scroll down if necessary).

    d. Select **Save**.

    Note:
    The **Allow null attribute** option in the hybrid option, is set to **false**. Therefore, all of the selected criterion attributes from both the currently selected table and the lookup table, must have a value. Also, setting optional conditions is available only for the lookup table, and is not available for the main table.

11. **Optional:** On the Related Entries section select an existing related entry to edit, or select **Add** to create one.

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a. Update the Related Entry form and then select **Save**.

Related Entry form

Field	Description
Active	Check box that specifies that the related entry is active.
Related table	A related table that references the CI that is being matched.
Referenced field	A referenced field in **Related table** that should store the referenced CI. This field always references the cmdb_ci table, or a descendent of the cmdb_ci table.
Priority	Priority of the related entry for the specified **Related table**. Rules with lower priority numbers are given higher priority while matching a related item for specific related table. Related entries for the specified related table with identical priorities are applied randomly. You can keep gaps between the priority numbers, so you can assign the unused priority numbers to new entries without modifying the existing priority order.
Criterion attributes	The set of attributes to uniquely identify the related item. Attributes can belong to the current class, or to a parent class. **Note:** It is possible to add reference fields as a criterion attribute. However, such fields might not always be effective: ▪ Reference fields store *sys_id*s that point to a record in another table, and thus is considered a weak criterion attribute (in terms of uniqueness) for the current table. ▪ The system detects and then replaces invalid values in a reference field with 'Unknown'. For example, an invalid *Model ID* value is replaced with the value 'Unknown'. Also, if several CIs end up having that same reference field set to 'Unknown', then these CIs become duplicate CIs. Select the lock icon to view, add, or remove attributes from the identification rule.
Allow null attribute	If at least one criterion attribute in the related table is not null, allow to attempt matching with an identifier entry even if there are criterion attributes which are null.
Filter conditions	Add conditions to construct a filter to narrow the set of records that will be searched for a matching related item.

Note:
If criterion attributes have only two attributes and *sys_class_name* is one of them (for example [name, sys_class_name], [ip_address, sys_class_name]), then the other attribute cannot be NULL, even if **Allow null attribute** is enabled. This restriction is due to *sys_class_name* being considered a special system matching attribute.

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Example:
For example, the pre-defined **Hardware Rule** applies to the Hardware [cmdb_ci_hardware] table. It has an identifier entry with the criterion attribute **Serial Number, Serial Number Type** and its **Search on table** field is set to **Serial Number**.

The following payload snippet adds a CI to the *cmdb_ci_linux_server* class, that is a child of the *Hardware* class. It also shows how you can add related items in the payload for which you should create **Related Entries** on the CI Identifier page for the Hardware [cmdb_ci_hardware] table:

```
{
    "items": [
        {
            "className": "cmdb_ci_linux_server",
            "lookup": [
                {
                    "className": "cmdb_serial_number",
                    "values": {
                        "serial_number": "VMware-42 21 e3 da 44
 14 5a a6-56 48 2b 0a 28 53 42 4c",
                        "serial_number_type": "system",
                        "valid": "true"
                    }
                },
                {
                    "className": "cmdb_serial_number",
                    "values": {
                        "serial_number":
 "4221E3DA-4414-5AA6-5648-2B0A2853424C",
                        "serial_number_type": "uuid",
                        "valid": "true"
                    }
                },                }
            ],

    “related": [
                {
                    "className": "cmdb_ci_ucs_chassis",
                    "values": {
                        “name": “chassis1",
                        “category": “category1",
                        “short_description": “My Chassis 1"
                    }
                },
                {
                    "className": "cmdb_ci_ucs_chassis",
                    "values": {
                        “name": "chassis2",
                        "category": "category2",
                        "short_description": "My Chassis 2"
                    }
                },    }
     ],

            "values": {
                ......
```

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```
                "name": "xpolog2.lab3",
                "os_name": "Linux",
                "output": "Linux xpolog2.lab3
 2.6.32-431.el6.x86_64 #1 SMP Fri Nov 22 03:15:09 UTC 2013
 x86_64 x86_64 x86_64 GNU/Linux",
                "serial_number": "VMware-42 21 e3 da 44 14 5a
 a6-56 48 2b 0a 28 53 42 4c",
                "sys_class_name": "cmdb_ci_linux_server"
            }
        }
    ]
}
```

When the **Hardware Rule** is applied, the Serial Number [cmdb_serial_number] table is searched for a match with the values specified within the `lookup` key. Unless **Enforce exact count match (Lookup)** is checked, it is not necessary for every lookup key to return a match, as long as there is at least one match. If all matches reference the same CI, then that CI is considered to be the existing CI record. If no match is found, then the identification search continues to the next rule entry. If after all the rules are exhausted without finding a match, a new CI record is created in the database.

What to do next

You can optionally create an inclusion rule to narrow the scope of CIs that are included in identification.

Create an identification inclusion rule

Narrow the scope of CIs that are included in the identification process by creating an identification inclusion rule.

Before you begin

Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task

During duplication detection of independent CIs, the identification and reconciliation engine (IRE) processes only the CIs that satisfy the identification inclusion rules. For example, you can set a filter to include only CIs whose state is operational. When no identification inclusion rules exist, all CIs are included in the identification process and in the CMDB Health duplicate metric calculations. In the base system, there are no predefined identification inclusion rules. Identification inclusion rules are defined at the class level.

Identification inclusion rules also indirectly impact what appears in CMDB health dashboards for duplicate CIs, in addition to any health inclusion rules.

Note:
Identification inclusion rules impact any script that calls IRE, therefore create them carefully. Identification inclusion rules can prevent the identification of certain types of CIs, affecting some features of Discovery and Service Mapping.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to display the CI Classes list.
3. Select the class for which to create an identification inclusion rule.
4. In the class navigation bar, expand **Class Info** and then select **Identification**.

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5. Create or edit a rule and specify its criteria.

   a. In the Inclusion Rule (Advanced) section, select **Add** to create a rule or select **Edit** to edit an existing rule.

   b. In the Create Inclusion Rules dialog box, specify a criteria in the **Active record condition** field.
   CIs must meet this criteria to be included in the identification process and in the duplicate CMDB Health metric.

6. Select **Save**.

What to do next

Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Identification Inclusion Rules** > to see the list of all identification inclusion rules.

Related topics

Create health inclusion rule

General guidelines for using CMDB Identification

Review the following general guidelines for using CMDB Identification effectively.

Identification rules

An independent identification rule identifies a CI based on the CI's attributes, independently of other CIs.

A dependent identification rule identifies a CI by its dependent CIs and the relationships of the identified CI with those dependent CIs. Identification with a dependent identification rule is based on the dependent CIs and the relationships and qualifiers between the identified CI and its dependent CIs. Identification then requires more time than with an independent identification rule and is prone to some identification errors. Usage of dependent rules should therefore be minimized.

CI modeling determines which type of identification rules are required for proper CI identification.

Create identification rules using the following order of importance:

1. Independent identification rules — It is always preferable to create independent identification rules rather than dependent identification rules. When you model a CI, define the CI with a complete set of attributes that lend themselves to independent identification, eliminating the need to use additional CIs for identification.
2. Dependent identification rules — If it is necessary to create dependent identification rules, then define a single level of dependency. Two is the maximum number of dependency levels that is supported.
3. Avoid creating lookup identifier entries. The use of lookup identifier entry is highly discouraged as it can reduce performance. If unavoidable, ensure to first review class definitions and consider updates that allow usage of independent identification rules.
4. Limit the number of identifier entries within an identification rule, ideally to 1. A second identifier entry can further reduce performance, as will each additional identifier entry.
5. Create strong identification rules in which the strongest identifier entries and related entries are set with the highest priority.
6. Ensure that the identification rule is at the class level that it needs to be.

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Payload

Create the payload using the following order of importance:

1. Payload size — Limit the number of CIs per payload to 500.
2. Avoid duplicate entries in the payload.

   Example: If an identification rule has a criterion attribute for the **name** field, then the following payload has duplicate items resulting in failure:

```
var payload = {
    items: [{
        className:'cmdb_ci_linux_server',
        values: {
            name:'Win Server 200',
            ram:'2048'
        }},
{
        className:'cmdb_ci_linux_server',
        values: {
            name:'Win Server 200',
            ram:'4096'
        }}]
};
```

3. Do not pass system data such as the following in the payload.

```
var payload = {
    items: [{
        className:'cmdb_ci_linux_server',
        values: {
            name:'Win Server 200',
            sys_domain:'global',
            sys_domain_path:'xyz',
            sys_updated_on:'2017-06-15 16:25:11',
            sys_mod_count:23,
        }}]
};
```

4. Provide the minimum necessary set of criterion attributes for each payload item, according to what is specified in the corresponding identification rules.
5. When matching CIs, use CIs' sysIds if available. If provided, IRE can use the sysId to directly locate a CI without requiring any criterion attributes from the identification rule. In this case, IRE does not use the sysId in the matching process.
   - Example: Independent CI that needs to be updated — sysId is available.

```
var payload = {
    items: [{
        className:'cmdb_ci_linux_server',
        values: {
            sys_id:'194876usytrr65378098',
            ram:'2048',
        }}]
};
```

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- Example: Dependent CI that needs to be inserted. Tomcat War CI depends on Tomcat CI, and Tomcat CI depends on Linux Server CI. SysIds for the Tomcat and the Linux CIs are available.

```
var payload = {
        items: [{
            className:'cmdb_ci_app_server_tomcat_war’,
            values: {
                name:'war1',
                short_description:'my description'
  }
        }, {
            className:'cmdb_ci_app_server_tomcat',
            values: {
                sys_id:'194876usytrr65378098'
            }
        }, {
            className:'cmdb_ci_linux_server',
            values: {
                sys_id:'09876tysueyt6345lakiu'
            }
        }],
        relations: [{
                    parent:1,
                    child:0,
                    type: 'Contains::Contained by’}, {
                        parent:1,
                        child:2,
                        type:'Runs on::Runs'}
                    ]
                };
```

- Example: Dependent CI that needs to be updated — sysId is available.

```
var payload = {
        items: [{
            className:'cmdb_ci_app_server_tomcat_war',
            values: {
                sys_id:'039387euey637465sytet',
                short_description:'my description new'
     }
        }]
                };
```

6. When inserting many CIs, all of which depend on the same CI, you should serialize your API calls. Otherwise, attempting to concurrently process many CIs can clog the system, significantly degrading overall system performance.

Reconciliation rules

Reconciliation rules determine which discovery sources can update CI attributes.

Discovery sources, such as EventManagement, ImportSet, ManualEntry, and Tivoli, are used with the createOrUpdateCI() API to simulate manual updates to CIs. Without reconciliation rules, discovery sources can overwrite each other's updates to attribute values.

There are two types of reconciliation rules:

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Static reconciliation rules

Static reconciliation rules are the legacy reconciliation rules that set priorities for the various discovery sources for updating CI attributes. Static reconciliation rules specify which discovery sources can update class attributes, and the precedence order among these discovery sources.

When creating static reconciliation rules, ensure that there is a reconciliation rule for each discovery source that is authorized to update an attribute. Reconciliation rules can be defined at the parent and the child class level.

Static reconciliation rules are stored in the Reconciliation Definition [cmdb_reconciliation_definition] table.

Dynamic reconciliation rules

Dynamic reconciliation rules are based on attribute values processed by CMDB 360/Multisource CMDB rather than on discovery source priority. First, CMDB 360 processes the current payload data into the CMDB 360 data store. Then, applying a dynamic reconciliation rule, IRE selects the largest or most reported value, for example, across all discovery sources. Because dynamic reconciliation rules leverage CMDB 360, you must enable that feature to use dynamic reconciliation rules.

Creating dynamic reconciliation rules can be useful, for example, if it becomes difficult to set priority order for multiple discovery sources. Only a single dynamic reconciliation rule can exist per class attribute.

Dynamic reconciliation rules are stored in the Dynamic Reconciliation Definitions [cmdb_dynamic_reconciliation_definition] table.

Examples of static reconciliation rules

The following sample static reconciliation rules are created for the *cmdb_ci_computer* class and its *cmdb_ci_linux_server* child class:

1. Discovery is exclusively authorized to update the *name* attribute in the *cmdb_ci_computer* class.

   Because reconciliation rules are derived by child classes from parent classes, this rule also authorizes Discovery to update the *name* attribute in any child classes for the *cmdb_ci_computer* class.

2. ServiceWatch is exclusively authorized to update the *name* attribute in the *cmdb_ci_linux_server* class.
3. ServiceWatch is exclusively authorized to update all attributes in the *cmdb_ci_linux_server* class, as configured by leaving the **Attributes** field empty in the rule.

See Create a CI reconciliation rule for details about creating a static reconciliation rule that, for example, authorizes a discovery source to update a specific attribute such as *name*.

Using reconciliation rules

As you create reconciliation rules, keep in mind the following principles which are designed for flexibility and the refinement of rules at the attributes level:

Precedence of dynamic reconciliation rules

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When both, static and dynamic reconciliation rules exist for the same CI attribute, the dynamic reconciliation rule takes precedence over the static reconciliation rule.

Authorization for all attributes in a class

A static reconciliation rule lets you authorize a discovery source to update all attributes in a class. However, this authorization can be overridden for some of the attributes by rules for child classes in which specific attributes are listed.

For example, if only example rules #1 and #3 above are created, then Discovery is authorized to update the *name* attribute in the *cmdb_ci_linux_server* class. ServiceWatch is authorized to update all other attributes in the class except for the *name* attribute.

To override the authorization of Discovery to update the *name* attribute, example rule #2 above is added to specifically authorize ServiceWatch to update the attribute.

Authorization to only specific attributes in a class

To authorize a discovery source to update specific attributes in a class, create a static reconciliation rule for the discovery source, and list these attributes in the rule. A rule that grants access to specific attributes in a class overrides other static reconciliation rules with an empty attribute list that grants access to the entire class.

Example rule #1 above grants Discovery with exclusive authority to update the *name* attribute of the *cmdb_ci_computer* class. All other discovery sources are prevented from updating the *name* attribute of any CI in the *cmdb_ci_computer* class.

Child class rules overrides parent class rules

Any reconciliation rules defined for a child class override the rules defined for its parent class. So if an attribute of a derived rule is overridden by a child's class rule for a specific class, then the derived rule has no effect on that attribute. This behavior applies also when the child's reconciliation rule is static and the parent's rule is dynamic (dynamic reconciliation rules have precedence over static reconciliation rules when they are for same level class).

For example, rule #1 above lets Discovery update the *name* attribute in the *cmdb_ci_computer* class and all of its child classes. However, rule #2 for the *cmdb_ci_linux_server* child class, which overrides rule #1 for the parent class, explicitly authorizes ServiceWatch to update this attribute in the child class.

As a result:

- Discovery cannot update the *name* attribute of the child *cmdb_ci_linux_server* class. Only ServiceWatch is authorized to update this attribute.
- Discovery is authorized to update the *name* attribute of CI records in all other child classes of the *cmdb_ci_computer* class.

Overlapping static reconciliation rules

Static reconciliation rules that authorize different discovery sources for the same attributes of the same class can coexist and do not exclude each other.

For example, assume the following rule is added. It is similar to example rule #1 above but authorizes a different discovery source:

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ServiceWatch is authorized to update the *name* attribute in the *cmdb_ci_computer* class.

Like example rule #1 above, this new rule applies to the *name* attribute in the *cmdb_ci_computer* class so both Discovery and ServiceWatch can update the attribute. Any reconciliation rules are enforced to prevent the discovery sources from overwriting each other's updates.

For more information about reconciliation rules, see the [CMDB - Data Precedence Rules] Understanding the CMDB data precedence rules and troubleshooting [KB0756709] knowledge base article.

Domain separation

If Domain Separation is enabled, then you can scope reconciliation rules to specific domains. Rules of the parent domain, if not overridden, apply to CIs of child domain. All rules that are visible to a domain are applied, and a rule overriding the parent domain displays thele child domain version.

Understanding the CMDB reconciliation rules and troubleshooting [KB0756709]

Create a CI reconciliation rule

Create a static or a dynamic CI reconciliation rule.

If both, static and dynamic reconciliation rules exist for the same CI attribute, the dynamic rule has precedence.

Note:
You can't create a reconciliation rule for system fields or for Identification and Reconciliation Engine (IRE) specific fields such as the Discovery source (discovery_source) field. Also, reconciliation rules can't be dot-walked using reference fields.

Create a static reconciliation rule

A static reconciliation rule specifies class attributes that discovery sources are authorized to update, and prevents unauthorized discovery sources from overwriting the attributes' values. A static reconciliation rule also specifies the prioritization among multiple discovery sources. Without static reconciliation rules, discovery sources can overwrite each other's updates to attribute values.

Before you begin
Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task
Static reconciliation rules are used in conjunction with data refresh rules to determine reconciliation steps for a CI. These rules determine if, when, and by which discovery source a CI can be updated. If multiple discovery sources are authorized to update the same class attributes, assign a priority to each of these discovery sources to prevent them from overwriting each other's updates.

After an authorized discovery source updates an attribute, subsequent updates are accepted only from the same discovery source or from a discovery source with a higher priority. Updates from a discovery source with a lower priority are rejected, unless these two conditions are met:

- The lower priority source is the first source updating the CI.
- The CI became stale based on data refresh rules for the CI class. However, a reconciliation rule that applies to all attributes, doesn't have precedence over a lower priority reconciliation rule that applies to a specific attribute, even if the CI is stale.

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Precedence order of static reconciliation rules:

- Rule configured for a specific attribute, has precedence over rule set with **Apply to all attributes** (regardless of priority value).
- Between two rules for the same attribute or between two rules set with **Apply to all attributes**, the rule that is specific directly for the class has precedence over the derived rule.
- Between two rules for the same attribute or between two rules set with **Apply to all attributes** at the same class level, precedence is determined by rule priorities.

Information about the last discovery source that updates each attribute is stored in the Data Source History [cmdb_datasource_last_update] table, but only after enabling the reconciliation rule. Therefore, there might be unexpected updates after you enable the rule until the highest priority data source has updated the CI.

Static reconciliation rules affect reconciliation of stale CI attributes. During reconciliation, the information in the Data Source History table is considered along with the data refresh rules for the CI's class, to determine if a CI attribute is stale. A CI attribute is determined to be stale if it was not updated by the latest discovery source to update the CI, within a time period. The time period is specified by the Effective Duration time in the data refresh rule for the class for the discovery source. In this case, if another authorized discovery source, with a lower priority attempts to update the stale CI attribute, the update is allowed.

If there is a dynamic reconciliation rule for the same CI attribute as in a static reconciliation rule, the dynamic rule takes precedence.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to open the CI Classes hierarchy list.
3. Select a class for which to create a reconciliation rule.
4. In the class navigation bar, expand **Class Info** and then select **Reconciliation Rules**.
5. In the Reconciliation Rules section, select **Add** to create a rule or select an existing rule to edit.
6. Select the **Static Reconciliation Rule** tile if it appears.
   If CMDB 360/Multisource CMDB is not enabled, you can't create a dynamic reconciliation rule and the tiles to choose the rule type do not appear.
7. Fill out the fields on the **Add Data Sources & Prioritize** tab, and then select **Next**.

Field	Description
Active	Check box to activate this reconciliation rule.
Discovery Source	Discovery source that you are configuring this rule for.
Priority	Priority of **Source** within other discovery sources for the specified attributes. Smaller numbers designate higher priority. Discovery sources without a reconciliation rule are assigned the lowest priority.

   You can add multiple pairs of **Discovery Source** and **Priority**.
8. Fill out the fields on the **Select Attributes** tab, and then select **Next**.

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Field	Description
Apply to all attributes	Authorizes the specified discovery sources to update all attributes of the specified class. **Note:** This rule will be overridden by any rule that applies to a specific attribute. In which case, instead of using this option, you can directly include all attributes for **Attributes**.
Attributes	Attributes, from the current or from a parent class, that the specified discovery sources are authorized to update. Available only if **Apply to all attributes** is not selected.
Update with Null	Attributes that the specified discovery sources can update with a null value. By default, authorized discovery sources cannot overwrite a non-null value with a null value. Attributes in this list, which are not in the **Attributes** list, are not included with the attributes that the discovery sources can update with a null value.

9. Fill out the fields on the **Set Filter Condition** tab, and then select **Save**.

Field	Description
Filter Condition	Conditions that CIs must meet for the rule to be applicable. For example, to apply this rule only to CIs that are associated with the Finance department, select this condition: **[Department] [is] [Finance]**.

Note:
The glide.identification_engine.enable_reconciliation_filter_before_update system property determines when filter conditions are applied. By default, those filter conditions are applied after attribute values have changed during payload processing. Set this property to **true** so that Identification and Reconciliation Engine (IRE) applies the filter conditions before attribute values change.

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What to do next

- Select the filter icon and then select:
  - **Attributes**: To show only reconciliation rules for a specific attribute.
  - **Discovery sources**: To show only reconciliation rules for a specific discovery source.
- Select **Preview Rule** to see per attribute, the precedence order between any discovery sources that are authorized to update that attribute and any dynamic reconciliation rules.
- If CMDB 360/Multisource CMDB is enabled, you can:
  - Select **Preview Data** to see all attributes for a specific CI. Also, for each attribute, the current CMDB value and discovery sources reported values for the attribute.
  - Select **Recompute** to recompute CI attribute values after changing reconciliation rules.
- Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Reconciliation Definitions** to see a list view of all definitions of reconciliation rules.

Create a dynamic reconciliation rule

A dynamic reconciliation rule uses CMDB 360 data to choose a value such as the largest value that is reported, for updating a CI.

Before you begin

CMDB 360/Multisource CMDB must be enabled.

Role required: itil has read access, itil_admin (on top of itil) has full access

About this task

If the same CI attribute has both, a static reconciliation rule and a dynamic reconciliation rule, the dynamic reconciliation rule has precedence.

A dynamic reconciliation rule supports several rule types, such as largest reported value and most reported value. When applying a dynamic reconciliation rule, IRE processes the current payload and then examines the CMDB 360 data store to select a value with which to update the CMDB. Depending on the dynamic reconciliation rule type, selecting the appropriate value might not be immediately conclusive. For example, there might not be a single value that is most reported, or for some values, the last discovered timestamp isn't reported. Therefore, when necessary, IRE falls back to examining additional details such as last reported, last discovered, and last updated values to select the most appropriate value.

Note:
You can't add a dynamic reconciliation rule when creating a new child class in the CI Class Manager. You must first save the new child class and then add the dynamic reconciliation rule.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to open the CI Classes hierarchy list.
3. Select a class for which to create a reconciliation rule.
4. In the class navigation bar, expand **Class Info** and then click **Reconciliation Rules**.
5. In the Reconciliation Rules section, click **Add** to create a rule or select an existing rule to edit.
6. Select the **Dynamic Reconciliation Rule** tile.
7. On the **Select Rule** tab, select a rule type in the **Dynamic Rule Type** list field, and then click **Next**.

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8. On the **Select Attributes** tab, select the attributes for which to apply the rule.
9. Select **Next**.
   Attributes that the specified rule type can't be applied to and attributes for which a dynamic reconciliation rule already exists for, don't appear.
10. Fill out the fields on the **Set Filter Condition** tab, and then select **Save**.

Field	Description
Filter Condition	Conditions that CIs must meet for the rule to be applicable. For example, to apply a rule only to CIs that are associated with the Finance department, select this condition: **[Department] [is] [Finance]**.

What to do next

- Select the filter icon and then select:
  - **Attributes**: To show only reconciliation rules for a specific attribute.
  - **Discovery sources**: To show only reconciliation rules for a specific discovery source.
- Select **Preview Rule** to see per attribute, the precedence order between any discovery sources that are authorized to update that attribute and any dynamic reconciliation rules.
- Select **Preview Data** to see all attributes for a specific CI. Also, for each attribute, the current CMDB value and discovery sources reported values for the attribute.
- Recompute CI attribute values.
- Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Reconciliation Definitions** to see a list view of all definitions of reconciliation rules.

Create a data refresh rule

Specify data refresh rules to determine if a CI is stale for a specific discovery source. Such CIs can then be updated by a lower-priority authorized discovery source.

Before you begin

Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task

Data refresh rules are used in conjunction with static reconciliation rules to determine reconciliation steps for a CI. These rules determine if, when, and by which discovery source a CI can be updated. The precedence order of applying reconciliation rules to a class, remains the same even when there are data refresh rules for that same class.

Data refresh rules have no impact when dynamic reconciliation rules are in effect.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to show the CI Classes list and then select the class for which to create a data refresh rule.
3. In the class navigation bar, expand **Class Info** and then click **Reconciliation Rules**.

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4. Create a rule by selecting **Add** in the Data Refresh Rules section, or select an existing rule to edit. Then fill out the details in the Create Data Refresh Rules dialog box.

Field	Description
Discovery source	Discovery source for which staleness is evaluated.
Effective Duration	The time period that is used for the staleness test. If the fields specified in the static reconciliation rule for the CI's class weren't updated by **Discovery source** within the specified **Effective Duration** — the CI is determined to be stale for **Discovery source** and a lower priority discovery source is authorized to update the CI. When set to 0 (default), the CI is determined to be stale for **Discovery source** immediately after an update and therefor, a lower priority discovery source will always be authorized to update the CI. If you enter a value with a prefix that is valid and a suffix that is not, such as `15 x` — the valid portion of the value is used ('15'). If the entire value is invalid — the default value of 0 is used.
Active	Activates the rule.

5. Click **Save**.

Configure CI reclassification during IRE processing

During the Identification and Reconciliation Engine (IRE) CI identification process, a CI might need to be reclassified to a different *`sys_class_name`* type. By default, CIs are reclassified automatically. If automatic reclassification is disabled, then the CI is not reclassified and the system generates a reclassification task for your review.

The class of a CI can be upgraded, downgraded, or switched to a different branch in the class hierarchy. For more details about reclassification operations, see Reclassify a CI. You can use system properties and payload flags to configure the IRE behavior of CI reclassification, globally or individually per CI.

Note:
CI reclassification is possible only between two classes that have identical identification rules.

Configure automatic CI reclassification using system properties

You can use system properties to configure system-wide IRE behavior for CI reclassification. For information about CI reclassification-related properties, including access, see Properties.

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- The following properties enable or disable automatic reclassification updates that are specified in a payload. These properties are set to **true** in the base system, enabling processing of CI updates, including CI reclassification updates.

  To disable any automatic reclassification update, set the respective property to **false**. In that case, IRE rejects a payload (or a payload item in Enhanced IRE) with the respective reclassification updates, and creates a reclassification task.

  - *glide.class.upgrade.enabled*
  - *glide.class.downgrade.enabled*
  - *glide.class.switch.enabled*

- The following properties enable IRE to process CI updates with reclassification operations. However, depending on the property setting, IRE processes or skips the reclassification update. These properties are set to **false** in the base system, in which case IRE processes CI updates including any CI reclassifications.

  Set a property to **true** to configure IRE to process CI updates but not the CI respective reclassification update.

  - *glide.identification_engine.update_without_switch_enabled*
  - *glide.identification_engine.update_without_downgrade_enabled*
  - *glide.identification_engine.update_without_upgrade_enabled*

  This set of properties takes precedence over the previous set of properties (glide.class.<reclassification>.enabled). For example, with the following conflicting property settings, the second property takes precedence over the first:

  - *glide.class.downgrade.enabled* = **false**
  - *glide.identification_engine.update_without_downgrade_enabled* = **true**

Example for IRE processing of a payload item with a switch of a CI from Linux Server to Window Server. With the following default property settings in the base system, IRE updates the attributes including the class switch:

- *glide.class.switch.enabled* = **true**
- *glide.identification_engine.update_without_switch_enabled* = **false**

However, with the following property settings, IRE updates the attributes but skips the class switch:

- *glide.class.switch.enabled* = **true**
- *glide.identification_engine.update_without_switch_enabled* = **true**

Configure automatic CI reclassification in input payloads

You can use flags which correspond to the system properties, in the input payload of the CreateOrUpdateCIEnhanced() or the createOrUpdateCI() APIs. In the payload, set these flags to **true** or **false** to temporarily override the respective system property settings, at the payload item level.

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For the following payload flags that control reclassification behavior, if any is set, the setting has precedence regardless of the setting of the corresponding *glide.class.xxx.enabled* property:

- `classUpgrade`
- `classDowngrade`
- `classSwitch`

For the following payload flags that control reclassification behavior, the system checks if either the flag or its corresponding *glide.identification_engine.update_xxx_enabled* property is true to allow the update without the respective reclassification operation:

- `updateWithoutUpgrade`
- `updateWithoutDowngrade`
- `updateWithoutSwitch`

Also, you can pass payload level settings (which apply to all items within a payload), per data source, by specifying CI reclassification properties on the Robust Import Set Transformers form. For more information, see Robust import set transformer properties.

The following sample JSON payload enables automatic reclassification for the specified CI:

```
{ items: [{className: 'cmdb_ci_server', classUpgrade:
 true, classDowngrade: true, classSwitch: true, values:
 {name: 'linux123', serial_number: '12srt567', ip_address:
 '10.2.3.4'}, }]}
```

Reclassification restriction rules

Prevent IRE from downgrading or switching a CI class during payload processing to help prevent data loss. A reclassification restriction rule prevents a CI class change for specific source and target classes, while still processing any other property updates for the CI.

You can use a reclassification restriction rule, for example, to prevent a CI class downgrade from *cmdb_ci_linux_server* (source class) to *cmdb_ci_server* (target class). Or, to prevent a CI class switch from Linux Server to Windows Server. Reclassification restriction rules can be useful when using a Service Graph Connector which might lead to a class downgrade or switch, and a potential loss of important data.

To control the application of reclassification restriction rules:

- Use the *glide.identification_engine.reclassification_restriction_rules_enabled* system property to globally enable or disable the application of active reclassification restriction rules. This property is set to **true** by default.

- Use the *skipReclassificationRestrictionRules* payload flag in an IRE payload to prevent the application of active reclassification restriction rules.

  For example, a payload with the *skipReclassificationRestrictionRules* flag:

```
{
  "items": [
    {
      "className": "cmdb_ci_server",
      "values": {
        "short_description": "Linux server description",
```

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```
        "name": "Linux Server 1"
      },
      "settings": {
        "skipReclassificationRestrictionRules": "true"
      }
    }
  ]
}
```

For information about how to create a reclassification restriction rule, see Create a reclassification restriction rule.

Create a reclassification restriction rule

Reduce data loss during IRE processing by preventing a CI class change for specific source and target classes. A reclassification restriction rule affects only the *Class* attribute and does not prevent the update to the rest of the CI properties.

Before you begin

Role required: Itil_admin (Itil has read privilege only)

About this task

If during IRE processing of a payload, a CI needs to be reclassified (downgrade or switch class), IRE checks reclassification restriction rules. If any reclassification restriction rule applies to the current CI reclassification, IRE processes the CI properties update, but skips the CI reclassification.

IRE output provides specific details about any processing related to reclassification restriction rules.

A reclassification restriction rule applies only to the direction between the specified source and the target classes. The rule doesn't prevent a reclassification in the opposite direction, from the specified target class to the source class. To restrict reclassification between two classes in both directions, specify two separate reclassification restriction rules, one for each direction.

Procedure

1. Enter `cmdb_ire_reclassification_restriction.list` in the filter navigator.
2. Fill out the Reclassification Restriction form.

Field	Description
Name	Name of the reclassification restriction rule.
Source table	Current CI class.
Source inheritance	Whether to apply the reclassification restriction rule to child classes of **Source table**.
Target class	Reclassification target class.
Target inheritance	Whether to apply the reclassification restriction rule to child classes of **Target table**.

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Field	Description
Type	CI reclassification type: **Downgrade** or **Switch**.

3. Click **Submit**.

What to do next
In the Reclassification Restrictions list view, you can activate or deactivate a reclassification restriction rule by setting its **Active** value to true or false.

Create an IRE data source rule

When using Identification and Reconciliation Engine (IRE), you can prevent a specific discovery (data) source from inserting new CIs for a specific class. Create IRE data source rules for discovery sources that you don't trust in creating CIs but continue to trust in updating those CIs that exist.

Before you begin
Role required: itil_admin

About this task
IRE data source rules have no impact when dynamic reconciliation rules are in effect.

For example, an IP scan tool that discovers network gear but does not discover servers and therefore creates server CIs without details. You can prevent such discovery source from creating specific CIs, while still permitting it to update those specific CIs if they exist. IRE data source rules are stored in the IRE Data Source Rule [cmdb_ire_data_source_rule] table.

- Child classes derive IRE data source rules from parent classes like identification rules do.
- IRE data source rules that are specified for a child class, override any IRE data source rules derived from a parent class.

When IRE processes an insert operation that is prohibited by an IRE data source rule, the insert operation fails. This failure happens when the discovery source and CI class in the insert operation and in an IRE data source rule, match. When CreateOrUpdateCIEnhanced() is used, IRE stores the failed payload in the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table for future potential use.

Note:
When an insert operation is not allowed by the IRE data source rule, then when using createOrUpdateCI(), the entire IRE payload fails since createOrUpdateCI() doesn't allow partial commits.

If later, a permitted discovery source attempts to insert that same CI, then IRE inserts the CI after merging it with the matching CI from the partial payloads. IRE then deletes the partial payload from the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table, and allows future updates by the discovery source specified in the rule.

IRE data source rules do not apply to lookup and related items, and only a single rule can be active for any class/discovery source pair.

Procedure
1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **IRE Data Source Rule**.
2. In the list view, click **New** and fill out the IRE Data Source Rule form.

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Field	Description
Active	Activates the IRE data source rule.
Applies to	The class (and child classes) that the specified discovery (data) source is not allowed to create CIs of.
Data source	Discovery (data) source that is not allowed to create CIs of the specified class.
Insert Not Allowed	Disables the specified discovery (data) source from inserting new CIs from the specified class, to the CMDB.

3. Click **Submit**.

Result

If a payload item with an insert request, and in which the discovery source and the CI class match the discovery source and the CI class specified in the IRE data source rule:

1. The insert operation fails and IRE logs the following message:

   INSERT_NOT_ALLOWED_FOR_SOURCE Insert into [xyz] is blocked for data source [xyz] by IRE data source rule.

2. If using CreateOrUpdateCIEnhanced(), then IRE stores the payload item as a partial payload in the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table.

If later, a permitted discovery source successfully inserts a CI that matches the CI from a partial payload item:

1. The current CI is merged with the matching CI from the partial payload, applying static reconciliation rules as needed.
2. The respective partial payload in the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table is deleted.
3. Later payloads in which the non-permitted discovery source updates the respective CI, run successfully.
4. IRE allows the discovery source, that was previously prohibited from inserting the CI, to update that same CI which now exists in the CMDB.

CMDB dependent relationship rules

Service definitions consist of CI types and relationship types. Dependent relationship rules define the dependency structure of the CI types and the relationship types in these service definitions, helping in CI identification and in the construction of business service maps.

The dependencies that are defined by these rules are used when identifying dependent CIs to prioritize the order of CI identification, and to match CIs and respective dependent CIs in a payload. Dependent relationship rules are also used by Service Mapping and can be defined for custom CI types. After defining a new CI type, you can define dependent relationship rules that specify how the new CI type is related to existing types in the CMDB.

Dependent relationship rules consist of hosting and containment rules (dependent relationship rules), each type modeling the data from a different perspective of the CI. Containment rules represent CIs' configuration hierarchy, describing which CI contains which other CIs. Hosting rules represent CIs' placement in a business definition, describing what CIs run on.

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Both hosting and containment rules describe a relationship type between two CI types and the same relationship type can be used in a hosting rule and in a containment rule. It is the context in which the relationship is used that distinguishes between a containment and hosting rule.

Manage dependent relationship rules:

- To access rules at the class level, use the CI Class Manager. Navigate to **All** > **Configuration** > **CI Class Manager**.
- To access grouped rules, use the Metadata Editor. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Metadata Editor**.

The plugins that have been activated on an instance determine which hosting and containment rules exist in a base system.

Hosting rules

Hosting rules represent all the possible valid combinations of pairs of hosting and hosted CIs in the service definition. Hosting rules are a flat set of rules that can be only one level deep, and which always involve resources, typically physical or virtual hardware. Each hosting rule is a stand-alone rule between two CI types, describing either a valid CI type that another CI type can host, or by which another CI type can be hosted. A hosting rule consists of a parent CI type, a relationship type (such as Hosted On::Hosts) and a child CI type. For example, you can have a hosting rule that specifies that the CI type ‘Application’ ‘Runs On::Runs’, the CI type ‘Hardware’.

A CI can be hosted on multiple resources (such as Windows and Linux). This CI is represented by a hosting rule for the CI with each resource that the CI can be hosted on. During CI identification, the pair of CIs that are being examined, should satisfy at least one hosting rule.

Hosting rules are stored in the CMDB Metadata Hosting Rules [cmdb_metadata_hosting] table.

Containment rules

Containment rules represent the containment hierarchy for a CI type, describing valid objects that a CI type can contain in the service definition, and valid objects that can be contained by the CI type. Containment rules are chained to each other in a containment rules group, with a CI type that is the top-level (root) parent of the group. The collection of containment rules construct a hierarchy-like map of containment relationships. Containment rules are logical concepts used to represent logical CIs, for example to describe software that runs on a server. A containment rule consists of a parent CI type, a relationship type (such as 'Contained By::Contains'), and a child CI type. For example, you might have a containment rule specifying that the CI type ‘Tomcat’ ‘Contains::Contained By' CI type ‘WAR File’.

Endpoints are special containment rules that specify incoming or outgoing connections in the model, designating the CI types that data of some specified type flows in to or out from the service definition. After adding an endpoint to a containment rule, you cannot add any child rules to the endpoint rule.

Containment rules are stored in the CMDB Metadata Containment Rules [cmdb_metadata_containment] table.

Reference rules

Reference rules are used mostly by Cloud Management to represent all of the possible valid combinations of pairs of referencing and referenced CIs in the service definition.

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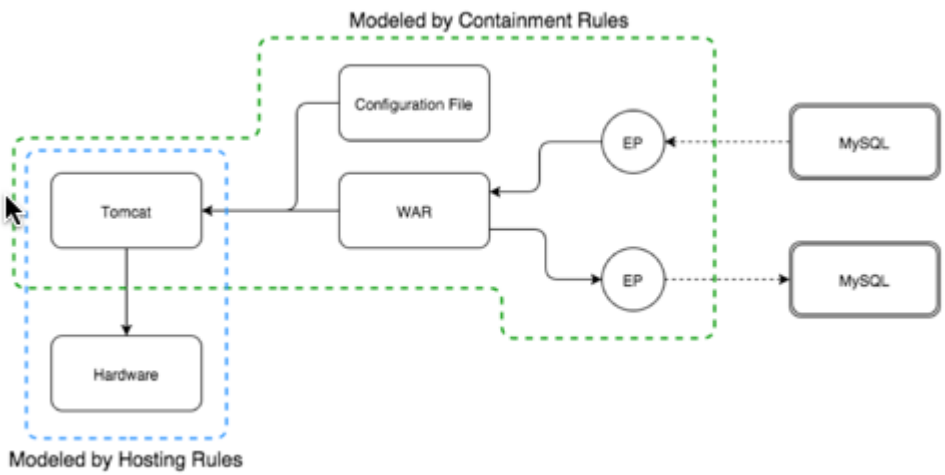
- Reference rules are a flat set of rules that can be only one level deep.
- Reference rules always involve resources, typically virtual entities. Each reference rule is a stand-alone rule between two CI types, describing either a valid CI type that another CI type can reference, or by which another CI type can be referenced. Both the CI classes should be able to live independent of each other.
- A referencing rule consists of a parent CI type, a relationship type (such as `Provisioned From::Provisioned`) and a child CI type. For example, you can have a referencing rule that specifies that the CI type 'Virtual Machine' `Provisioned From::Provisioned`, the CI type 'Image'.
- A CI can reference multiple resources (for example, a VM Instance can have a reference relation with both the Image and the Hardware templates). This CI is represented by a referencing rule for the CI with each resource that the CI can be referenced from.
- The reference rule cannot be part of the CI identification.
- Reference rules are stored in the CMDB Metadata Reference Rules [cmdb_metadata_reference] table.

Rules requirements

The rules that you create are bound by the following requirements which narrow the relationships and ensure that only valid options are available in the drop-down lists in the Metadata Editor.

- Given a CI type that is as a child in a containment rule: Not this CI type or its children can be a top-level (root) parent of any other containment rule, and it cannot be in any hosting rule, either as a parent or as a child.
- Given a CI type that is a top-level (root) parent of a containment rule: It cannot be a child in a hosting rule (for example, you cannot be hosted on Tomcat, if Tomcat has any containment rules).
- Given a CI type that is a child in a hosting rule: It cannot be in any containment rule, either as a parent or a child.
- Given a CI type that is a parent in a hosting rule: It cannot be a child in any containment rule.
- Hosting rules cannot create loops such as Tomcat –runs_on- VMWare –runs_on- Tomcat.

Example: Hosting and containment rules model



Hosting rules that model the diagram:

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Tomcat 'Runs on' Hardware.

Containment rules that model the diagram:

- Tomcat 'Contains' Configuration File
- Tomcat 'Contains' WAR
- WAR has two endpoints for JDBC with MySQL:
  - Inbound
  - Outbound

Example: Valid set of rules

```
Tomcat Hosted Linux
Linux Hosted Computer
```

The second metadata entry triggers the third requirement, which is satisfied (it is a hosting rule, not a containment rule).

Create dependent relationship rules

Create hosting and containment rules (dependent relationship rules) for CI classes to help with correctly identifying dependent CIs during the business discovery process and service mapping. Discovery calls the identification API that applies dependent relationship rules.

You can create a basic hosting or containment rule in the CI Class Manager. Or, use the Metadata Editor to create groups of hosting and containment rules, and inbound or outbound endpoints in containment rules. The CI Class Manager and the Metadata Editor are synchronized, and you can use each of those tools to display and edit a dependent rule.

Create a dependent relationship rule for a CMDB class

Use the CI Class Manager to create a basic dependent relationship rule (hosting or containment relationship rule) for a CMDB class.

Before you begin

Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task

The class for which you create dependent relationship rule, must have a dependent identification rule.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Click **Hierarchy** to display the CI Classes list, and select the class for which you want to create a hosting or a containment rule.
3. In the class navigation bar, click **Dependent Relationships**.
4. In the Dependent Relationships view, click **Add dependency**.
5. Fill out the details in the Add Dependent Relationship Rule dialog box.

Field	Description
Rule Type	Designation of whether this rule is a hosting rule or a containment rule.

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Field	Description
This Class	The class that the rule applies to.
Relationship	The relationship type for the rule.
Target Class	The target class for the dependent relationship rule. The designation of this class as a child or parent class, is based on the specified **Relationship**.

6. Click **Save**.

What to do next
You can click **Reset to derived** and then confirm the operation to delete all dependent relationship rules that were added specifically for the selected class. Only dependent relationships that are derived from a parent class, remain.

For more information about child and parent classes, see Table extension and classes.

Create or edit a collection of containment rules

Create containment rule for CIs to help with correctly identifying dependent CIs during the business discovery process and service mapping. Discovery calls the identification API that applies dependent relationship rules.

Before you begin
Role required: admin

About this task
A containment rule is a dependent relationship rule which defines a relationship between two CIs, structured as: CIType1 RelationshipType CIType2. The first CI type that you add becomes the top level CI of a containment rules group which is a chain of containment rules. The entire set of containment rules is organized as groups according to top-level CIs.

To create a containment rules group for a new CI type, you need to first add the CI Type1 of the relationship. To add a child containment rule for a CI type that exists, you need to select that CI type, and define the second portion of the relationship rule which is the relationship type and CI Type2.

To each rule within a containment rules group you can add inbound or outbound endpoints, which are noted by blue up and down arrows. After adding an endpoint, you can not add a containment rule in that branch of the containment rules hierarchy.

Procedure
1. Navigate to **All** > **Configuration** > **Metadata Editor**.
2. In the Metadata Editor, click the **Containment Rules** tab.
3. Click **Add New Rule** to add a top-level rule or point to a rule for which you want to add a child rule and click the green '+' icon that appears on the right.
4. Complete the **Add Containment Rule to <class>** form.

Field	Description
Configuration Item Type	The CI class that the rule applies to.
Relationship Type	The relationship type for the rule.

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Field	Description
Reverse Relationship Direction	Enable to use the reverse relationship in the rule.
Always include in Service Model	Enable to always include the CIs of the specified class in the Service Map if their parent CI (based on the containment relationship) is present in the Service Map.

5. Click **Create**.
6. Add an endpoint to a child rule:

   a. Point to a child rule for which you want to add an endpoint.

   b. Click the blue "+" icon that appears on the right.

   c. Complete the **Add Endpoint To <class>** form.

Field	Description
Endpoint Type	The type of endpoint.
Inbound or Outbound	The direction of the endpoint.

   d. Click **Create**.

Create or edit a collection of hosting rules

Create hosting rule for CIs to assist in correctly identifying dependent CIs during the business discovery process and service mapping. Discovery calls the identification API that applies dependent relationship rules.

Before you begin

A hosting rule is a dependent relationship rule which defines a relationship between two CIs, structured as: <CI Type1> <relationship type> <CI Type2>. To create a hosting rule, you need to add a CI type as <CI Type1> in the relationship rule, and then define the second portion of the relationship rule which is the relationship type and <CI Type2>. The entire set of hosting rules is organized as groups according to the top-level hosted CIs.

A hosting rule implicitly contains two rules, which are the reversal of each other. When you create the rule '<CI Type1> <relationship type> <CI Type2>', the rule '<CI Type2> <reversed relationship type> <CI Type1>' is automatically added.

Role required: admin

Procedure

1. Navigate to **All** > **Configuration** > **Metadata Editor**.
2. In the Metadata Editor, click the **Hosting Rules** tab.
3. Click **Add New Rule** to add a top-level rule or point to a rule for which you want to add a child rule and click the green '+' icon that appears on the right.
4. Complete the **Add Hosted/Hosting Rule to <class>** form.

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Field	Description
Configuration Item Type	The <CI Type2> in the rule.
Relationship Type	The relationship type for the rule.
Reverse Relationship Direction	Check to reverse relationship in the rule.

5. Click **Create**.

Applying IRE to Import Sets

You can apply CMDB Identification and Reconciliation Engine (IRE) processes when Import Sets are used to import CIs into the CMDB. CI identification can prevent duplicate CIs in the CMDB, which Import Sets might otherwise cause.

Populating CMDB tables using Import Sets can inadvertently result in duplicate CIs when multiple imported records are identical to an existing CI. To minimize this duplication, you can apply CMDB Identification and Reconciliation processes to Import Sets when importing new records into CMDB tables.

Transform map script

In the onBefore transform map script for an import set, add a call to the CMDBTransformUtil API, similar to the following code sample:

```
(function runTransformScript(source, map, log, target) {
// Call CMDB API to do Identification and Reconciliation of
 current row
var cmdbUtil = new CMDBTransformUtil();
cmdbUtil.setDataSource('ImportSet');
cmdbUtil.identifyAndReconcile(source, map, log);
ignore = true;

if (cmdbUtil.hasError()) {
        var errorMessage = cmdbUtil.getError();
        log.error(errorMessage);
} else {
        log.info('IE Output Payload: ' +
 cmdbUtil.getOutputPayload());
        log.info('Imported CI: ' +
 cmdbUtil.getOutputRecordSysId());
}

})(source, map, log, target);
```

The `ignore = true` code phrase prevents Import Sets from creating the same record again after it is processed by the identification engine.

Process

The identification engine performs identification of each source record before it is inserted into the CMDB. The identification engine determines if the record is a duplicate of an existing CI, and then:

- If not duplicate: Inserts the record to the target table.
- If duplicate: Updates the existing CI in the CMDB, with data from the source record.

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The CMDBTransformUtil API pre-processes the source data, then passes the input values to the identification engine with import set being the data source by default. The CMDBTransformUtil API supports a target field that is a reference field in the same manner that Import Sets supports it. The CMDBTransformUtil API also supports a source script, evaluating source scripts to determine the target value which is then passed to the identification engine. For more information, see Creating a field map.

Specify multiple target tables for an import set

You can configure each record in an import set with its own target table. Then, instead of inserting all the transformed records into a single target table, the records are inserted into the different target tables that are specified per record. For example, you might need to insert some records from the import set to the Computer class and other records to the Server class.

When importing data using Import Sets, incorporate the following steps:

- In the data source file, add a target table column. Use a string such as "MyTable" to label the column header. In each record row, enter the target table for the record, as a valid CMDB class name such as "cmdb_ci_computer".
- After you **Auto Map Matching Fields** on the Table Transform Map form, add a field map for the added target table column to establish a relationship between classes and the target tables in the CMDB.
  1. In the **Field Map** related list on the Table Transform Map form, click **New**.
  2. Set **Source field** to the header of the target table column that you added in the data source file, such as `MyTable`.
  3. Set **Target field** to **Class**.
  4. Click **Submit**.

When you configure an import set with multiple target tables as described in the steps above, the **Target table** that is specified on the Table Transform Map form is not used.

Restrictions

The following restrictions apply:

- An import set should be associated with a single transform map. While adding a call to the CMDBTransformUtil API, ensure that still a single transform map exists for the import set.
- The CMDBTransformUtil API does not check if mandatory fields have values when used with Import Sets . Regardless of how *`enforce mandatory fields`* is set in the transform map, data import fails if a mandatory field does not have a value.
- CI Identification and Reconciliation cannot be applied to Import Sets for dependent CIs (CIs with dependent identification rules).

Related topics

Create a transform map

Detecting duplicate CIs

When IRE identification process detects duplicate CIs, it groups each set of duplicate CIs into a de-duplication task for review and remediation. A large number of duplicate CIs might be due to weak identification rules. You can configure the identification engine to reconcile duplicate CIs.

During Identification and Reconciliation Engine (IRE) processes,
handling of duplicate CIs is determined by the properties
`glide.identification_engine.skip_duplicates` (set to true by default) and

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glide.identification_engine.skip_duplicates.threshold (set to 5 by default), and on the number of duplicate CIs that are detected. You can configure these properties so duplicate CIs are automatically reconciled, skipping duplication.

- If *glide.identification_engine.skip_duplicates* is true, and the number of duplicate CIs is less than the threshold specified by *glide.identification_engine.skip_duplicates.threshold*, then the oldest of the duplicate CIs is picked as a match and gets updated. That oldest duplicate CI also becomes the main CI for that set of duplicate CIs. The rest of the duplicate CIs are tagged as duplicates by setting their *duplicate_of* attribute to the appropriate main CI. During matching, IRE filters out any CI that is tagged as duplicate of any CI.
- If *glide.identification_engine.skip_duplicates* is false, then matching of duplicate CIs fails with an error, and none of the duplicate CIs are updated.

Also, the *glide.duplicate_ci_remediator.max.cis* property determines de-duplication processing for a large number of duplicate CIs. For more information, see the 'Large number of duplicate CIs' section in the Duplicate CIs remediation topic.

In either case, de-duplication tasks are always created.

Note:
For a duplicate CI, if any of the CI's attributes, other than *duplicate_of*, is updated by IRE processing, then the CI is no longer considered a duplicate CI. In that situation, the value of *duplicate_of* is cleared in the CI.

For more information about these properties, see Properties.

Remediating de-duplication tasks

For information about reviewing and remediating de-duplicate tasks, and how the main CI is used, see Duplicate CIs remediation.

Using identification simulation

Identification simulation is a central location for automatically constructing a payload that is guaranteed to be complete and valid. You can then simulate the processing of the payload by the Identification and Reconciliation Engine (IRE) and examine the results before actually submitting it for execution by IRE.

Use identification simulation to construct an input payload, and simulate processing of the payload by IRE. You can then examine the results, adjust identification rules if needed, and re-run the simulation of the updated payload.

Use the identification simulation to:

- Automatically construct input payload that is based on existing identification rules, hosting and containment rules.
- Simulate execution of a payload (automatically constructed by identification simulation, or manually created).
- Browse payload output and execution log messages for a simulated run.

Note:

- Identification simulation does not commit any updates to the CMDB.
- Identification simulation supports simulation of processing payloads that are provided and which contain non-CMDB tables, but doesn't support the generation of such payloads.

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Automatically generate payload

Use identification simulation to automatically construct an input payload for a specified class. The constructed payload is complete with any required dependent CIs, correctly structured, and syntactically valid for processing by the identification and reconciliation engine (IRE).

Before you begin
Role required: admin

About this task
The payload that is constructed during identification simulation is for the specified class. For a dependent CI class, you will be prompted for information about all dependencies. After you provide the required details, identification simulation constructs the payload based on your input.

Note:
Automatically generating payloads that contain non-CMDB tables, isn't supported.

Procedure
1. Navigate to **All** > **Configuration** > **Identification/Reconciliation**, and click **Identification Simulation**.
2. In the **Start with CI Class** box click **Start**.
3. On the **Payload Information** form, in the **Data source** field, select the data source that is associated with this class update.
   For the ServiceNow Discovery data source, select `ServiceNow`.
4. Select the **Class** in the payload.
   a. In the **Criterion Attributes** area select the CI identifier attributes and then specify the values that uniquely identify a CI.
   b. In the **Additional Attributes** area specify attributes and values that matching CIs will be updated with.
5. For dependent CIs associated with dependent identification rules, fill out the **Criterion Attributes** and **Additional Attributes** sections in all **Container level** sections that display.
6. Click **Generate Script**.
7. If any errors indicate that there are missing fields, fill in the missing fields and then click **Generate Script** again.

What to do next
- Click **Run Simulation** to simulate processing of the payload by IRE.
- Examine the results of the simulation, fine-tune the payload as needed, and combine with other payloads for other classes as desired. After finalizing the payload, use the createOrUpdateCI() API to execute the payload by IRE which will result in actual updates to the CMDB.
- Click **Copy Script** to copy the JSON script into the clipboard. You can then paste that script into a third party software or to another screen of the identification simulation.

Simulate payload processing using identification simulation

Use identification simulation to simulate the identification and reconciliation engine (IRE) process of CI identification for an input payload. Provide a valid payload, which was constructed using identification simulation or that was created manually.

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Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation**, and click **Identification Simulation**.
2. **Optional:** To run a simulation of an existing payload:
   a. Click **Start** in the **Start with Existing Payload** tile.
   b. On the Insert JSON Payload page, select the **Data source** that is associated with this class update.
   c. **Optional:** Select **Use Enhanced Identification** to apply the identifyCIEnhanced API for enhanced CI identification, instead of using the identifyCI API.
   d. Paste the JSON payload into the empty canvas.
3. **Optional:** To construct a new payload click **Start** in the **Start with CI Class** tile.
   See Automatically generate payload for more information.
4. Click **Run Simulation** to simulate processing of the payload by IRE.

What to do next

1. Examine the results of the simulation in the results pane, and fine-tune the payload as needed:
   a. Click **Run #1** to display the **Context ID** and the **Run ID** of the simulated run.
   b. Click the drop down arrow next to **Run #1** to display additional details.
      - **Input**: Displays the payload for the simulation.
      - **Logs**: Displays all the logged messages that IRE generated while simulating processing of the payload, according to the specified logging level.
      - **Output**: Displays the output payload returned by IRE.
2. After finalizing the payload, use the createOrUpdateCI() API to execute the payload by IRE which will result in actual updates to the CMDB.

Set logging level for identification simulation

Identification simulation logs each step of a simulated payload processing. You can then examine these run logs to determine if a payload was processed as expected, and if identification rules are effective. You can adjust the level of logging so it is helpful, and so that the amount of messages is not excessive or insufficient.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation**, and click **Identification Simulation**.
2. Click the **Settings** icon.
3. Select logging level for the identification and reconciliation engine (IRE) under **IE Log Level** and for the service cache under **Service Cache Log Level**.
   The logging levels are displayed in ascending order, from the minimum level to the maximum level of logging.
4. Click on the **Settings** icon again to close the **Settings** dialog box.

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Examine run logs

Identification simulation provides run logs which are generated by Identification and Reconciliation Engine (IRE). You can access these run logs for payload runs, to examine results and for debugging purposes. IRE payload output logs appear in a user friendly format on a central page.

Before you begin

Role required: admin

About this task

Also, internal applications that use IRE (such as Discovery) can call an internal API to provide a URL to viewing IRE run logs.

Logging is in the context of a specific run of the identification engine, and you can filter the log list by a specific data source and time range. Up to 1000 run logs that are up to 2 months old are listed, grouped by Context IDs, and run times. You can use the glide.identification_logs.max_run_ids property to modify the 1000 limit.

You can control the logging level by using the *glide.discovery.identification.log_level* Discovery system property and setting the value to one of the following:

- Info
- Warn
- Error
- Debug
- DebugVerbose
- DebugObnoxious

Note:
IRE performs an initial verification of a payload before processing identification rules. If IRE detects any duplicate CIs based on any class identifiers, the payload is rejected and processing stops.

Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Identification Logs**.
2. Filter the runs list as follows:
   a. **Source**: Select the data source for which to display run logs.
   b. **Time Range**: Specify a time range for which to display run logs.
   The **Runs** list displays all runs for the specified data source, during the specified time range.
3. In the **Runs** list, click a **Run #** to display its **Context ID** and **Run ID**.
   A unique Context ID is associated with each specific payload that is run. Each run of that payload, is associated with a unique Run ID. A single Context ID for a payload that is run multiple times is associated with multiple Run IDs.
4. Click the drop down arrow for a **Run #** to display additional details.
   - **Input**: Displays the payload for the run.
   - **Logs**: Displays all the logged messages that the identification engine generated while running the payload, according to the specified logging level.
   - **Output**: Displays the output payload returned by the identification engine.

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View a reclassification task

Reclassification tasks are created for CIs that couldn't be automatically reclassified during the identification process. Review these tasks to locate the CIs and decide if to reclassify them.

About this task

The properties you use to disable automatic CI reclassification determine whether reclassification tasks are created for those CIs that couldn't be automatically reclassified:

- Using any one of the 'glide.class.<reclassification operation>.enabled' properties (such as *glide.class.upgrade.enabled*): Reclassification tasks are created.
- Using any one of the 'glide.identification_engine.update_without_<reclassification operation>_enabled' properties (such as *glide.identification_engine.update_without_switch_enabled*): Reclassification tasks aren't created.

For more information about reclassification during IRE processing, see Configure CI reclassification during IRE processing.

Before you begin

Role required: admin or itil

Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Reclassification Tasks**.
2. Select a reclassification task.
3. Examine the details on the Reclassification Task form.

Reclassification Task form

Field	Description
Configuration item	The CI that must be reclassified.
Short description	Short description noting that CI reclassification was not allowed.
Description	Description noting the current class of the CI and the class that the CI must be changed to.
Internal payload	Payload used in the identification process.

What to do next

After examining the task details, you can locate the CI that is noted in the task **Description** and manually reclassify it. For details, see Reclassify a CI.

IRE support for non-CMDB tables

Apply Identification and Reconciliation Engine (IRE) processes to supported non-CMDB tables to ensure data integrity and health of those tables.

Starting with the Zurich release, IRE supports some non-CMDB tables. You can use all IRE features with some non-CMDB tables after creating identification rules (CI identifiers and identifier entries) for those tables. Non-CMDB tables supported for IRE features include:

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- In an application-specific scope: All non-CMDB tables
- In the global scope: Only non-CMDB tables that are preset in the base system. In the Zurich release for example, the Location [cmn_location], Department [cmn_department], Cost Center [cmn_cost_center], Building [cmn_building], User [sys_user], and Group [sys_user_group] non-CMDB tables are supported.

You can't use the CI Class Manager to manage any IRE-related rules for non-CMDB tables. Instead, you must work directly with the respective tables in list views to create and manage those rules as described in the following procedures:

- Create an identification rule for a non-CMDB table
- Create a reconciliation rule for a non-CMDB table
- Create an IRE data source rule for non-CMDB tables
- Create a data refresh rule for a non-CMDB table
- Create an identification inclusion rule for a non-CMDB table
- Simulate payload execution using identification simulation
- Use partial payloads
- Review and remediate de-duplication tasks

You can use the following store apps with supported non-CMDB tables:

- CMDB 360 in CMDB Workspace
- IntegrationHub ETL

IRE processes are applied to supported non-CMDB tables with the following differences:

- IRE doesn't populate the *discovery_source*, *last_discovered*, and the *first_discovered* attributes if those attributes don't exist in the non-CMDB table.
- IRE uses the non-CMDB table's class name as *sys_class_name* if the table doesn't include a *sys_class_name* attribute.
- IRE payloads don't support relationships with non-CMDB tables.

Note:
Although IRE-related user interface and accompanying documentation might reference CMDB and CMDB elements, most of those references also apply to any supported non-CMDB tables.

Create an identification rule for a non-CMDB table

To use Identification and Reconciliation Engine (IRE) features with supported non-CMDB tables, you must first create identification rules that uniquely identify the table records. Each non-CMDB table can be associated with a single identification rule.

Before you begin
Role required: itil has read access, itil_admin (on top of itil) has full access

About this task
Each identification rule consists of a single identifier for the table, one or more identifier entries, and one or more related entries.

Review the following topics before creating identification rules:

- Identification rules
- General guidelines for using CMDB Identification

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When creating identifier entries, you can configure the **Search on table** and **Criterion attributes** fields on the Identifier Entry form to implement one of the following options:

Regular identifier entry

Lets you select attributes from the associated identifier table.

Lookup identifier entry

Lets you select attributes from any related table (Lookup table), other than the currently selected table.

Hybrid identifier entry

Lets you select attributes from both the currently main selected table, and from another table (Lookup table).

For non-CMDB tables, only independent identification rules are supported.

Procedure

1. Navigate to **All** > **Identification/Reconciliation** > **CI Identifiers**.
2. In the Identifiers list view, click **New**.
3. Fill out the Identifier form.

Field	Description
Name	Name of CI identifier.
Applies to	Supported non-CMDB table.
Independent	Must be checked to indicate that the identifier can identify a record independently of other records.

4. Click **Submit**.
5. In the Identifiers list view, locate and open the identifier that you just created.
6. On the Identifier form, select the **Identifier Entries** tab and then click **New**.
7. Fill out the Identifier Entry form.

Field	Description
Identifier	Preset with the name of the table of the associated identifier.
Search on table	Preset with the label of the table of the associated identifier. To create: ○ A regular identifier entry: Set to the identifier table and select **Criterion attributes** from that same table. ○ A lookup identifier entry: Set to another table (lookup table) and select **Criterion attributes** from that lookup table. ○ A Hybrid identifier entry: Set to another table (lookup table) and then do the following steps. ▪ Select **Criterion attributes** from the lookup table. ▪ Add **Hybrid Entry CI Criterion Attributes** from the current table using background scripts, after saving the rule. For more details, see the 'What to do next' section at the end of this task.

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Field	Description
	A lookup table should have a reference to the associated identifier table.
Criterion attributes	Set of attributes that uniquely identify the record. Attributes can belong to the current class, or to a parent class. **Note:** It's possible to add reference fields as a criterion attribute. However, such fields might not always be effective: ○ Reference fields store *sys_id*s that point to a record in another table, and thus is considered a weak criterion attribute (in terms of uniqueness) for the current table. ○ The system detects and then replaces invalid values in a reference field with 'Unknown'. For example, an invalid *Model ID* value is replaced with the value 'Unknown'. Also, if several CIs end up having that same reference field set to 'Unknown', then these CIs become duplicate CIs.
Priority	Priority of applying the identifier entry. Rules with lower priority numbers are given higher priority. Identifier entries of identical priorities are applied randomly. You can keep gaps between the priority numbers, so you can assign the unused priority numbers to new entries without modifying the existing priority order.
Active	Specifies whether the identifier entry is active. At least one identifier entry in an identification rule must be active for the rule to apply.
Enforce exact count match	For lookup identification, match a record only on exact lookup records count match. When enforced, all lookup items for a record in the payload must have matching records in the lookup table that reference the same record: **a.** Only matches records that have all the lookup items from the input payload referencing the record in the table. **b.** If there are multiple matches, selects the oldest created record as the final match. When not enforced, one lookup item for a record in the payload matching a record in the lookup table, is sufficient to consider a match: **a.** Matches any record that has at least one of the lookup items from the input payload referencing the record in the table. **b.** If there are multiple matches, selects the records with the max number of lookup items from the input payload referencing the record in the table. **c.** If there are still multiple matches, selects the oldest created record as the final match.
Allow null attribute	When selected, then if at least one criterion attribute isn't null, attempt matching with an identifier entry even if there are criterion attributes that are null. Otherwise, all criterion attributes must have values to attempt matching with an identifier entry.
Allow fallback to parent's rules	Allows the identification rules of the record's parent table to be used if a match isn't found for this identification rule. Applies only for dependent identification rules.

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Field	Description
Optional condition	A filter to narrow the set of records that will be searched for a matching record. Available only if the *glide.identification_engine.enable_identifier_optional_condition* system property is set to **true** (**false** by default). In the base system, identifier entries of various classes are pre-configured with advanced options conditions. All these pre-configured conditions in regular identifier entries will automatically apply when you set this property to **true**. Therefore, to prevent unexpected behavior, review those predefined conditions in regular identifier entries before setting this property to **true**. For more details about this property, see Properties.

Note:
If criterion attributes have only two attributes and *sys_class_name* is one of them (for example [name, sys_class_name], [ip_address, sys_class_name]), then the other attribute can't be NULL, even if **Allow null attribute** is enabled. This restriction is due to *sys_class_name* being considered a special system matching attribute.

8. Click **Submit**.
9. On the Identifier form, select the **Related Entries** tab and then click **New**.
10. Fill out the Related Entry form.

Related Entry form

Field	Description
Identifier	Preset with the identifier that this related entry is associated with.
Active	Check box that specifies that the related entry is active.
Related table	A related table (lookup table) that references the record that is being matched.
Referenced field	A referenced field in **Related table** with a reference to the associated identifier table.
Criterion attributes	The set of attributes to uniquely identify the related item. Attributes can belong to the current class, or to a parent class. **Note:** It's possible to add reference fields as a criterion attribute. However, such fields might not always be effective: ○ Reference fields store *sys_id*s that point to a record in another table, and thus is considered a weak criterion attribute (in terms of uniqueness) for the current table. ○ The system detects and then replaces invalid values in a reference field with 'Unknown'. For example, an invalid *Model ID* value is replaced with the value 'Unknown'. Also, if several CIs end up having that same reference field set to 'Unknown', then these CIs become duplicate CIs. Click the lock icon to view, add, or remove attributes from the identification rule.

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Field	Description
Allow null attribute	If at least one criterion attribute in the related table isn't null, allow to attempt matching with an identifier entry even if there are criterion attributes which are null.
Priority	Priority of the related entry for the specified **Related table**. Rules with lower priority numbers are given higher priority while matching a related item for a specific related table. Related entries for the specified related table with identical priorities are applied randomly. You can keep gaps between the priority numbers, so you can assign the unused priority numbers to new entries without modifying the existing priority order.
Optional condition	Filter conditions to narrow the set of records that will be searched for a matching related item.

11. Click **Submit**.

What to do next

To add criterion attributes to a **Hybrid Entry CI Criterion Attributes** field in a hybrid identifier entry, instead of using the Identifier Entry form, you must use background scripts. After saving the identification rule, navigate to **System Definitions** > **Scripts - Background**, and then enter a script that adds the attributes and click **Run script**.

Sample script:

```
var gr = new GlideRecord('cmdb_identifier_entry');
// get the identifier entry you want to update
gr.get('<identifier_entry_sys_id>');
// set the attributes you want in the hybrid rule in a comma
 separated list
// for example: 'name,serial_number'
gr.
 hybrid_entry_ci_criterion_attributes='<column_name_1>,<column_n
ame_2>,<etc.>';
gr.update();
```

This process requires the admin role.

Create a reconciliation rule for a non-CMDB table

Create a static or a dynamic CI reconciliation rule for a non-CMDB table.

For information about static reconciliation rules, dynamic reconciliation rules, and other principals related to reconciliation rules, see Reconciliation rules.

If both, static and dynamic reconciliation rules exist for the same record attribute, the dynamic rule has precedence.

Note:
You can't create a reconciliation rule for system fields or for Identification and Reconciliation Engine (IRE) specific fields such as the Discovery source (discovery_source) field. Also, reconciliation rules can't be dot-walked using reference fields.

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Create a static reconciliation rule for a non-CMDB table

A static reconciliation rule specifies class attributes that data sources are authorized to update, and prevents unauthorized data sources from overwriting the attributes' values. A static reconciliation rule also specifies the prioritization among multiple data sources. Without static reconciliation rules, data sources can overwrite each other's updates to attribute values.

Before you begin

Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task

Static reconciliation rules are used in conjunction with data refresh rules to determine reconciliation steps for a record. These rules determine if, when, and by which data source a record can be updated. If multiple data sources are authorized to update the same attributes, assign a priority to each of these data sources to prevent them from overwriting each other's updates.

After an authorized data source updates an attribute, subsequent updates are accepted only from the same data source or from a data source with a higher priority. Updates from a data source with a lower priority are rejected, unless these two conditions are met:

- The lower priority source is the first source updating the record.
- The record became stale based on data refresh rules for the class.

Precedence order of static reconciliation rules:

- Rule configured for a specific attribute, has precedence over rule set with **Apply to all attributes** (regardless of priority value).
- Between two rules for the same attribute or between two rules set with **Apply to all attributes**, the rule that is specific directly for the class has precedence over the derived rule.
- Between two rules for the same attribute or between two rules set with **Apply to all attributes** at the same class level, precedence is determined by rule priorities.

Information about the last discovery source that updates each attribute is stored in the Data Source History [cmdb_datasource_last_update] table, but only after enabling the reconciliation rule. Therefore, there might be unexpected updates after you enable the rule until the highest priority data source has updated the CI.

Static reconciliation rules affect reconciliation of stale attributes. During reconciliation, the information in the Data Source History table is considered along with the data refresh rules for the CI's class, to determine if a CI attribute is stale. A CI attribute is determined to be stale if it was not updated by the latest discovery source to update the CI, within a time period. The time period is specified by the Effective Duration time in the data refresh rule for the class for the discovery source. In this case, if another authorized discovery source, with a lower priority attempts to update the stale CI attribute, the update is allowed.

If there is a dynamic reconciliation rule for the same record attribute as in a static reconciliation rule, the dynamic rule takes precedence.

Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Reconciliation Definitions**.
2. In the Reconciliation Definitions list view, click **New**.
3. Fill out the Reconciliation Definition form.

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Field	Description
Data source	The data source that you are configuring this rule for.
Priority	Priority of **Data source** within other data sources for the specified attributes. Smaller numbers designate higher priority. Data sources without a reconciliation rule are assigned the lowest priority.
Applies to	Authorizes the specified data source to update all attributes of the specified non-CMDB table. **Note:** This setting will be overridden by any setting that applies to a specific attribute. In which case, instead of using this option, you can directly include all attributes for **Attributes**.
Filter condition	Conditions that records must meet for the rule to be applicable. For example, to apply this rule only to records that are associated with the Finance department, select this condition: **[Department] [is] [Finance]**. **Note:** The glide.identification_engine.enable_reconciliation_filter_be system property determines when filter conditions are applied. By default, those filter conditions are applied after attribute values have changed during payload processing. Set this property to **true** so that Identification and Reconciliation Engine (IRE) applies the filter conditions before attribute values change.
Attributes	Attributes from the current or from a parent class, that the specified data source is authorized to update. Available only if **Apply to all attributes** is not selected.
Update with null	Attributes that the specified data source can update with a null value. By default,

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Field	Description
	authorized data sources cannot overwrite a non-null value with a null value. Attributes in this list, which are not in the **Attributes** list, are not included with the attributes that the data source can update with a null value.

4. Click **Submit**.

Create a dynamic reconciliation rule for a non-CMDB table

A dynamic reconciliation rule for non-CMDB table uses CMDB 360 data to choose a value such as the largest value that is reported, for updating a record.

Before you begin

CMDB 360/Multisource CMDB must be enabled.

Role required: itil has read access, itil_admin (on top of itil) has full access

About this task

If the same CI attribute has both, a static reconciliation rule and a dynamic reconciliation rule, the dynamic reconciliation rule has precedence.

A dynamic reconciliation rule supports several rule types, such as largest reported value and most reported value. When applying a dynamic reconciliation rule, IRE processes the current payload and then examines the CMDB 360 data store to select a value with which to update the CMDB. Depending on the dynamic reconciliation rule type, selecting the appropriate value might not be immediately conclusive. For example, there might not be a single value that is most reported, or for some values, the last discovered timestamp isn't reported. Therefore, when necessary, IRE falls back to examining additional details such as last reported, last discovered, and last updated values to select the most appropriate value.

Note:
You can't add a dynamic reconciliation rule when creating a new child class in the CI Class Manager. You must first save the new child class and then add the dynamic reconciliation rule.

Procedure

1. Click **All**.
2. In the Filter navigator, enter `cmdb_dynamic_reconciliation_definition.list` to open the Dynamic Reconciliation Definitions table.
3. In the Dynamic Reconciliation Definitions list view, click **New**.
4. Fill out the Dynamic Reconciliation Definition form.

Field	Description
Name	
Attributes	Attributes for which to apply the rule. Attributes that the specified rule type can't be applied to and attributes for which a dynamic

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Field	Description
	reconciliation rule already exists for, don't appear.
Filter condition	Conditions that CIs must meet for the rule to be applicable. For example, to apply a rule only to CIs that are associated with the Finance department, select this condition: **[Department] [is] [Finance]**.
Applies to	Non-CMDB table that this rule applies to.
Dynamic Rule Type	Rule type which is based on CMDB 360 data.

5. Click **Submit**.

Create a data refresh rule for a non-CMDB table

To apply Identification and Reconciliation Engine (IRE) features to supported non-CMDB tables, create data refresh rules for those tables. Data refresh rules are used to determine if a record is stale for a specific data source. Such records can then be updated by a lower-priority authorized data source.

Before you begin
Role required: itil has read access, itil_admin (on top of itil) has full access

About this task
Data refresh rules have no impact when dynamic reconciliation rules are in effect.

Data refresh rules are used in conjunction with static reconciliation rules to determine reconciliation steps for a record. These rules determine if, when, and by which data source a record can be updated.

Procedure
1. Click **All**.
2. In the Filter navigator, enter `cmdb_datasource_staleness.list` to open the Data Source Staleness Definitions table.
3. In the Data Source Staleness Definitions list view, click **New**.
4. Fill out the Data Source Staleness Definitions form.

Field	Description
Applies to	Non-CMDB class that this rule applies to.
Data source	Data source for which record staleness is evaluated.
Effective Duration	The time period that is used for the staleness evaluation. If the fields specified in the static reconciliation rule for the record's class were not updated by the specified data source

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Field	Description
	within the specified time period — the record is determined to be stale for that data source. If you enter a value with a prefix that is valid and a suffix that is not, such as `15 x` — the valid portion of the value is used ('15'). If the entire value is invalid — the default value of 0 is used.
Active	Activates the rule.

5. Click **Submit**.

Create an identification inclusion rule for a non-CMDB table

Narrow the scope of records that are included in the identification process of non-CMDB records by creating an identification inclusion rule.

Before you begin
Role required: itil has read access, itil_admin (on top of itil) has full access.

About this task
During duplication detection of independent CIs, the Identification and Reconciliation Engine (IRE) processes only the records that satisfy the identification inclusion rules. For example, you can set a filter to include only records whose state is operational. When no identification inclusion rules exist, all records are included in the identification process.

In the base system, there are no predefined identification inclusion rules. Identification inclusion rules are defined at the class level.

Note:
Identification inclusion rules impact any script that calls IRE, therefore create them carefully. Identification inclusion rules can prevent the identification of certain types of records, affecting some features of Discovery and Service Mapping.

Procedure
1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Identification Inclusion Rules**.
2. In the Identification Inclusion Rules list view, click **New**.
3. Fill out the Identification Inclusion Rules form.

Field	Description
Applies to	Non-CMDB table that this rule applies to.
Inclusion condition	Criteria that non-CMDB records must meet to be included in the identification process.

4. Click **Save**.

Create an IRE data source rule for non-CMDB tables

When using Identification and Reconciliation Engine (IRE), you can prevent a specific data source from inserting new records for a specific non-CMDB table. Create IRE data source rules

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for data sources that you don't trust in creating records but continue to trust in updating those records that exist.

Before you begin
Role required: itil_admin

About this task
IRE data source rules have no impact when dynamic reconciliation rules are in effect.

- Child classes derive IRE data source rules from parent classes like identification rules do.
- IRE data source rules that are specified for a child class, override any IRE data source rules derived from a parent class.

When IRE processes an insert operation that is prohibited by an IRE data source rule, the insert operation fails. This failure happens when the data source and record class in the insert operation and in an IRE data source rule, match. When CreateOrUpdateCIEnhanced() is used, IRE stores the failed payload in the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table for future potential use.

Note:
When an insert operation is not allowed by the IRE data source rule, then when using createOrUpdateCI(), the entire IRE payload fails since createOrUpdateCI() doesn't allow partial commits.

If later, a permitted data source attempts to insert that same record, then IRE inserts the record after merging it with the matching record from the partial payloads. IRE then deletes the partial payload from the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table, and allows future updates by the data source specified in the rule.

IRE data source rules do not apply to lookup and related items, and only a single rule can be active for any class/data source pair.

Procedure
1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **IRE Data Source Rules**.
2. In the IRE Data Source Rules list view, click **New** and fill out the IRE Data Source Rule form.

Field	Description
Data source	Data source that is not allowed to create CIs of the specified class.
Active	Activates the IRE data source rule.
Applies to	The class (and child classes) that the specified data source is not allowed to create records for.
Insert Not Allowed	Disables the specified data source from inserting new records of the specified class, to the non-CMDB table.

3. Click **Submit**.

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Result

If a payload item with an insert request, and in which the data source and the record class match the data source and the record class specified in the IRE data source rule:

1. The insert operation fails and IRE logs the following message:

   INSERT_NOT_ALLOWED_FOR_SOURCE Insert into [xyz] is blocked for data source [xyz] by IRE data source rule.

2. If using CreateOrUpdateCIEnhanced(), then IRE stores the payload item as a partial payload in the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table.

If later, a permitted data source successfully inserts a record that matches the record from a partial payload item:

1. The current record is merged with the matching record from the partial payload, applying static reconciliation rules as needed.
2. The respective partial payload in the CMDB IRE Partial Payloads [cmdb_ire_partial_payloads] table is deleted.
3. Later payloads in which the non-permitted data source updates the respective record, run successfully.
4. IRE allows the data source, that was previously prohibited from inserting the record, to update that same record which now exists in the non-CMDB table.

CMDB IRE reference

Reference topics provide property settings, domain separation, and other reference content for the CMDB Identification and Reconciliation Engine (IRE).

Reference topics

Domain separation

How domain separation is supported in IRE to let you separate data, processes, and administrative tasks by domains in your organization.

Properties

Properties that you can adjust to manage different aspects of how IRE functions.

IRE error messages

Errors and messages that the Identification and Reconciliation Engine (IRE) generates.

Components installed with IRE

Details about tables associated with IRE.

Domain separation

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

Domain separation is enforced during the CMDB Identification and Reconciliation (IRE) process. IRE processes are domain aware and domain separation is applied to the Identification and Reconciliation rules.

For more information about domain separation, see domain separation.

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How domain separation works in Identification and Reconciliation

Domain separation in the identification engine is enforced when users activate the domain separation plugin. Domain separation for IRE has two modes of operation in domain separated instances:

- Strict mode (enabled by default): In this mode, identification processes only those CIs in which the domain ID is identical to the domain of the currently logged in user. If duplicate CIs exist across domains (including parent and child domains), then those CIs aren't considered duplicate CIs because their domain IDs don't match.

- Platform domain separation mode (disabled by default): In this mode, IRE follows the platform domain separation behavior. So during identification, parent domains can access all CIs within their child domains or any of the domains it has visibility into. For more information, see Visibility domains and Contains domains.

  Platform domain separation mode is intended to be used by advanced users for very specific or advanced use cases.

  Note:

  Platform domain separation mode introduces some risks that are greater on upgraded instances and much lesser on zBooted instances.

  Depending on how IRE processes are configured on a domain separated instance, setting IRE to use platform domain separation mode might result in unexpected and undesirable behavior if not used carefully. One of the risks is if enabling platform domain separation mode is followed by running IRE processes from a different domain than the one on which IRE processes were previously run. In this situation, CIs that were previously identified as unique, might get identified as duplicate CIs and might cause some applications to start failing.

  If any application is already using IRE effectively in domain separated environment, then there's no advantage in switching to platform domain separation mode that might create some risk.

Use the glide.identification_engine.platform_domain_separation_enabled system property to switch between those two modes for IRE domain separation. By default, this property is set to **false**.

Platform domain separation mode

Set the system property glide.identification_engine.platform_domain_separation_enabled to **true** to enable the platform domain separation mode for IRE processing. With the platform domain separation mode, parent domains can access all of their child domains during IRE processing. For example, IRE can detect a matching CI in a child domain and then update that CI instead of creating a new one.

In the platform domain separation mode for IRE:

- IRE run from a parent domain can access CIs contained within their domain, child domains that are lower in the domain hierarchy, and global domain.
- IRE run from the global domain can access all CIs.
- Visibility domains and Contains domains are supported.

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Note:
When platform domain separation mode is enabled, there might be a sudden increase in IRE detection of duplicate CIs.

Domain separation during the Identification Process

Domain separation during the Identification process is enforced as follows:

- Regardless of the setting of the glide.identification_engine.platform_domain_separation_enabled system property:
  - Domain IDs don't need to be explicitly sent in the input payload of the identification engine APIs. Internally, the identification engine causes the current domain ID of the user to call the identification engine APIs.
  - During matching, if no records are found and a CI is inserted, the CI domain ID is the same as the domain ID of the logged-in user's domain. When updating a CI, the CI domain ID doesn't change.
  - During matching, if duplicates are found, De-Duplication tasks created in the [reconcile_duplicate_task] table have the same domain ID as of the duplicate CIs.
  - During matching, if reclassification of the CI isn't allowed, reclassification tasks are created in the [reclassification_task] table, with the same domain ID as the CI for which reclassification is needed.
- When the system property glide.identification_engine.platform_domain_separation_enabled is set to **false**:
  - Only CIs that have the same domain ID as the currently logged-in user's domain are used during matching.
  - Duplicate CIs that exist across domains (including parent and child domains) aren't considered as duplicate CIs by IRE.
- When the system property glide.identification_engine.platform_domain_separation_enabled is set to **true**:
  - Duplicate CIs that exist across domains (such as parent and child domains) are considered as duplicate CIs by IRE.
  - CIs from the logged in user domain and child domains are used during matching.

Domain separation and Identification Rules

The identification rules and identification inclusion rules used during the identification process are always defined at the global level. For example, the following tables don't have a sys_domain field:

- Identifier (cmdb_identifier)
- Identifier Entries (cmdb_identifier_entry)
- Related Entries (cmdb_related_entry)
- Identification Inclusion Rules (cmdb_ie_active_config)

Domain separation and Reconciliation Rules

The reconciliation definition rules that are used during the reconciliation process can be defined for different domains. For example, the following tables do have sys_domain, sys_overrides, sys_domain_path fields:

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- Reconciliation Definition (cmdb_reconciliation_definition)
- Datasource Precedence (cmdb_datasource_precedence)
- Data Source Staleness Definitions (cmdb_datasource_staleness)

Properties

Use the Identification and Reconciliation properties to configure the identification and reconciliation engine (IRE).

These properties are available for Identification and Reconciliation. To view and edit these properties, the admin role is required.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

Properties for Identification and Reconciliation

Property	Description
Enforce the requirement that required attributes cannot be null during identification and reconciliation. glide.required.attribute.enabled	• Type: true | • Default valu • Location: **C**
Allow class upgrade during IRE identification and reconciliation. glide.class.upgrade.enabled	• Type: true | • Default valu • Location: **C** • Learn more When **false**, I reclassificatio
Allow class downgrades during IRE identification and reconciliation. glide.class.downgrade.enabled	• Type: true | • Default valu • Location: **C** • Learn more When **false**, I reclassificatio
Allow class switching during IRE identification and reconciliation. glide.class.switch.enabled	• Type: true | • Default valu • Location: **C** • Learn more

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Properties for Identification and Reconciliation (continued)

Property	Description
	When **false**, I reclassificatio
glide.identification_engine.update_without_upgrade_enabled	Enable IRE to precedence c • Type: true | • Default valu • Location: A • Learn more Depending on • **true**: IRE pr update. • **false**: IRE p
glide.identification_engine.update_without_downgrade_enabled	Enable IRE to precedence c • Type: true | • Default valu • Location: A • Learn more Depending on • **true**: IRE pr update. • **false**: IRE p
glide.identification_engine.update_without_switch_enabled	Enable IRE to precedence c • Type: true | • Default valu • Location: A • Learn more Depending on • **true**: IRE pr update. • **false**: IRE p

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Properties for Identification and Reconciliation (continued)

Property	Description
glide.identification_engine.reclassification_restriction_rules_enabled	Globally enab • Type: true | • Default valu • Location: A • Learn more
Allow the update of an empty field by a lower priority data source. glide.reconciliation.override.null	• Type: true | • Default valu • Location: **C**
Controls how identification processes a small set of duplicate CIs. glide.identification_engine.skip_duplicates	• Type: true | • Default valu • Other value **true** If the *gli* then olde For t to th **false** Matc • Location: **C**
Maximum number of CIs that can be in a set of duplicate CIs to allow identification to process the duplicate CIs according to the setting of *glide.identification_engine.skip_duplicates*. glide.identification_engine.skip_duplicates.threshold	If the number duplicate CIs false. • Type: Integ • Default valu • Location: **C**
Maximum number of log runs that can be displayed when navigating to **Configuration** > **Identification Logs**. glide.identification_logs.max_run_ids	• Type: integ • Default valu • Location: **C**
glide.cache.size.service_cache	Maximum cac outbound rela discarded, re

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Properties for Identification and Reconciliation (continued)

Property	Description
	Note: You cann • Type: Integ • Default valu • Location: A
glide.identification_engine.granular_insert_locking	Determines w Set to false if insert locks. • Type: true | • Default valu • Location: A
glide.identification_engine.batch_update_last_discovered	Controls batc identification Set to false if want to trigge • Type: true | • Default valu • Location: A
glide.identification_engine.related_items_local_cache_count	For optimizati items. • Type: integ • Default valu • Location: A **Note:** If there is *glide.* and the *glide.* propertie
glide.identification_engine.dependent_items_local_cache_count	For optimizati • Type: integ • Default valu • Location: A

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Properties for Identification and Reconciliation (continued)

Property	Description
	Note: If there is *glide.* and the *glide.* propertie
glide.identification_engine.independent_items_local_cache_count	For optimizati • Type: integ • Default valu • Location: A Setting the va performance.
glide.cmdb.logger.source.identification_engine	Enable and c identification • Type: string • Values: info • Location: A **Note:** Dependi affect ove and use t For more trou reconciliation
glide.identification_engine.partial_payload_items_max_size	Maximum nu the partial pa For example, references, a payload. Adjusting this items. • Type: integ • Default: 100 • Learn more • Location: A

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Properties for Identification and Reconciliation (continued)

Property	Description
glide.identification_engine.partial_items_process_limit	Maximum nu fetches only Adjusting the • Type: integ • Default: 20 • Location: A
glide.identification_engine.partial_items_process_absolute_limit	Absolute limi partial payloa Adjusting the • Type: integ • Default: 50 • Location: A
glide.identification_engine.skip_updating_source_last_discovered_if_older	Determines h attributes in t • true: If *las* *last_dis* the *last_* • false: Even *last_dis* *last_dis* **Note:** Only the • Type: true | • Default: tru • Learn more • Location: A
glide.identification_engine.ire_message_listener_skip_updating_source_last_discovered_to_now	If Robust Tran *ire.skip_* Robust Impor *skip_upda* • Type: true | • Default: fals • Learn more • Location: A

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Properties for Identification and Reconciliation (continued)

Property	Description
glide.identification_engine.skip_updating_last_scan_if_older	Determines h determine wh table. • true: If *sou* *last_sca* Source [sys • false: Even than the *la* *last_sca* You can chec [sys_object_s **Note:** Only the • Type: true | • Default: tru • Learn more and Recon • Location: A
glide.identification_engine.ire_message_listener_skip_updating_last_scan_to_now	If RTE does n on the Robus *ire.skip_* • Type: true | • Default: fals • Learn more and Recon • Location: A
glide.identification_engine.platform_domain_separation_enabled	Toggles doma • false: IRE p access to c • true: IRE do enabling pa • Type: true | • Default: fals • Learn more • Location: A

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Properties for Identification and Reconciliation (continued)

Property	Description
glide.identification_engine.enable_identifier_optional_condition	Enables adva options let yo CI. **Note:** This prop identifier In the bas options c automati To preven entries b enter cm the 'Optio • Type: true | • Default: fals • Learn more • Location: A
glide.identification_engine.enable_reconciliation_filter_before_update	Determines w during payloa • Type: true | • Default: fals • Learn more • Location: A
glide.identification_engine.skip_sys_object_source_matching	Determines w identify CIs in When set to t to be process can be useful sources in wh However, whe of the identifi present in the property is se • Type: true | • Default: fals

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Properties for Identification and Reconciliation (continued)

Property	Description
	• Learn more • Location: A

IRE error messages

The Identification and Reconciliation Engine (IRE) generates the following errors and messages. Depending on settings, these messages appear in the Identification Logging pane and in the system logs.

For information about lookup-based CI identification and qualifier chains, see Create a CI identification rule.

Note:
IRE performs an initial verification of a payload before processing identification rules. If IRE detects any duplicate CIs based on any class identifiers, the payload is rejected and processing stops.

For information about CMDB Identification Payload error: "FAILED TRYING TO EXECUTE ON CONNECTION", see CMDB Identification Payload error - "Insertion failed with error Error during insert of cmdb_ci...", where node logs show "FAILED TRYING TO EXECUTE ON CONNECTION" "Duplicate entry 'XXX' for key 'XXX'" knowledge base article.

Error- IDENTIFICATION_RULE_MISSING

Message	Description and Resolution
Identity Rule Missing for table [xyz]	**Description:** Identification rule is missing for a class. **Resolution:** Ensure that there is an identification rule for table [xyz], and that the rule is active.

MISSING_MATCHING_ATTRIBUTES

Message	Description and Resolution
In payload missing minimum set of input values for criterion (matching) attributes from identify rule for table [xyz]. Add these input values in payload item 'abc'	**Description:** Missing minimum set of values for criterion attributes for an identification rule. **Resolution:** In the payload, add minimum set of values for criterion attributes for CI Identifier for table [xyz]. Open the CI Class Manager, click **Hierarchy** and select the [xyz] class. Check the identification

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Message	Description and Resolution
	rule and the identifier entries for table [xyz].

Error- NO_CLASS_NAME_FOR_INDEPENDENT_CI

Message	Description and Resolution
Cannot have 'sys_class_name' as a key field in an Independent Identity Rule on 'xyz'	**Description:** The class attribute was added to the CI identifier which is not supported. **Resolution:** Remove the class attribute from CI Identifier for table [xyz].

Error- IDENTIFICATION_RULE_FOR_LOOKUP_MISSING

Message	Description and Resolution
Identity Rule for table [xyz] missing Lookup Rule for class [abc]	**Description:** The payload has a lookup class name, but the corresponding lookup rule is missing. **Resolution:** Add lookup identifier entry with [Search on table] as [abc] for CI Identifier for table [xyz]. For more information about this error message, see Identification error "Identity Rule for table [cmdb_ci_table_name] missing Lookup Rule for class [table_name]" [KB0786444].

Error- IDENTIFICATION_RULE_FOR_RELATED_ITEM_MISSING

Message	Description and Resolution
Identity Rule for table [xyz] missing Related Rule for class [abc]	**Description:** The payload has a related class name, but the corresponding related rule is missing. **Resolution:** Add related entry with [Related table] as [abc] within CI Identifier for table [xyz].

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Error- NO_LOOKUP_RULES_FOR_DEPENDENT_CI

Message	Description and Resolution
Cannot have Lookup Rule for a Dependent Identity Rule on 'xyz'	**Description:** Cannot have Lookup Rule for a Dependent Identity Rule. **Resolution:** Remove lookup identifier entry from dependent CI Identifier for table [xyz].

Error- INVALID_INPUT_DATA

Message	Description and Resolution
Found invalid sys_id in payload. No record with sys_id [xyz] exist in table [abc] or is a duplicate record with [duplicate_of] field set to a main CI	**Description:** The payload has a reference to an invalid sys_id. **Resolution:** Remove the referenced sys_id, or provide a valid sys_id.
In payload no data source exist. You need to provide choice value from choice field [discovery_source] in table [cmdb_ci]	**Description:** In payload no data source exists. **Resolution:** In the payload, provide a valid choice value from choice field [discovery_source] from table [cmdb_ci].
In payload invalid data source [xyz] exist. You need to provide a valid choice value from field [discovery_source] in table [cmdb_ci]	**Description:** The payload contains an invalid data source. **Resolution:** In the payload, provide a valid choice value from choice field [discovery_source] from table [cmdb_ci].
No such relationship with name [xyz] exist in table [cmdb_rel_type]. If out-of-box relationship for [xyz] has been removed or renamed, it should be restored	**Description:** The payload is referencing a relationship that does not exist in the [cmdb_rel_type] table. **Resolution:** Verify that the reference to the relationship is accurate. Or, if it is a new relationship, add it to the [cmdb_rel_type] table. Or, If out-of-box relationship for [xyz]

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Message	Description and Resolution
	has been removed or renamed, restore it.
Payload relations 'xyz' has invalid parent record index: [0]	**Description:** Payload references invalid parent indexes. **Resolution:** Check payload indexes and ensure that they are all valid.
Payload relations 'xyz' has invalid child record index: [0]	**Description:** Payload references invalid child indexes. **Resolution:** Check payload indexes and ensure that they are all valid.

Error- DUPLICATE_RELATIONSHIP_TYPES

Message	Description and Resolution
Duplicate relationship type records exists with name [xyz] in table [cmdb_rel_type] having sys_ids: [abc]	**Description:** There are duplicate records in the [rel_ci_type] table for the relationship. **Resolution:** Remove the duplicate records.

Error- DUPLICATE_PAYLOAD_RECORDS

Message	Description and Resolution
Found duplicate items in the payload (index 0 and 1), using className [xyz] and fields [abc]. Remove duplicate items from payload	**Description:** The payload contains two items whose criterion attributes have identical values. **Resolution:** Remove one of the duplicate items.

Error- LOCK_TIMEOUT

Message	Description and Resolution
Failed to acquire synchronization lock for xyz	**Description:** Failed to acquire the system mutex lock. **Resolution:**

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Message	Description and Resolution
	Increase the mutex expiration time by adding the system property **glide.identification_engine.mutex_expiration_time** and setting to an integer value that is greater than the default value (15 min).

Error- MULTIPLE_DUPLICATE_RECORDS

Message	Description and Resolution
Found duplicate records in table [xyz] using fields [abc]	**Description:** Found duplicate records in the specified table. **Resolution:** Fix the duplicate records found by the identification engine. Check de-duplication tasks for information about all duplicates.

Error- REQUIRED_ATTRIBUTE_EMPTY

Message	Description and Resolution
Missing mandatory field [xyz] in table [abc]. Add input value for mandatory field in payload	**Description:** A required attribute is missing in the payload. **Resolution:** In the payload, add input value for mandatory field [xyz] in table [abc].

Error- MISSING_DEPENDENCY

Message	Description and Resolution
In payload no relations defined for dependent class [xyz] that matches any containment/ hosting rules: [abc]. Add appropriate relations in payload for 'def'	**Description:** No relations defined for the dependent class that matches any of its metadata rules. **Resolution:** In payload add appropriate relations for dependent class [xyz] that matches any containment/hosting rules: [abc].

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Error- METADATA_RULE_MISSING

Message	Description and Resolution
No containment or hosting rules defined for dependent class [xyz]. Add containment/ hosting rules for ‘abc'	**Description:** There are no containment or hosting rules defined for dependent class. **Resolution:** Add containment or hosting rules for dependent class [xyz].

Error- MULTIPLE_DEPENDENCIES

Message	Description and Resolution
Found multiple dependent relation items [xyz] and [abc] in payload	**Description:** Multiple dependent relation items exist. **Resolution:** Remove one of the multiple dependent relation items [xyz] or [abc].
Multiple paths leading to the same destination: xyz -> abc	**Description:** Multiple paths leading to the same destination. **Resolution:** Remove duplicate relationship/ qualifier chains that might exists between xyz -> abc.

Error- ABANDONED

Message	Description and Resolution
Abandoning processing payload item 'xyz', since its depends on payload item 'abc' has errors	**Description:** Dependent payload item has errors, so abandoning processing. **Resolution:** Resolve the error on the dependent payload item ‘abc'.
Can't find matched record with sys_id [xyz] in table [abc]	**Description:** Matched sys_id does not exist in the corresponding table. **Resolution:**

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Message	Description and Resolution
	Check in table [abc] whether matched record is a valid record based on input payload.
Identification engine API got called recursively, aborting...	**Description:** The Identification engine API was called recursively. **Resolution:** Avoid calling the Identification engine API recursively.
Detected error while processing payload from xyz	**Description:** Error occurred during processing payload. **Resolution:** Resolve all errors mentioned in the output payload from xyz.
While processing relations encountered errors in payload item: xyz	**Description:** Payload item has errors. **Resolution:** Resolve errors in payload item 'xyz'.
Error occurred during parsing input json payload: xyz	**Description:** Error occurred during parsing JSON payload. **Resolution:** Ensure that input JSON payload has correct JSON format.

Error- MULTI_MATCH

Message	Description and Resolution
Duplicate dependent records found having relationship [xyz] with same CI (className: [abc], sysId:[def])	**Description:** Found duplicate dependent CIs. **Resolution:** Check de-duplication tasks for information about all duplicates, and then delete duplicate records.
Found multiple relations between payload items: 'xyz' and 'abc'	**Description:** Found multiple relations between payload items. **Resolution:**

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Message	Description and Resolution
	Check for duplicate relationship chains and qualifier chains that might exist.
Found duplicate records in lookup table [xyz] using fields [abc] and reference field [def]	**Description:** Found duplicate records in lookup table. **Resolution:** Check de-duplication tasks for information about all duplicates, and then delete duplicate records.

Error- QUALIFICATION_LOOP

Message	Description and Resolution
Qualification chain has loop that contains relation 'xyz'	**Description:** Qualification chain has a loop. **Resolution:** Remove the loop from the qualification chain with relation ‘xyz'.

Error- TYPE_CONFLICT_IN_QUALIFICATION

Message	Description and Resolution
Invalid payload, qualification chain has multiple possible paths for payload items: 'xyz' and 'abc'	**Description:** Multiple qualification paths found. **Resolution:** Remove multiple possible qualification paths between items ‘xyz’ and ‘abc'.

Error- RECLASSIFICATION_NOT_ALLOWED

Message	Description and Resolution
CI Reclassification not allowed from class: [xyz] to [abc]	**Description:** CI reclassification not allowed. **Resolution:** Check reclassification tasks for information about reclassification, and check if reclassification from class: [xyz] to [abc] is valid.

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Error- DUPLICATE_RELATED_PAYLOAD

Message	Description and Resolution
Found duplicate Related items (0 and 1) in the payload index 1 using fields xyz	**Description:** Duplicate Related items present. **Resolution:** Remove one of the duplicate related items present in the payload.

Error- DUPLICATE_LOOKUP_PAYLOAD

Message	Description and Resolution
Found duplicate Lookup items (0 and 1) in the payload index 1 using fields xyz	**Description:** Duplicate lookup items present. **Resolution:** Remove one of the duplicate lookup items present in the payload.

INSERT_NOT_ALLOWED_FOR_SOURCE

Message	Description and Resolution
Insert into [xyz] is blocked for data source [abc] by IRE data source rule	**Description:** An IRE data source rule is configured to prevent data source [abc] from inserting CIs of the [xyz] class. **Resolution:** Delete or update the appropriate IRE data source rule to let data source [abc] insert CIs of the [xyz] class. Or, wait for another permitted data source to create the same CI.

Components installed with IRE

Several types of components are installed with Identification and Reconciliation (included in the com.snc.cmdb plugin), including tables.

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Tables installed

Table	Description
Identifier [cmdb_identifier]	Identification rule sets defined for different classes of CIs.
Reconciliation Definition [cmdb_reconciliation_definition]	Static reconciliation rules defined for different classes of CIs at the table and field level.
Dynamic Reconciliation Definitions [cmdb_dynamic_reconciliation_definition]	Dynamic reconciliation rules defined for different attributes and classes.
Identifier Entry [cmdb_identifier_entry]	Rule entries with different priorities assigned to each identifier.
Duplicate Audit Result [duplicate_audit_result]	Duplicate audit results corresponding to a specific duplicate task. These results are generated automatically during the identification process and should not be added manually.
Remediate Duplicate Task [reconcile_duplicate_task]	Task to address duplication that is detected during the identification process. Records are generated automatically, and users should not add records manually.
Reclassification Task [reclassification_task]	Reclassification tasks that were generated during the identification process.
Data Source History [cmdb_datasource_last_update]	Information about the last data source that updated each attribute. Used to determine if a data source can update a stale CI.
Data Source Staleness Definition [cmdb_datasource_staleness]	Effective duration per data source. When effective duration is exceeded, then CMDB Health determines that the information provided by that data source is stale.
Identification Engine Context [cmdb_ie_context]	Input payload, and data source (cmdb_ci's discovery_source) that will be used as input for a specific identification engine API. Stores information about which specific identification engine API will be called (`identifyCI` or `createOrUpdateCI` API). Also stores information about enhanced IRE options used in Identification Simulation. **Note:** Internal table used by identification simulation.
Identification Engine Run	Specific cmdb_ie_context record that was used to run against the identification engine. Also details

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Table	Description
[cmdb_ie_run]	about the output payload returned by APIs, such as start and end time of the run and whether the run was successful. **Note:** Internal table used by identification simulation.
Identification Engine Log [cmdb_ie_log]	Identification engine logs for a specific cmdb_ie_run simulated in the identification simulation. Also details about logs level and order. **Note:** Internal table used by identification simulation.
IRE Data Source Rule [cmdb_ire_data_source_rule]	IRE data source rules.
CMDB IRE Partial Payloads [cmdb_ire_partial_payloads]	Payload items that were determined to be partial, and which might be later matched with an incoming payload. If a partial payload is matched and processed, it is deleted from the CMDB IRE Partial Payloads table. Partial payloads older than 90 days are deleted from the table. For more information about usage of this table in IRE processes, see Identification and Reconciliation engine (IRE).
CMDB IRE Partial Payloads Index [cmdb_ire_partial_payloads_index]	Identifier keys associated with partial items. IRE uses those keys to try to match with identifier keys of incoming payloads. For more information about usage of this table in IRE processes, see Identification and Reconciliation engine (IRE).
CMDB IRE Incomplete Payloads [cmdb_ire_incomplete_payloads]	Incomplete items, stored using JSON format as incomplete payloads. Incomplete items are stored for the purpose of logging payloads with irrecoverable errors, and are never processed again. The table is configured for table rotation, with duration of one day and seven table rotations. For more information about usage of this table in IRE processes, see Identification and Reconciliation engine (IRE).

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Table	Description
IRE Output Aggregate Stats [cmdb_ire_output_aggregate_stats]	This table is populated when RTE invokes IRE, for example, when processing integrations. Details about data inserted by Import Sets or Robust Transform Engine (RTE) to the CMDB (via IRE). Numbers of items inserted, partial items, and updated items, are stored for each type of CI, per run.
IRE Output Target Items [cmdb_ire_output_target_item]	This table is populated when RTE invokes IRE, for example, when processing integrations. Details about data inserted by Import Sets or Robust Transform Engine (RTE) to the CMDB (via IRE). Target class and the sys_id are stored per ImportSet row id, within a run. For this table to populate, RTE must pass the *`ire_output_detailed_stats`* property.
Reclassification Restrictions [cmdb_ire_reclassification_restriction]	Reclassification restriction rules. These rules prevent switch and downgrade reclassification updates for specific source and target classes. For more information, see Configure CI reclassification during IRE processing.

User roles installed

Role	Description
cmdb_payload_admin	Automatically assigned to users with the cmdb_admin role for internal use only.

Related topics

Properties

Populating the CMDB

You can populate the CMDB by using Discovery, by using the IntegrationHub ETL or Import Sets to import and integrate data from a third-party source, by integrating with an external CMDB, or by manually creating CIs.

When you populate the CMDB with information, you create a record for each configuration item in the cmdb_ci table or on one of the tables that extend that table.

Related ServiceNow® Store apps and reference information:

- CMDB schema model: A collection of class diagrams and class attributes for key CMDB classes.
- CMDB tables descriptions: Descriptions of key CMDB tables in the base system.
- CMDB CI Class Models: A ServiceNow Store app that adds class models that extend the base CMDB class hierarchy. This includes class descriptions, identification rules, identifier entries,

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and dependent relationships if applicable. You can then use the added classes as any other CMDB base class.

- Discovery patterns: A ServiceNow Store app that provides a library of Discovery patterns for discovering specific devices and applications in the industry.
- Getting started with Service Graph Connectors: ServiceNow Store apps that provide pre-defined integrations for importing and integrating common third-party data into CMDB classes. Also includes the IntegrationHub ETL wizard for creating new ETL transform maps.

ITIL configuration management auto-discovery

The key to any configuration management business practice is the initial and on-going inventory or discovery of what you own. The ServiceNow platform provides three options for auto-discovery:

- The separate and highly robust Discovery product.
- For organizations that want to leverage the discovery technologies they already have deployed (SMS, Tally NetCensus, LanDesk, and so on), the ServiceNow platform supports integrations to those technologies via web services. Scanned data can be mapped directly into the CMDB.

For further information on designing, constructing, and maintaining the CMDB, see the CMDB Design & Configuration white paper.

Discovery

The Discovery product automatically populates the CMDB. Discovery searches the network for all attached computers and devices, then populates the CMDB with information on each computer/device's configuration, provisioning, and current status. Discovery uses probes, sensors, and patterns, to collect and process data about computers, servers, printers, a variety of IP-enabled devices, and the relationships between all the items found. Discovery also reports on any software which is running, and the TCP connections between computer systems, thereby establishing their relationships. This information is sent back to the instance and is used to populate the CMDB.

For more information about Discovery see:

- ITOM Visibility
- Discovery basics

Integrate third-party data using IntegrationHub ETL

Use the IntegrationHub ETL to import and integrate data from a third party into the CMDB. Using IntegrationHub ETL, create ETL transform maps which are used for integrating data from specific data sources. IntegrationHub ETL guides you through importing source data, transforming any data if needed, and selecting target CMDB classes and attributes to map the data to. You then preview the integration results and adjust any configurations before scheduling recurring integrations.

Visit the ServiceNow Store website to view and download common integrations.

Import data from another source using Import Sets

You can import data to the CMDB using Import Sets. Import sets find files of information (in formats such as XML, Excel, or CSV), import them, and transform them onto the required table. This process can be scheduled or performed on demand.

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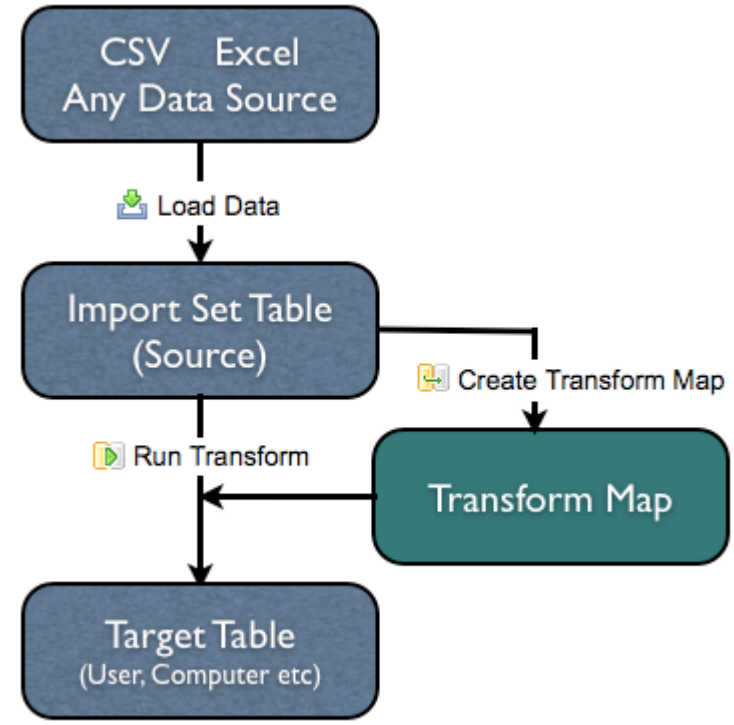
To import relationships between CIs, use import sets to populate the table [cmdb_rel_ci] with information on the parent, the child, and the nature of the relationship. The [cmdb_rel_ci] table displays a list of all CI relationships and is useful when importing CI data.

Import Sets overview



CMDB instance API

Use the CMDB instance API to populate the CMDB by creating or updating CMDB tables.

Manually create a CI

Create a single CI for a specific class in CMDB Workspace, Service Graph Workspace, or in Core UI. The role required for this operation depends on the settings of the class table you select for the CI.

You can also manually create a CI while leveraging Identification and Reconciliation Engine (IRE) processes to ensure that the new CI complies with various class requirements and that it's unique.

1. Use the CI Class Manager:
   a. Navigate to **All** > **Configuration** > **CI Class Manager**.
   b. Select **Hierarchy** to display the list of CI Classes. Select the class to use for the CI.
   c. In the class navigation bar, select **CI List** and then on the CI list view, select **New**.
   d. Fill out the CI form and then select **Submit**.
2. Or, manually create a CI while leveraging Identification and Reconciliation Engine (IRE) processes to ensure that the new CI complies with various class requirements and that it's unique. For more information, see Create a CI manually in CMDB Workspace or Create a CI manually in Service Graph Workspace.
3. Or, directly use a table:

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a. Navigate to **All** > **Configuration** and then elect the class to use for the CI, such as Business Services.

b. In the navigation filter of the application navigator, enter the table label (such as 'Linux'), or the table name in the format of <table name>.list (such as 'cmdb_ci_linux_server.list'). Then, press Enter.

c. In the list view of the table, select **New** and fill out the form fields for the table.

d. Select **Submit**.

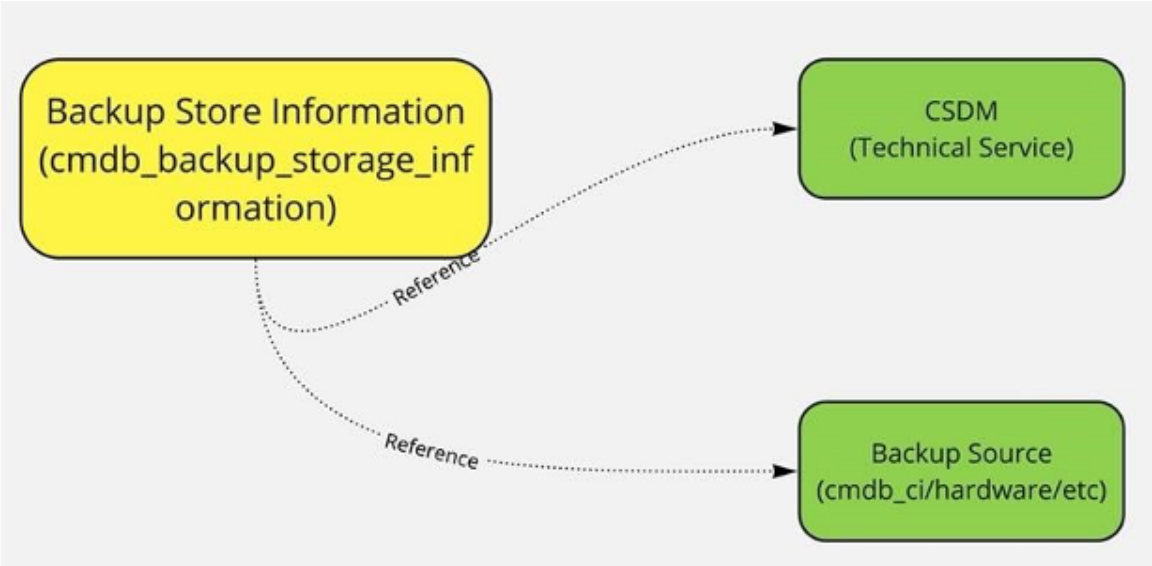
Backing up CMDB data

The cmdb_backup_storage_information table (part of the [app-cmdb-content] ServiceNow Store application) holds generic backup storage information for a CI as a platform related item. The table includes a CI as a reference attribute and stores information for hardware, cloud, containers, and other CI types.

Backup Store Information [cmdb_backup_storage_information] table

The table captures backup policy, last successful backup, last backup attempt, execution mode, backup source, backup source ID, and backup service.

To mitigate the risk of uncontrolled growth of the table, a cascade-delete rule applies to the Backup Source (CI) reference field. When a CI is deleted, the corresponding rows in the table are deleted.



Tables related to backup operations

Tables related to backup operations

Table	Contents
Backup Store Information [cmdb_backup_storage_information]	Informational object that stores CI backup/ snapshot information.
cmdb_related_entry	To populate the cmdb_backup_storage_information with an IRE payload, you define a CMDB-related rule in cmdb_related_entry. For the related rule, use the Backup Source ID criteria attributes

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Tables related to backup operations (continued)

Table	Contents
	and Backup Source as a reference field. Example: `//. Sample IRE payload var payload = { "items": [{ "className": "cmdb_ci_hardware", "sys_object_source_info": { "source_name": "ServiceNow", "source_native_key": "some key" }, "values": { "name": "I am a good cat" }, "lookup": [], "related": [{ "className": "cmdb_backup_storage_information", "values": { "backup_policy": "true", "last_backup": "2023-02-02", “backup_id”:”sede-09191-fet” } }] }] } var jsonUntil = new JSON(); var input = jsonUntil.encode(payload); var output = SNC.IdentificationEngineScriptableApi.createOrUpdateCI('ServiceNow', input); gs.print(output);`
sys_security_acl	Reports and user access.
sys_ui_related	Multisource configuration, default forms.

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Columns in cmdb_backup_storage_information

Columns in cmdb_backup_storage_information

Column	Description
Backup Configuration Status [backup_config_status]	String (choice) • Backup Disabled [False, default]: CI has not been configur • Backup Enabled [True]: CI has policies and configurations service, or appliance for regular backups • Unknown • Not Applicable • Planned • Not Planned
Last Successful Backup [last_successful_backup]	glide_date_time Date and time of last successful backup. Platform-specific va or end of the backup attempt as reported by the platform AP time of the backup attempt.
Last Backup Attempt [last_backup_attempt]	glide_date_time Date and time of the last successful or failed backup attemp can be either the start or the end of the backup attempt as re ambiguous, use the start time of the backup attempt. For a successful backup, both last_backup and last_backup value.
Execution Mode [backup_execution_mode]	String (choice) • Manual: Run as needed. • Automatic: Run periodically. • Unknown
sys_domain and sys_domain_path	glide columns Values copied from cmdb_ci.
managed_by and managed_by_group	Values copied from cmdb_ci.
Backup Source [backup_source_configuration_item]	reference (ci) Backup status details for the referenced CI being backed up
Backup Source ID [backup_source_id]	String (1024)

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Columns in cmdb_backup_storage_information (continued)

Column	Description
	Backup Service source identifier for the CI. Identifies the CI i service such as host_id, vcenter_id, instance_id, and db_id.
Backup Service [backup_service_configuration_item]	reference (ci) Reference to the CSDM technical service that hosts the exte service, or appliance.
Recovery Point Objective [recovery_point_objective]	Duration Time that can elapse between backups and the acceptable

CMDB 360/Multisource CMDB

CMDB 360 retains complete history about discovery sources and proposed values, involved in updates of CI attributes. Use CMDB 360 data to track how the CMDB is populated by various discovery sources at the CI attribute level. Also, to revert CI updates from a specific discovery source, or to recompute attribute values using updated reconciliation rules.

Starting with the Utah release, the Multisource CMDB feature is part of the CMDB 360 feature. CMDB 360 provides all the functionality of Multisource CMDB and additional capabilities such as an analytics dashboard, and new query functionality. You can access all of the CMDB 360 capabilities in the CMDB 360 view in CMDB Workspace or in the CMDB 360 insights dashboard in Service Graph Workspace.

How CMDB 360 works

When multiple discovery sources attempt to update the same CI attribute, the Identification and Reconciliation Engine (IRE) uses reconciliation rules to select a single discovery source for the update. Without CMDB 360, details about the lower-priority discovery sources whose values were rejected, are discarded. Also, it is difficult to identify the source of an attribute value without CMDB 360.

With CMDB 360, the raw details for every discovery source and CI combination are retained for both, discovery sources that were selected for an update and all others that were not. CMDB 360 data, consisting of records for each discovery source and CI combination, is stored in the CMDB MultiSource Data [cmdb_multisource_data] table. You can examine, query, and report on the CMDB 360 data store.

You can optionally exclude classes and their descendents from collecting and processing CMDB 360 data. The CMDB MultiSource Data [cmdb_multisource_data] table doesn't contain data for those excluded classes. For more information, see Exclude classes from CMDB 360.

Note:
CMDB 360 supports non-CMDB tables. The widely used term Configuration Item (CI), can also refer to a non-CMDB table record. For information about support for non-CMDB tables, see IRE support for non-CMDB tables.

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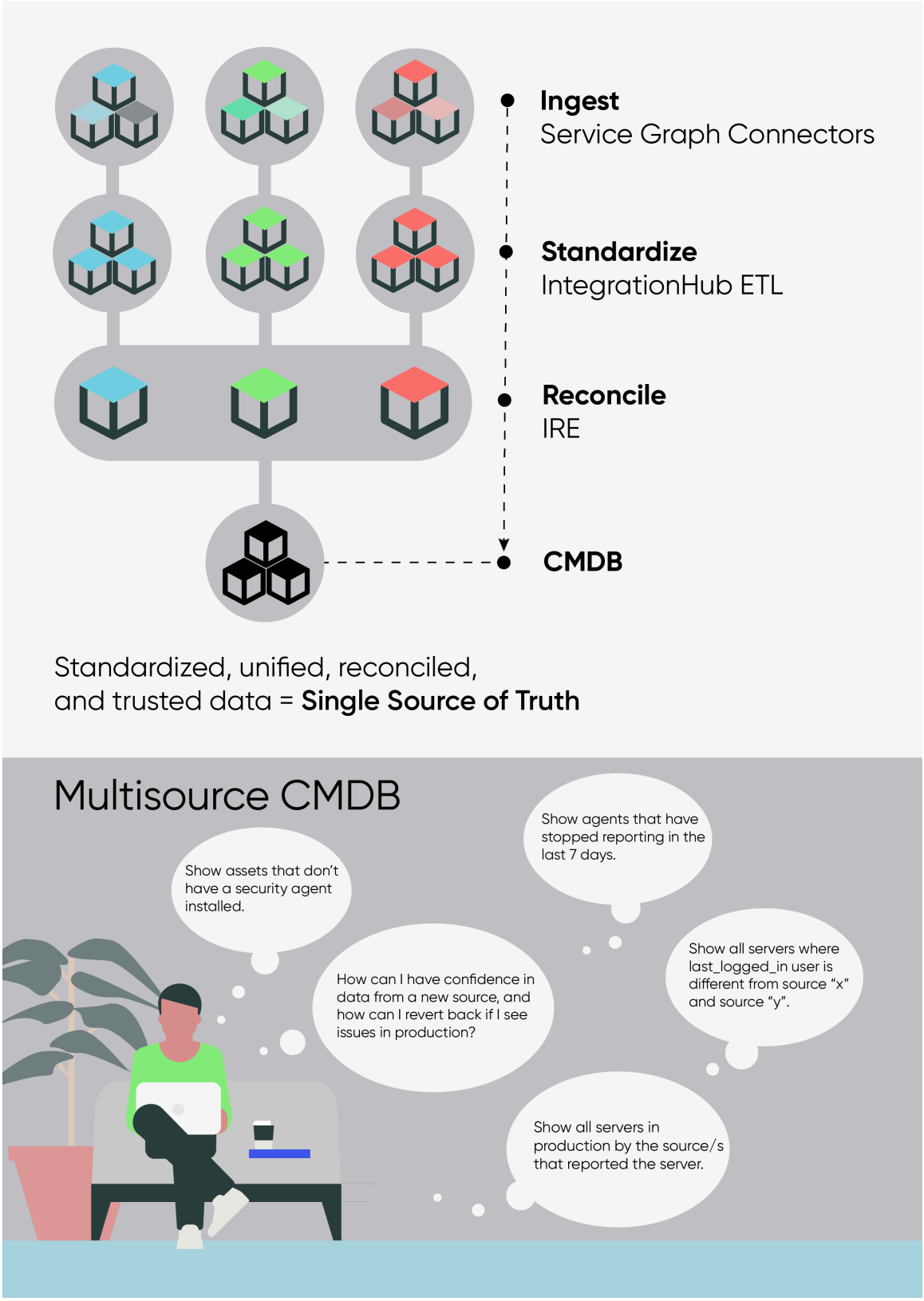
CMDB 360 insights into data source processes



After data is initially ingested from multiple data sources, several processes are applied to standardize and reconcile the data before it is stored in the CMDB. CMDB 360 provides insights that can help you configure some of these processes.

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Using CMDB 360

Use CMDB 360 to:

- Create a dynamic reconciliation rule.
- Control CI updates at the discovery source and CI attribute level.
- Visualize discovery sources of attribute values, at the attribute level.
- Modify reconciliation rules and then recompute CMDB data, reflecting the updated reconciliation rules.
- Revert CMDB data integration from a specific discovery source, if, for example, you realize that the discovery source is not reliable. Recompute CI attribute values, while excluding the discovery source that you want to ignore.
- Validate a new discovery source by comparing its data to data from other discovery sources, which are known to be valid.
- Improve data management, data quality, and operational insights, by querying on CMDB 360 data. Use the CMDB 360 query builder in CMDB Workspace or in Service Graph Workspace to create queries for CMDB 360 records, discovery sources, and CI records.

Enable and configure CMDB 360

- Activate the ITOM Discovery License (com.snc.itom.discovery.license) plugin.
- Navigate to **All** > **Configuration** > **CMDB 360 Properties**. Then, in the CMDB 360 Properties pane ensure that the glide.identification_engine.multisource_enabled (Enables CMDB 360) property is set to **true**.
- Optionally, Exclude classes from CMDB 360.

By default, CMDB 360 tracks discovery source information for CIs from CMDB classes and doesn't collect data for non-CMDB tables. You can independently enable or disable tracking data for CMDB and for non-CMDB classes, using these system properties:

- glide.identification_engine.multisource_cmdb_ci_enabled (Enables capturing CMDB 360 data for CIs from CMDB classes)
- glide.identification_engine.multisource_non_cmdb_ci_enabled (Enables capturing CMDB 360 data for CIs from non-CMDB classes)

Report on CMDB 360 data

Use the CMDB 360 view in CMDB Workspace or CMDB 360 insights dashboard in Service Graph Workspace to gain insights into the CMDB 360 data store. Build reports that, for example, do the followings:

- Find CIs not reported by any discovery source.
- Find discovery sources populating data in your CMDB.
- Compare attribute values across discovery sources.
- Compare attribute values between CMDB and other discovery source.
- Limit reports for CMDB 360 data, to a specific application service, technical service, or a CMDB group.

See Sample CMDB 360/Multisource CMDB queries for more details.

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Visualize CMDB 360 data

CMDB 360 is highly verbose in the user interface:

- On the Reconciliation Rules page in CI Class Manager, click the **Preview Data** tab to see per attribute, discovery sources that are authorized to update that attribute, in precedence order.
- On a CI form, click the **CMDB 360 Data Preview** related link to see per CI attribute, current value in the CMDB and incoming values from other discovery sources.

Logging

Enable logging for CMDB 360 by adding and enabling the system property glide.cmdb.logger.source.cmdb_multisource. In the Log [syslog] table, search for entries in which `source="cmdb_multisource"`.

CMDB 360 experience in CMDB Workspace and in Service Graph Workspace

The CMDB 360 view in CMDB Workspace and in Service Graph Workspace provides aggregations and analysis of CMDB 360 data which you can use to track activities and identify Potential issues of discovery sources. You can also create different types of your own queries and associated schedules and reports to explore CMDB data.

Use the CMDB 360 view in CMDB Workspace or the CMDB 360 insights page in Service Graph Workspace store app, to access all of the CMDB 360 capabilities. For information about all CMDB 360 dashboard settings, see Configure the CMDB 360 dashboard in CMDB Workspace or in Service Graph Workspace.

Note:
Most cards on the CMDB 360 dashboard support non-CMDB tables in their aggregation, or can be configured to provide support. However, the CIs not reported by discovery sources card, for example, doesn't apply to non-CMDB tables. Creating queries for non-CMDB tables is also supported. For information about support for non-CMDB tables, see IRE support for non-CMDB tables.

Access

Requirements:

- Role requirement: sn_cmdb_user (CMDB user) or any role containing sn_cmdb_user
- Additional requirement: Enable and configure CMDB 360

To access the CMDB 360 view experience:

- In Service Graph Workspace: Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Insights icon and in the Insights page navigation panel, select **CMDB 360**
- In CMDB Workspace: Navigate to **Workspaces** > **CMDB Workspace**, and then in the CMDB Workspace menu bar, select **CMDB 360**.

Potential issues

Cards on the Potential issues tile show details about CIs with discovery sources that are incorrectly reporting on the CIs.

CIs not reported by discovery sources

Lists CIs that are discovered by multiple discovery sources, but one or more of the discovery sources has stopped reporting within a specified number of days. The

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Number of days since CIs were last discovered by a discovery source dashboard setting is used in the card's aggregation.

Drill down on this card to see a list view of the CIs for the card and the specific discovery source per CI that is no longer reporting.

Example: You configure 7 days for the setting. A Linux server CI named backup-linux.sea.com is reported by these discovery sources within the specified number of days:

- ServiceNow - today.
- ServiceWatch - 4 days ago.
- AgentClientCollector - 8 days ago.

In this scenario, the CI shows on the CIs not reported by discovery sources card, since AgentClientCollector reported over seven days ago.

Data mismatch

Lists CIs for which different discovery sources are reporting different values. Attributes are considered mismatched when different discovery sources report different values for the attribute. CIs that appear when you drill down on this card can reveal issues with the individual CI, or your reconciliation rules.

The specific records that appear in the drilled-down list view, depend on the Data mismatch dashboard settings.

In the Data mismatch records list view, select an item in a Source column to access the Multisource Data Preview page with details about all discovery sources with values for the attribute. On the Multisource Data Preview page you can use the Search Attributes box to search for specific attributes and also choose one of the following options:

- **All attributes**: Shows all attributes of the selected class, regardless of whether they have a value in the CMDB.
- **Attributes with CMDB values**: Shows only attributes of the selected class, with a value in the CMDB.
- **Attributes with multisource data**: Shows all attributes of the selected class, and for each attribute shows current CMDB value and any other discovery sources with a value for the attribute.

Regardless of the option that you choose on the Multisource Data Preview page, a discovery source value that was used for the current CMDB value – is highlighted in green. These values are identical to the CMDB value of the attribute.

Saved queries

The Saved queries card shows up to 20 of your CMDB 360 queries. You can use the card to edit and run those queries, or create new queries. Saved queries are sorted on both the card and list view by the most recently created or updated queries.

If your instance has been upgraded from an instance that contained Multisource Report Builder queries, then those queries appear on the Saved queries card.

- Click a saved query to modify or view it before running.
- Click a query's action icon and then select **Run**.
- Click **View All Queries** to see all the Saved queries where you can examine or run a query.

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- Click **Create Query** to create a query of one of the following types:
  - Get Records: Creates a query that you can use to explore your CMDB 360 data. It queries your CMDB 360 for CIs matching your criteria that are reported by specified discovery sources.
  - Find Gap: Creates a query that you can use to analyze gaps in discovery sources reporting your CMDB 360 data. It queries discovery sources that report CIs against discovery sources that don't report those same CIs.
  - Compare Attribute Values: Creates a query that you can use to identify CIs with attribute values that differ across multiple discovery sources or against the CMDB. It queries at least two discovery sources and/or the CMDB for CIs that match your criteria.
- Schedule a CMDB 360 query for a report to run that query on a regular basis. Scheduling a query enables you to create a CMDB 360 report that integrates the query results with the platform Reporting feature.

Discovery sources

Cards in the Discovery sources tile show aggregated counts for your discovery sources. This tile also includes coverage cards showing a breakdown of CIs per the number of discovery sources reporting those CIs.

Number of discovery sources

The total number of discovery sources that report CMDB 360 data.

Total CMDB 360 records

The total number of raw CMDB 360 records in the CMDB 360 data store that contains records for each discovery source report, per each CI attribute.

Reconciled CIs

The total number of unique CIs created in the CMDB after processing incoming data from all discovery sources, including after reconciling data from multiple discovery sources for the same CIs. For more information, see CMDB Identification and Reconciliation.

Discovery source overviewt

The distribution of CMDB 360 CIs across all reporting discovery sources.

Coverage: CIs with a single discovery source

Shows CIs that are only reported by a single discovery source, with a breakdown by the discovery source reporting those CIs. The number on the chart is the actual total number of CIs with a single discovery source, regardless of any dashboard settings. The number of records in list views that appear when you drill down the chart, depends on dashboard settings and can be only a subset of that total.

Coverage: CIs by number of discovery sources

Shows CIs reported by multiple discovery sources, grouped by the number of discovery sources that are reporting those CIs.

You can use the following options to filter the calculated records in the CMDB 360 data store that apply to all cards in the Discovery sources tile:

- All (default): Includes records from both CMDB and non-CMDB tables.
- CMDB CI: Includes records only from CMDB classes.
- Principal Class: Includes records only from principal classes. For information about defining a class as principal and therefore including that class in the Principal Class filter, see Create a CI class.

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Various settings apply only to the coverage charts. They determine the scope and type of data that is included in the coverage charts and can greatly affect the performance of the associated calculation job:

- The dashboard Coverage settings determine the mixture of classes for the records in drill-down list views. For information about these settings and their effect, see Coverage cards.
- The system properties *sn_cmdb_ws.ms.calculate_cmdb_only* and *glide.identification_engine.multisource_non_cmdb_ci_enabled* determine if both CMDB and non-CMDB or CMDB only data, is included in the coverage charts. For more information about these system properties, see Components related to CMDB 360.

  Note:
  If the *sn_cmdb_ws.ms.calculate_cmdb_only* is true or *glide.identification_engine.multisource_non_cmdb_ci_enabled* is false, then both 'All' and 'CMDB CI' filters show CMDB data only (non-CMDB data is ignored).

- The *sn_cmdb_ws.ms.report_class_ci_count_max_threshold* system property and the CMDB 360 Analytics Skipped Class [sn_cmdb_ws_ms_skip_class] table, together, determine class inclusion in the coverage charts.

  If the record count for a class (CMDB or non-CMDB) in the CMDB 360 Data [cmdb_multisource_data] table exceeds the value set by the *sn_cmdb_ws.ms.report_class_ci_count_max_threshold* system property, then a record is created in the CMDB 360 Analytics Skipped Class [sn_cmdb_ws_ms_skip_class] table and by default, the class is skipped in future calculations for the coverage charts. You can include a skipped class in the coverage charts by setting the *Override class CI records population* column of a skipped class in the *sn_cmdb_ws_ms_skip_class* table, to 'true'.

  Note:
  Some classes, when included or excluded from the coverage charts, can greatly impact the overall performance of the chart calculations. For more information, see Components related to CMDB 360.

Configure the CMDB 360 dashboard in CMDB Workspace or in Service Graph Workspace

Configure settings on the CMDB 360 of the CMDB Workspace or the Service Graph Workspace to determine how your CMDB 360 data is analyzed and aggregated. These settings affect the data that appears on the cards and the records shown when you drill down on those cards on your CMDB 360 dashboard.

About this task

For detailed information about CMDB 360-related components, such as system properties, scheduled jobs, and tables, that are installed with CMDB Workspace, see Components installed with CMDB Workspace or Components installed with Service Graph Workspace.

Before you begin

To access the CMDB 360 dashboard in Service Graph Workspace, you must first switch from CMDB Workspace to Service Graph Workspace. For more information, see Service Graph Workspace store app.

Role required: cmdb_ms_admin

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Procedure

1. Open either workspace:
   - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Insights icon and in the Insights page navigation panel, select **CMDB 360**.
   - Navigate to **Workspaces** > **CMDB Workspace**, and then in the CMDB Workspace menu bar, select **CMDB 360**.
2. Select **Settings**.
3. Configure Global settings.
   The **Maximum number of records in a list view** setting determines the maximum number of records that can show when you drill down on the cards in the CMDB 360 dashboard (drill-down set). If the total number of returned records is greater than the specified setting value, the dashboard trims the list view output according to this setting and the settings of individual cards.

   You can use this setting to limit the number of records that CMDB 360 must process. The setting applies to these cards:
   - CIs not reported by discovery sources
   - Data mismatch
   - Coverage: CIs with a single discovery source
   - Coverage: CIs by number of discovery sources

   The CMDB 360 dashboard defaults this value to 100,000.
4. Configure Potential issues settings.
   These settings affect the calculations for cards on the CMDB 360 view/Potential Issues tile and the list of CIs that appear when you drill down on those cards.

   a. Configure CIs not reported by discovery sources.
   The **Number of days since CIs were last discovered by a discovery source** setting determines the number of days used in the calculation of the CIs not reported by discovery sources card. The card shows CIs that are discoverable by multiple sources, but at least one discovery source hasn't reported on that CI in the specified number of days.

   b. Configure Data mismatch.

   These settings determine the classes of CIs included in the calculation and in the drill-down list views of the Data mismatch card. These settings determine which classes to use for the card and the relative weight (%) of each of those classes in the card calculations.

   Using these settings, add the classes for which you are interested in seeing CMDB 360 mismatch data. Regardless of the classes that you add in the Data mismatch settings, the 'Maximum number of records in a list view' setting, is always in effect when you drill down the card (100,000 by default).

Setting	Description
Automatic data weights	Evenly distributes weights among any added classes. The global setting of 'Maximum number of records in a list view' is evenly divided between all added classes so that each class can contribute an equal number of records to the drill-down set.

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Setting	Description
	For example, if you added four classes, the weight of each class = 25. Therefore, the system adds to the set of drill-down records, up to 25,000 CMDB 360 records (25% of 100,000) of each added class.
Manual data weights	Custom weight (%) for each added class. The global setting of 'Maximum number of records in a list view' is divided between the added classes, according to the specified class weights. For example, if you added two classes, class A weight = 25 and class B weight = 75. The system adds to the set of drill-down records, up to 25,000 CMDB 360 records (25% of 100,000) of class A, and up to 75,000 CMDB 360 records (75% of 100,000) of class B.
Select CI classes you want to include in the calculation	Specify the CI classes that you want to check for attribute mismatches. CI classes you specify also include any child classes. Attributes are considered mismatched when different discovery sources report different values for the attribute.
Show CIs where EVERY attribute doesn't match	Select to include only CIs with a mismatch between discovery sources for every attribute that you specify.
Show CIs where ANY attribute doesn't match	Select to only include CIs with a mismatch between discovery sources for any attribute you specify.
Select an attribute	Specify the attributes that you want to check for mismatches.

5. Configure Coverage settings.

   These settings affect the calculations related to the coverage cards ('Coverage: CIs with a single discovery source' and 'Coverage: CIs by number of discovery sources') in the Discovery Sources tile on the CMDB 360 view. These settings determine the mixture of classes in the drill-down set of records.

   Using these settings, you can give priority to classes for which you are most interested in seeing CMDB 360 data in the Coverage charts. The number of records that you can drill down to in the Coverage charts, is limited by the global setting 'Maximum number of records in a list view' (100,000 by default). Regardless of your settings and class priorities, the 'Maximum number of records in a list view' setting, is always in effect.

   By default, the classes of the records in the drill-down set are random. You can add classes in this Coverage settings to ensure that your preferred classes have priority in being included in the drill-down set of records. You can prioritize any number of classes and assign a weight (%) for each of those classes within the total number of drill-down records.

Setting	Description
Automatic data weights	Evenly distributes weights among any added classes. The global setting of 'Maximum number of records in a list view' is evenly divided between

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Setting	Description
	all added classes so that each class can contribute an equal number of records to the drill-down set. For example, if you added four classes, the weight of each class = 25. Therefore, the system adds to the set of drill-down records, up to 25,000 CMDB 360 records (25% of 100,000) of each added class.
Manual data weights	Custom weight (%) for each added class. The global setting of 'Maximum number of records in a list view' is divided between the added classes, according to the specified class weights. For example, if you added two classes, class A weight = 25 and class B weight = 75. The system adds to the set of drill-down records, up to 25,000 CMDB 360 records (25% of 100,000) of class A, and up to 75,000 CMDB 360 records (75% of 100,000) of class B.
Select CI classes you want to include in the calculation	Prioritized classes for which you are most interested in seeing CMDB 360 data in the Coverage charts ('CIs with a single discovery source' and 'CIs by number of discovery sources'). CI classes that you specify also include any child classes.

Using the Coverage settings, the system calculates an allowance of records per class, in the drill-down set of records. If the number of actual records per added class, is less than the computed allowance for that class, then the system adds records of random classes, up to the computed allowance for the class.

6. Select **Save**.

Create a Get Records query

Create a Get Records query from the CMDB 360 dashboard of your CMDB Workspace or in Service Graph Workspace to help you explore your existing CMDB 360 data.

Before you begin

To access CMDB 360 in Service Graph Workspace, you must first switch from CMDB Workspace to Service Graph Workspace. For more information, see Service Graph Workspace store app.

Role required: sn_cmdb_user and either cmdb_ms_admin or cmdb_ms_editor

Procedure

1. Open either workspace:
   - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Insights icon and in the Insights page navigation panel, select **CMDB 360**.
   - Navigate to **Workspaces** > **CMDB Workspace**, and then in the CMDB Workspace menu bar, select **CMDB 360**.
2. On the Saved Queries tile, select **Create Query.**
3. Select **I want to get CMDB 360 data**.
4. Select the CI classes to include in the query.
   You can select a class to open the condition builder. Use the condition builder to specify conditions that must be met for each class. Use **And** or **Or** to specify multiple conditions.

   Select **All Classes** if you want to include all CI classes without conditions.

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5. Select **Continue**.
6. Select discovery sources to query on.
   The query retrieves CMDB 360 data that originates from the discovery sources you specify.

   You can leave the Select discovery sources prompt empty to retrieve data for all discovery sources.
7. Select **Continue**.
8. On the form, select the options:

Results Layout form

Field	Description
Show unique CMDB 360 records	Select if you want to see only unique CMDB 360 records. Records for the same CIs from different discovery sources are consolidated.
Show CI records by discovery source	Select if you want to see records for each CI and discovery source pair.
Limit results to	Limits the query results to CIs that belong to a service or CMDB group. When you select **Application Services**, **Technical Services**, or **CMDB Groups**, a prompt appears. You can use the prompt to specify the service or group that you want the query to filter for.

9. Select **Continue**.
10. Enter a name and description for your query.
11. Select **Save** .

What to do next

Run the query at least once if you want to create a schedule or report.

On the CMDB 360 Query Results page:

- If the number of results exceeds the number of results appearing on the page:
  - Select **Load More Results**: To show the next page of results. The number of results that appear on each result page is specified by the glide.identification_engine.multisource.query.batch.limit system property (100 items by default).
  - Select **Load All Results**: To show all results, up to the limit specified by the glide.identification_engine.multisource.query.max.limit system property (10000 by default).
  - Select a CMDB 360 Source link to easily access preview data of a source and see more details.
- You can select **Create Schedule** to set up a schedule that runs your query on a regular basis. Scheduling your query enables you to use the query results in reports you create.

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- After creating a schedule, you can select **Create Report** to configure a report that you can manage using Reporting capabilities.
- On the Query Results page, access a record to view further details. For example, select a link in the Primary Record column, and then in the CI Details page, select **View CMDB 360 Data**.

Create a Find Gap query

Create a Find Gap query from the CMDB 360 dashboard of your CMDB Workspace or in Service Graph Workspace to help you find CIs that are not being reported by a discovery source.

Before you begin

To access CMDB 360 in Service Graph Workspace, you must first switch from CMDB Workspace to Service Graph Workspace. For more information, see Service Graph Workspace store app.

Role required: sn_cmdb_user and either cmdb_ms_admin or cmdb_ms_editor

About this task

Gaps in discovery source reporting occur when at least one discovery source reports on the CI and another doesn't, enabling you to identify discovery sources that might have an issue.

Procedure

1. Open either workspace:
   - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Insights icon and in the Insights page navigation panel, select **CMDB 360**.
   - Navigate to **Workspaces** > **CMDB Workspace**, and then in the CMDB Workspace menu bar, select **CMDB 360**.
2. Select **Create Query.**
3. Select **I want to find gaps in data between discovery sources**.
4. Select the CI classes that you want to check for gaps.
5. Select **Continue**.
6. Select non-reporting discovery sources.
   A non-reporting discovery source is a discovery source that doesn't report CIs as expected. Multiple non-reporting discovery sources have an OR condition with each other.
7. Select one or two reporting discovery sources.
   These discovery sources report the CI as expected and act as a baseline for identifying the gap in reporting.

   You can leave the **Select reporting discovery sources for gap tracking** prompt empty to include all discovery sources in the query.
8. Select **Continue**.
9. On the form, select the options:

Results Layout form

Field	Description
Show unique CMDB 360 records	Select if you want to see only unique CMDB 360 records. Records for the same CIs from different discovery sources are consolidated.

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Field	Description
Show CI records by discovery source	Select if you want to see records for each CI and discovery source pair.
Limit results to	Limits the query results to CIs that belong to a service or CMDB group. When you select **Application Services**, **Technical Services**, or **CMDB Groups**, a prompt appears where you can specify the service or CMDB group that you want the query to filter for.

10. Select **Continue**.
11. Enter a name and description for your query.
12. Select **Save** .

What to do next
Run the query at least once if you want to create a schedule.

On the CMDB 360 Query Results page:

- If the number of results exceeds the number of results appearing on the page:
  - Select **Load More Results**: To show the next page of results. The number of results that appear on each result page is specified by the glide.identification_engine.multisource.query.batch.limit system property (100 items by default).
  - Select **Load All Results**: To show all results, up to the limit specified by the glide.identification_engine.multisource.query.max.limit system property (10000 by default).
  - Select a CMDB 360 Source link to easily access preview data of a source and see more details.
- You can select **Create Schedule** to set up a schedule that runs your query on a regular basis. Scheduling your query enables you to use the query results in reports you create.
- After creating a schedule, you can select **Create Report** to configure a report that you can manage using Reporting capabilities .
- On the Query Results page, access a record to view further details.

Create a Compare Attribute Values query

Create a Compare Attribute Values query from the CMDB 360 dashboard of your CMDB Workspace or in Service Graph Workspace to help you find CIs with mismatched attribute values between discovery sources.

Before you begin
To access CMDB 360 in Service Graph Workspace, you must first switch from CMDB Workspace to Service Graph Workspace. For more information, see Service Graph Workspace store app.

Role required: sn_cmdb_user and either cmdb_ms_admin or cmdb_ms_editor.

About this task
The query enables you to determine if there's an issue with how a discovery source reports a CI.

The Compare Attribute Values query compares CIs from different discovery sources for mismatched values. Mismatches occur when a discovery source reports attribute values for a CI that are different from values reported by other discovery sources or the CMDB. You can use the

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query to identify these CIs and reconcile the attribute values, or fix any issues with the discovery sources.

Procedure

1. Open either workspace:
   - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Insights icon and in the Insights page navigation panel, select **CMDB 360**.
   - Navigate to **Workspaces** > **CMDB Workspace**, and then in the CMDB Workspace menu bar, select **CMDB 360**.
2. Select **Create Query**.
3. Select **I want to compare attribute values between discovery sources or against the CMDB**.
4. Select a CI class that you want to compare attribute values for.
   You can select a selected class to open the condition builder. Use the condition builder to specify conditions that must be met for each class. Use **And** or **Or** to specify multiple conditions.
5. Select **Continue**.
6. On the Attributes to compare form, select options:

Option	Description
Any attribute doesn't match	Select if you want to retrieve CIs where there's a mismatch with any specified attribute values between the discovery sources.
Every attribute doesn't match	Select if you want to retrieve CIs where there's a mismatch with every specified attribute value between the discovery sources.
Select attributes to compare	Specify the attributes that you want to compare for mismatched values.

7. Select **Continue**.
8. Select the discovery sources that you want to compare attribute values for.

Discovery sources form

Field	Description
Compare to CMDB	Select if you want to compare the specified attribute values against your CI attributes recorded in the CMDB. When you compare against the CMDB, you only need one discovery source.
Select discovery sources	The discovery sources that you want to compare. Select at least two.
Limit results to	Limits the query results to CIs that belong to a service or CMDB group. When you select **Application Services**, **Technical Services**, or **CMDB Groups**, a prompt appears. You can use the prompt to specify the service or group that you want the query to filter for.

9. Select **Continue**.
10. Enter a name and description for your query.
11. Select **Save** .

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What to do next

Run the query at least once if you want to create a schedule.

On the CMDB 360 Query Results page:

- If the number of results exceeds the number of results appearing on the page:
  - Select **Load More Results**: To show the next page of results. The number of results that appear on each result page is specified by the glide.identification_engine.multisource.query.batch.limit system property (100 items by default).
  - Select **Load All Results**: To show all results, up to the limit specified by the glide.identification_engine.multisource.query.max.limit system property (10000 by default).
  - Select a CMDB 360 Source link to easily access preview data of a source and see more details.
- You can select **Create Schedule** to set up a schedule that runs your query on a regular basis. Scheduling your query enables you to use the query results in reports you create.
- After creating a schedule, you can select **Create Report** to configure a report that you can manage using Reporting capabilities.
- On the Query Results page, access a record to view further details.

Schedule a CMDB 360 query for a report

Set up a schedule to regularly query for CMDB 360 data. Use scheduled queries to provide CMDB 360 data to reports you create, which can provide insight into how discovery sources populate the CMDB and the reliability of those discovery sources.

Before you begin

Ensure that you run the CMDB 360 query at least once.

To access CMDB 360 in Service Graph Workspace, you must first switch from CMDB Workspace to Service Graph Workspace. For more information, see Service Graph Workspace store app.

Role required: sn_cmdb_user and either cmdb_ms_admin or cmdb_ms_editor.

Procedure

1. Open either workspace:
   - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Insights icon and in the Insights page navigation panel, select **CMDB 360**.
   - Navigate to **Workspaces** > **CMDB Workspace**, and then in the CMDB Workspace menu bar, select **CMDB 360**.
2. On the Saved queries tile, create or access a CMDB 360 query.
   If you created a new query, you must run the query at least once before you can select **Create Schedule** on the query results page.
3. Select **Schedule query** on the Results Layout page of the query.
   To create a schedule for the Compare attributes values query, select **Schedule query** on the Discovery Sources page.
4. Specify a **Run** frequency and time you want to schedule the query to run.
   When you select Weekly or Monthly, you must also select a day of the week or calendar day, respectively.
5. Select **Save**.

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What to do next

Create a CMDB 360 report to integrate CMDB 360 query results with platform Reporting capabilities. Each run of the query automatically updates the generated report.

Related topics

- Create a Get Records query
- Create a Find Gap query
- Create a Compare Attribute Values query

Exclude classes from CMDB 360

Prevent CMDB 360 from collecting, storing, and analyzing data for classes for which it isn't needed. CMDB 360 processes large amounts of data. Therefore, excluding classes can help improve the performance of the Multisource Dashboard Analytics Population scheduled job and of CMDB 360 queries.

Before you begin

Role required: cmdb_ms_admin (automatically included in the CMDB Admin role)

About this task

To exclude classes from CMDB 360, you must directly manage records in the CMDB 360 denied classes [cmdb_multisource_deny_class] table. For each class that you want to exclude, add an active record for that class. Excluding a class from CMDB 360 also automatically excludes any of its descending classes. In the base system, the CMDB 360 denied classes table is populated by default with some classes, such as dscy_net_base and discovery_net_base.

Procedure

1. Select **All** and then, in the Filter navigator, enter `cmdb_multisource_deny_class.list` to open the CMDB 360 denied classes table.
2. Select **New** and then fill out the form.
   - Select the class to exclude (with its descendents) in the field labeled **Deny this class and all extended classes from this class to store CMDB 360 data**.
   - Ensure that **Active** is selected. If **Active** isn't selected, then the specified class isn't excluded from CMDB 360.
   - Select **Submit**.

Result

Existing data for the specified class and its descending classes will be gradually removed from the CMDB 360 Data [cmdb_multisource_data] table using record cleaners, without any impact to the system.

What to do next

You can deselect **Active** or completely delete a record for a class that you want to include in CMDB 360 data collection.

Recompute CI attribute values

Modify reconciliation rules, or exclude a discovery source which is found to be invalid. Then, use the updated reconciliation rules in recomputing CI attribute values, for which those reconciliation rules or discovery source are applicable to.

Before you begin

Enable and configure CMDB 360.

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If you want to recompute to apply updated reconciliation rules, then you must first update the reconciliation rules.

Role required: itil_admin or sn_cmdb_admin

About this task

CMDB 360 automatically generates a recompute task for each recompute that you submit. If you submit multiple recomputes, a recompute task is generated for each operation, but only one task runs at any given time. To list all recompute tasks, enter `cmdb_multisource_recomp_task.list` in the left navigation search box.

There is a maximum number of records that can be included in a single recompute operation. This number is specified by the system property glide.identification_engine.multisource.recompute.max.ci.limit (100,000 by default).

Note:

- Recompute skips CIs which are reported by multiple discovery sources, but with different class names.
- Recomputing CI attribute values is not supported with non-CMDB tables.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select a class from the CI Classes hierarchy list.
3. In the left-side pane, expand **Class Info**, and select **Reconciliation Rules**.
4. On the Reconciliation Rules page, click **Recompute**.
5. Select the **Recompute Type**.
   - **Replace values from the specified discovery source with value from the discovery source next in priority, according to reconciliation rules**: Recompute attribute values for the class CIs, applying priorities specified in reconciliation rules and while excluding the specified **Discovery Source**. Records for the discovery source you are excluding, are also removed from the CMDB 360 data store.

     This operation applies to data that exists in the CMDB. If reconciliation rules remain in effect for the discovery source that you have excluded, then future data from that discovery source, can populate the CMDB.
   - **Apply updated reconciliation rules**: Recompute attribute values for the class CIs, applying the updated reconciliation rules which are now in effect.
6. Select the **Recompute Scope**.
   The scopes grow from one option to the next:
   - **Recompute only CIs of this class**: Basic scope of CIs to recompute.
   - **Recompute CIs of this and derived classes**: Expand the basic scope to include CIs from derived classes.
   - **Recompute CIs of this and derived classes, along with selected related items**: Expand the previous scope to also include CIs from specified related items. Select the related items to include in the recompute.
7. Select the **Delete action** for CIs for which the excluded discovery source, is the only discovery source.

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- **Delete record**: Delete the CI record from CMDB.
- **Set record attributes to custom value**: Set a specified CI attribute to a custom value to remove the CI from regular operations without deleting the CI. For example, set the *Operational status* attribute to *Retired*.

8. Select **Next**.
9. On the Review page, carefully review the counts for the affected CIs to ensure that all record counts are as you expect.
10. Select **Back** to adjust any settings for the recompute.
11. Select **Recompute**.

What to do next

You can do any of the followings:

- In the status message that appears for the recompute operation, click the link to see the CMDB 360 Recompute Task for more details. The Recompute Task shows the progress and status of the recompute operation.

  You can abort the recompute by setting **Status** to **Closed Incomplete** and selecting **Update**. You can then set **Status** back to **Work in progress** to resume recompute from where it was aborted.

- Enter `cmdb_multisource_recomp_task.list` in the left navigation search box, to see the status and progress of all recompute tasks.

Multisource Report Builder (legacy)

Improve CMDB data management by querying and reporting on Multisource CMDB data. Use the Multisource Report Builder to gain insights about how discovery sources are populating the CMDB and their reliability. You can then adjust reconciliation rules to improve the quality of CMDB data, if needed.

CMDB 360 in CMDB Workspace

Starting with the Zurich release, the Multisource CMDB feature is part of the CMDB 360 feature which is accessible in the CMDB Workspace. Create, view, modify, schedule, create reports, and run CMDB 360 queries using the CMDB 360 query builder in the CMDB Workspace store app. Use the CMDB 360 query builder to create queries of the following types:

- Get Records: Queries your discovery sources for CIs that match your criteria.
- Find Gap: Queries for gaps in discovery sources reporting your CMDB 360 data. Queries discovery sources that report CIs against discovery sources that don't report those same CIs.
- Compare Attribute Values: Queries for CIs with attribute values that differ across multiple discovery sources or against the CMDB. Queries at least two discovery sources and/or the CMDB for CIs that match your criteria.

Legacy Multisource Report Builder

Instead of using the CMDB 360 query builder in CMDB Workspace, you can still use the legacy Multisource Report Builder as described in this topic.

After you create a Multisource query in the Multisource Report Builder, you can run the query to see the results. You can then also create a Multisource report that integrates the Multisource query results with the platform Reporting capabilities. High level steps for creating a Multisource report:

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1. Create a query, then save and run it.
2. Create a schedule for the query.
3. Create a Multisource report that is based on the Multisource query.

You can create queries that find:

- All the discovery sources populating data in your CMDB.
- CIs not reported by any discovery source.
- All CIs discovered by one discovery source, but not by another discovery source.

You can create other queries that show differences in CI attribute values between multiple data sources, while being compared to the CMDB:

- Show how an attribute value is different between a discovery source and the current CMDB record. For example, find Hardware CIs with different location than what SCCM reports.
- Show how an attribute is different between SourceA, SourceB, and SourceC. For example, show all Computer CIs where RAM is different between SCCM, ServiceWatch, and CMDB.

You can show query results by CI records, Multisource CMDB data records, or discovery sources. You can also limit the report results to CIs within a specific application service, technical service, or a CMDB group.

Create a Multisource query

Query the Multisource CMDB data to gain insights about how discovery sources are populating the CMDB, and then use that query to create a Multisource data report.

Before you begin

Enable and configure CMDB 360.

Role required: cmdb_ms_editor

About this task

The Multisource Report Builder page updates dynamically as you set fields. Therefore, some of the fields that are described in the steps below might not appear.

Procedure

1. Navigate to **All** > **Configuration** > **Multisource Report Builder**.
2. On the Multisource Report Builder page, select a query to edit or run, or click **New**.
3. Enter **Name** and **Description** for the query.
4. Select the **Result type** for the query.
   - **CI records**: Results show unique CIs from the Multisource CMDB data store.
   - **Multisource data records**: Results show all entries of CI/discovery source combinations from Multisource CMDB data.
   - **Discovery sources**: Results are grouped by discovery sources that match the query criteria.
5. Select **Only show difference** to show differences in CI attribute values and then select the **Type of difference**.

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- **Between CMDB record and discovery source**: Show differences in attribute values between the CMDB data and the specified discovery sources.
- **Between discovery sources**: Show differences in attribute values between specified discovery sources based on Multisource data.

6. Select the **Class** to apply the query to, or select **All Classes** to apply the query to all classes. Use the condition builder to specify conditions that must be met for the class. Use **And** or **Or** to specify multiple conditions.
7. Use the list collector to select one or more **Discovery source** items to query on.
8. Set **Field to compare** to the class attributes for which to show differences.
   Use the OR and AND operators to compare based on multiple attributes. The list of attributes is a pre-populated subset of the class attributes, to which you cannot add or remove items.
9. Set **Limit results to** to limit the query results to CIs that belong to a specific application service, technical service, or a CMDB group.
10. Click **Save** and then click **Run**.

What to do next

- On the CMDB Multisource Query Results page:
  - If the number of results exceeds the number of results appearing on the page:
    - Click **Load More Results**: To show the next page of results. The number of results that appear on each result page is specified by the glide.identification_engine.multisource.query.batch.limit system property (100 items by default).
    - Click **Load All Results**: To show all results, up to the limit specified by the glide.identification_engine.multisource.query.max.limit system property (10000 by default).
    - Click a Multisource CMDB value link or a CI value link to access the respective records and see more details.
  - In the Configuration Item column, click a CI link to open the CI form. In the Related Links section on the CI form, click the **Multisource Data** tab to show Multsource data, such as discovery sources, related to the CI.
- Create a schedule for the query and ensure that the schedule runs at least once. This step is required for creating a Multisource report.

> **Note:**
> Initially, after creating a query, both the **Create Schedule** and the **Create Report** buttons are grayed out. Only after saving the query, you can create and run a schedule for the query, and only then you can create a report that is based on the query.

Schedule a Multisource query

After saving and running a Multisource query, create a schedule for the query to run automatically on a set schedule. Query results are stored in a results table and you can configure email addresses for the results to be sent to or include the results in CMDB dashboards.

Before you begin

The query for the schedule must be already saved and run at least one time.

Role required: cmdb_ms_user

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Procedure

1. Navigate to **All** > **Configuration** > **Multisource Report Builder**.
2. On the Multisource Report Builder page, select the query that you want to create a schedule for.
3. On the Multisource Report form, click **Create Schedule**.
4. On the Scheduled Email of Multisource Report Builders, click **New**.
5. Fill in the Scheduled Email of Multisource Report Builders form.

Field	Description
Query	Saved query that was created in Multisource Report Builder.
Users	Users to email the query results to.
Groups	User groups to email the query results to.
Run Time	Frequency and time to run the query automatically. When you set **Run** to **On Demand**, the query runs only when you run it manually.
Email addresses	More ad-hoc email addresses to email the query results to.
Subject	Text that will appear as the subject of the email with the query results.
Introductory message	Text that is included in the body of the email with the query results.
Type	Type of the file with the query results, which will be attached to the email.
Zip output	Enables zipping of the results file.
Conditional	Enable a condition for running the query and specify the condition in the **Condition** field. If the specified condition isn't met, the query doesn't run.
Condition	Condition that must be met for the query to run (Java script). Appears only if **Conditional** is selected.
Omit if no records	Disable sending an email for a query run that returns no results.

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Note:
When using update sets to port Multisource schedules from a non-production to a production environment, check the **Users** and **Groups** settings in the schedule. Any user or group that doesn't exist in the production environment, and which needs to receive the query results, must be re-added in either of the following ways:

- Manually created in the production environment. In this case, you must also remove the invalid user or group in the production environment (ported from non-production environment) from any schedules and add the new user or group instead.
- Explicitly ported from the non-production to production environment.

6. Click **Submit**.

What to do next

- If **Run** is set to **On Demand** in a schedule, or if you need to run a query randomly even if it has a recurring schedule, you can manually run that query as follows:
  1. Navigate to **All** > **Configuration** > **Multisource Report Schedules**.
  2. In the Scheduled Email of Multisource Report Builders list view, select the query that you want to run.
  3. On the Scheduled Email of Multisource Report Builder form, click **Execute Now**.
- Create a Multisource report for the query, that integrates the Multisource query results with the platform Reporting feature.

Create a report based on a Multisource (CMDB 360) query

After creating, saving, running, and scheduling a Multisource (CMDB 360) query, you can create a Multisource (CMDB 360) report that integrates the query results with the platform Reporting feature. You can for example, include such Multisource (CMDB 360) report in the platform CMDB dashboards.

Before you begin

The Multisource (CMDB 360) query for the report must be already saved, have a schedule, and must have already run at least once.

Role required: cmdb_ms_user

About this task

Creating a report that is based on a Multisource (CMDB 360) query, creates a report source which you can then manage using Reporting capabilities.

Note:
If you are using the CMDB 360 view in CMDB Workspace to generate the CMDB 360 query and the report, you can skip to step 4 in the procedure below.

Procedure

1. Navigate to **All** > **Configuration** > **Multisource Report Builder**.
2. In the Multisource Report Builder list view, select the query that you want to create a schedule for.
3. On the Multisource Report form, click **Create Report**.
4. On the Create a report form, click **Save** or **Run**.

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Trouble?
A report shows the results for the most recent query run. If meanwhile the query has changed, then the report shows results that are out of synchronization with the query. When you update the query, ensure to immediately run the updated query so that the report is synchronized with the query.

What to do next

To add a Multisource (CMDB 360) report to the CMDB Correctness Dashboard for example, see Add a report to a dashboard.

Sample CMDB 360/Multisource CMDB queries

Use sample queries to create your own CMDB 360/Multisource CMDB queries.

Discrepancy in multiple attributes between multiple discovery sources

Field	Setting
Name	Discrepancy in multiple attributes between multiple discovery sources (discovery source vs. discovery source)
Description	Find Linux servers with name containing "backup" which have discrepancy in *`Disk Capacity`* OR *`CPU Count`* OR *`Serial Number`* between discovery sources ServiceNow/ServiceWatch/SCCM/Tivoli.
Result type	Multisource data records
Only show difference	Selected
Type of difference	Between discovery sources
Class	Linux Server [cmdb_ci_linux_server]
Conditions	[Name] [contains] [backup]
Discovery Source	ServiceNow/ServiceWatch/SCCM/Tivoli
Field to compare	*`Disk Capacity`* OR *`CPU Count`* OR *`Serial Number`*
Limit results to	All

Discrepancy in multiple attributes between CMDB record and discovery sources

Field	Setting
Name	Discrepancy in multiple attributes between multiple discovery sources (CMDB vs. discovery sources)
Description	Find Linux Servers with name containing "backup" which have discrepancy in *`Disk Capacity`* AND *`CPU Count`* AND *`Fully Qualified Domain Name`* for discovery sources ServiceNow/ServiceWatch/SCCM
Result type	Multisource data records
Only show difference	Selected

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Discrepancy in multiple attributes between CMDB record and discovery sources (continued)

Field	Setting
Type of difference	Between CMDB record and discovery source
Class	Linux Server [cmdb_ci_linux_server]
Conditions	[Name] [contains] [backup]
Discovery Source	ServiceNow/ServiceWatch/SCCM
Field to compare	*Disk Capacity* AND *CPU Count* AND *Fully Qualified Domain Name*
Limit results to	All

Servers discovered by ServiceNow but not by Tivoli

Field	Setting
Name	Missing Discovery by Tivoli
Description	Servers discovered by ServiceNow but not by Tivoli
Result type	CI records
Class	Server [cmdb_ci_server]
Discovery Source	[is] [ServiceNow] [is not] [Tivoli]
Limit results to	All

All discovery sources for backup servers

Field	Setting
Name	Discovery Sources Backup Servers
Description	All discovery sources for backup servers
Result type	Data sources
Class	Server [cmdb_ci_server] and class condition: [Host name][starts with][backup]
Limit results to	All

All CMDB 360/Multisource CMDB records where the reported value of Location is different between Altiris and Tivoli discovery sources

Field	Setting
Name	Compare Location-Altiris vs. Tivoli

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All CMDB 360/Multisource CMDB records where the reported value of Location is different between Altiris and Tivoli discovery sources (continued)

Field	Setting
Description	List all Multisource CMDB records where the reported value of Location is different between Altiris and Tivoli discovery sources
Result type	Multisource data records
Only show difference	Selected
Type of difference	Between discovery sources
Discovery Source	• Altiris • Tivoli
Field to compare	Location
Limit results to	All

All CMDB 360/Multisource CMDB records for Linux Server, where the Location value is different than the reported value by Tivoli

Field	Setting
Name	Linux Server Location - Diff than Tivoli value
Description	All Multisource CMDB records for Linux Server, where the Location value is different than the value reported by Tivoli.
Result type	Multisource data records
Class	Linux Server
Only show difference	Selected
Type of difference	Between CMDB record and discovery source
Discovery Source	[is][Tivoli]
Field to compare	Location
Limit results to	All

Components related to CMDB 360

Several types of components are related to CMDB 360 (included in the com.snc.cmdb plugin), such as tables and properties.

Properties

Open the CMDB 360 Properties page by navigating to **All** > **Configuration** > **CMDB 360 Properties**. You can hover over the '?' icon for a property, to show property names.

You must have the cmdb_ms_admin role to modify property values.

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Property	Description
glide.identification_engine.multisource_enabled	Enables CMDB 360. • Type: true | false • Default value: false • Location: CMDB 360 Properties page
glide.identification_engine.multisource_cmdb_ci_enabled	Enables capturing CMDB 360 data for CIs from CMDB classes (derived from the cmdb_ci class). • Type: true | false • Default value: true • Location: CMDB 360 Properties page
glide.identification_engine.multisource_non_cmdb_ci_enabled	Enables capturing CMDB 360 data for CIs from non-CMDB classes (not derived from the cmdb_ci class). For example, the Serial Number [cmdb_serial_number] class, or the Software instance [cmdb_software_instance] class. • Type: true | false • Default value: false • Location: CMDB 360 Properties page
glide.identification_engine.multisource.query.batch.limit	Max number of items to show per query results page, in the CMDB 360 Report Builder. Changing the value of this property, might affect performance when running a query. • Type: numeric • Default value: 100 • Location: CMDB 360 Properties page
glide.identification_engine.multisource.query.max.limit	Max number of query results to show when you click **Load All Results** in the CMDB 360 Report Builder. Changing the value of this property, might affect performance when running a query.

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Property	Description
	• Type: numeric • Default value: 10000 • Location: CMDB 360 Properties page
glide.identification_engine.multisource.recompute.max.ci.limit	Max number of CIs that can be included in a CMDB 360 recompute operation. • Type: numeric • Default value: 100000 • Location: CMDB 360 Properties page
glide.cmdb.logger.source.cmdb_multisource	Enable logging for CMDB 360. CMDB 360 logs are stored in the Log [syslog] table with *source* set to "cmdb_multisource". • Type: string • Values: info, warn, error, debug, or debugVerbose • Location: Add to System Properties [sys_properties] table.

sn_cmdb_ws.ms.calculate_cmdb_only	Limits the scope of data in the Discovery sources tile in the CMDB 360 dashboard, to CMDB classes only (derived from the cmdb_ci class).
	• Type: true | false
	• Default value: true
	• Values:
	  ○ True: Include data only from CMDB classes.
	  ○ False: Include data from CMDB and non-CMDB tables.
	• Location: Add to System Properties [sys_properties]

sn_cmdb_ws.ms.report_class_ci_count_max_threshold	Threshold number of multisource records that when exceeded for a class, CMDB 360 Coverage charts in CMDB Workspace and in Service Graph Workspace stop

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Property	Description
	populating data for that class (CMDB or non-CMDB tables). When the specified threshold number is reached for a class, the system creates a record in the CMDB 360 Analytics Skipped Class [sn_cmdb_ws_ms_skip_class] table causing that class to be skipped in future job runs. **Note:** Managing class inclusion in the Coverage charts, by using this system property and the CMDB 360 Analytics Skipped Class [sn_cmdb_ws_ms_skip_class] table, can greatly decrease or increase performance of the Coverage chart job. • Type: numeric • Default value: 10 million • Location: Add to System Properties [sys_properties] • Learn more: CMDB 360 experience in CMDB Workspace and in Service Graph Workspace

Tables

Table	Description
CMDB 360 Data [cmdb_multisource_data]	CMDB 360 data store. Contains the raw data sent by all discov
CMDB MultiSource Column Metadata [cmdb_multisource_column_metadata]	Mapping of attributes for each class to floatable columns. Used performance of queries that involve high volumes of data.
CMDB Multisource Queries [cmdb_multisource_query]	CMDB 360 query definitions created by the user in CMDB Wor Service Graph Workspace.
Query Status [cmdb_multisource_query_status]	State of execution, of queries created in CMDB Workspace or i Graph Workspace.
CMDB Multisource Query Results	Results for queries created in CMDB Workspace or in Service G Workspace, configured with result type of CI records.

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Table	Description
[cmdb_multisource_query_result]	
CMDB Multisource Query Result Multisource Records [cmdb_multisource_query_result_ms_record]	Results for queries created in CMDB Workspace or in Service C Workspace, configured with result type of CMDB 360 records.
CMDB Multisource Query Result Discovery Sources [cmdb_multisource_query_result_disco_source]	Results for queries created in CMDB Workspace or in Service C Workspace, configured with result type of Discovery source rec
CMDB MultiSource Recompute Task CIs [cmdb_multisource_recomp_task_ci]	All CIs that are involved in a recompute operation.
CMDB Multisource Recompute Tasks [cmdb_multisource_recomp_task]	Recomputation requests and progress status.
CMDB 360 denied classes [cmdb_multisource_deny_class]	Classes that are excluded from CMDB 360 data collection and For any class with an active record, there won't be any data in t Data [cmdb_multisource_data] table.
CMDB 360 Analytics Skipped Class [sn_cmdb_ws_ms_skip_class]	Internally used to store records of classes for which the threshold number of CMDB 360 records, as set in the *sn_cmdb_ws.ms.report_class_ci_count_max_thi* property, has exceeded. Classes in this table are excluded from charts in CMDB Workspace and in Service Graph Workspace. You can set the *Override class CI records popula* column for an excluded class to 'true', to include it in Coverage computations. **Note:** Managing class inclusion in the Coverage charts, by using this table and the *sn_cmdb_ws.ms.report_class_ci_count_max_* system property, can greatly decrease or increase perform Coverage chart job.

Roles

Role	Description
cmdb_ms_read	Can access and run a CMDB 360 query but can't create a query. Contains cmdb_read role.
cmdb_ms_editor	Can create and run a query, has full read and write access, but can't do Recompute. Contains cmdb_ms_read role.
cmdb_ms_admin	Can create and run a query, and can modify CMDB 360 properties. Contains cmdb_ms_write role.

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CMDB data management

The integrity and health of the CMDB is essential for the various features that depend on the data in the CMDB. As the CMDB grows and infrastructures change, the CMDB can accumulate stale, duplicate, or outdated CIs and therefore no longer accurately reflect the IT infrastructure and applications in the organization.

The CMDB Data Manager is an essential tool where you can create, publish, and manage policies that reflect organizational needs for data management. The CMDB Data Manager is a comprehensive and integrated solution that scales to large CMDBs. It supports bulk management of CI life cycle operations such as deletion, archival, and attestation. Use the CMDB Data Manager to automate and govern CI life cycle operations to help maintain the CMDB in a healthy and efficient operational state.

Managing duplicate CIs is also an important data management task that helps maintain the health of the CMDB.

Working with CMDB Data Manager

CMDB Data Manager is a policy-driven framework for bulk management of CI life-cycle operations such as deletion, archival, and attestation. The CMDB Data Manager is a comprehensive and integrated solution that scales to large CMDBs and copes with rapid changes in a cloud-based world.

Large CMDBs can over time accumulate large amounts of stale CIs that can impact overall performance. Custom mitigating solutions can be difficult to develop and to maintain, and are also prone to errors. The CMDB Data Manager is the tool where you can create, publish, and manage policies. Create policies to automate and govern CI life-cycle operations to help maintain the CMDB in a healthy and efficient operational state.

Use the CMDB Data Manager to create policies that represent your organizational processes for managing the life cycle of CIs such as:

- Retire all computers without owners that were created more than a year ago ('Retire' policy type).
- Archive all Linux servers in the Seattle datacenter that haven't been updated for six months ('Archive' policy type).
- Delete all containers that haven't been discovered in the past week ('Delete' policy type).
- Attest all the CIs in a specified location (Attestation policy type).
- Approve cascade-delete, archive, or retire life-cycle tasks generated by dependent CI management.
- Delete orphan, stale, or irrelevant records in non-CMDB related tables. The non-CMDB Related tables in the Related Entry [cmdb_related_entry] table have references to CMDB tables. A CI in a related table can, for example, become orphan if the referenced CI in the CMDB is deleted ('Delete CMDB Related Entry' policy type).
- Certify that attributes have a specific value required for the business.

You can apply CMDB Data Manager policies only to classes that extend the Configuration Item [cmdb_ci] table.

CMDB Data Manager experience in CMDB Workspace and in Service Graph Workspace

You can use the CMDB Workspace landing page and its views or the Service Graph Workspace governance view to fully administer CMDB Data Manager, access high-level analytic and counts

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for its policies and tasks, and review your tasks. For more information, see CMDB Data Manager experience in CMDB Workspace and in Service Graph Workspace.

Terms

Policy

A CMDB Data Manager policy captures the overall management plan for a life-cycle event, such as CI retirement. A policy is associated with a subflow (the policy subflow) which creates the tasks (the policy tasks) for the target CIs of the policy. A policy is configured with a policy type and the policy tasks perform operations associated with that policy type, such as archiving or deleting a CI record. Also, you can configure a policy to require an approval.

The policy type, policy subflow, and policy tasks are all aligned to a specific CI life-cycle event. For example, a policy set with the delete policy type is associated with the delete subflow, and its policy tasks handle the deletion of CIs.

A daily scheduled job processes all published CMDB Data Manager policies.

Policy subflow

The policy subflow contains the underlying logic to process a life-cycle event such as retire or delete. If the policy is configured to require approval, then the policy subflow runs only after a policy task is approved.

The base system provides several common subflows such as delete, archive, and retire, which you can use with policies. You can also create custom subflows for your organization.

Policy task

A separate task is created and assigned to each unique *Managed By Group* value within the set of target CIs in a policy. A policy task triggers the policy subflow, tracks the set of target CIs for the task, and handles the approval of the task, if necessary.

If a policy requires an approval, the policy tasks don't trigger the policy subflow until a member of the group assignment in the *Managed by Group* attribute of the target CIs, approves the tasks. If a task is rejected or if the *Managed by Group* attribute is empty, the task is assigned to an administrator who must manually intervene to resolve the task.

If a policy isn't configured to require an approval, then the policy tasks are automatically approved.

CI exclusion list

A set of CIs to which policies of a specified type don't apply.

Policy types

You can create policies of the following types:

Delete

Use to remove a CI from its current table with no option to restore the CI into an active state.

Retire

Use to retire a CI while keeping the CI active in list views and in processes such as CMDB Health.

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Attestation

Use to assign and process attestation tasks that verify the existence of actual IT infrastructure and applications that you own. As CIs are continuously ingested into the CMDB from various data sources, attesting CIs support the integrity of the CMDB. For more information about using the Attestation policy type, see CIs attestation.

Archive

Use to remove a CI from its current table and store the CI in a separate archive table for temporary retention. Archiving a CI excludes the CI from views and from features such as maps and the relations formatter. During the retention period, you can restore CIs into active state. At the end of the retention period, archived CIs are deleted from their archive table.

Delete CMDB Related Entry

Use to clean up any irrelevant or stale data from related tables to help keep CMDB data healthy and relevant as the state of referenced CIs change.

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

Certification

Use to certify that specific attributes are of a specific value.

You can implement your Retire, Delete, and Archive policies so that they follow Common Service Data Model (CSDM) standards where for example, CIs are archived and deleted only when a CI is already in retired state. When you create these life-cycle policies, the system applies processes to manage any dependent CIs that might be left behind. For more details about these processes and about verifying that the feature is enabled, see Dependent CIs management.

ServiceNow AI Platform® data archiving

The functionality that the Archive policy type in CMDB Data Manager provides, relies and extends the ServiceNow AI Platform® data archiving feature, applied specifically for CMDB CIs. While processing an Archive policy to archive CMDB CIs, CMDB Data Manager uses components and processes of ServiceNow AI Platform® data archiving in the following ways:

- The Archive Rule [sys_archive] table contains the ServiceNow AI Platform® archive rules including the *`Archive Configuration Items`* CMDB archive rule which CMDB Data Manager Archive policies use.
- Data Manager relies on the *`Archive`* scheduled job to run (every hour by default) and process CMDB Data Manager archive policies. The *`Archive`* scheduled job is stored in the Schedule Item [sys_trigger] table.
- In the ServiceNow AI Platform® table Archive Job Execution Chunks [sys_archive_run_chunk], the *`Keys`* attribute contains the sys_ids of the CMDB CIs to be archived (where Rule ID is the CMDB archive rule ID).
- Archived records are stored in the ServiceNow AI Platform® archive tables, which are prefixed by 'ar_'. In a similar way, the first time that a CMDB archive job runs, it creates an archive table for each CMDB class (prefixed by 'ar_cmdb'). The initial CMDB archive task, therefore, takes longer than subsequent CMDB archive tasks.

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For each Data Manager archive policy, the system batches the policy CIs to be archived into batches of 1000 CIs. The sys_archive_run_chunk table contains a record for each of the batches.

CMDB archive tables, such as ar_cmdb_ci_computer, are listed under **All** > **System Archiving** > **Archive Tables**.

When using the CMDB Data Manager to archive CIs, you can also directly apply ServiceNow AI Platform® data archiving features, such as restore CIs into active state during a CIs retention period.

CI life cycle management

You can use life-cycle policies in CMDB Data Manager to manage the life cycle of CIs. Those life-cycle policies use retirement definitions that specify the retirement state for classes in your organization and support the transition of CIs through life cycle stages. For more information about accessing and managing retirement definitions, see Retirement definitions.

In general, CIs that are no longer needed should be retired. Then, to complete the CI life-cycle, retired CIs should be deleted or archived according to business needs. The following high level steps describe how to manage CIs' life cycle:

1. Use a non-production instance as a safe environment for configuring and testing life-cycle management in your organization.
2. Choose the CI class for which you want to define a retirement definition while carefully considering derivation. Due to derivation, the retirement definition that you are specifying for a class, is also in effect for all child classes that don’t have their own retirement definition.
3. Specify the retirement definition for the class.
4. Create a retirement policy targeting the CIs that you want to retire.
5. Create a delete or an archive policy targeting the retired CIs.
6. After testing and verification that the entire life-cycle management plan works as intended, transfer all of those configurations to the production instance.

The life cycle state of a CI affects the CIs visibility and inclusion in ongoing CMDB processes:

- A retired CI isn't excluded from any views or processes such as CMDB Health.
- An archived CI no longer exists in its active table and instead it's stored in a separate archive table. Archived CIs are no longer visible or included in processes such as list views, maps, and relations formatters. Archived CIs can be retained for a specified retention period before being deleted from the archive table. During the retention period, archived CIs can be manually restored into an active state by using the ServiceNow AI Platform® feature to restore CIs into active state.

Note:
Deleting a CI is an irreversible operation. A deleted CI no longer exists in the table that it belonged to and there's no way to restore it to an active state.

Configure the environment for CMDB Data Manager

Prepare your environment for using the CMDB Data Manager:

1. Some policy types such as the life-cycle policies Retire, Archive, and Delete, require that an active retirement definition exists for each targeted class in the policy. This requirement doesn't apply to all policy types. For example, this requirement doesn't apply to the Attestation

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policy type. If you attempt to create a policy of a policy type for which this requirement applies but isn't met, an error message appears and the operation fails.

2. You can streamline approval of policies by populating the *Manage by Group* attribute of CIs that you plan to target in policies. Use the CI Class Manager to populate that attribute for an entire class, in a single synchronization operation. For more information about this data synchronization, see Set the group for a CI or an entire class of CIs. If the *Managed by Group* attribute isn't populated for a CI, then the approval process is directed to the administrator.

Retirement definitions

Specify a retirement definition for a class, to reflect protocols in your organization applicable to the class and to its child classes. These definitions support the transition of CIs through life cycle stages as implemented by CMDB Data Manager life-cycle policies. A class can have a retirement definition by derivation, or by a retirement definition specified for that class.

CMDB Data Manager requirement and usage

An active retirement definition is required for each targeted class in a Retire, Archive, or Delete CMDB Data Manager policy. A retirement definition is used to flag a CI as retired according to the CI's class retirement definition in effect. When retiring a CI, the CI's attributes are set according to the retirement definition for the CI's class. A subsequent operation such as delete or archive, that needs to be applied to retired CIs, first checks if a CI is in a retired state by verifying that it satisfies the retirement definition for its class.

Retirement definitions are used in life-cycle policies as follows:

- Setting target CIs in Retire policies, according to their associated class retirement definitions.
- Filtering out target CIs In Retire policies, that are determined to already be in a retired state according to their associated retirement definitions. Those CIs aren't targeted even if they meet the policy filter.
- Identifying CIs as being ready to be processed by an Archive or Delete policies. Archive and Delete policies can only process CIs that are in a retired state that matches their associated class retirement definition. Therefore, target CIs in Archive and Delete policies, are checked against their associated class retirement definition to verify that they are in a retired state before they can be archived or deleted.

Derivation across the CMDB hierarchy

Retirement definitions are derived throughout the CMDB hierarchy in the same way that rules, such as identification rules, are derived. Child classes extended from a parent class with a retirement definition, derive that definition unless there's a retirement definition defined at the child class level.

When retirement definitions for classes exist in different levels in the class hierarchy, then the retirement definition that applies is the one that is most specific for a class. For example, if there are retirement definitions for both, the Computer and the Configuration Item class, then the Computer class definition also applies to its descendant classes. All other classes that aren't descendants of the Computer class, use the Configuration Item retirement definition.

Always be aware of the automatic derivation of retirement definitions throughout the class hierarchy. For example, an active retirement definition for the Configuration Item [cmdb_ci] class can potentially be in effect throughout the entire CMDB hierarchy (aside from classes with their own retirement definition).

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Predefined retirement definitions

The base system includes predefined retirement definitions for key classes such as Hardware [cmdb_ci_hardware] and Application [cmdb_ci_appl], and are stored in the CMDB Retirement Custom Definitions [cmdb_retirement_custom_definitions] table. For example, the predefined retirement definition for the Service [cmdb_ci_service] class specifies that for a retired CI, the value of the attributes [operational status], [Phase], and [Status] is **Retired**.

Retirement definition for the Configuration item [cmdb_ci] class behaves in the following important ways:

- It is active by default and you can't deactivate it.
- You can't delete it.
- By default, it is in effect throughout the entire CMDB hierarchy due to derivation.

The rest of the predefined retirement definitions are inactive by default, and you must activate a retirement definition that corresponds to a targeted class in a Retire, Archive, or Delete CMDB Data Manager policy.

You can use the default retirement definitions, or customize a definition to reflect practices in your organization. You can also add a custom retirement definition for a class. However, each CMDB class can be associated with only a single retirement definition.

To manage or delete a retirement definition, see Manage retirement definitions.

Manage notifications for CMDB Data Manager

The CMDB Data Manager supports several types of notifications that alert administrators, task assignees, and approvers about policy execution outcomes, task life-cycle events, and pending actions. All notifications are delivered via email using ServiceNow® event-driven email actions.

The following system properties control different behaviors of notifications:

- cmdb.data.manager.stale.tasks.notifications.frequency
- sn_cmdb_ws.cmdb.dm.policy_types.due_date_notification
- sn_cmdb_ws.glide.cmdb.data_manager.rejected.task.notifications.group
- cmdb.data.manager.stale.task.life.in.days

For information about these properties, see Components related to CMDB Data Manager.

Most notifications don't require special configuration and trigger automatically when their specified conditions are met. Recipients are determined by role (such as data_manager_admin), task assignment, approval group membership, or a configurable user group. For information about the **Run policy scheduled job as**, **Run as**, and other policy setting, see Create a CMDB Data Manager policy.

Notifications

There are the notifications generated by the CMDB Data Manager, listed by the respective subject line of each notification email:

FAILED: A CMDB Data Manager policy has failed to run

Trigger conditions	Evaluation of a CMDB Data Manager policy encountered an error during execution.

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Recipients	• Users with data_manager_admin role • The policy's Run as user
Configuration	None

FAILED: A CMDB Data Manager task has failed

The notification email includes a link to the policy and failure details from the task close notes.

Trigger conditions	A task's associated subflow failed during execution.
Recipients	• Users with data_manager_admin role • The policy's Run as user
Configuration	None

ACTION REQUIRED: A CMDB Data Manager task needs review

The periodic (based on settings) email reminders contain the task number, creation date, and a link to the task.

Trigger conditions	A task is open with no recent notifications within the configured frequency window.
Recipients	The task's approval approvers, based on records in the Approvals [sysapproval_approver] table, where *State*=**Requested**.
Configuration	Properties in the CMDB Data Manager Settings page: • *cmdb.data.manager.stale.tasks.notifications.frequency* • *cmdb.data.manager.stale.task.life.in.days*

cmdb_data_management_task {task number} Approval Request

Sending this notification depends on whether the policy type is configured to require a review. For information about the **Needs review** field, see Create a CMDB Data Manager policy.

Trigger conditions	Task ready for approvals.
Recipients	Approval group members determined by the policy configuration.
Configuration	None

Due date is approaching for ${number}

Trigger conditions	An active task that has a due date, and which is assigned. Sends reminder notifications at milestone intervals before due date.
Recipients	The *assigned_to* user.

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Configuration	Property in the CMDB Data Manager Settings page: *sn_cmdb_ws.cmdb.dm.policy_types.due_date_notification*.

Due date breached for ${number}

Trigger conditions	An open task with a due date that has passed.
Recipients	• assigned_to user • assigned_to.manager
Configuration	Property in the CMDB Data Manager Settings page: *sn_cmdb_ws.cmdb.dm.policy_types.due_date_notification*.

CMDB Attestation task ${number} completed

Email notification includes a CI summary (total, attested, rejected counts), who completed the task, and when.

Trigger conditions	User closes/submits an attestation task in the workspace.
Recipients	Users with data_manager_admin role.
Configuration	None

CMDB Data Manager task ${number} rejected

Email notification includes rejection reason/comments and task link. This notification applies to all policy types.

Trigger conditions	User rejects a task during a review in the workspace.
Recipients	• Members of group configured in system properties: *sn_cmdb_ws.glide.cmdb.data_manager.rejected.task.notificatio* • Falls back to data_manager_admin role if no group is set.
Configuration	System property *sn_cmdb_ws.glide.cmdb.data_manager.rejected.task.notification*

CMDB Data Manager experience in CMDB Workspace and in Service Graph Workspace

Use the CMDB Data Manager in CMDB Workspace or in Service Graph Workspace to administer policies, CIs life-cycle and attestation tasks, view analytics about on-going CMDB Data Manager processes, and to approve or reject assigned tasks.

Use the CMDB Workspace or Service Graph Workspace store app landing page and its views to administer CMDB Data Manager, to access overall analytic and counts for its policies and tasks, and review your tasks:

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- Use the Management view in CMDB Workspace or the Governance view in Service Graph Workspaceto create and track policies, and to manage exclusion lists and retirement definitions.
- Use the Important actions tile on the CMDB Workspace landing page to access data attestation and life cycle approval tasks such as reassignment requests and unassigned overdue tasks. Drill down these task cards to see further details about the tasks.
- Use the My work tile on the CMDB Workspace landing page to access all open tasks, which are assigned to you, or to the group assigned in the *Managed by Group* attribute and which you're a member of. For CMDB administrators, any unassigned tasks are also included for reassignment. Review and process all tasks. Review and process attestation tasks by checking the physical existence of IT infrastructure or applications associated with the CIs in the tasks.
- Use the My Work view in CMDB Workspace to access attestation and non-attestation tasks that are assigned to you or to an assignment group that you belong to in accordance with CMDB Data Manager policies. Overdue attestation tasks appear in a separated **Overdue tasks** list.

Manage policies in CMDB Data Manager in CMDB Workspace or in Service Graph Workspace:

- Create a CMDB Data Manager policy
- Review CMDB Data Manager tasks
- Review CMDB Data Manager attestation tasks in CMDB Workspace or in Service Graph Workspace
- Manage retirement definitions for CMDB Data Manager
- Manage exclusion lists for CMDB Data Manager

Administer CMDB Data Manager

As a CMDB administrator, you can create policies, manage CI attestation, manage CI exclusion lists, access CMDB Data Manager insights, and access subflows and settings that are used in the CMDB Data Manager.

You can administer CMDB Data Manager using the CMDB Workspace store app or the Service Graph Workspace store app.

You can administer CMDB Data Manager using the CMDB Workspace store app or the Service Graph Workspace store app

Get started with CMDB Data Manager

The Data Manager overview page in CMDB Workspace and in Service Graph Workspace provides a dashboard view of Data Manager tasks, and lets you get started in using the CMDB Data Manager.

Before you begin

Role required: sn_cmdb_admin

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Procedure

1. Open either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace**, and then select the **Data Manager** quick link on the Home view.
   - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Governance icon. Then, in the Governance navigation pane, select **Data Manager overview**.
2. Select **Data Manager overview** in the left navigation bar.
   The Data Manager overview page provides the following cards:

   Open tasks

   Count of the open tasks created for Data Manager policies.

   Drill down the card to open a list view with details of the tasks associated with the card.

   Unassigned tasks

   Count of the open tasks created for Data Manager policies, which aren't assigned.

   Drill down the card to open a list view with details of the tasks associated with the card.

   Pending tasks

   Tasks in Pending state, such as archive tasks where archive is still being processed.

   Closed incomplete tasks

   Tasks that encountered errors while processing, resulting with the task not completing successfully. Such tasks are in a Closed Incomplete state.

   Overdue tasks

   Count of tasks with a due date, such as attestation tasks, whose due date has passed.

   Aging tasks

   A bar chart showing counts of tasks without a due date and with no activity for over the number of days specified by the *sn_cmdb_ws.glide.cmdb.data.manager.aging.policy.task.timeframe* system property (30 by default).

   Policies failing evaluation

   Policies whose evaluation failed at some point and are in an error state. These policies require your attention, and after resolving any issues, you can publish them again.

   Workload

   - Groups: Tasks that are assigned to a group.
   - Individuals: Tasks that are assigned to individual users.

What to do next

- Create a CMDB Data Manager policy.
- Manage retirement definitions for CMDB Data Manager.
- Manage exclusion lists for CMDB Data Manager.

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- View CMDB Data Manager analytics.
- View properties and other settings for CMDB Data Manager by selecting **Settings** in the left navigation pane. For details about the system properties associated with those settings, see Components related to CMDB Data Manager.

Manage retirement definitions for CMDB Data Manager

Use CMDB Workspace or Service Graph Workspace to create, delete, edit, or activate retirement definitions in your organization, for a class. Tables that are targeted in CMDB Data Manager life-cycle policies, must be associated with an active retirement definition. Target CIs in Retire policies, are set to match their associated class retirement definitions.

Before you begin

Role required: sn_cmdb_admin

About this task

Some retirement definitions in the base system are inactive and you must activate any retirement definition that you want to use with a CMDB Data Manager life-cycle policy by setting its *Active* attribute to **true**. Retirement definitions are stored in the CMDB Retirement Custom Definitions [cmdb_retirement_custom_definitions] table.

When a CMDB Data manager retires a CI, ensure that any of its dependent CIs are also retired and don't remain as orphan CIs, by enabling management of dependent CIs. Orphan CIs can impact the consistency, accuracy, and integrity of the CMDB.

- For information about enabling and managing dependent CIs, especially in the context of cascade-retire, cascade-archive, and cascade-delete, see Dependent CIs management.
- For details and definitions of independent and dependent CIs, see CMDB classifications and class dependency.

Note:

- Always be aware of the automatic derivation of retirement definitions throughout the class hierarchy. For example, an active retirement definition for the Configuration Item [cmdb_ci] class can potentially be in effect throughout the entire CMDB hierarchy (aside from classes with their own retirement definition).
- You can't deactivate (or delete) the retirement definition of the Configuration Item [cmdb_ci] class.
- Each CMDB class can be associated with only a single retirement definition.

Procedure

1. Open either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace**, and then select the **Data Manager** quick link on the Home view.
   - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Governance icon. Then, in the Governance pane, select **Data Manager overview**.
2. In the Get started area on the Data Manager overview page, select **Manage retirement definitions**.
3. On the Data Manager settings page, review the Retirement definitions list view.

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a. **Optional:** Drill down to a definition and then, on the Retirement definition form, toggle the **Active** switch to activate or deactivate a definition.

b. **Optional:** Edit the conditions on the definition.

c. Select **Save definition**.

4. On the Data Manager settings page, select **Add definition**.
5. Fill out the Retirement definition form and then select **Save definition**.

Field	Description
Active	Toggles the retirement definition between active and inactive.
Table	Table that the retirement definition applies to. The retirement definition will be derived by all child classes of the specified parent class.
Condition builder	Condition that reflects on what retirement means in the organization. Target CIs in Retire policies that belong to the specified table are set as specified in the retirement definition. You can, therefore, only use **AND** clauses in the definition. **OR** clauses aren't applicable.

Delete a CMDB Data Manager retirement definition

Delete a retirement definition that is no longer needed by CMDB Data Manager, in CMDB Workspace or in Service Graph Workspace.

Before you begin

The following restrictions are in effect:

- The retirement definition that you want to delete must be in an inactive mode (*Active* = **false**).
- The retirement definition for the Configuration Item [cmdb_ci] class can't be deleted.

Role required: sn_cmdb_admin, data_manager_admin

About this task

Procedure

1. Open either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace**, and then select the **Data Manager** quick link on the Home view.
   - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Governance icon. Then, in the Governance pane, select **Data Manager overview**.
2. In the Get started area on the Data Manager overview page, select **Manage retirement definitions**.
3. On the Data Manager settings page, in the Retirement definitions tile select the retirement definition that you want to delete.

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4. On the Retirement definition page, select **Delete definition**.
5. In the Deleted retirement definition dialog box, select **Delete**.

Result
After the deletion, a retirement definition for the class is derived from a parent class.

Manage exclusion lists for CMDB Data Manager

Create and manage exclusion lists for the various policy types used in CMDB Data Manager, in CMDB Workspace or in Service Graph Workspace. Policies of the specified type won't target CIs and other records in the exclusion list for that policy type.

Before you begin
Role required: sn_cmdb_admin

About this task

Note:
The Certification policy type doesn't support exclusion lists.

Procedure
1. Open either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace**, and then select the **Data Manager** quick link on the Home view.
   - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Governance icon. Then, in the Governance pane, select **Data Manager overview**.
2. Select **Excluded records** in the left-side bar.
   The Excluded records list view shows lists of all records currently excluded, grouped by policy type. You can expand any group to show its CIs and other records and then drill down to any record.
3. **Optional:** Remove excluded records from the exclusion list:
   a. Expand a policy type group to show its list of excluded records.
   b. In the list view, select the records that you want to remove from the exclusion list.
   c. Select **Remove from list**
   d. In the Confirm removal from exclusion list dialog box, select **Confirm**.
   The selected records are removed from the exclusion list and can be targeted for the policy type.
4. **Optional:** Add records to an exclusion list:
   a. Select **Exclude Records** and fill out the Data Filter form.

Field	Description
Tables	Table from which to select CIs or records for the exclusion list.
Filter conditions	Use the condition builder to specify the criteria that CIs or records from the specified **Tables** must meet to be included in the exclusion list.

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Field	Description
Related List Condition	Add a condition that is based on related lists that are associated with the records that you want to exclude.

b. Select **Apply filters** and then review the Search results list.

c. Select the records that you want to add to exclusion lists and then select **Continue**.

d. On the Select policy type page, select the policy types for which to exclude the selected records and then select **Continue**.

e. Review the details of the exclusion on the summary page and then select **Save**.

Create a CMDB Data Manager policy

Create a CMDB Data Manager policy in CMDB Workspace or Service Graph Workspace to automatically process CIs life-cycle events such as deletion. Applying consistent and standard life-cycle policies to CIs helps maintain the health of the CMDB.

Before you begin

- The life-cycle policies Retire, Archive, and Delete, require that an active retirement definition exists for each targeted class in the policy. If you attempt to create a policy of a policy type for which this requirement applies but isn't met, an error message appears and the operation fails.

  For more information about retirement definitions, see Retirement definitions.

- Verify that any custom subflow that you want to associate with a policy exists:

  1. Open either workspace:
     - Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar. Then, select the **Data Manager** link in Management tools, in the Manage section.
     - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Governance icon. Then, in the Governance pane, select **Data Manager overview**.
  2. Select **Subflows** in the navigation bar on the left.
  3. Review the subflows on the Data Manager subflows page, and drill down to a subflow to open it in Workflow Studio.
  4. Select **Create new subflow** to create a new subflow in Workflow Studio.

- To require a review and an approval for a policy task: Ensure that the *Managed By Group* attribute is populated in target CIs and that the assigned users have the privilege to approve the policy tasks.

- When Asset Management is activated, check if there's an asset record associated with that CI before retiring the CI. Check the associated asset record, if there's one, and verify that its asset state (install_status) is *Retired*.

Role required: sn_cmdb_admin

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About this task

Specify for each policy a policy type, a subflow for life-cycle policies, a set of CIs to operate on as target CIs, and any other options specific to the selected policy type. Target CIs must typically be from classes extending the Configuration Item [cmdb_ci] table, and with the Delete CMDB Related Entry policy type, also tables in the Related Entries [cmdb_related_entry] table. However, the Certification policy type for example, also supports non-CMDB tables. Many fields dynamically appear on the form based on how you set previous fields and some fields are specific to the policy type that you set.

Set condition filters to specify the initial set of CIs that the policy applies to. You can then further narrow down the initial set of CIs by using a CI exclusion list for the policy type. During the final preview of the policy, or from a policy task, you can select individual CIs to also exclude for the policy type. In addition, for operations that require that CIs are in a retired state, retirement definitions are enforced. The policy eventually applies to the resulting set of CIs, after applying all those filters.

Note:
CMDB Data Manager limits the number of target CIs per task to 10,000. Therefore, when a task exceeds that number, Data Manager automatically creates as many additional tasks as needed to include all the CIs for the task. For example, if you target 30,000 CIs in an attestation task, Data Manager breaks down that task into three tasks, each targeting 10,000 CIs.

For more information about life-cycle state definitions and other concepts for working with the CMDB Data Manager, see Working with CMDB Data Manager.

Procedure

1. Open either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar. Then, select the **Data Manager** link in Management tools, in the Manage section.
   - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Governance icon. Then, in the Governance pane, select **Data Manager overview**.
2. Select **Policies** in the left-side bar.
   For information about the Policies page, see View CMDB Data Manager policies.
3. Select **Create new policy**.
4. Fill out the General information form and then select **Continue**.

Field	Description
Name	Unique name for the policy.
Description	Description for the policy.
Policy type	Life-cycle event or data management action, such as Delete or Attestation, that this policy manages, indicating the type of actions to perform on target CIs. Your **Policy Type** setting determines which fields appear in the forms that follow.

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Field	Description
Work notes	Notes that are internal and visible only to administrators.

5. Fill out the Data Filter form.

   a. Fill out filter conditions for the target CIs and records for the policy.

Field	Description
Table	Table from which to select target CIs or records for the policy. Only classes that you have read access to, are available for selection.
Filter conditions	Use the condition builder to specify the criteria that CIs from the specified **Table** must meet to be included as target CIs for the policy. Select **New condition set** to add a condition to the filter.
Related List Condition	Add a condition that is based on related lists that are associated with the target records for the policy.

   b. Select **Apply filters** and then review the results of the impact analysis.

   This analysis estimates the number of CIs that the policy applies to based on the policy filters, any CI exclusion lists, and the life cycle stage of CIs. For example:

   - If the policy type is retired, CIs that meet the policy filters but are already in a retired state according to the class retirement definitions, aren't targeted for the policy.
   - If the policy type is archive or delete, CIs that meet the policy filters but aren't retired according to the class retirement definitions, aren’t targeted for the policy. A filter on the *Life Cycle Stage* or the *Life Cycle Stage Status* attributes has no effect if the respective class retirement definition is based on those attributes.

   Review the lists in the following tabs:

   - **Included records**: You can select records to be excluded from the policy, and select **Exclude records**.
   - **Excluded records**: Select records to be included in the policy, and select **Include records**.

     Note:
     The Excluded records tab doesn't appear when the policy type is Certification.

   c. Select **Continue**.

6. Fill out the Assignment form and then select **Continue**.

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a. Set the **Assignment type** and then the **Task assignment** field that appears, to specify the type of assignment and the table columns to use for assigning the policy tasks. The drop-down list in **Task assignment** is dynamically populated with columns in the table that the policy is created for, and that reference **Assignment type** tables, as follows:

   - **User Field**: Assigns policy tasks to a user in the user field specified in **Task assignment**. The drop-down list in **Task assignment** contains fields in the table set by the data filter, that reference the User [sys_user] table (such as *Attested by* and *Assigned to*).

     During assignment, records will be grouped based on the selected column, allocated to tasks, and then the tasks will be assigned to the resulting users.

   - **User Group Field**: Assigns policy tasks to the user group in the user group field specified in **Task assignment**. The drop-down list in **Task assignment** contains fields from the table set in the data filter, that reference the Groups [sys_user_group] table (such as *Change Group* and *Support Group*).

     During assignment, records will be grouped based on the selected column, allocated to tasks, and then the tasks will be assigned to the resulting user group.

   - **Specific User**: Assigns policy tasks to the user specified in **Task assignment**. The drop-down list in **Task assignment** contains users with the *data_manager_user* role.
   - **Specific User Group**: Assigns policy tasks to the user group specified in **Task assignment**. The drop-down list in **Task assignment** contains user groups that are either directly associated with the *data_manager_user* role, or contain at least one user with the *data_manager_user* role.

   In the **User Group Field** and **User Field** you can use dot-walking by selecting the search icon for the field. In the selection dialog box, drill down lists by expanding or selecting list items that are links (usually appear in a unique text color).

b. For certification and attestation tasks, set the **If task assignment field is empty** field to create assigned or unassigned tasks in cases where the specified task assignment field is empty. If you select to create an assigned task, then depending on the **Assignment type** setting, select the user or user group to assign a task to in that situation. Unassigned tasks are later reviewed by an administrator for assignment.

7. Fill out the Options form and then select **Continue**.
   The options that appear depends on whether they are relevant to the selected policy type. Therefore, some of the following options don't appear on your form. For example, not all policy types are associated with a subflow.

Field	Description
Days to complete	Maximum number of days that policy tasks must be completed by. If notifications are enabled for certification or attestation tasks, then this number is used to calculate the milestones for sending notifications. The full time (100%) interval starts when a task is created and ends when the number of days to complete the task arrives. Notifications are sent if a task isn't closed when 50%, 70%, and 90% of that interval passes. For more information about

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Field	Description
	setting those notifications, see Components related to CMDB Data Manager.
Subflow	A subflow with the actions that will run on the target CIs for the policy. The subflow typically matches the policy type. For example, if **Policy type** is set to **Delete CMDB Related Entry**, then set **Subflow** to **Delete Related Entry Configuration Item**.
Needs review	Option to require a review and an approval of the policy tasks, by the group assignment in CIs' *Managed by Group* attribute or by an administrator. Otherwise, all policy tasks are approved automatically.
Retention time	The length of time for retaining archived CIs in the archive table before they're deleted. During the specified retention period, you can use the ServiceNow AI Platform® data archiving feature to restore archived CIs. **Note:** You can't use the CMDB Data Manager to re-archive a CI that was previously archived and restored.
Display fields	One or more fields that appear in list views in Data Certification tasks, that uniquely identify the records that require certification. The selected fields can't overlap fields in **Certification fields**.
Certification fields	One or more fields whose value requires verification and certification. The selected fields can't overlap fields in **Display fields**.
Allow field updates	Option to allow certification task reviewers to update field values while reviewing CIs.

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Field	Description
	○ When selected, certification task reviewers can update field values in order to certify a CI. ○ When clear, certification task reviewer can't update field values, and therefore reject CIs that aren't compliant.
Allow empty field values	Option to allow users to certify CIs with empty attributes: ○ When selected, certification task reviewers can certify or fail certification of a CI with an empty attribute. ○ When clear, certification task reviewers can fail certification of a CI with an empty attribute but aren't able to certify that CI.
Instructions	Any instructions to assigned users, to help them complete the tasks.

8. Fill out the Schedule form and then select **Continue**.

Field	Description
Schedule	Recurring schedule for how often and when to run the task. The **On demand** option doesn't set any recurring schedule for running the policy. To learn how to run a task configured with **On demand**, see 'What to do next' below. Your setting determines which other fields appear on the form.
Start time	Time in the day to start running the policy.
Day of the week	Day of the week to run the policy.
On	Day of the month to run the policy.
Start day and time	Date and time of first run of the policy.
Run after every	Interval (by days) between subsequent runs after running the policy for the first time.
Run policy scheduled job as	User to set the *Run as* field with, in scheduled jobs for attestation and certification tasks. By default, the drop-down list is populated with users in the Data Manager Scheduled Job Users user group and the field is set to the user specified by the *Scheduled job default user* property (DataManager

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Field	Description
	Job Runner). For more information about this property and the *Scheduled job default user* user role, see Components related to CMDB Data Manager.

9. Review the policy details on the Review form, and then select **Publish policy** to activate the policy or **Save & Exit** to save the policy as a draft.
   You can later continue to configure a draft policy, and then publish it when it's ready.

Result

After you publish a policy:

- A daily scheduled job processes the published policy and policy tasks are assigned according to the policy settings. If the policy is associated with a subflow, then policy tasks trigger the policy subflow. Policy execution issues are recorded in an error log with notifications sent to the CMDB Data Manager administrator.

  If the policy is configured to require an approval for its tasks, then email notifications are sent to members of the assignment group in the *Managed by Group* attribute of the CI. If the policy is associated with a subflow, then a policy task triggers the policy subflow only after the task is approved.

- If the policy is associated with a subflow, then after a policy task is complete, the policy subflow closes the task. For an Attestation policy (which isn't associated with a subflow), a user must process all CIs in the task and submit the task to close it.
- For Attestation policies, attestation tasks are assigned to users as specified, and those tasks appear in the CMDB Workspace and Service Graph Workspace store app when those users log in.
- For some policy types, such as **Delete**, the list of the target CIs is rolled up in a CSV file that is then attached to the task for tracking purposes.
- Stale tasks are set to **Closed Canceled** by a daily scheduled job. A task becomes stale when it's still open and not approved after at least 90 days. The number of days after which a task is considered stale is determined by the *cmdb.data.manager.stale.task.life.in.days* system property.

What to do next

- Publish a draft CMDB Data Manager policy.
- On the Policies page, in the Published policies list view, select a policy to see policy details on a policy form. Select **View Policy** to see the settings in all of the policy form pages.
- On the Policies page, in the Published policies list view, select a policy that you want to deactivate. On a policy form select **Deactivate Policy** to temporarily prevent the policy from running.
- Select **View Open Tasks** in the Open Policy Tasks tile to track the processing of policy tasks in the CMDB Data Management Task Control list view. The Success Percent column shows the percentage of CIs in the task for which the task is completed. A CI is counted as complete in an archival task only after the archival process has been fully completed for the CI (and isn't counted as complete while the CI is initially staged for archival for example).

- Run a policy on-demand. In general, the system generates a scheduled job for on-demand policies, prefixed with the policy name.

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- Run the scheduled job:
  1. Navigate to **System Definition** > **Scheduled Jobs**.
  2. Select the scheduled job for the task policy that you want to run.
  3. On the scheduled job form, select **Execute Now**.

- Users log int o CMDB Workspace or to Service Graph Workspace store app to review and process attestation tasks assigned to them.
- Users log in to CMDB Workspace or to Service Graph Workspace store app to review and process non-attestation tasks assigned to them.
- You can use update sets to transfer a policy between instances, in which case that policy is imported as a draft policy at the destination instance. You can later continue to configure the draft policy at the destination instance and then publish it when it's ready.

Publish a draft CMDB Data Manager policy

If you created a draft Data Manager policy, or imported legacy certification schedules, you can activate that draft policy by publishing it in CMDB Workspace or in Service Graph Workspace.

Before you begin

Role required: sn_cmdb_admin

Procedure

1. Open either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace**, and then select the **Data Manager** quick link on the Home view.
   - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Governance icon. Then, in the Governance pane, select **Data Manager overview**.
2. Select Policies in the left-side bar in the Data Manager overview page.
3. Select the Draft policies list view on the Data Manager policies page.
4. Select the policy that you want to publish and then, on the policy form, select **Edit Policy**.
5. Review any policy settings by selecting the pages to review in the left-side bar.
6. Select Review in the left-side bar and then, on the Review form select:
   a. **Publish Policy** to activate the policy.
   b. **Save & Exit** to save any changes and keep the policy in draft mode.

What to do next

Deactivate a policy to temporarily prevent the policy from running:

1. On the Policies page, select the Published policies list view.
2. Select a policy that you want to deactivate.
3. On a policy form select **Deactivate Policy**.

View CMDB Data Manager policies

View Data Manager policies on a dashboard view in CMDB Workspace or in Service Graph Workspace, with a timeline of upcoming scheduled policies, counts, and grouped by policy status.

Before you begin

Role required: sn_cmdb_admin

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Procedure

1. Open either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace**, and then select the **Data Manager** quick link on the Home view.
   - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Governance icon. Then, in the Governance pane, select **Data Manager overview**.
2. Select **Policies** in the left-side bar.

   Select a tab on the Data Manager policies page:

   - Published policies: Provides the following cards:

     Upcoming scheduled policies

     Timeline showing scheduled policies across time. On the timeline, you can:

     - Point to indicators to show details about a scheduled policy.
     - Zoom in or out to extend or shorten the time span of the timeline.
     - Go forward or backward in time.
     - Show or hid the timeline legend, where you can toggle the Attestation Policy switch to show or hide attestation policy indicators on the timeline.

     Policies

     Pie chart showing the breakdown of policies by policy type.

     Published policies

     List view of policies that are published. You can drill down a policy to show the policy form view with further details about the policy.

   - Draft policies: Policies in draft state.
   - De-activated policies: Policies that have been de-activated and therefore aren't active.
   - Policies failing evaluation: Policies that are invalid and therefore require your attention.

What to do next

- Create a CMDB Data Manager policy
- Manage retirement definitions for CMDB Data Manager

View CMDB Data Manager analytics

The CMDB Data Manager in CMDB Workspace and in Service Graph Workspace provides charts and counts that show the overall state of Data Manager policies in the organization. Review these details to track progress and to identify any problems that require your attention.

Before you begin

Role required: data_manager_admin or sn_cmdb_admin

Procedure

1. Open either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace**, and then select the **Data Manager** quick link on the Home view.
   - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Governance icon. Then, in the Governance pane, select **Data Manager overview**.

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2. Select **Analytics** in the left navigation bar.
   The Data Manager analytics page provides the following charts:

   CIs processed by lifecycle policies

   Counts of CIs processed by each type of lifecycle policy type such as Delete and Archive, over the past six months.

   Average time to close tasks

   Average number of days it took to close tasks, by general policy type such as lifecycle and attestation, over the past six months.

   Closed complete vs closed incomplete tasks

   Number of tasks per month, that were closed complete and incomplete, over the past year.

   Policy execution time

   Number of policies per day, broken by the length of execution time, over the past month.

Review CMDB Data Manager tasks

Review Data Manager tasks (such as life-cycle tasks) that are assigned to you, to an assignment group that you belong to, to people you manage, or to members of a group that you are the manager of. All in accordance with CMDB Data Manager policies. During the review, you can approve, cancel, reject, or reassign a task.

Before you begin

Role required: sn_cmdb_user, sn_cmdb_editor, or sn_cmdb_admin

Canceling a life-cycle task is available only for tasks that are in the 'Not started' status, and the required role is data_manager_admin or sn_cmdb_admin.

About this task

- To review attestation tasks, see Review CMDB Data Manager attestation tasks in CMDB Workspace or in Service Graph Workspace.
- To review certification tasks, see Review certification tasks.

Procedure

1. Navigate to either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace** and then select **My Work** in the CMDB Workspace menu bar.
   - Navigate to **Workspaces** > **Service Graph Workspace**, in the navigation panel select the Tasks icon, and then, in the Tasks navigation panel, select **Certification**.
2. In the My tasks section, select the **All other tasks** tab.
3. Review the Approval tasks list view and then select the task that you want to process.
4. Review the task details on the task form.
5. **Optional:** CMDB administrators can select **Cancel task** if the task isn't needed.
   The canceled task is deleted without any further processing.
6. **Optional:** Select **Reassign** if the task isn't appropriately assigned, and then select **Assign to me** or **Request reassignment** as appropriate.
7. **Optional:** Select **Review records** to review the target CIs and records for the task.

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a. Select any records that you want to exclude for the task and then select **Exclude**.
The records being excluded for the task are also being added to the exclusion list of the associated policy type. Therefore, these records will be excluded from any future tasks of the associated policy type.

b. Select **Reassign** if the task isn't appropriately assigned.

c. Select **Reject task** to reject a task, fill in a **Reason for rejection** and then select **Save**.

(Optional) You can only reject a task that is assigned to you.

After you reject a task, the *State* of the task is set to **Closed Canceled** and *Approval* is set to **Rejected**. Also, appropriate notifications are sent to members of the group specified in the *glide.cmdb.data_manager.rejected.task.notification_group* system property. For more information about how this property is used for notifications, see Components related to CMDB Data Manager.

d. Select **Assign to me** or **Request reassignment** as appropriate.

e. Select **Approve task** to trigger the subflow associated with the policy.

Duplicate CIs remediation

Duplicate CIs in the CMDB unnecessarily overload the system and interfere with the CMDB's integrity and reliability. It is therefore important to regularly use CMDB tools that detect and remediate duplicate CIs.

De-duplication tasks

When Identification and Reconciliation Engine (IRE) processes detect duplicate CIs, IRE groups each set of duplicate CIs into a de-duplication task for review and remediation. De-duplication tasks provide details about the duplication, including a list of all the duplicate CIs in the set. Review the details of each duplicate CI in the task and the data that was used to determine that the CI is a duplicate. For more information about IRE processes that detect duplicate CIs and generate de-duplication tasks, see Detecting duplicate CIs.

Under some circumstances, IRE doesn't automatically generate de-duplication tasks for duplicate CIs. To still remediate the duplication in such case, you must create the de-duplication task manually. For information about when this happens and how to manually create a task, see Manually create a de-duplication task.

Remediation of a de-duplication task consolidates its set of duplicate CIs into a single CI, eliminating the duplication.

To process de-duplication tasks (automatically-generated by IRE or manually created) to remediate duplicate CIs:

- In bulk: Use the De-duplication dashboard and the De-duplication Template Library in CMDB Workspace to:
  - Review de-duplication tasks
  - Remediate de-duplication tasks in bulk by using de-duplication templates
  - Gain insights into de-duplication counts and status in your organization

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Access the CI de-duplication experience in CMDB Workspace and in Service Graph Workspace to create de-duplication templates that remediate similar de-duplication tasks in bulk.

- A single task: Review de-duplication tasks (manual) and use the Duplicate CI Remediator wizard to process a single de-duplication task.

Main CI

The main CI plays a key role in the remediation of duplicate CIs. The main CI is one of the duplicate CIs that you want to retain as an active CI after reconciling the rest of the duplicate CIs into that main CI. You can then potentially retire or delete the rest of the duplicate CIs, or assign custom values to their attributes. The first step during remediation is to select a main CI for the remediation process. During remediation, you choose which attribute values, relationships, and related items from the duplicate CIs to reconcile into the main CI. Alternatively, you can choose not to consolidate any data and retain the main CI as it is.

The *duplicate_of* attribute in duplicate CIs, is used to store a reference to the main CI. For duplicate CIs which existed in an instance that was upgraded to the New York release or later, the main CI is unknown. After upgrade, *duplicate_of* for those duplicate CIs is set to 'Unknown', indicating that the CI is a duplicate but the main CI is unknown.

Before remediation, the CIs in a duplicate CIs set are all duplicates of each other. After remediation, a set of duplicate CIs consists of one main CI, and any number of CIs, each considered a duplicate of the main CI. The *duplicate_of* attribute of the main CI is empty. The *duplicate_of* attribute for all the rest of the duplicate CIs in the set, is a reference to the main CI of the set.

Default related items list

A list of related items that is used globally in the remediation of duplicate CIs, with all de-duplication tasks. During remediation, all items from the default related items list are selected by default to be merged to the main CI. During remediation, adding or removing related items to be merged doesn't affect the default related items list. See Manage default related items list for more information.

Note:

- Merging of attributes and related items that are associated with assets is not supported. Asset related tables are not included in the default related items list and therefore they are not available for merge.
- If a scenario involves an inactive change request, the **Configuration item** field on the Change Request form is cleared. If the current value is a duplicate CI, then it isn't merged with the main CI.

De-duplication dashboard

CMDB Workspaceand Service Graph Workspace store app provides a de-duplication remediation solution letting you remediate de-duplication tasks, in bulk. The De-duplication dashboard, and the de-duplication templates and libraries, let you remediate multiple de-duplication tasks, consistently, in a single operation. The De-duplication Template Library in CMDB Workspace lets you create a preconfigured de-duplication template with the remediation settings for a class. The De-duplication dashboard in CMDB Workspace lets you then run the preconfigured template on multiple de-duplication tasks for the class that is set in the template. The remediation settings in the template, are then consistently applied to the duplicate CIs of the de-duplication tasks, to remediate CI duplication.

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For more information about remediating duplicate CIs in CMDB Workspace, see CI de-duplication experience in CMDB Workspace and in Service Graph Workspace.

Duplicate CI Remediator

A de-duplication remediation tool, that is wizard-like and that lets you reconcile a set of duplicate CIs associated with a single de-duplication task. You can choose one of the duplicate CIs to retain as an active CI, and then decide how to process the rest of the duplicate CIs. The Duplicate CI Remediator lets you set reconciliation options for attributes, relationships, and related items.

For information about using the Duplicate CI Remediator, see Remediate a de-duplication task (manual).

Effects on related tables (such as change requests)

Remediation can potentially have the following effects on change requests:

- When a CI is associated with a change request whose state isn't **New**, then when duplicate CI remediation processes delete the CI, the CI is removed from the change request.
- When a CI is associated with a change request whose state is **New**, then when duplicate CI remediation processes delete the CI, the CI in the change request is updated to the main CI.

The business rule *Ready only CI when not New* prevents change requests that aren't in the New state, from getting updated. This behavior ensures the validity and the continued processing of a change request when change request CIs are affected by duplicate remediation processing.

When a CI is associated with a problem or an incident task, those tasks remain valid after duplicate CI remediation processes run as the system merges the main CI in those tasks even if the remediation processes deleted the associated CI.

Properties that affect processing of duplicate CIs

During CMDB Identification, processing of sets of duplicate CIs is determined by:

- Property *glide.identification_engine.skip_duplicates* (true by default).
- Property *glide.identification_engine.skip_duplicates.threshold* (5 by default).
- Number of duplicate CIs in a set.

For information about how these properties affect the management of duplicate CIs, see Detecting duplicate CIs.

Special remediation scenarios

There are a few special remediation scenarios in which the remediation of duplicate CIs behaves differently:

Large number of duplicate CIs

Support for reconciliation of duplicate CIs is limited when the number of duplicate CIs exceeds a certain threshold. This threshold is based on the value of the *glide.duplicate_ci_remediator.max.cis* property, which is 1,000 by default. You can update this property to increase the threshold. However, this threshold never exceeds 5,000, even if you set the property to a value greater than 5,000.

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When the number of duplicate CIs for a de-duplication task exceeds the threshold, the options available in the wizard are limited:

- On the **Select Main CI** tab, only the **Recommended** list of main CIs appears, and only the **Use Main CI** option is available.
- Recommendations are based only on the oldest created, newest updated, and most recently discovered CIs.
- Reconciliation of attribute conflicts and CI relationships is not supported, and only default related items are reconciled.

Duplicate serial numbers

Duplicate CI remediation is usually applied to duplicate CMDB CIs. However, in some situations de-duplication tasks might be created for duplicate serial numbers. When remediation is applied to duplicate serial numbers, the merge of relationships from duplicate records, is not referenced and is not applied.

Large number of related items

A de-duplication task might be associated with a large number of related items which might block the remediation process as loading the task times out. To continue the remediation process in this case, you can try running remediation in a restricted mode. Add the *glide.duplicate_ci_remediator.enable_restricted_mode* system property, and set its value to **true** to show the **Use the Duplicate CI Remediator (Restricted Mode)** option in the Remediate dialog box. For more information about using this option to restrict the use of related items in de-duplication remediation and allow remediation to proceed, see Using restricted mode within the Duplicate CI Remediator [KB1542272].

Restrictions

IRE uses the *duplicate_of* field internally by populating it as part of the skip duplicate mechanism, and you should restrict manual updates of that field. For more details, see Detecting duplicate CIs.

If you do attempt to modify the value of *duplicate_of* directly on a CI form or by using a script, the following restrictions are enforced to ensure data integrity:

- A CI cannot be its own main CI (you cannot set a CI as a duplicate of itself).
- A CI and its main CI cannot be from different domains.
- The *duplicate_of* attribute of the main CI cannot reference any CI as its main CI (you cannot set a CI as a duplicate of another duplicate CI to create a chain of duplicate CIs).
  - If you attempt to set a CI as a duplicate of another duplicate CI, then the CI is set as a duplicate of the main CI of the duplicate CI you are trying to set. If the main CI of the duplicate CI you are trying to set is 'Unknown', the operation fails.

Example: Attempt to set a CI as duplicate of another duplicate CI

CIs	Attempted setting	Result (System enforced)
CI1: *duplicate_of* = empty CI2: *duplicate_of* = **CI3**	CI1: *duplicate_of* = **CI2**	CI1: *duplicate_of* = **CI3** CI2: *duplicate_of* = **CI3**

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CIs	Attempted setting	Result (System enforced)
CI3: Main CI		CI3: Main CI

If CI2 is a duplicate of 'Unknown', the operation fails.

- If a main CI becomes a duplicate of another CI, then it can no longer be a main CI. All CIs that were duplicates of that main CI are set as duplicates of the new main CI.

Example: Attempt to set a main CI as duplicate of another CI

CIs	Attempted setting	Result (System enforced)
CI1: *duplicate_of* = **CI4** CI2: *duplicate_of* = **CI4** CI3: *duplicate_of* = **CI4** CI4: Main CI CI5: *duplicate_of* = empty	CI4: *duplicate_of* = **CI5**	CI1: *duplicate_of* = **CI5** CI2: *duplicate_of* = **CI5** CI3: *duplicate_of* = **CI5** CI4: *duplicate_of* = **CI5** CI5: Main CI

- If a main CI becomes a duplicate of a CI within the same duplicate CI set, then the selected duplicate becomes the main CI in the duplicate CI set. The rest of the duplicate CIs in the set are set as duplicates of the new main CI.

Example: Attempt to set a main CI as duplicate of a CI within the duplicate CIs set

CIs	Attempted setting	Result (System enforced)
CI1: *duplicate_of* = **CI4** CI2: *duplicate_of* = **CI4** CI3: *duplicate_of* = **CI4** CI4: Main CI	CI4: *duplicate_of* = **CI1**	CI1: Main CI CI2: *duplicate_of* = **CI1** CI3: *duplicate_of* = **CI1** CI4: *duplicate_of* = **CI1**

- You can't delete a CI that is the main CI for a set of duplicate CIs. To delete a main CI, you must first disassociate that main CI with all of its duplicate CIs. Either delete all duplicate CIs that are associated with that main CI, or remove the reference to that main CI from all *duplicate_of* attributes in any duplicate CIs that have it.

CI de-duplication experience in CMDB Workspace and in Service Graph Workspace

Create libraries of de-duplication templates in CMDB Workspace or in Service Graph Workspace, to remediate de-duplication tasks in a consistent manner, and in bulk. De-duplication templates are pre-configured with all necessary settings for remediating duplicate CIs in de-duplication tasks, per class.

Use the De-duplication dashboard in CMDB Workspace or in the Service Graph Workspace store app to see an overview and insights about duplicate CIs in your CMDB. The De-duplication

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dashboard lets you create de-duplication templates and organize these templates into libraries. You can also examine de-duplication tasks and then run a preconfigured template to remedy duplicate CIs in multiple de-duplication tasks in a single operation.

More information:

- To learn about general duplicate CI remediation concepts, restrictions, and special cases such as remediations that involve a large number of duplicate CIs, see Duplicate CIs remediation.
- To remediate a single de-duplication task manualy, using the Duplicate CI Remediator, see Remediate a de-duplication task (manual).
- To learn about Identification and Reconciliation (IRE) processes that detect duplicate CIs and other concepts related to duplication CI, see Detecting duplicate CIs.

Access

1. Access either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
   - Navigate to **Workspaces** > **Service Graph Workspace** and then select the Governance icon in the Service Graph Workspace navigation panel.
2. In the Manage group in Management tools, select either of the following links:
   - **De-duplication Dashboard**
   - **De-duplication Template Library**

Role requirement:

- To access the Management view in CMDB Workspace to perform de-duplication tasks: sn_cmdb_admin
- To access the Governance view in Service Graph Workspace to perform de-duplication tasks: sn_cmdb_editor and sn_cmdb_admin
- To perform de-duplication tasks, cmdb_dedup_admin or any role containing cmdb_dedup_admin (such as sn_cmdb_admin)

De-duplication templates and libraries

Use a de-duplication template to apply a consistent remediation to multiple, similar, de-duplication tasks, in a single action. A de-duplication template contains the settings that are required to remediate de-duplication tasks for a class. For example, how to choose the main CI, which method to use to consolidate attributes, and what to do with the duplicate CIs (aside from the main CI) after remediation. A de-duplication template also contains conditions that de-duplication tasks are matched on. When you run a de-duplication template, the remediation settings in the template are applied to all de-duplication tasks that match the template conditions.

To be able to run a de-duplication template, the template must be in a published state (a template is initially in a draft state).When published, you can create a schedule for a de-duplication template so it will automatically run on a recurring time interval. When necessary, you can unpublish a published template so it is temporarily unavailable for use until you republish it.

Organize your de-duplication templates into libraries to group templates by categories that are meaningful in your organization and to help locate a template. For example, you can create several de-duplication templates, all of which for the same CMDB class such as

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cmdb_ci_win_server. Then, add all those templates to the 'De-duplication templates for cmdb_ci_win_server' library for easy access.

De-duplication dashboard

The De-duplication dashboard in CMDB Workspace is a central location for remediating de-duplication tasks. Use the dashboard to:

- See all de-duplication templates on a set of cards. Each card shows details about a template. On a template card, you can select **Assign task** to assign de-duplication tasks to the template, and run the template to remediate its associated de-duplication tasks. You can also create a recurring schedule for a template such as daily and monthly.
- Select **Run all** to run all templates, each template remediating its assigned and matching de-duplication tasks.
- Select **View de-duplication tasks** to access a list view of de-duplication tasks with details such as the de-duplication template assignment. In the list view, you can select **Only show tasks that do NOT match any template conditions** to show only those de-duplication tasks that are unassigned or unmatched to any template class.
- Select **View template libraries** to create and manage de-duplication templates and libraries.
- Select the **Running** tab to track templates that are currently running.
- Select the **Completed** tab to check the status and details about the final state of a run, such as Completed, Cancelled, or Completed with errors.

De-duplication insights pane

The De-duplication insights pane on the right side of the De-duplication dashboard provides counts and insights related to the on-going de-duplication processes in your organization. This pane provides the following cards and links to help you resolve issues:

- Total count of de-duplication tasks that were remediated in the past week.
- De-duplication tasks that have completed with various types of errors and therefore need your attention. Provides the **View de-duplication tasks that need your attention** link to access a list view of the associated de-duplication tasks. You can examine error messages and drill down tasks for further troubleshooting details.
- De-duplication tasks that don't match the conditions in any template and therefore can't be assigned for remediation by a template. Provides the **View de-duplication tasks that don't match** link to access a list view of the associated de-duplication tasks. You can drill down tasks for further details.

Review the de-duplication templates and ensure that they're properly configured for remediating the on-going duplicate CIs that are being generated in the CMDB by newly added data.

Manage duplicate CIs skill

You can use the manage duplicate CIs skill that Now Assist for CMDB provides to get step-by-step guidance through the de-duplication process. The manage duplicate CIs skill guides you through reviewing de-duplication templates, assigning tasks to the templates, and then running the templates. The manage duplicate CIs skill presents you with relevant options for your next step, as you go, until you complete the remediation.

For more information, see Now Assist for Configuration Management Database (CMDB).

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Create a de-duplication template

Create a de-duplication template that you can then run to apply pre-configured and consistent remediation to de-duplication tasks, in bulk. Organize your templates in libraries that make sense in your organization.

Before you begin

Role required:

- To access the Management view in CMDB Workspace to perform de-duplication tasks, sn_cmdb_admin
- To access the Governance view in Service Graph Workspace to perform de-duplication tasks: sn_cmdb_editor and sn_cmdb_admin
- To perform this task, cmdb_dedup_admin or any role containing cmdb_dedup_admin (such as sn_cmdb_admin)

About this task

By default, a newly created template is in draft mode. Therefor, after creating a template, you must publish the template to make it available for remediation.

Procedure

1. Navigate to either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
   - Navigate to **Workspaces** > **Service Graph Workspace** and then select the Governance icon in the navigation panel.
2. Select the **De-duplication Template Library** link in Management tools, in the Manage section.
3. **Optional:** Create a library for the new template.
   a. On the De-duplication templates page, select **Create a library**.
   b. In the Create new library dialog box, fill out the **Name** and the **Description** for the new library.
   c. Select **Create**.
4. On the De-duplication templates page, select **Create a template**.
   On the New template page, configure the different sections of the template by completing the rest of the steps.
5. **General information**: Fill out the form and then select **Next**.

Field	Description
Name	Unique name for the template.
Class	CMDB class that this template can be applied to.
Template library	Library that the de-duplication template belongs to. Select a newly created library or any other librarySelect a library, or select the '+' icon to create a new library.

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Option	Description
Automatically select all de-duplication tasks that match the selected class	Assign all de-duplication tasks that match the template class, to the template for remediation.
Add all child classes	Also assign all de-duplication tasks that match descending classes of the template class, to the template for remediation. This option is available only if the **Automatically select all de-duplication tasks that match the selected class** option is selected.

6. **Create condition**: Use a condition builder or a custom script to narrow down the list of de-duplication tasks assigned to the template, and then select **Next**.
   Use script toggle options:
   - Off: Specify conditions to filter on CIs from the template class. Only the de-duplication tasks containing CIs that match the filter will be assigned to the template.
   - On: Enter a custom script that returns a valid array of de-duplication tasks sys_ids (from the Remediate Duplicate Task [reconcile_duplicate_task] table), that are applicable to the template class. Those de-duplication tasks will then be assigned to the template.

     Note:
     Ensure that the script runtime doesn't exceed your intended runtime expectation and doesn't unexpectedly affect performance. Invalid values returned by the script are ignored.

7. **Select main CI**: Select the method for choosing the main CI from the drop-down list and then select **Next**.

   Note:
   - Applying the chosen method to a set of duplicate CIs must result in exactly one CI. If during remediation, the chosen method yields no CIs or multiple CIs, then the **Newest updated** method is automatically applied regardless of your choice.
   - After selecting the main CI out of the set of duplicate CIs, the main CI is separate from the rest of the duplicate CIs. From that point, 'duplicate CIs' refers to all of the initial duplicate CIs, aside from the selected main CI.

8. **Merge attributes**: Configure merging attributes from duplicate CIs into the main CI, and then select **Next**.

   a. Select the method to use for merging the attributes of duplicate CIs into the corresponding attributes of the main CI.
   For each method card on the left (such as Use latest updated CI), select attributes in the list on the right, that should be merged into the main CI using that method.

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b. Select options as appropriate.

Option	Description
Allow null value updates when merging attributes to main CIAllow null value updates from duplicate CIs to main CI	When merging duplicate CIs into the main CI, lets a null value from a duplicate CI to overwrite a non-null value in main CI.
Allow updates from duplicate CIs only when the main CI value is null	When merging duplicate CIs into the main CI: ▪ Prevents updates to main CI attributes that have non-null value. ▪ Allows updates to main CI attributes that have a null value, with a non-null value.

9. **Merge relationships**: Select an option for merging relationships from duplicate CIs into the main CI, and then select **Next**.

10. **Merge related items**: Select the method to use for merging related items associated with the duplicate CIs into the main CI, and then select **Next**.
    For information about the default list of related items used in de-duplication processes, see Manage default related items list.

11. **Duplicate CI actions**: Select what to do with the duplicate CIs after they're merged into the main CI, according to the template settings, then select **Next**.

12. **Review and test**: Access the following tabs to complete the template by reviewing and testing it.
    a. Summary: Review all template settings and select **Back** to modify any settings.
    b. Test: Select a sample de-duplication task and then select **Save and Preview Results** to save and run the template.
    c. Preview the results of the remediation test.
    d. Select **Save & Exit** to save the template and return to the De-duplication templates home page.

Result

The new template is added to the specified library in draft mode and can be edited. However, a template in draft mode isn't available for remediation of de-duplication tasks until you publish it.

What to do next

- Publish a de-duplication template
- Run a template to remediate de-duplication tasks
- Remediate a single de-duplication task

Run a template to remediate de-duplication tasks

Run a de-duplication template to remediate de-duplication tasks in bulk. A de-duplication template is pre-configured with remediation settings per class. Running a de-duplication

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template, remediates its assigned de-duplication tasks, consistently, according to the template settings.

Before you begin

Role required:

- To access the Management view in CMDB Workspace to perform de-duplication tasks, sn_cmdb_admin
- To access the Governance view in Service Graph Workspace to perform de-duplication tasks: sn_cmdb_editor and sn_cmdb_admin
- To perform this task, cmdb_dedup_admin or any role containing cmdb_dedup_admin (such as sn_cmdb_admin)

About this task

You can run a single template to remediate its associated de-duplication tasks, or run all published templates at once, each remediating duplicate CIs in its associated tasks. Before running any templates, ensure that those templates are properly configured with their remediation settings and are properly assigned with de-duplication tasks. De-duplication tasks can be automatically assigned to a template based on the template conditions. You can also manually assign additional de-duplication tasks to a template.

Procedure

1. Navigate to either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
   - Navigate to **Workspaces** > **Service Graph Workspace** and then select the Governance icon in the navigation panel.
2. Select the **De-duplication Dashboard** link in Management tools, in the Manage section.
3. Select a template library in the **Ready** tab, or select **All libraries** in the libraries drop-down list (set to **All libraries** by default).
   The set of cards is filtered to show only the templates from the selected library, or to show all templates from all libraries if you select **All libraries** from the drop-down list.
4. **Optional:** On the De-duplication templates page, select **Run all** to run all de-duplication templates on their assigned de-duplication tasks.
   To assign de-duplication tasks to a template or to run a single template, continue with the following steps.
5. On the De-duplication templates page, locate the card with the template that you want to run and select **Assign tasks** in that card.
6. Select the tasks in the Available de-duplication tasks list that you want to remediate using the selected de-duplication template. Then select **Add Selected** to assign the selected tasks to the current template.

   Available de-duplication tasks lists all open de-duplication tasks, some of which can be non-compatible with the template. If you try to associate a non-compatible task, an error appears. Some of the tasks in the list might be assigned to another template, and you can reassign those to the current template.

   The Assigned de-duplication tasks pane on the right contains two tabs:
   - **All matching tasks**: Shows de-duplication tasks that match the condition of the selected template.
   - **Your selected tasks**: Shows the tasks that you've assigning to the template for remediation.

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The selected tasks are added to the list in the **Your selected tasks** tab in the Assigned de-duplication tasks pane on the right. The template will run for all tasks in the **Your selected tasks** list and any tasks in the **All matching tasks** list that aren't assigned to another template.

7. Select **Run template**.
   The selected template is added to the running queue.

What to do next

- Select the **Running** tab to track the progress and details of templates that you added to the running queue and are currently running. General counts for the template run appear when those counts become available. The templates are sorted by their start time, with the template with the most recent start time at the top of the list.
  - Select **Details** (accessible only after all de-duplication tasks have been calculated) to show further details about this run and to drill down to de-duplication tasks.
  - Select **Cancel** to stop a template's run. The details for the cancelled template are added in the **Completed** tab with the state of Cancel Requested. Upon completing the cancellation, the state changes to Cancelled.

  After a template run completes, its details no longer appear under the **Running** tab, but are available in the **Completed** tab. Also, the completed template is available again for running in the **Ready** tab.
- Select the **Completed** tab to view general counts per template, such as erroneous and skipped tasks, and general run time. The templates are sorted by their completion time, with the template that completed most recently at the top of the list. Select **Details** for a template to access a list view of the template's assigned de-duplication tasks. This list view shows details for each de-duplication task, such as its state (color coded) and error message if applicable. You can drill down a de-duplication task for further details.
- Select **View de-duplication tasks that need your attention** in the De-duplication tasks completed with errors card in the De-duplication insights pane on the right. The De-duplication tasks with errors list view shows de-duplication tasks that didn't complete successfully along with an error message. You can drill down de-duplication tasks in the list for more details.
- Schedule a de-duplication template.

Remediate a single de-duplication task

Remediate a single de-duplilcation task using a de-duplication template in CMDB Workspace, in Service Graph Workspace, or manually, using the Duplicate CI Remediator.

Before you begin

Role required:

- To access the Management view in CMDB Workspace to perform de-duplication tasks, sn_cmdb_admin
- To access the Governance view in Service Graph Workspace to perform de-duplication tasks: sn_cmdb_editor and sn_cmdb_admin
- To perform this task, cmdb_dedup_admin or any role containing cmdb_dedup_admin (such as sn_cmdb_admin)

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Procedure

1. Navigate to either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
   - Navigate to **Workspaces** > **Service Graph Workspace** and then select the Governance icon in the navigation panel.
2. Select the **De-duplication Dashboard** link in Management tools, in the Manage section.
3. In the De-duplication templates section, select **View de-duplication tasks**.
4. In the De-duplication tasks list view, select the task that you want to remediate.
5. Select **Remediate** on the task form.
6. In the Remediate dialog box, choose which method you want to use for remediation, and then select **Remediate**.

What to do next

On the task form:

- Track the progress and the details of remediation in the Activity stream until remediation is complete.
- Select the **Duplicate Audit Results** tab to see the results of the duplicate audit.

Publish or unpublish a de-duplication template

After creating a de-duplication template, you must publish the draft template to make it available to run. You might also need to unpublish a published de-duplication template so it's temporarily unavailable for de-duplication remediation, until you republish it again.

Before you begin

- A template that you want to publish must not be in a published state.
- A template that you want to unpublish must be currently published.
- If the template that you want to unpublish is currently running or in the running queue, you must wait for the run to complete or cancel the run. In the De-duplication dashboard, select the **Running** tab, locate the template that you want to unpublish, and then select **Cancel** in the template's card.

Role required:

- To access the Management view in CMDB Workspace to perform de-duplication tasks, sn_cmdb_admin
- To access the Governance view in Service Graph Workspace to perform de-duplication tasks: sn_cmdb_editor and sn_cmdb_admin
- To perform this task, cmdb_dedup_admin or any role containing cmdb_dedup_admin (such as sn_cmdb_admin)

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About this task

Procedure

1. Navigate to either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
   - Navigate to **Workspaces** > **Service Graph Workspace** and then select the Governance icon in the navigation panel.
2. Select the **De-duplication Template Library** link in Management tools, in the Manage section.
3. In the libraries pane locate the template that you want to publish or unpublish and then either:
   a. Publish: Ensure that all the sections of the template are complete and select **Publish**.
   b. In the Publish template dialog box, select **Publish**.
   c. Unpublish: Select **Unpublish** and in the Unpublish template dialog box, select **Unpublish**.

Result

A published template:

- Becomes available on the De-duplication templates page and can be used for remediation.
- Can't be edited or retired.

An unpublished template is set back into draft mode:

- Is no longer available on the De-duplication templates page and can't be selected for remediation.
- Can be edited or retired.

Schedule a de-duplication template

Create a schedule, such as a monthly schedule, for a published de-duplication template so it will automatically run on a recurring interval.

Before you begin

The de-duplication template that you want to create a schedule for, must be in a published state. For information about publishing a template, see Publish or unpublish a de-duplication template.

Role required:

- To access the Management view in CMDB Workspace to perform de-duplication tasks, sn_cmdb_admin
- To access the Governance view in Service Graph Workspace to perform de-duplication tasks: sn_cmdb_editor and sn_cmdb_admin
- To perform this task, cmdb_dedup_admin or any role containing cmdb_dedup_admin (such as sn_cmdb_admin)

Procedure

1. Navigate to either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
   - Navigate to **Workspaces** > **Service Graph Workspace** and then select the Governance icon in the navigation panel.
2. Select the **De-duplication Dashboard** link in Management tools, in the Manage section.

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3. On the De-duplication templates pane, select the More options icon for the template that you want to create a schedule, and then select **Create schedule**.
4. On the Schedule <template> dialog box, fill in the scheduling details.
   Various fields, such as **Time zone** and **Time** appear on the form according to your choice in the **Run** field. If **Run** is **Periodically**, you must set the **Repeat internal (day)** or the **Repeat interval (time)** fields (or both) before you can save the schedule.
5. Select **Save**.

Result
The newly created schedule is active by default.

What to do next
Track the state and details of templates:

- Select the **Running** tab to track the progress and details of the scheduled templates that are currently running. General counts for the template run appear when those counts become available. The templates are sorted by their start time, with the template with the most recent start time at the top of the list.
  - Select **Details** (accessible only after all de-duplication tasks have been calculated) to show further details about this run and to drill down to de-duplication tasks.
  - Select **Cancel** to stop a template's run. The details for the cancelled template are added in the **Completed** tab with the state of Cancel Requested. Upon completing the cancellation, the state changes to Cancelled.

  After a template run completes, its details no longer appear under the **Running** tab, but are available in the **Completed** tab. Also, the completed template is available again for running in the **Ready** tab.
- Select the **Completed** tab to view general counts per template, such as erroneous and skipped tasks, and general run time. The templates are sorted by their completion time, with the template that completed most recently at the top of the list. Select **Details** for a template to access a list view of the template's assigned de-duplication tasks. This list view shows details for each de-duplication task, such as its state (color coded) and error message if applicable. You can drill down a de-duplication task for further details.
- Select **View de-duplication tasks that need your attention** in the De-duplication tasks completed with errors card in the De-duplication insights pane on the right. The De-duplication tasks with errors list view shows de-duplication tasks that didn't complete successfully along with an error message. You can drill down de-duplication tasks in the list for more details.

On the De-duplication templates pane, select the More options icon for a template with a schedule. Some of the following options appear, according to the state of the schedule:

- Select **Edit schedule** to modify the schedule.
- Select **Deactivate schedule** to halt temporarily the automatic runs of the template, while preserving the schedule settings.
- Select **Activate schedule** to resume automatic runs of the template according to the schedule settings.

Retire a de-duplication template

Retire a template that is no longer needed for remediating de-duplication tasks.

Before you begin
The template that you want to retire must be in an unpublished state.

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Role required:

- To access the Management view in CMDB Workspace to perform de-duplication tasks, sn_cmdb_admin
- To access the Governance view in Service Graph Workspace to perform de-duplication tasks: sn_cmdb_editor and sn_cmdb_admin
- To perform this task, cmdb_dedup_admin or any role containing cmdb_dedup_admin (such as sn_cmdb_admin)

Procedure

1. Navigate to either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
   - Navigate to **Workspaces** > **Service Graph Workspace** and then select the Governance icon in the navigation panel.
2. Select the **De-duplication Template Library** link in Management tools, in the Manage section.
3. In the library pane, select the template that you want to retire and then select **Retire**.
4. Select the template's context menu and then select **Retire template**.
5. In the Retire template dialog box, select **Retire**.

Result

A retired template is no longer available in the De-duplication dashboard and can't be used for remediation.

Review de-duplication tasks (manual)

Review details of de-duplication tasks, and then potentially remediate a de-duplication task.

Before you begin

Role required: itil to view, and itil_admin or cmdb_dedup_admin to remediate a de-duplication task.

About this task

Alternatively, you can use de-duplication capabilities in the CMDB Workspace or in Service Graph Workspace. Use the De-duplication dashboard and the De-duplication Template Library to:

- Review de-duplication tasks
- Remediate de-duplication tasks in bulk by using de-duplication templates
- Gain insights into de-duplication counts and status in your organization

For more information, see CI de-duplication experience in CMDB Workspace and in Service Graph Workspace.

If a duplicate CI is a dependent CI, then you can view the details of the dependent relationship, the Depend on CI, and any relation qualifier chain. If the dependent CI has a lookup table, then you can see the details of the respective lookup table.

Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **De-duplication Tasks**.
2. Select a task.

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Remediate Duplicate Task form

Field	Description
Number	Unique task number.
Assigned to	Person who is responsible for resolving the task.
Short description	Description for the task.
Work notes	Details describing how the CI was identified as a duplicate. **Note:** Not available in de-duplication tasks that were created prior to the London release. This field also contains user notes about the decisions and steps of resolving the task.
Priority	Task priority.
State	State of the de-duplication task as it progresses through resolution.

3. Click the **Duplicate Audit Results** tab in the related lists section, to see the list of duplicate CIs in this task. You can click a CI to display more CI details.

Column	Description
Duplicate CI	Reference to the duplicate CI. **Note:** This field is a document ID type, which means that it can reference any record on any table. If the referenced CI is deleted as part of resolving duplicate tasks, then this field is empty.
Relationship	For a duplicate CI that is a dependent CI, this field shows the relationship between the duplicate CI and depend on CI.
Depend on CI	If the duplicate CI is a dependent CI, then this field displays the depend on CI.
Discovery source	Discovery method used for the CI.

What to do next

Analyze de-duplication tasks to determine which CIs should remain active and which of the duplicate CIs in the Duplicate Audit Results lists are stale or incorrect. Click **Remediate** to remediate a single de-duplication task.

Related topics

Relation qualifier

Document ID field

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Remediate a de-duplication task (manual)

Remediate a single de-duplication task by using the Duplicate CI Remediator wizard. Use the wizard to guide you through the duplicate CI reconciliation process or to apply a custom workflow.

Before you begin

Review the following topics to familiarize yourself with important concepts of duplicate CI remediation:

- Duplicate CIs remediation to learn about general duplicate CI remediation concepts, restrictions, and special cases such as remediations that involve a large number of duplicate CIs.
- Properties related to remediation of duplicate CIs for information about important properties that affect processes of duplicate CI remediation. Including the glide.duplicate_ci_remediator.dry_run property that determines if the Duplicate CI Remediator actually updates the CMDB or not.

Role required: itil to read, itil_admin or cmdb_dedup_admin to write

About this task

Instead of using the build of the Duplicate CI Remediator on Core UI, you can use the De-duplication dashboard, and de-duplication templates and libraries, available in CMDB Workspace and in the Service Graph Workspace store app. Using de-duplication capabilities in CMDB Workspace or in Service Graph Workspace is especially useful for bulk remediation of de-duplication tasks. These capabilities let you pre-configure a de-duplication template with remediation settings, which can then be applied in a consistent manner to multiple de-duplication tasks. For more information, see CI de-duplication experience in CMDB Workspace and in Service Graph Workspace.

- Duplicate CI Remediator provides a remediation option that is based on the AI engine of the Now Assist for CMDB De-duplication task resolution assistant skill. This skill suggests remediation options, which are based on the AI analysis of CMDB data. Use the Now Assist option to bypass all the tabs in the Duplicate CI Remediator where you manually enter those selections, and go directly to the final review to initiate the remediation
- Instead of using the build of the Duplicate CI Remediator on Core UI, you can use the De-duplication dashboard, and de-duplication templates and libraries, available in CMDB Workspace and in the Service Graph Workspace store app. Using de-duplication capabilities in CMDB Workspace or in Service Graph Workspace is especially useful for bulk remediation of de-duplication tasks. These capabilities let you pre-configure a de-duplication template with remediation settings, which can then be applied in a consistent manner to multiple de-duplication tasks. For more information, see CI de-duplication experience in CMDB Workspace and in Service Graph Workspace.

>>>>>>> Stashed changes

As you progress through the tabs of the Duplicate CI Remediator, CIs are not updated. All updates are applied only in the final step, after you click **Remediate**.

Note:
Remediation behaves differently when remediation involves a large number of duplicate CIs or where the duplicates are serial numbers. For information about special cases in remediation, see Duplicate CIs remediation.

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Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **De-duplication Tasks**.
2. Open the de-duplication task that you want to remediate.
3. On the task form, select **Remediate**.
4. In the Remediate dialog box, select either of the following options:
   - **Use the Duplicate CI Remediator (Recommended)**: Use the wizard to consolidate duplicate CIs according to your configurations and settings. Follow the Duplicate CI Remediator tabs to configure the reconciliation.

     Note:
     This option is not available with non-CMDB tables.

   - **Use a custom remediation workflow**: Use an existing CMDB remediation rule or select **Add New** to create a new one.
     - On the CMDB Remediation Rule form, set **Task type** to `Remediate Duplicate Task` and select **Active**.
     - On the Workflow form, set **Table** to Remediate Duplicate Task [reconcile_duplicate_task] and **If condition matches** to `None`.
     - Ensure that the associated workflow remediates duplicate CIs.

     In the Remediate dialog box, select **Next** to start the workflow and to exit the Duplicate CI Remediator. The Remediate Duplicate Task form appears, where you can update the **State** of the task.
   - **Use the Duplicate CI Remediator (Restricted Mode)**: Appears only if the *`glide.duplicate_ci_remediator.enable_restricted_mode`* system property is set to **true**. You might need to use this option if remediation is blocked because loading the de-duplication task times out. This option might be relevant when there is a large number of related items associated with a de-duplication task, allowing remediation to continue with the limited features in a restricted mode. For more information about using this option to restrict the use of related items in de-duplication remediation and allow remediation to proceed, see Using restricted mode within the Duplicate CI Remediator [KB1542272].
5. On the **Select Main CI** tab in the Duplicate CI Remediator:

   a. Select the main CI for this reconciliation using either of the following lists of duplicate CIs. For any CI, you can click the **Name** link to display the CI's attributes, or click the **Related Items** link to display the number of related items.
      - **Recommended**: A subset of the **All** list, containing only system recommended main CIs. System recommendations are based on checking the duplicate CIs for the following criteria:
        - CI with most related items.
        - CI with most relationships.
        - Newest discovered CI.
        - Newest updated CI.
        - Oldest created CI.
        - Previous main CI, if one was previously selected.
      - **All**: All duplicate CIs for the de-duplication task.

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Either option lets you review a summary of the remediation settings before starting the remediation.

b. Select one of the following options to choose whether to consolidate any attribute values, relationships, or related items from any of the duplicate CIs into the main CI:

- **Remediate Manually**: Lets you specify which attribute values, relationships, and related items from duplicate CIs to consolidate into the main CI.
- **Use Main CI**: Retains main CI attribute values, merges relationships, and merges only the default related items.

  Skip to step number 7 as this selection skips all configurations other than choosing the action for the duplicate CIs on the **Determine Duplicate CI Actions** page.

6. On the **Merge Attribute Values** tab review inconsistent values of each attribute. For each attribute, choose to retain the main CI's value, or choose a value from a duplicate CI for the main CI to be set with.

7. Select **Next**.

Column	Description
Attribute	Attribute for which there are different values.
Main CI Value	**Attribute** value in the main CI.
Other Values	The number of unique **Attribute** values within the duplicate CIs.

To override the main CI attribute value with a duplicate CI value:

a. Click the **Other Values** link.

b. In the attribute dialog box, click **Unique Values** to display only unique attribute values, or **All** to display all attribute values including identical values.

c. Select a value for the main CI **Attribute** to be set with.
You can click **Reset to Original** to undo the selection of a different attribute value for the main CI.

d. Click **Select**.

Note:
Attributes, such as system fields, discovery fields (*discovery_source*, *last_discovered*, *first_discovered*), and read-only fields (such as the asset field) do not appear in the list.

8. On the **Merge Relationships and Related Items** tab:

a. In the Merge Relationships section, select whether to merge all relationships from all duplicate CIs into the main CI. Click **View all relationships** to display all the relationships in which a duplicate CI is a parent or a child. You can click a **Parent** or a **Child** link to display more details. Orphan and duplicate relationships of duplicate CIs are deleted if you choose to merge relationships. For more information about the CMDB Health relationship KPI, see CMDB Health KPIs and metrics.

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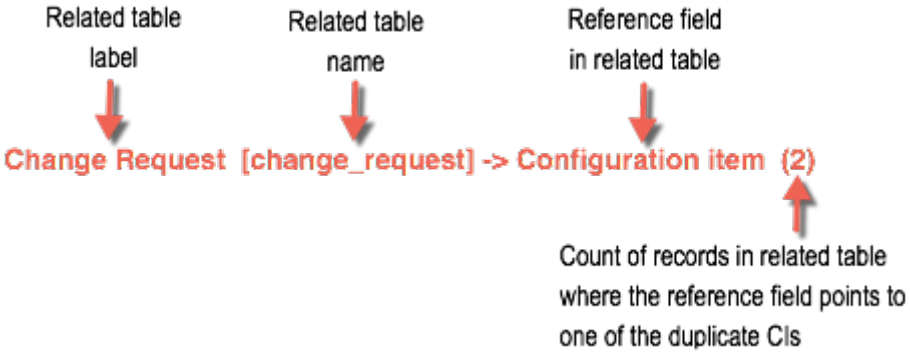
b. In the Merge Related Items section use the list collector to select related items to be merged into the main CI. Click **View all related items** to display all related tables (items) and the count of references in each table to one of the duplicate CIs. You can click the links in **Main CI Related Items** and **Duplicate CIs Related Items** to display details about the related items.

Related items in the list collector have the following format:



- By default, all items in the default related items list are selected to be merged.
- Related items (tables) that have no references to a duplicate CI are not listed, unless that table is included in the default related items list.
- Since asset related tables are part of the exclusion list, they are not available for merge.

See Manage default related items list for more information about configuring a default list of related items.

c. Click **Next** .

9. On the **Determine Duplicate CI Actions** tab, choose one of the following actions to perform after completing the reconciliation. Then click **Next**.

- **Set attributes to custom values** (recommended): Retain all duplicate CIs. Mark the duplicate CIs as invalid by setting a specific **Attribute** to a specific **Value** for all duplicate CIs. For example, set *Operational Status* to `Retired` to retire the duplicate CIs.

  The *duplicate_of* attribute of the duplicate CIs is automatically set to the appropriate main CI. Also, the duplicate CIs will not be added to any de-duplication task after this task is remediated. If the identification engine is not configured to skip duplication, ensure that identification inclusion rules are configured to exclude the duplicate CIs during identification. This configuration prevents new de-duplication tasks with the same duplicate CIs from being created after remediation.

  Note:
  Discovery fields, system fields, read only fields, and date fields are excluded from the attributes list.

- **Delete**: Delete all duplicate CIs (only the main CI remains).

  Note:
  Review Roll back and delete recovery for information about reverting the deletion of CIs and related records.

10. On the **Review and Confirm** tab:

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a. Review the summary of the expected updates for this duplicate CIs reconciliation. Updates are based on your selections and therefore the summary includes only the details that are applicable. This summary can include details of the relationships and related items that will be merged to the main CI, the attribute values that the main CI will be set with, and the number of CIs that will be deleted. Click **Attributes**, **Relationships**, **Related Items**, or **Duplicate CI Actions** if applicable, to display further details such as changes to attribute values.

b. Click **Remediate** to complete the reconciliation according to your reconciliation settings. Once complete, the task **State** is set to **Closed Complete**.

Result

The following relationships are deleted without being merged to the main CI:

- Relationships in which the type, child, or parent field is empty.
- Relationships for which merging to the main CI will result in cyclic relationships.
- Relationship for which merging to the main CI will result in duplicate relationships.

What to do next

The reconciliation process runs in the background and may take a while to complete. Upon completion, the system sends a confirmation notice to the remediator of the task. Meanwhile, you can:

- **Review Identification Rules**: Review identification and inclusion rules and make any necessary updates to reduce CI duplication.
- **Check Progress**: View the task activities that are logged as the remediation progresses.
- **View Main CI**: View the main CI for this reconciliation process.

Manually create a de-duplication task

Manually create a de-duplication task when it is not automatically created. You can then use the Duplicate CI Remediator or the De-duplication dashboard in CMDB Workspace and in Service Graph Workspace to remediate the manually created task.

In some situations, duplicate CIs are not automatically detected and de-duplication tasks are not automatically generated. Such situation happens with a class for which identification rules are not defined and the identification engine cannot be applied. However, you still want to reconcile these duplicate CIs by utilizing the Duplicate CI Remediator or the De-duplication dashboard in CMDB Workspace or in Service Graph Workspace.

Use the CMDBDuplicateTaskUtils API to manually create a de-duplication task in which all duplicate CIs are specified. The de-duplication tasks that you create manually and the automatically created tasks, are stored in the same table ([reconcile_duplicate_task]) and are processed in the same manner.

Note:
You can manually create a de-duplication task only for CMDB CIs and a CI can be specified as a duplicate CI only in a single de-duplication task.

Manage default related items list

You can add or remove items from the default list of related items which is used in duplicate CI remediation for all de-duplication tasks.

Before you begin

Role required: itil_admin

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About this task

The default related items list is used by the Duplicate CI Remediator, appearing on the **Merge Relationships and Related Items** tab. You can modify the list for only a specific task in the Duplicate CI Remediator without affecting the default global list.

The default related items list is also used by the De-duplication dashboard in CMDB Workspace and in Service Graph Workspace for remediation.

Globally modifying the list affects the remediation of all de-duplication tasks in the Duplicate CI Remediator and in the De-duplication dashboard in CMDB Workspace and in Service Graph Workspace.

Note:
Only related items in which the reference field points to Configuration Item [cmdb_ci] in *sys_dictionary* can be selected for the default related items list. Related items with references to any child of the Configuration Item class cannot be selected for the default related items list, but are still available for merging in the Duplicate CI Remediator for a specific task.

Procedure

1. Navigate to **All** > **Configuration** > **Identification/Reconciliation** > **Duplicate CI Remediator Default Related Items**.
2. On the Default Related Items List for Duplicate CI Remediator page, use the list collector to add or remove items from the **Selected** list.
3. Click **Save**.

Properties related to remediation of duplicate CIs

Use de-duplication properties to configure how remediation of duplicate CIs works when using the Duplicate CI Remediator or the De-duplication dashboard in CMDB Workspace and in Service Graph Workspace.

To view and edit these properties, the admin role is required.

Although the properties below reference the Duplicate CI Remediator, these properties have an equivalent effect in duplicate CI remediation in CMDB Workspace.

Property	Description
Attributes in which *max_length* exceeds this property value (4000 by default) are excluded from the **Select Main CI**, **Merge Attribute Values**, and **Determine Duplicate CI Actions** tabs in the Duplicate CI Remediator wizard. glide.duplicate_ci_remediator.max.field_length	If the *max_length* for an attribute is equal to the prop data is truncated to the property value and the attribute • Type: integer • Default value: 4000 • Location: **Configuration** > **CMDB Properties** > **Duplic** **Note:** This property impacts the performance of de-duplic

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Property	Description
Comma separated list of related tables in the format '<table>.<reference column>', that are excluded from merging during duplicate CI remediation. glide.duplicate_ci_remediator.related_items_blacklist	• Type: string • Default value: cert_task.cmdb_ci,cert_audit_result.configuration_iter • Location: **Configuration** > **CMDB Properties** > **Duplic**
Threshold for the number of duplicate CIs, which if exceeded, support for reconciliation in the Duplicate CI Remediator is limited (1,000 by default). glide.duplicate_ci_remediator.max.cis	• Type: integer • Default value: 1000 • Location: **Configuration** > **CMDB Properties** > **Duplic** • Learn more: See 'Large number of duplicate CIs' in Re This threshold never exceeds 5,000, even if you set the
Determines whether the Duplicate CI Remediator actually remediates CI duplication by updating records in the CMDB, or not. glide.duplicate_ci_remediator.dry_run	When set to false (default value), updates specified in th You can set this property to true and then test run throug updated. In this case, the work notes for the task descril • Type: true | false • Default value: false • Location: **Configuration** > **CMDB Properties** > **Duplic**
glide.duplicate_ci_remediator.enable_restricted_mode	Enables restricted mode remediation in the Duplicate C duplication remediation and allows a blocked remediati **Mode)** option. For more information, see Using restricte • Type: true | false • Default value: false • Location: Add to System Properties [sys_properties] • Learn more: Remediate a de-duplication task (manual Set to **true** to enable restricted mode remediation.

Components installed for duplicate CI remediation

Tables installed to support duplicate CI remediation (included in the com.snc.cmdb plugin).

Tables installed

Table	Description
Remediate Duplicate Task [reconcile_duplicate_task]	De-duplication tasks.
Duplicate Audit Result [duplicate_audit_result]	CIs associated with each de-duplication task.

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Table	Description
Duplicate CI Remediation [cmdb_duplicate_ci_remediation]	Input, selections on each tab, overall status of remediation, and results of each run of the Duplicate CI Remediator.
CMDB Workspace De-duplication template library [sn_cmdb_ws_reconcile_duplicate_template_library]	Library names and their descriptions.
De-duplication template suggested task [sn_cmdb_ws_reconcile_duplicate_template_suggested_task]	Mappings of de-duplication tasks to templates.

Scheduled jobs installed

Scheduled job	Description
De-duplication: Populate Duplicate Task Data	Runs daily to copy metadata, such as the identification attributes and identification rules used in generating a de-duplication task, into an easily accessible table. The metadata is stored in the Reconcile Duplicate Task Data [reconcile_duplicate_task_data] table and used for analytics for the De-duplication dashboard.
De-duplication: Populate Template Task Run Records	Runs every minute to evaluate the de-duplication tasks applicable for a template according to your settings. Based on settings, assigns matching tasks and manually added tasks to the template for remediation. De-duplication tasks are remediated after you select **Run template**.
De-Duplication: Template Scheduler	Runs every minute by the template scheduler to check the capacity of the execution engine. If there is available capacity, picks any new de-duplication tasks added to the queue, for remediation. De-duplication tasks aren't remediated and remain in ready state unless this job runs periodically.
De-duplication: Populate Template Suggested and Orphan Tasks	Runs hourly to count the number of tasks that match each published template and the number of tasks that don’t match any published template. These counts then appear on various cards in the De-duplication dashboard.

CIs attestation

Verify the existence of actual IT infrastructure and applications that you own, systematically and in bulk. As CIs are continuously ingested into the CMDB from various data sources, ensure the integrity of the CMDB. Remove any stale CIs that are associated with IT infrastructure or applications that no longer exists.

Use the CMDB Data Manager in CMDB Workspace and in Service Graph Workspace to create an Attestation policy, specifying CIs that need to be attested and the attestation frequency. Assign Attestation tasks to users that are familiar with or that manage the CIs, and who can attest or

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reject the IT infrastructure or applications that those CIs represent. Rejected CIs that are no longer needed can then be retired, archived, or deleted from the CMDB.

Users can go to the My Work view in CMDB Workspace or to the Tasks view in Service Graph Workspace to see their assigned attestation tasks, and then review and process the tasks.

Smart detection and auto-attestation

Smart detection streamlines and simplifies CI attestation. With smart detection you can auto-attest CIs that are automatically detected by discovery programs, based only on recent discovery results.

The following conditions must be met to enable smart detection:

- Discovery is enabled in your organization or Getting started with Service Graph Connectors are implemented.
- The system property *sn_cmdb_ws.attestation.smart_detection.disabled* is set to **false** (default value).

In addition, smart detection uses the following system properties as filters when creating a list of CIs that are candidates for auto-attestation. To be included as candidates for auto-attestation, CIs must be discovered:

- Within the discovery time window specified by the *sn_cmdb_ws.attestation.smart_detection.discovery_window* system property (for example, within the last 30 days)
- By any discovery source that isn't excluded by the *sn_cmdb_ws.attestation.smart_detection.discovery_source.exclusion* system property

Then, when you review those candidate CIs, you can choose to auto-attest them.

Properties associated with Attestation

Property	Description

sn_cmdb_ws.attestation.smart_detection.disabled	Disables smart detection.
	• Type: true | false
	• Default value: false
	• Values:
	  ○ **true**: Disable smart detection.
	  ○ **false**: Enable smart detection.
	• Location: Add to System Properties [sys_properties] table.
	• Learn more: Review CMDB Data Manager attestation tasks in

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Property	Description
	CMDB Workspace or in Service Graph Workspace
sn_cmdb_ws.attestation.smart_detection.discovery_source.exclusion	Comma-separated list of discovery sources that are excluded in smart detection processing. For example, a data source that is unreliable in detecting CIs. CIs discovered by discovery sources in the list, can't be candidates for auto-attestation. • Type: string • Default value: Manual Entry • Location: System property • Learn more: Review CMDB Data Manager attestation tasks in CMDB Workspace or in Service Graph Workspace
sn_cmdb_ws.attestation.smart_detection.discovery_window	Number of days (discovery window) that smart detection uses to determine whether a CI is a candidate for auto-attestation. Only CIs that were discovered within this discovery window can be candidates for auto-attestation. • Type: integer • Default value: 30 • Location: System property • Learn more: Review CMDB Data Manager attestation tasks in CMDB Workspace or in Service Graph Workspace

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Review CMDB Data Manager attestation tasks in CMDB Workspace or in Service Graph Workspace

Review attestation tasks that are assigned to you or to an assignment group that you belong to in accordance with CMDB Data Manager Attestation policies. Check the physical existence of IT infrastructure or applications associated with CIs in the attestation task and then process those CIs as appropriate.

About this task

For managers, tasks of direct reports are included, and for user group managers, tasks of members in the group are also included.

Before you begin

Role required:

- CMDB administrator: data_manager_admin or sn_cmdb_admin
- CI and service owner or manager: data_manager_user, sn_cmdb_user (already includes the data_manager_user role)

Canceling an attestation task is available only for tasks that are in the 'In progress' or 'Not started' status, and the required role is data_manager_admin or sn_cmdb_admin.

About this task

After you receive notifications about attestation tasks assigned to you, check the actual IT infrastructure or applications that you own, and then process the CIs in the task accordingly. Initially, all the CIs in the attestation task are listed in a Not Yet Reviewed list and therefore require a review. Attested CIs are then moved to an Attested CIs list, while CIs you reject are moved to a separate Rejected CIs list. After processing all the CIs in the task, you can submit and complete the task. For general information about attestation and the flow of attestation, see CIs attestation.

As you process the CIs in the task, only the fields *Attestation Status* (values: **Attested**, **Rejected**, **Not Yet Reviewed**), *Attested By*, and *Attested Date* are automatically updated. Also, details of your activities are captured in the activity stream of the task.

Procedure

1. Navigate to either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace** and then select **My Work** in the CMDB Workspace menu bar.
   - Navigate to **Workspaces** > **Service Graph Workspace**, in the navigation panel select the Tasks icon, and then, in the Tasks navigation panel, select **Attestation**.

   Any attestation tasks that are assigned to you or to assignment groups you belong to, appear in the **Attestation tasks** tab in the My tasks section. Attestation tasks are associated with details such as the due dates and short descriptions for those tasks. Assignment groups that you are a member of, are also listed.
2. Select a task to review from the Attestation tasks list.
   For a bulk review, select multiple tasks or check the box next to 'Configuration Item' to review all the tasks in the list.
3. Review details of a task:

   a. **Optional:** Administrators can select **Cancel task** if attesting the CIs in the task isn't needed. For example, if the task was created by error. The canceled task is deleted without any further processing.

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b. **Optional:** If the task isn't properly assigned, select **Reassign** and then select one of the following options.

(Optional) Depending on your selection, the task might no longer be assigned to you.

- **To me**: If the task isn't yet assigned to a specific user and you are the owner of the CIs who can process the task.
- (Optional) **To other user**: If you aren't the actual owner of the CIs and there is someone else that is more appropriate as the owner for the task. In the Reassign to other user dialog box, set **Assign to** to that user and enter the reason for the reassignment. Then select **Proceed**.

  For a CI owner, only users from the assignment group that the task is currently assigned to, appear. For Admins, all users with the data_manager_user role appear.
- **Send for reassignment**: If you aren't the appropriate user for this task and the administrator needs to assign the task to someone else. In the Send for reassignment dialog box, enter the reason for the operation and then select **Submit** to send a notification to the administrator.

c. Select **Review CIs to attest** to continue the CI attestation process.
If the task is not assigned to anyone, it is automatically assigned to the current user.

4. **Optional:** If the Smart detection dialog box appears, select **Review** to review the CIs or **Auto-attest** to attest the detected CIs without a review.
   a. Review the details of the CIs in the list.
   b. **Optional:** Select **Auto-attest** to automatically attest all the CIs in the list and to move them to the Attested CIs list.
   c. **Optional:** Select **Cancel auto-attestation** to leave all the CIs in the Not Yet Reviewed list and to later continue attesting those CIs regardless of smart detection.

   If you select **Cancel**, you can later select **Run auto-attestation** in the Smart detection widget. When reviewing the CIs to attest, the list in the Smart detection pane is filtered to CIs that are candidates for auto-attestation, letting you auto-attest all those CIs in bulk.
5. Review the CIs in the Not Yet Reviewed list.

   You can select a CI to open a dashboard with more details such as CI health, key properties, and CMDB 360 data. The CI health details that appear depend on settings and activation of various features.

   Use the following cards on the right hand bar to get help and status:

   - Select Attestation actions ( ) to get help on the possible actions you can take while reviewing CIs.
   - Select Attestation status ( ) to see your progress in reviewing and attesting CIs.
   - Select Smart detection status ( ) to see if any CIs are candidates for auto-attestation and to apply auto-attestation if applicable.
6. In the **Details** tab of the Attestation Review CIs pane, select the CIs that you are ready to process and select an action to apply to all selected CIs.

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- Select the CIs that you can attest their existence and select **Attest** to move them to the Attested list.

  To undo attestation, select the Attested list, select the CIs that you want to move back to the Not Yet Reviewed list and select **Unattest**. Or, select the CIs that you want to move to the Rejected list and select **Reject**.

- Select the CIs that you can't attest their existence and select **Reject** to move them to the Rejected list. In the Confirm rejecting CIs dialog box, enter an explanation and then select **Proceed**.

  To undo rejection, select the Rejected list, select the CIs that you want to move back to the Not Yet Reviewed list and select **Unattest**. Or, select the CIs that you want to move to the Attested list and select **Attest**.

- Select the CIs that shouldn't be included in this task and in future Data Manager attestation policies, and select **Exclude**. In the Confirm excluding CIs dialog box, enter an explanation and then select **Proceed**.

  Those excluded CIs are added to the exclusion list of CMDB Data Manager attestation policies. For more information, see Manage exclusion lists for CMDB Data Manager. Only an admin can undo this operation using the CMDB Data Manager.

- Select any CIs that you identify as duplicates of other CIs and select **Remove duplicates from task**. In the Confirm removing duplicate CIs dialog box, enter an explanation and then select **Proceed**.

  Those duplicate CIs are removed from the attestation task and a de-duplication task is generated for them, which is similar to the de-duplication tasks created by the Identification and Reconciliation Engine (IRE). For more details about how to process and remediate de-duplication tasks, see Duplicate CIs remediation.

  Note:
  Only an admin can undo this operation.

- After processing all the CIs in the task, when the Not Yet Reviewed list is empty, the **Submit** button is enabled. Select **Submit** or the **Submit task** link in the 'Ready to submit' notification, and then in the Submit attestation dialog box select **Submit** to close the task.

Run an attestation policy on-demand

Run an attestation policy in Service Graph Workspace or in CMDB Workspace, when needed, regardless of the policy recurring schedule. A manual, on-demand run doesn't interfere with the policy's specified schedule.

Before you begin

You can run on-demand only one policy at a time, and that policy, must not be actively running.

Role required: sn_cmdb_admin

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Procedure

1. Navigate to either workspace:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and in the navigation panel select the Governance icon.
   - Navigate to **Workspaces** > **CMDB Workspace** and select **Management** in the CMDB Workspace menu bar.
2. Select the **Data Manager** link in Management tools, in the Manage section.
3. In the Data Manager navigation panel, select **Policies**.
4. Run the policy using either of the following ways.
   - In the Published policies tile, select the attestation policy that you want to run and then select **Run Policy**.
   - In the Published policies tile, select the attestation policy that you want to run and then, on the policy details page, select **Run Policy**.
5. In the Run Policy dialog box, select **Run**.

Data Certification

Data Certification manages scheduled and on-demand validations of data in CMDB and non-CMDB tables.

Information is added to the CMDB by Discovery, by importing from third-party tools, or manually. For regulatory or procedural reasons, information in the CMDB requires checks for accuracy and certification. The person or team responsible for certification can define what information requires verification and the frequency of verification. Using CMDB Data Manager supports policy-driven validation of specific attributes using the certification policy type. CMDB Data Manager generates certification tasks for verifying the data on a recurring schedule, which then, individuals assigned to those tasks answer a series of questions to verify the data.

Use Data Certification to:

- Maintain the accuracy, completeness, and reliability of critical data in both, CMDB and non-CMDB tables.
- Create a framework for ongoing data compliance, regulatory, governance, and operational standards.

Data certification can be performed against specific fields on specific tables. Based on the certification schedule, certification tasks are automatically created and assigned. A certification task represents the work of verifying the data associated with a particular record. For example, you can set up a certification to validate key information fields, such as **Operating System** and **CPU count**, on all Windows servers located in Chicago. You can then assign the tasks to the appropriate team member automatically.

When planning an implementation of Data Certification, answer the following questions:

- What information requires certification?
- When is the due date for certification?
- Who must perform the certification?

Domain separated systems can use the Data Certification application.

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Data Certification experience in CMDB Workspaceand in Service Graph Workspace

You can use the CMDB Workspace or Service Graph Workspace landing page and its views to fully administer and use Data Certification, view various analytics, and handle Data Certification functions such as:

- Create a certification policy.
- Convert legacy certification schedules into Data Manager certification policies.
- Review certification tasks.
- Review failed certification tasks.

The Data Certification experience in CMDB Workspace doesn't provide functionality such as reset, merging of multiple certification tasks, and escalation.

For more information about using Data Certification in CMDB Workspace, see Data Certification experience in CMDB Workspace and in Service Graph Workspace.

Data Certification on Core UI (UI 16)

Data Certification experience in CMDB Workspace and in Service Graph Workspace provides the latest Data Certification functionality. However, the legacy build of Data Certification on Core UI (UI 16) is available by navigating to **All** > **Data Certification**. For information about using the CMDB Data Manager legacy build on Core UI, see Data Certification on Core UI.

Note:

Data Certification in CMDB Workspace and the legacy build of Data Certification on Core UI operate separately, and aren't synchronized. Therefore, any Data Certification elements, such as definitions and schedules, that you create in one of those implementations, doesn't appear and isn't included in the other implementation.

To convert data created in the legacy build of Data Certification on Core UI, into draft Certification policies in CMDB Workspace, see Convert legacy certification schedules into Data Manager certification policies.

Data Certification experience in CMDB Workspace and in Service Graph Workspace

Use Data Certification in CMDB Workspace or in Service Graph Workspace to administer Data Certification, create certification policies, manage certification tasks, and view analytics about on-going processes.

Note:
Data Certification in CMDB Workspace and the legacy build of Data Certification on Core UI operate separately, and aren't synchronized. Therefore, any Data Certification definitions, such as filters and certification schedules, that you create in one of those implementations, doesn't appear and isn't available in the other implementation.

Use Data Certification in CMDB Workspace and in Service Graph Workspace

Use the CMDB Workspace landing page and its views to administer Data Certification:

- Use the Management view in CMDB Workspace to navigate to CMDB Data Manager to create a new Certification policy.
- Use the My work tile on the CMDB Workspace landing page to access your open and overdue certification tasks that you need to review and process.

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- Use the My Work view in CMDB Workspace to access any certification tasks assigned to you under the Certification tasks section.
- Use the Governance view in Service Graph Workspace to navigate to CMDB Data Manager to create a new Certification policy.
- Use the Tasks view in Service Graph Workspace to access any certification tasks assigned to you and certification instances that you own.

Manage certification tasks in CMDB Workspace and in Service Graph Workspace:

- Manage Data Certification instances and tasks, and see progress, status, and insights in the Data Certification Dashboard
- Review certification tasks in CMDB Workspace
- Review failed certification tasks

Retention of Data Certification records

Archival and destroy processes of certification policy related records, are separate from those processes for records of all other policy types. This separation facilitates the extension of the retention period of certification policy records. Retaining certification policy execution records for longer periods of time is useful in situations where those records are needed for audits and is also useful for the Data Certification Dashboard, which is populated by these records.

The following configurations facilitate the separation of retention policies for Data Certification records:

- The table cleanup rule for the CMDB Data Management Policy Executions [cmdb_data_management_policy_execution] table, which is stored in the Auto Flushes [sys_auto_flush] table, excludes certification policy execution records from recurring cleanups.
- The Archive CMDB Data Management Tasks archive rule, that applies to all CMDB Data Manager policy execution records, excludes certification policy records. At each archive run, this archive rule is configured to also automatically archive its related records in the CMDB Data Management Certification Task To Document [sn_cmdb_ws_dm_certification_task_to_document] table (Archive Related Records).
- The archive rule, Archive Certification Instances, archives certification policy execution records from the CMDB Data Management Policy Execution [cmdb_data_management_policy_execution] table. This archive rule is configured to archive certification policy execution records 2 years after creation, and to destroy those records 7 years after they are archived.
- The archive rule, Archive Certification tasks, archives the certification task records from the CMDB Data Management Task [cmdb_data_management_task] table. This archive rule also contains an Archive Related Records entry that archives the related records in the CMDB Data Management Certification Task To Document [sn_cmdb_ws_dm_certification_task_to_document] table.

Convert legacy certification schedules into Data Manager certification policies

Convert certification schedules created in the legacy Data Certification application (running on Core UI), into draft Data Manager certification policies available in CMDB Workspace or in Service Graph Workspace.

Before you begin

Role required: data_manager_admin or sn_cmdb_admin

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About this task

If you have been using the legacy Data Certification application on Core UI, then any associated certification schedules aren't automatically available in the new implementation of Data Certification in CMDB Workspace version 6.0 and in Service Graph Workspace. You can convert those definitions into draft Data Manager Certification policies. Then you can publish the converted policies in CMDB Workspace and in Service Graph Workspace just like publishing any draft Data Manager policy.

Important things to know:

- Legacy certification schedules that were successfully converted are automatically deactivated.
- This conversion migrates most fields from the legacy certification schedule. However, the *Assign to empty* and the *Last run date* fields aren't migrated into CMDB Workspace and in Service Graph Workspace Data Manager tables.
- Any dot-walking settings in the legacy certification schedules used for assignments of *User Field* or *User Group Field* are preserved in this conversion.

Procedure

1. Navigate to either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace** and then select **Management** in the CMDB Workspace menu bar.
   - Navigate to **Workspaces** > **Service Graph Workspace** and then select the Governance icon in the navigation panel.
2. Select the **Data Manager** link in Management tools, in the Manage section.
3. On the Data Manager overview page, select **Import** on the banner at the top of the page. If there aren't any legacy certification schedules to import, the notification banner about importing existing policies doesn't appear.
4. In the Confirm import of certification schedule into draft policies, select **Import into draft policies**.

   a. Track progression in the Import in progress dialog box.

   b. Review the import results in the Import summary dialog box.

      If there were earlier conversion operations, the results reflect only the current conversion operation. For example, the Completed count includes only those records that were successfully converted in the current run.

      Select the links associated with the completed and skipped results to drill down to the associated records.

      Also, to see additional details, select **All** and in the Filter navigator, enter `cert_schedule.list` to open the Certification Schedules table. The *Migration Status* and the *Migration exception* columns provide details that are especially important for failed and skipped records.

   c. Select **View draft policies** to view the converted policies in the Data Manager policies page, under the Draft policies tab.

5. **Optional:** Publish a draft CMDB Data Manager policy

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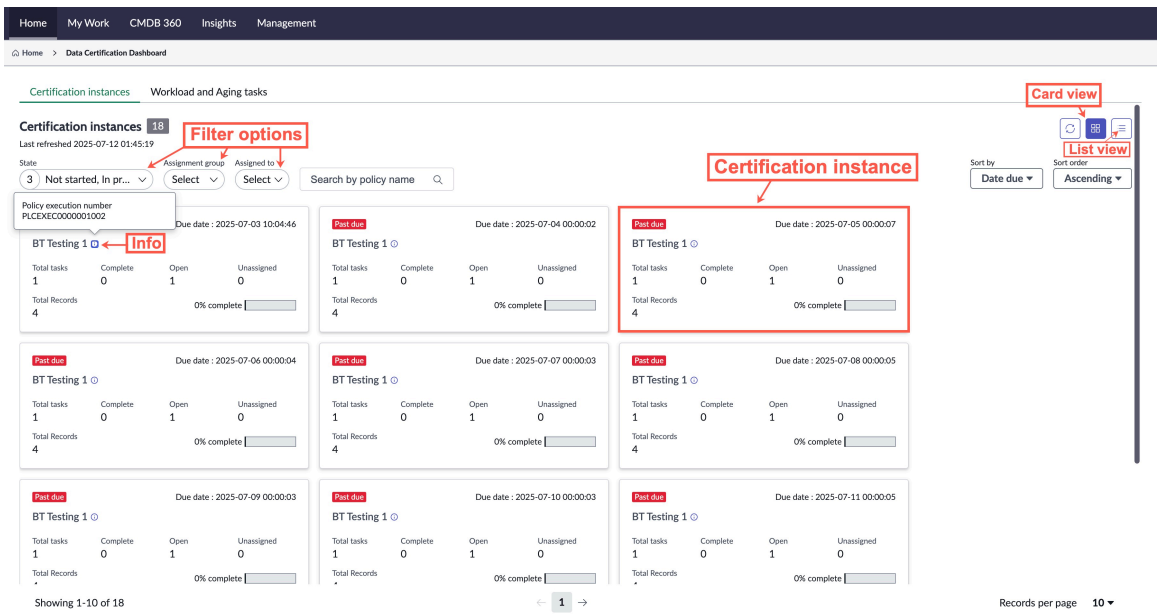
Result

- If you log in while this conversion is in process, a progress message appears on the Data Manager overview page. You can select the **View details** link to open the Import in progress dialog box with details about the progress of the operation.
- The legacy certification schedules are available as draft Certification policies in Data Manager in CMDB Workspace and in Service Graph Workspace.
- The legacy certification schedules are deactivated.
- The legacy certification tasks are unchanged and you can review and resolve them as needed.

Data Certification Dashboard

Use the Data Certification Dashboard in CMDB Workspace or in Service Graph Workspace as a central location to manage Data Certification instances and tasks, and to see counts, progress, state, and analytical insights. You can drill down past due certification tasks to examine and to reassign them, for example, so that they can be completed by an appropriate user.



The Data Certification Dashboard gets populated by Data Certification execution records. For information about the archive rules that control the retention of those records, see 'Retention of Data Certification records' in Data Certification experience in CMDB Workspace and in Service Graph Workspace.

Role requirements

The user role determines which certification tasks are included in the dashboard, as follows:

- data_manager_user: Minimum role required for access. Provides access to those certification tasks that are assigned to the user, to an assignment group that the user is a member of, or if the user is the manager of the assigned user or of the assignment group.
- data_manager_admin: Provides access to all certification tasks.

Access

Navigate to either workspace:

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- Navigate to **Workspaces** > **CMDB Workspace**, then select **My Work** in the CMDB Workspace menu bar. In the My tasks section, select the Certification tasks tab.
- Navigate to **Workspaces** > **Service Graph Workspace** and in the navigation panel select the Tasks icon. In the Tasks navigation panel select **Certification**.

Reviewing certification tasks

The Data Certification Dashboard provides several ways for you to drill down to the certification tasks list, which can contain tasks requiring review. For information about reviewing (and then certifying or failing), reassigning, or canceling tasks, see Review certification tasks.

Certification tasks

The Certification tasks tab lists all certification tasks from all policy executions from all certification instances, per your user role. For each task you can see details such as progress indicators, overall percent complete, and a general state such as Not Started and Past Due.

You can filter, sort, or group the list of tasks, or search for specific tasks. Select a task to see its details and to process.

Certification instances

The Certification instances tab shows counts and other details for certification instances. A certification instance is the collection of certification tasks for a policy execution identified by its unique policy execution number. For each certification instance, the dashboard shows progress indicators such as the overall percent complete, and a general state such as Not Started and Past Due. Each card shows the total number of associated tasks, and within that total, the number of tasks in a complete, open, and unassigned state.

You can:

- Switch the type of view by selecting the List or the Cards icon.
- Filter the list of certification instances that appear, by selecting the available filters such as State, Assignment group, or Assigned to filter and then selecting the specific items that you want to filter by.
- Filter the list of certification instances that appear by searching for specific strings in certification policy names.
- Sort the list of certification instances by various attributes such as instance state, percent complete, or policy execution number. Select ascending or descending sort order to apply along with any list filter.
- Select the info icon next to a certification instance name, to show its respective policy execution number. For information about policy execution numbers, see table CMDB Data Management Policy Executions [cmdb_data_management_policy_execution] in Components related to CMDB Data Manager.

Select a card to see more details about the certification instance, and all the tasks in that instance based on your user role. In the Certification tasks tab you can drill down the certification tasks list to access the tasks themselves for processing.

Select the Certification records tab to see all the certification records associated with all of the certification tasks in the certification instance. You can filter the certification records by **Certified** or **Failed** to show those records with at least one attribute in the selected state.

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Workload and Aging tasks

The Workload and Aging tasks tab contains two tabs showing the distribution of certification tasks workload and past-due tasks.

Workload

Shows the distribution of work related to certification tasks, by user groups and by individual users. Select the Groups or the Individuals tab to see the distribution by percentage and by total number of tasks. Select any entry in a list to drill down to the certification tasks list which lets you then access the tasks themselves for processing.

Aging

Shows bar charts with counts of data certification tasks that are past due. Past due state is determined by the setting of the *sn_cmdb_ws.glide.cmdb.data.manager.aging.policy.task.timeframe* system property (by default, 61–90 and over 90 days old). Select a chart to drill down to the certification tasks list which lets you then access the tasks themselves for processing.

Review certification tasks

Review the values of record fields and CI attributes in certification tasks assigned to you, and then certify, edit, or fail the review according to your findings. For managers, tasks of direct reports are included, and for user group managers, tasks of members in the group are also included.

Before you begin

Role required: sn_cmdb_user, sn_cmdb_editor, or sn_cmdb_admin

Canceling a certification task is available only for tasks that are in the 'In progress' or 'Not started' status, and the required role is data_manager_admin or sn_cmdb_admin.

About this task

If a certification task isn't properly assigned, you can reassign it to another user if you know who the appropriate reviewer is, or request an administrator to reassign the task.

Note:

- If the policy is configured to disallow empty attribute values, you will only be able to fail certification of the associated CIs, but you won't be able to certify them unless you populate the empty attributes first.
- If the policy is configured to disallow updates to field values, you won't be able to update non-compliant CIs, resulting in failing their certification.

Procedure

1. Navigate to the Certification tasks list in either of the following ways.
   - Navigate to **Workspaces** > **CMDB Workspace**, then select **My Work** in the CMDB Workspace menu bar. In the My tasks section, select the Certification tasks tab.
   - Navigate to **Workspaces** > **CMDB Workspace**. On the Home view in CMDB Workspace, select the **Data Certification Dashboard** quick link. Then, on the Data Certification Dashboard, drill down to the Certification tasks list from a certification instance card or from the Workload and Aging tasks tiles, as described in Data Certification Dashboard.
   - Navigate to **Workspaces** > **Service Graph Workspace** and in the navigation panel select the Tasks icon. In the Tasks navigation panel select **Certification** and on the Data Certification page, select the Certification tasks tab.

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2. **Optional:** In the Certification tasks list, select multiple tasks to reassign tasks in bulk.

   a. Select the Certification tasks tab, then the task or tasks that you want to reassign.

   - Select **Reassign**: Reassign a task to another group or user if you aren't the appropriate user to review the field values and you know who the appropriate reviewer is.
     - **Assignment group**: Select the assignment group the user belongs to.
     - **Assign to:** Search for the appropriate reviewer to reassign this task to.
     - **Submit a reason for this action**: Enter a reason why you are reassigning the task.
   - Select the **Reassign** drop-down menu then select **Assign to me**: Assign the task that isn't assigned, to yourself, if you are the appropriate reviewer for this task.
   - Select the **Reassign** drop-down menu then select **Request reassignment**: Request to reassign the task, that is assigned to you incorrectly, to someone else. Enter a reason why the task needs to be reassigned, then select **Submit**.

   b. Select **Proceed**.

3. In the Certification tasks tab, select the certification task that you want to review.
4. Review the details of the certification task, then select **Review records to certify**.

   Note:
   You can reassign the tasks on this page, see Step 2 to review the reassignment options.

5. Select the records that you want to conclude the review for in the Review not completed tab, and then select **Certify** or **Fail**.

   You can select all the records showing on the page for bulk processing by selecting the check box in the first column header, and then selecting the **Select all <n> item/s in this list** link that appears.

   - The review conclusion of certified or failed is applied in bulk only to those certification fields in the selected records, which are still pending a review. For example, a certification field that is already marked as certified, isn't affected by selecting **Fail**. Only the unreviewed fields are marked as failed. Records whose review is concluded are moved to the Review completed tab.
   - If the policy is configured to disallow empty attribute values, then CIs with empty fields won't be certified when you select **Certify**. In this situation, to certify those CIs, you must first populate the empty attributes.

6. Select the records that you want to review in details and then select **Review records**.

   A check mark next to a column header, denotes the fields whose values are included in this certification review (certification fields). All other columns show additional fields that are included only to help you identify records (display fields).

   When you select records (or CIs) to review, the fields (or attributes) for the selected records appear on the right, in a separate field review section. When you select a single record to review, the field values of the selected record appear. When you select multiple records to review, the field values don't appear. In that section, select the fields to apply your review results, or select **Select all fields** to apply the review results to all fields.

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7. Select **Submit** when all the records have been reviewed.
   The **Submit** button isn't available until all the records in the task are reviewed and the task is complete. Alternatively, you can select the **Submit task** link in the 'Ready to submit' notification.

What to do next
You can review the certification results in the Review completed tab, and change certification results or edit field values.

Review failed certification tasks

Review records (and CIs) that failed the certification review and are assigned to you. Those exceptions appear in a list that is dynamically updated as certification tasks are being reviewed.

Before you begin
Role required: sn_cmdb_admin

Procedure

1. Navigate to the Certification tasks list in either of the following ways:
   - Navigate to **Workspaces** > **CMDB Workspace**, then select **My Work** in the CMDB Workspace menu bar. In the Certification exceptions pop-up banner, select **Click here to view**.
   - Navigate to **Workspaces** > **Service Graph Workspace** and in the navigation panel select the Tasks icon. In the Tasks navigation panel select **Certification** and on the Data Certification page, select the Exceptions tab.
2. Select a drop-down to expand a task to show the records and fields that failed the certification review.
3. Select the Certification Document Id of the field that you want to update.
   The Element column shows the fields that failed the review. The Certification Document Id column contains links to the respective records.
4. Review the details of fields that require updating.

What to do next
See the Review certification tasks topic to locate and review the respective certification task and to update incorrect field values. You can also directly access record and CI forms to update incorrect values.

Run a certification policy on-demand

Run a certification policy in Service Graph Workspace or in CMDB Workspace, when needed, regardless of the policy recurring schedule. A manual, on-demand run doesn't interfere with the policy's specified schedule.

Before you begin
You can run on-demand only one policy at a time, and that policy, must not be actively running.

Role required: sn_cmdb_admin

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Procedure

1. Navigate to either workspace:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and in the navigation panel select the Governance icon.
   - Navigate to **Workspaces** > **CMDB Workspace** and select **Management** in the CMDB Workspace menu bar.
2. Select the **Data Manager** link in Management tools, in the Manage section.
3. In the Data Manager navigation panel, select **Policies**.
4. Run the policy using either of the following ways.
   - In the Published policies tile, select the certification policy that you want to run and then select **Run Policy**.
   - In the Published policies tile, select the certification policy that you want to run and then, on the policy details page, select **Run Policy**.
5. In the Run Policy dialog box, select **Run**.

Data Certification on Core UI

The legacy build of Data Certification on Core UI lets you centrally track and handle Data Certification tasks, create certification filters, and define certification schedules.

The Data Certification plugin (com.snc.certification_v2) is now deprecated and no longer supported or available for new activation. The latest experience for this functionality is included with CMDB Workspace.

- For details about the deprecation, see the Deprecation Process [KB0867184] article in the Now Support knowledge base.
- For information about using Data Certification, see Data Certification experience in CMDB Workspace and in Service Graph Workspace.
- For information about converting schedules created in the legacy build of Data Certification on Core UI, into draft Certification policies in CMDB Workspace, see Convert legacy certification schedules into Data Manager certification policies.

Activate Data Certification

Activate the Data Certification plugin to access the application. Activating this plugin also activates the Version Management plugin, which manages certification filter versions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Data Certification plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

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Note:
When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Installed With Data Certification

Activating the Data Certification plugin installs the following components.

Demo data is available with Data Certification. The demo data provides information including filters, schedules, instances, and tasks.

Tables

Data Certification adds the following tables:

Table	Description
Certification Audit Definition [cert_audit_definition]	Stores collections of certification schedules that can be run as a single entity.
Certification Audit Definition Elements [m2m_cert_audit_def_cert_sched]	Lists the certification schedules in each certification audit definition.
Certification Audit Instance [cert_audit_instance]	Stores the certification instances associated with a specific audit definition.
Certification Element [cert_element]	Stores the data elements that are grouped into certification tasks.
Certification Filter [cert_filter]	Stores the data that requires certification using a filtering condition for the certification.
Certification Instance [cert_instance]	Stores a collection of certification tasks representing a single instance of a scheduled certification. This table extends the Audit [cert_audit] table.
Certification Schedule [cert_schedule]	Stores certification for a specific set of information on a specific table, what user or group the tasks are assigned to, and how often this certification is done.
Certification Task [cert_task]	Stores individual certification tasks. Certification Task extends the Task table.

Script Includes

Data Certification adds the following script includes:

Name	Description
CertificationAjax	Provides utilities that enable individual certification elements to be certified, rejected, or reverted.

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Name	Description
CertificationTaskCreate	Custom code that extends the standard code for certification tasks.
CertTaskEscalationTimerPercentage	Updates time and percentage complete information for a certification.
CertificationUtilities	Provides utility functions for certification.

Client Scripts

Data Certification adds the following client scripts:

Name	Table	Description
Alert If Boxes Checked	Certification Task [cert_task]	Provides a warning if the certifier attempts to leave a record without certifying the checked elements
Check Table Name	Certification Schedule [cert_schedule]	Updates the table name when a different filter is selected.

UI Policies

Data Certification adds the following UI policies:

Name	Table	Description
Hide next scheduled run	Certification Schedule [cert_schedule]	Hides the *Next Scheduled Run* field when the schedule is set to run once or on demand only.
Hide Run When Not Active	Certification Schedule [cert_schedule]	Hide "run" associated fields when active is set to false.
Make table name read only	Certification Schedule [cert_schedule]	Makes the *Table* field read-only.
Hide Table field	Certification Element [cert_element]	Hides the *Table* field on the certification task form.
Make percent complete field read only	Certification Instance [cert_instance]	Makes the *Percent complete* field read only when the *State* is *Work in Progress*, *Closed Complete*, *Closed Incomplete*, or *Cancelled*.
Show Assign to fields	Certification Schedule [cert_schedule]	Shows the *Assign To* field when the assignment type is *User* and hides the *Assign To* field for all other assignment types.
Show Group field	Certification Schedule [cert_schedule]	Shows the **Change Group** (formerly Assignment Group) field when the assignment type is *Group* and hides the **Change Group** field for all other assignment types.

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Name	Table	Description
Show User field	Certification Schedule [cert_schedule]	Shows the *User* field when the assignment type is *User*.
Show Assignment Fields	Certification Schedule [cert_schedule]	Shows the *Assign To Empty* option when the assignment type is *User Field* or *Group Field*.

Business Rules

Data Certification adds the following business rules:

Name	Table	Description
Adjust dates for cert tasks	Certification Instance [cert_instance]	Adjusts dates for tasks belonging to the certification instance when the dates are changed for an active certification.
Cancel Instance	Certification Instance [cert_instance]	Cancels all open certification tasks when an active certification is canceled.
certification audit instance events	Certification Audit Instance [cert_audit_instance]	Sends an inserted event when an active certification audit instance is created. Sends a completed event when an active certification audit instance is marked as complete or incomplete.
certification element events	Certification Element [cert_element]	Sends a failed event when an element of a certification is marked as failed.
certification instance events	Certification Instance [cert_instance]	Sends an inserted event when an instance of a certification is created. Sends a completed event when an instance of a certification is completed.
Certification Instance Rollup	Certification Task [cert_task]	Updates the *Percent complete* field on the certification instance record.
certification task events	Certification Task [cert_task]	Sends an inserted event when a task is inserted. Sends a completed event when a task is deactivated. Sends a canceled event when a task is canceled.
Certification Task Values	Certification Element [cert_element]	Updates the percent complete of the parent task when a certification element is updated.
Check Certification Audit Progress	Certification Instance [cert_instance]	Updates the completion status of the audit instance as a whole when a certification that is part of an audit is complete.
Clean Certification Views	Certification Instance [cert_instance]	Cleans all related records when a certification instance is deleted.
Copy certification schedule fields	Certification Instance [cert_instance]	Copies changes to the certification schedule to the certification instance.

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Name	Table	Description
Merge Certification Tasks	Certification Task [cert_task]	Merges two tasks together when a task is reassigned and there is another task for the same instance with the new user.
Prevent delete of Filter with Schedule	Certification Filter [cert_filter]	Prevents the deletion of a filter that is used in a schedule.
Reassign Notification	Certification Task [cert_task]	Sends out a notification to the new and previous assignees when a task is reassigned.
Rollup State	Certification Task [cert_task]	Updates all necessary parent items when task state is changed.
Update audit reference	Certification Task [cert_task]	Makes Data Certification records compatible with Desired State records. This rule makes sure that the *Audit* field is correctly completed when a record is inserted using Insert and Stay.
Update audit result	Certification Element [cert_element]	Makes Data Certification records compatible with Desired State records for reporting purposes. This rule puts certified values in the *Desired value* column when an audit is *Certified*. It also puts actual values in the *Discrepancy value* column when an audit is *Failed*.
Update follow_on_task & audit references	Certification Element [cert_element]	Makes Data Certification records compatible with Desired State records for reporting purposes. This rule makes certification tasks compatible with follow-on tasks and displays all tasks, regardless of origin.
Update next run time	Certification Schedule [cert_schedule]	Updates the *Next scheduled run* field when a schedule runs *Daily*, *Weekly*, *Monthly*, or *Periodically*.
Verify Fields	Certification Schedule [cert_schedule]	Verifies that no field is used in both *Display* and *Certification* fields when the fields of a certification schedule are changed.

Formatter

Data Certification adds the following formatter:

Formatter

Name	Description
Certification Task Elements	Enables custom user interface formatting of elements on a certification task. For example, displays the green check mark and red exclamation point to use when certifying an element.

Properties

Properties

Name	Table	Description
glide.ui.cert_task_activity.fields	System Properties [sys_properties]	Defines which journal field is the task activity field.

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Properties (continued)

Name	Table	Description
		Default: work_notes

User Roles

Data Certification adds the following user roles:

User Roles

Role	Contains Roles	Description
certification_admin	certification	Can: • Create and configure certifications • Override provided answers • Perform certification tasks for certification task owners • Send certification task notifications to users and owners at any time • Cancel or delete certifications in any state
certification_filter_admin	certification	Can create and manage all data certification filters.
certification	none	Can update active or incomplete tasks assigned to them or to groups of which they are a member. Can also update configuration items owned by them or by groups of which they are a member. Receives email notifications when assigned certification tasks.

Events

Data Certification adds the following events. The ServiceNow system uses these events to send email notifications to task owners and managers about changes in certification records.

Name	Description
cert_audit_instance.completed	A certification audit instance has been completed.
cert_audit_instance.inserted	A certification audit instance has been inserted.
cert_element.failed	A certification element has failed certification.
cert_instance.complete	A certification instance has been completed.
cert_instance.inserted	A certification instance has been inserted.
cert_task.cancelled	A certification task has been canceled.
cert_task.completed	A certification task has been completed.
cert_task.escalate	A certification task record has been escalated.

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Name	Description
cert_task.inserted	A new certification task has been created.
cert_task.notifications	A certification task notification has been resent to a user.
cert_task.overdue	A certification task is past its specified completion date.
cert_task.reassign	A certification task has been reassigned.
cert_task.warning	A new task escalation point has been reached.

Email Templates

Data Certification adds the following email templates:

Name	Message
certification.task.cancelled	A certification task assigned to you/your group as part of the data certification and management process has been canceled.
certification.task.reminder.inserted	A certification task that has been assigned to you/your group as part of the data certification and management process requires attention.
certification.task.reminder.outstanding	A certification task that has been assigned to you/your group as part of the data certification and management process requires attention.
certification.task.reminder.overdue	A certification task that has been assigned to you/your group as part of the data certification and management process is overdue.

Certification schedules

A certification schedule defines the information that requires certification and the frequency of execution.

At each time interval specified, or on-demand, the certification schedule generates a set of certification tasks based on set conditions. Use the Preview Certification Tasks related link to preview the certification tasks generated from a certification schedule.

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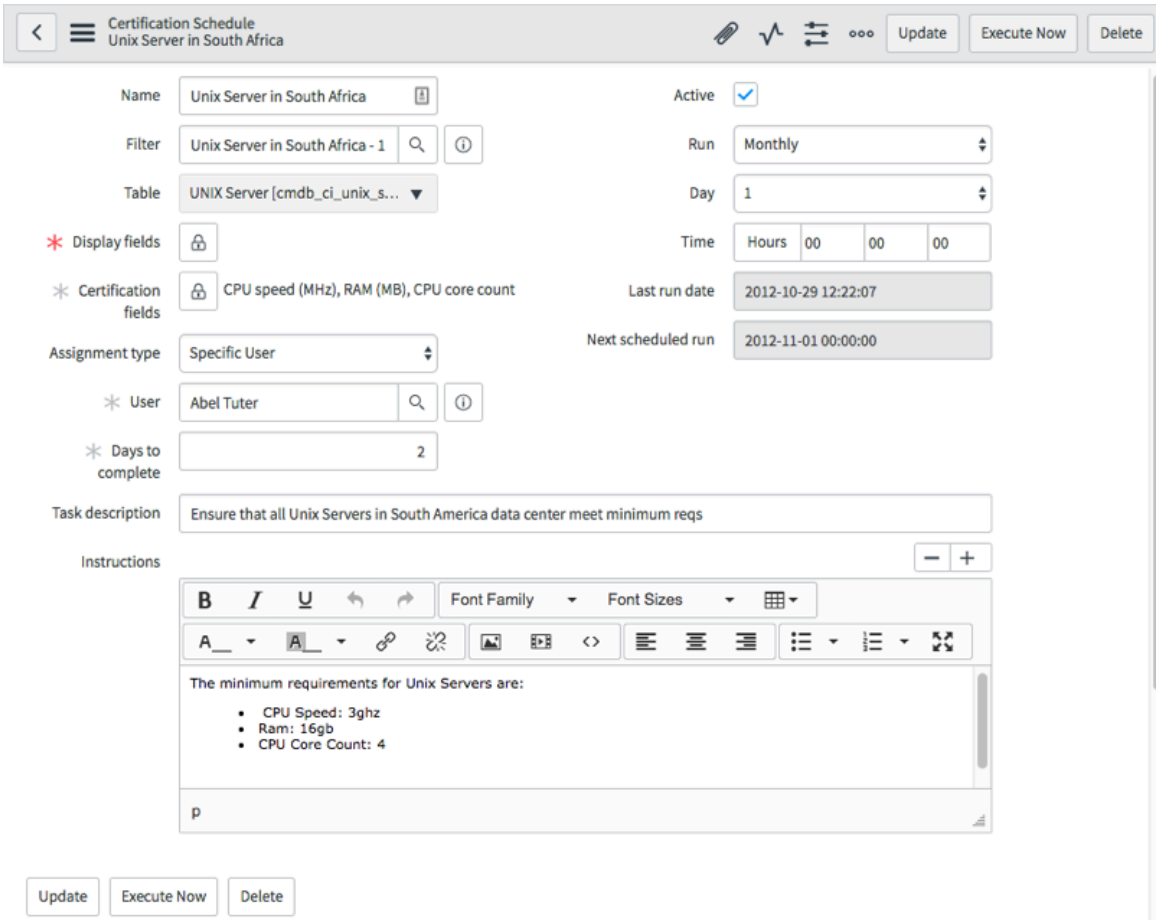
Certification schedule



Certification tasks

A certification task represents the work of verifying the data associated with a particular record.

Task owners are responsible for performing the certification tasks. Tasks have an associated workflow that sends reminders to the task owner and, if necessary, the manager of the owner at regular intervals.

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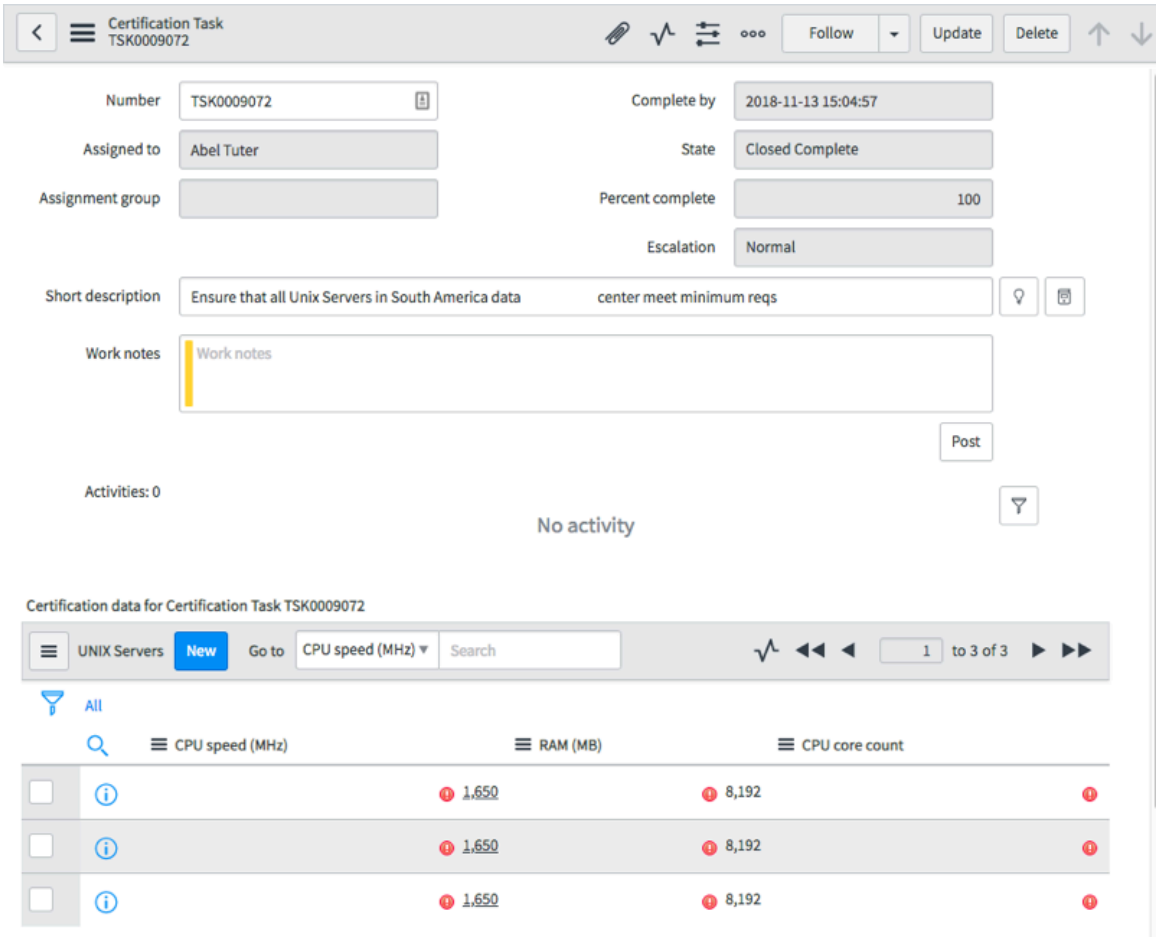
Certification task



Note:
If the message

```
Record cannot be certified until the instance is finished
 creating all certification tasks and elements. Reload the
 page to try again
```

appears, it signifies that:

- A large amount of data is present in the cmbd_ci and cmdb_ci_server tables.
- Data certification task processing is not complete (Data Certification jobs are still in process).

As directed, reload the page and wait for the processing to complete.

Clean up invalid elements

Use the **Clean up invalid elements** UI action to query and delete certification elements that reference invalid records. Each certification task has a certification schedule, and each certification schedule has Table and Filter fields. When you use this UI action, it performs the following processing:

1. Collects all available records from Table field in the certification schedule with filters that are available in certification schedule.
2. Collects all certification elements associated with the current certification task.
3. Deletes the certification elements that are no longer available for the data collected in the previous step.

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4. After deleting invalid records, it recomputes the certification completion percentage using the following formula:

   (1 - (number of certification elements pending / total no of certification elements associated)) * 100;)

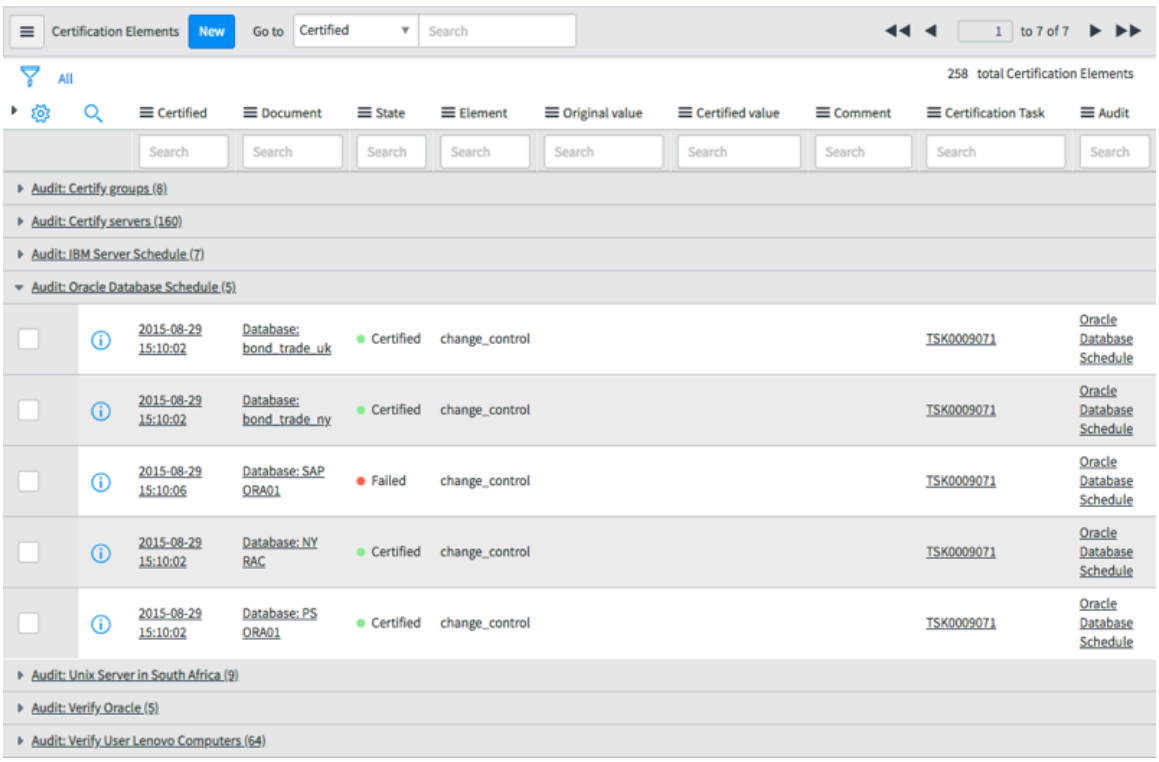
5. If there are no certification elements with a Pending status, it marks the associated certification task as Closed, and deactivates it.
6. If there are remaining certification elements with a Pending status, it activates the associated certification task and changes its status to Work in Progress.

Certification elements

Each element of each record being certified is tracked in its own certification element record.

Also tracked are the date and time when the element was certified, comments, and the original and certified values of the field. You can view elements on individual certification tasks. Or, you can directly access the Certification Elements [cert_element] table by navigating to **All** and then in the Filter box, entering `cert_element.list`.

Certification elements



Certification instances

A certification instance is the collection of certification tasks for one execution of a certification schedule.

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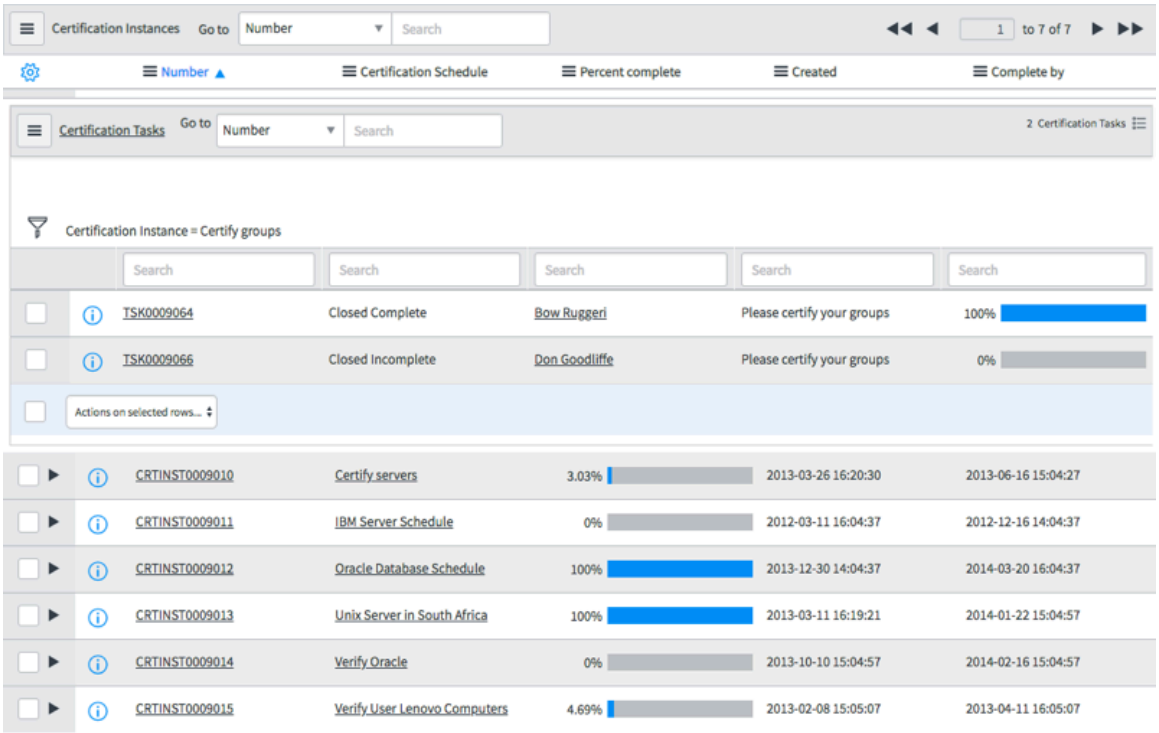
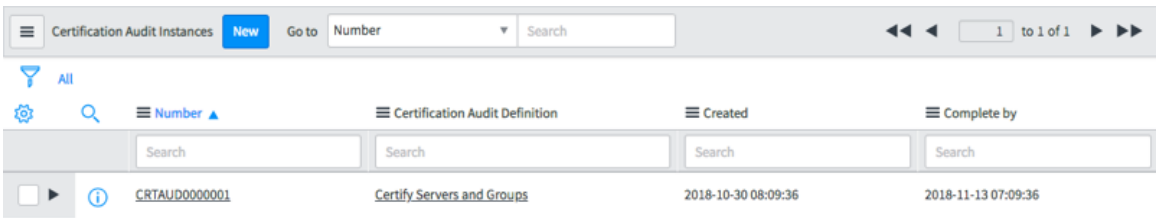
Certification instances



Certification audit instances

A certification audit instance is a collection of the certification instances and tasks generated by a single execution of the certification audit definition.

Certification audit instance



Certification audit definition

A certification audit definition is a collection of certification schedules that can be run at once.

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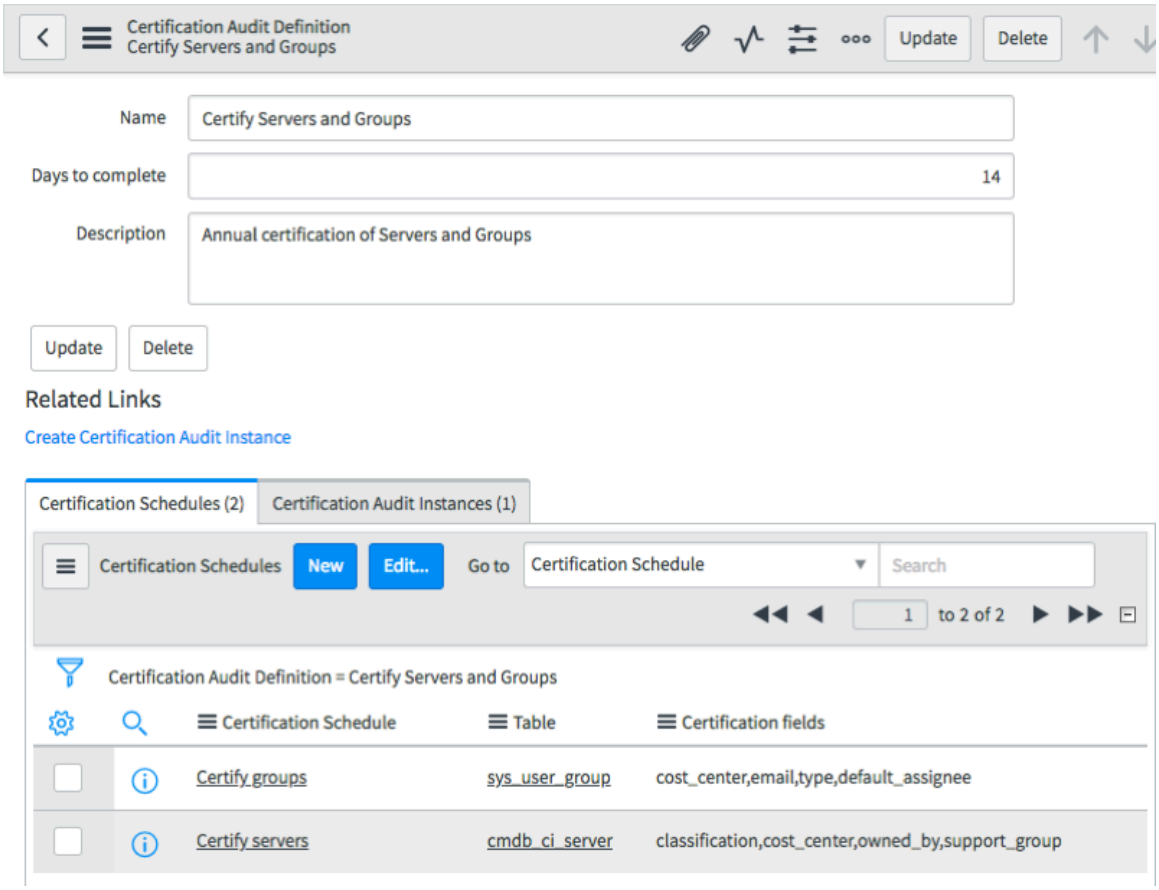
Certification audit definition



Data Certification Overview module

The Data Certification Overview module displays various data certification-related reports on the Data Certification Console homepage.

The Overview module is a type of homepage.

The different levels of access are:

Access levels per role

Role	Access
certification	• View (view overview page and refresh reports) • Review, certify, and fail certifications
certification_admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) View, customize
admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) • Edit (can edit reports)

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Data Certification Overview Module

The Overview module includes the following reports:

Data Certification Overview Module Description

report	Description	Table
30/60/90 Day Aging	Groups tasks by the number of days (*30*, *60*, *90*, and *90 and over*) since the task was opened.	Certification Task
Certification Instances	Lists all certification instances.	Certification Instance
Certification Progress Report	Groups tasks by task owner, indicating task progress as a percentage.	Certification Task
Certification Task Completed Report	Groups tasks by task owner, indicating tasks that are complete.	Certification Task
Exceptions To Date	Lists all task elements that have comments added and a state of *Failed* or *In Progress*.	Certification Element
Functional Roll Up	Lists the managers that have groups with assigned certification tasks. The report is a horizontal bar chart, grouped by status, with each bar representing a manager of an assignment group.	Certification Task
Hierarchical Roll Up	Shows the managers that have employees with assigned certification tasks (task owners). The report is a horizontal bar chart, grouped by status, with each bar representing a manager of a task owner (identified in the **Assigned to** field).	Certification Task
Upcoming Schedules	Lists all schedules that are scheduled to run within the next 30 days.	Certification Schedule

Related topics

Use the Data Certification Overview module

Use the Data Certification Overview module

View the status of data certification tasks.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Data Certification** > **Overview**.
2. Click elements within the reports to obtain more information.
   For example, click any of the colored bars in the **Functional Roll Up** bar chart and detailed information replaces the Data Certification Console screen.
3. Update some fields directly on the overview page.

Example:
For example, in the red box on the image shown, a certification schedule is being updated in the certification instances report.

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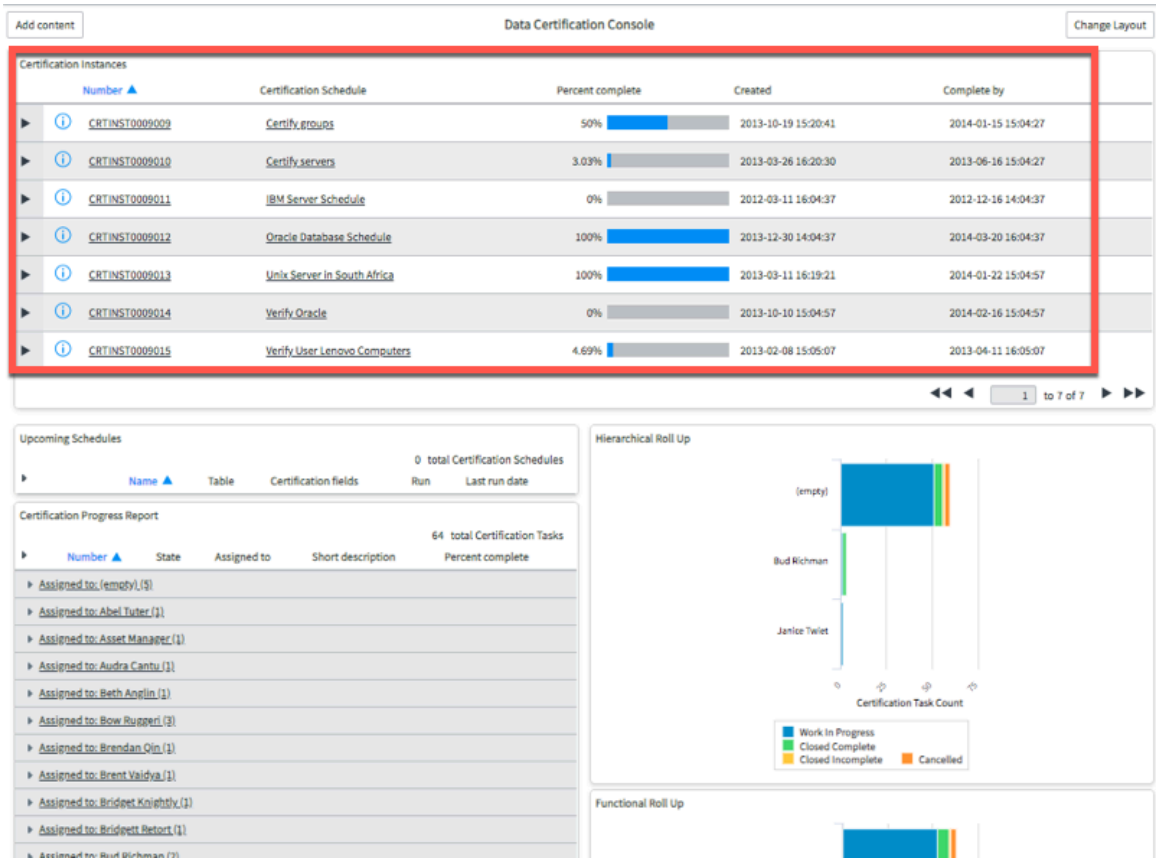
Data certification overview module



Related topics

Data Certification Overview module

Data Certification planning

Initial planning can make the certification process more successful.

By defining certification schedules and certification audit definitions, users with the certification_admin role establish when certifications are performed, who performs it, and what data must be certified.

Required Roles

Users with the certification_admin role can view filter versions. These users can create, update, and delete filters, if they have the proper access to necessary tables. In the base ServiceNow system, certification_admin users have limited system rights and do not have access to all the tables required for creating a filter. When assigning compliance resources, make sure to grant additional roles to the certification_admin user as needed. For example, this user requires roles that grant access to these tables:

- Company `[core_company]`
- Cost Center `[cmn_cost_center]`
- Schedule `[cmn_schedule]`

Planning Data Certification

Planning the data certification process requires defining:

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- The certification schedule defines certification for a particular set of information on a particular table. It also generates certification tasks to perform that certification. One certification task is generated per task owner and a certification instance record groups the tasks.
- The optional certification audit definition groups some certification schedules to be performed together and generates certification audit instances to perform them.

The following questions require answers for each certification schedule:

- What information requires certification?
- When is the due date for certification?
- Who must perform the certification?

Create a certification filter

A filter is a subset of configuration items from any ServiceNow table that is created with a standard condition builder.

Before you begin

Role required: admin

About this task

An example is a filter that selects all UNIX servers in the Australian data center.

With filters, you can:

- Create multiple versions of a filter and then select the version you want to use.
- Use one filter on multiple certification schedules.
- View the number of records that match your filter as you create the conditions.

Note:
Be sure to create certification filters before creating certification schedules.

Procedure

1. Navigate to **All** > **Data Certification** > **Certification Filters**.
2. Click **New**.
3. Fill in the form (see table).
4. Click **Submit**.

   This action saves the filter as version 1.

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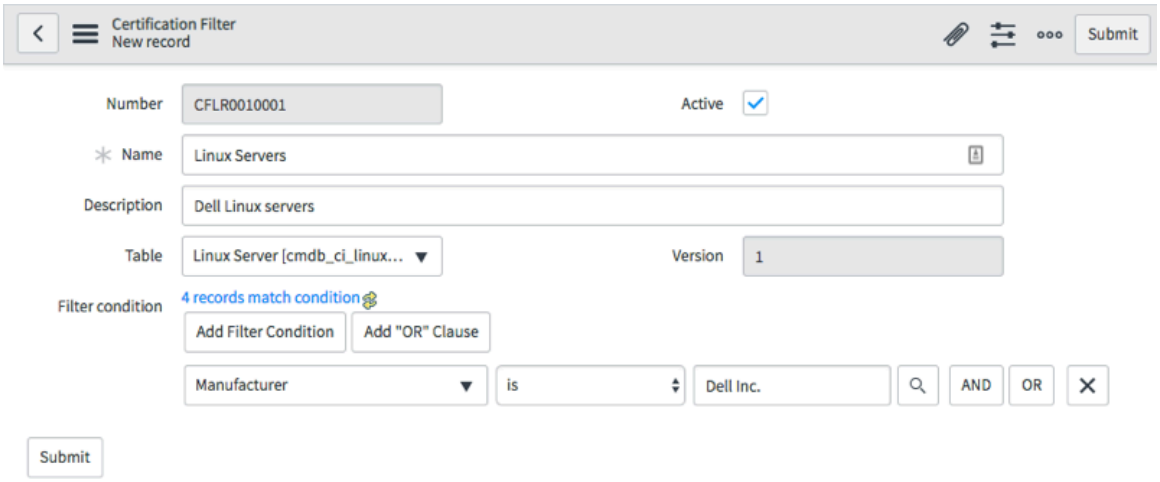
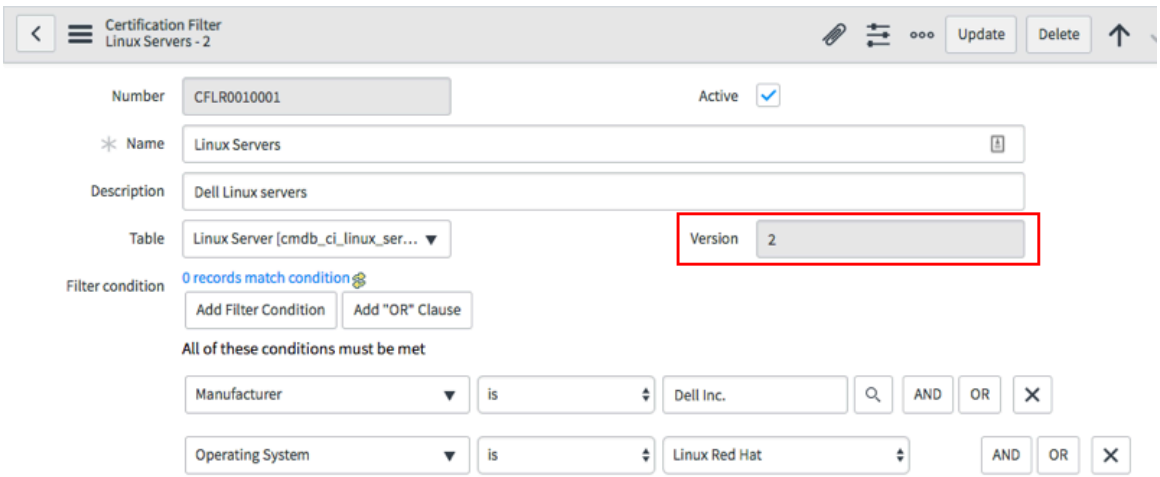
Certification filter V1



5. To create another filter version, modify the filter conditions and click **Update**.

   The system saves the new filter and increments the version number.

Certification filter V2



   By default, the Certification Filters list shows only the current version of each filter. To see all filter versions, click **All** in the breadcrumbs.

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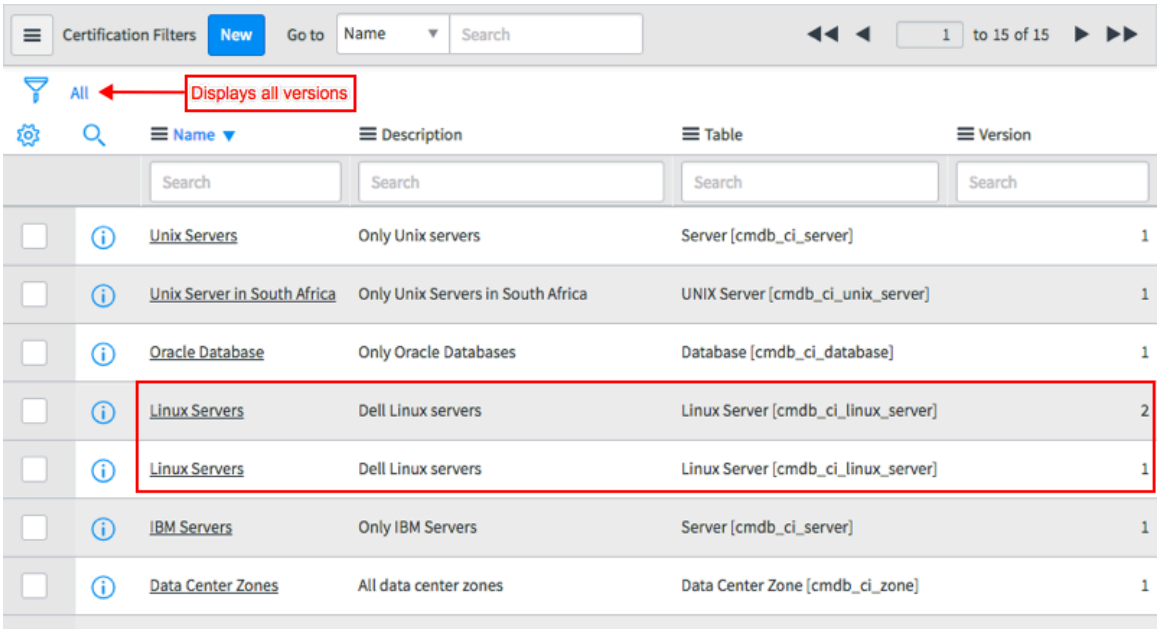
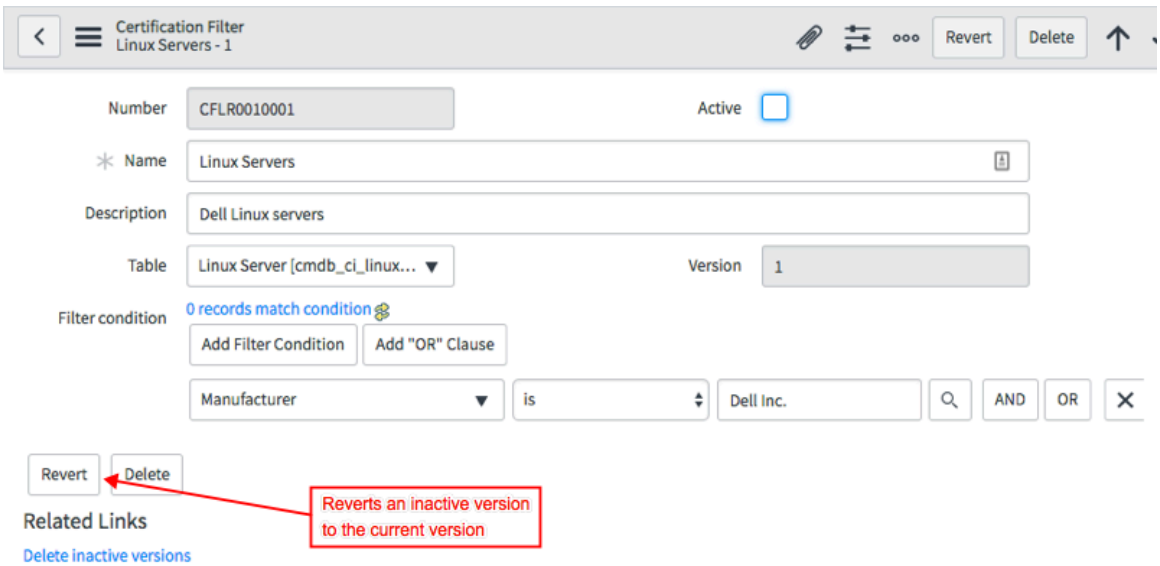
Certification Filter List



6. To make an inactive filter the current version, open the inactive filter and click **Revert**.

Certification filter revert



This action creates a new, active version of the filter and makes all previous versions inactive.

7. To delete a single filter version, open that version record and click **Delete**.
8. To delete inactive versions of a filter, click **Delete inactive versions** under **Related Links** in that filter record.

   You cannot delete a filter that is used in a schedule definition. The system displays a warning and the filter is not deleted.

Creating certification filters

Field	Description
Name	[Required] Filter name.

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Field	Description
Description	[Optional] Brief description of the filter.
Number	[Read-only] Automatically assigned filter identification number.
Table	Table containing the records to be filtered. Use of the Database View `[sys_db_view]` table is limited by version.
Active	Control to make the filter available for use from the **Filter** field on the Certification Schedule form.
Version	Current version of this filter. Any significant changes to the filter make the current version inactive. The system copies the updated filter, marks it as active, and increments the version number. The system saves all versions of the filter and makes them available to users. More than one version of a filter can be marked active.
Filter condition	Field, operator, and value to create the condition. The available options depend on the table selected. You can view the number of records that match the filter by clicking the refresh icon. **Refresh Conditions** If the filter does not match any records, the system marks the certification instance as **Closed Complete**, with the **Percent complete** value set to **100%**.

Related topics

Data Certification planning

Define a certification schedule

A certification schedule specifies the fields to display, the fields that require certification, certification task assignments, completion requirements for task owners, frequency of schedule, and detailed instructions.

Before you begin

Role required: admin

About this task

Use the preview option to see what tasks are created before saving the schedule. If the tasks are not what you want, edit the schedule and preview the tasks again. The system creates certification tasks automatically when it executes a schedule.

To schedule a certification:

Procedure

1. Navigate to **All** > **Data Certification** > **Schedule Definitions**.
2. Click **New**
3. Fill in the fields (see table).
4. Click **Submit**.

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Defining A Certification Schedule

Field	Description
Name	A schedule name.
Filter	A certification filter for this schedule.
Table	[Read-only] The table holding the records to be certified. To change the table name, select a different **Filter** or create a new **Filter**.
Display fields	The fields displayed in the Certification Task list to provide context. These do not require certification themselves. For example, although users are not required to certify the **Name** field of a record, it displays so that users know what record they are certifying.
Certification fields	The fields to certify on this certification schedule.
Assignment type	A choice list to select how the certification schedule assigns the certification tasks. ○ **User Field**: Select a user reference field on the table being certified. As an example, select the user named in the **Managed by** field to identify the user who performs the task. This selection displays the **Assign to** and **Assign to empty** fields. If the reference field on the record is empty, the value in the **Assign to empty** field is used. ○ **Specific User**: Select a specific user to perform the tasks. This selection displays the **User** field. ○ **Group Field**: Select a group reference field on the table being certified. As an example, select the **Support group** field to identify the user who performs the task. This selection displays the **Assign to group** and **Assign to empty** fields. All members of the group from the reference field on the record are assigned to the tasks. If the reference field on the record is empty, the value in the **Assign to empty** field is used. ○ **Specific Group**: Select a specific group to perform the tasks. This selection displays the **Group** field. All members of the named group are assigned to the tasks.
User	This field appears when: ○ **Assignment type** is **Specific User**. This system assigns this user to all certification tasks for this schedule. ○ The **Assign to empty** field is set to **Create Assigned Task**, and you have selected **User Field** as the assignment type. The system assigns this user to certification tasks containing unassigned records. You can only select users with the certification role.
Assign to group	The group field that defines the group assigned to the certification tasks. This field is available only when the **Assignment type** is **Group Field**.
Group	The specific group to which certification tasks are assigned for this schedule. This field is available only when the **Assignment type** is **Specific Group**
Assign to	The user field that defines which user is assigned to the certification task. This field is available only when the **Assignment type** is **User Field**.
Assign to empty	The behavior to use if the field selected in **Assign to** or **Assign to group** is blank on the record being certified. For example, if a task must be assigned to

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Field	Description
	a manager, but no manager is identified, the value in this field determines what happens. This field appears only when the **Assignment type** is **User Field** or **Group Field**. The possible selections are: ○ **Do Not Create Task**: No task is created when the **Assign to** or **Assign to group** field is empty. ○ **Create Unassigned Task**: Create a task, but do not assign it to any user or group. The task can be manually assigned later. ○ **Create Assigned Task**: Create a task and assign it to the user or group specified. If you selected an assignment type of **User Field**, the **User** field is available. If you selected the **Group Field** type, the **Group** field is available. The schedule automatically creates certification tasks for all records that do have "Assign to" populated, regardless of which selection you make for "Assign to empty."
Days to complete	[Required] The number of days that task owners have to complete the certification tasks. When the certification schedule is part of a certification audit definition, the **Days to Complete** audit definition value overrides the value set for the certification schedule.
Active	Check box to activate this certification schedule, generating certification tasks at the scheduled date and time. Clear this check box to hide scheduling fields on the form (except **Last run date**) and not generate certification tasks.
Run	How often to run the schedule that generates certification tasks: ○ Daily ○ Weekly ○ Monthly ○ Periodically ○ Once ○ On Demand
Day	When **Run** is **Weekly**, the day of the week when the schedule runs and generates certification tasks. When **Run** is **Monthly**, the day of the month the schedule runs and generates certification tasks. If the day is **29**, **30** or **31**, the certification runs on the last day of the month for shorter months.
Repeat Interval	When **Run** is **Periodically**, the frequency that the schedule runs to generate certification tasks, entered in time, days, or both. For example, set **Days** to **10** and **Hours** to **14:00:00** to run the schedule and generate certification tasks every 10 days at 14:00.
Starting	When **Run** is **Periodically** or **Once**, the date and time the schedule runs and generates certification tasks.
Time	When **Run** is **Daily**, **Weekly**, **Monthly**, or **Once**, the time of day, on a 24-hour clock, the schedule runs and generates certification tasks.
Last run date	[Read-only] The date and time that the schedule ran last, either on its regular schedule or manually, and generated certification tasks.

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Field	Description
Next scheduled run	[Read-only] The next date and time the schedule runs and generates certification tasks.
Task Description	A description to add to the **Short Description** field of the certification task.
Instructions	An HTML field for providing instructions to the user or group performing the certification.

Related topics

Data Certification planning

Preview a certification task

Previewing certification tasks saves any changes to the Certification Schedule form and displays the tasks that are created when you execute the certification schedule.

Before you begin

Role required: admin

About this task

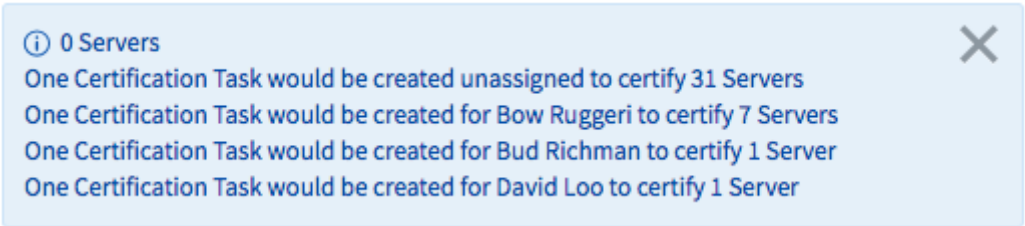
Previewing tasks is especially useful if you want to test different combinations of options in the **Assignment type**, **Assign to**, and **Assign to empty** fields.

Procedure

1. Navigate to **All** > **Data Certification** > **Schedules** > **Schedule Definitions**.
2. Click a certification schedule **Name**.
3. In **Related Links**, click **Preview Certification Tasks**.

   The tasks to be created appear at the top of the screen.

Certification info message



Related topics

Data Certification planning

Define a certification schedule

Use a certification schedule notification

After you define a certification schedule, the system automatically sends notifications to specific users based on the information in the schedule.

Before you begin

Role required: admin

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About this task

The following notifications are sent automatically:

Certification Schedule Notifications

Time elapsed to end date	Email template name	Notification message is sent to
0% (when task is created)	certification.task.reminder.inserted	Task owner or assignment group, if specified
50%	certification.task.reminder.outstanding	Task owner or assignment group, if specified
75%	certification.task.reminder.outstanding	Task owner, assignment group, if specified, and manager of the task owner, if specified
95%	certification.task.reminder.outstanding	Task owner, assignment group, if specified, and manager of the task owner, if specified
100%	certification.task.reminder.overdue	Task owner, assignment group, if specified, and manager of the task owner, if specified

The email templates used in the notifications can be edited, for example, to change the email message text.

Executing a Certification Schedule

Executing a certification schedule generates certification tasks based on the schedule.

Procedure

1. Navigate to **All** > **Data Certification** > **Schedules** > **Schedule Definitions**.
2. Click a certification schedule **Name**.
3. Click **Execute Now**.

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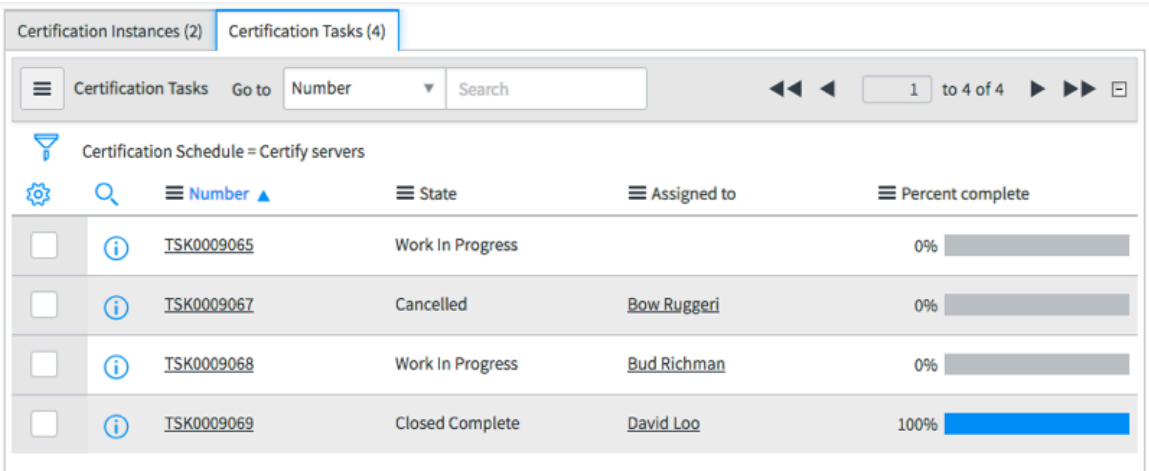
The related lists **Certification Instances** and **Certification Tasks** display the instances or tasks generated by the schedule. The amount of time it takes to generate all certification tasks depends on the size of the table selected and how many fields require certification.

Execute certification schedule



Define and create a certification audit

A certification audit is a collection of certification schedules that can be run as a single entity.

Before you begin

Role required: admin

About this task

Certification audits can be useful when there are multiple certification schedules. After creating a certification audit definition, you can generate a certification audit instance. The certification audit instance is a collection of the certification instances and tasks generated by a single execution of the certification audit definition.

Procedure

1. Navigate to **All** > **Data Certification** > **Audits** > **Audit Definitions**.
2. Click **New**.
3. Fill in the fields (see table).
4. Right-click the header bar and select **Save**.
5. In the **Certification Schedules** related list, click **Edit**.
6. In the **Collection** list on the left, select one or more schedules and click **Add**.
7. Click **Save**.
8. In **Related Links**, click **Create Certification Audit Instance**.

   The system generates an audit instance based on the certification schedules selected. All audit instances based on this audit definition are listed in the **Certification Audit Instances** related list.

Defining and Creating a Certification Audit

Field	Description
Name	The name of the audit definition.

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Field	Description
Days to Complete	The number of days that task owners have to complete the certification tasks created by this audit definition. Overrides the identical field on the certification schedule.
Description	A short description of the intended audit.

Related topics

Data Certification planning

Track a certification audit instance

You can view a list of all certification audit instances at any time.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Data Certification** > **Audits** > **Audit Instances**.
2. View the **Certification Instances** related list.

   The list contains each of the associated instances generated as part of the audit.

Related topics

Data Certification planning

Data certification performance

After the certification process has been planned, certification tasks can be performed according to defined schedules.

Users with the certification role can perform certification tasks. The certification tasks can be tracked as part of certification instances.

Related topics

Data Certification planning

Define a certification schedule

Installed With Data Certification

View and resolve certification tasks

After you execute a certification schedule manually or at a scheduled time, the ServiceNow system performs certain actions.

- Creates certification tasks for any records that meet the filter requirements in the specified table, like tasks from the Configuration Item `[cmdb_ci]` table.
- Assigns the new tasks to the user or group identified in one of these certification schedule fields:
  - Assign to
  - User
  - Assign to group
  - Group

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- Places the new tasks in the *Work in Progress* state.
- Adds the certification schedule *Short description* and *Assigned to* values to the corresponding fields on the certification task record.
- Adds the certification schedule *Days to complete* and *Complete by* date fields to the certification task record, based on when the task is created.

Note:
If the certification filter does not match any CIs, the system sets the *State* to *Closed Complete* and the *Percent complete* to *100*.

To view tasks assigned to you, navigate to **Data Certification** > **Tasks** > **My Tasks**. To resolve tasks assigned to you, see Certify an element. For more information about purpose and usage of certification tasks, see certification tasks.

The following information is tracked on the certification task record:

Certification task record

Field	Description
Number	An identification number for the certification task.
Assigned to	The user responsible for certifying the data.
Assignment group	The group responsible for certifying the data.
Complete by	[Read-only] A date field containing a deadline for the task. This field is automatically filled in based on the Days to Complete field on the certification schedule.
State	[Read-only] The current state of the certification task. The selections are: Work in Progress, Closed Incomplete, Closed Complete, and Cancelled.
Percent complete	The task progress as a percentage. This field is read-only when a task is in a Closed Incomplete, Closed Complete, or Cancelled state.
Escalation	[Read-only] The escalation level of the task. When 0–49% of the time to Complete By has elapsed, this field is set to Normal. At 50%, this field changes to Moderate and an email reminder is sent to the task owner. At 75%, this field changes to High and an email reminder are sent to the task owner and the manager of the task owner. At 95%, this field remains set to High, but a second email reminder is sent to the task owner and manager.
Short Description	A short description of the task. This field is automatically filled in with the text from the certification schedule of the Task description field.
Work notes	Information about work performed on the certification.

Certify an element

The Certification Task form contains a list of all elements to be certified.

Before you begin

Role required: admin

About this task

Note:
After you certify all the elements in a task, no elements can be reverted.

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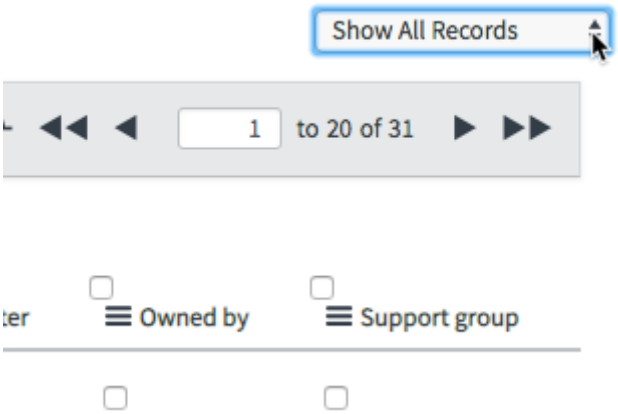
Procedure

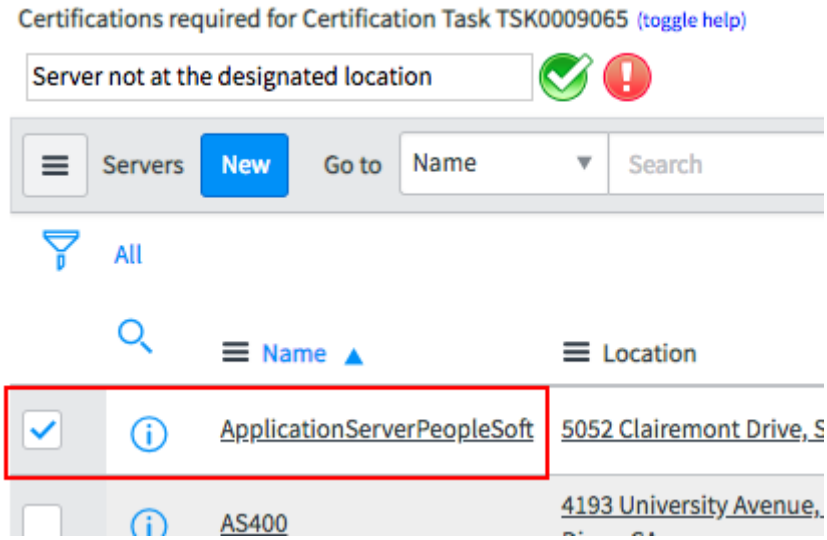
1. Navigate to **All** > **Data Certification** > **Tasks** > **My Tasks**.
2. Open a certification task with a *State* of *Work in Progress*.
3. In the upper right corner of the list, select records that require certification for this task or all records that are part of this certification task.

Certification list 3



4. Select the check box beside a certification element.
5. In *Optional comment for checked elements*, above the list, enter information that would be useful to others.

Certification list



6. Do:
   - Click the green check mark to certify the element.
   - Click the red exclamation point to fail the element.
7. To see the certified or failed element, set the view to *Show All Records*.

   A green check mark or red exclamation mark appears beside the element.

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8. Point to an icon to see any certification comments.
9. Ensure that all elements have the correct certification, either accepted or rejected.

   After you certify all elements, no elements can be reverted. When all elements of a certification task are certified or rejected, the task *State* changes to *Closed Complete*.

View an audit result

View audit results after you certify the elements.

Before you begin

Role required: admin

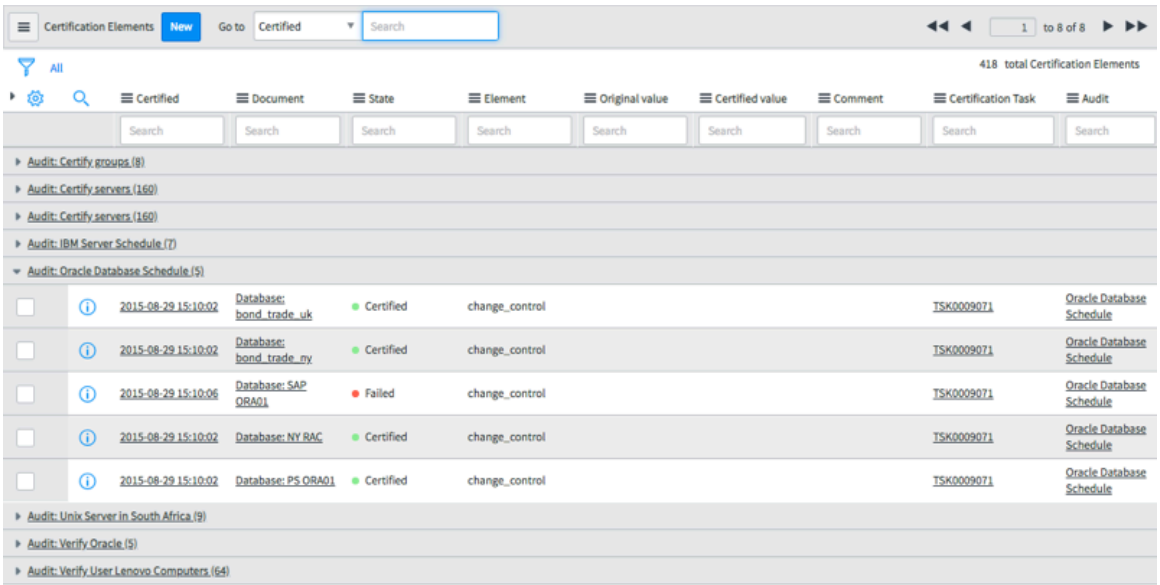
Procedure

1. Navigate to **All** > **Data Certification** > **Schedules** > **Audit Results**.

   The list of data certification audit results appears, grouped by certification instances. Certified configuration items show the *Original value* only. Failed CIs contain the *Certified value* and the *Original value*.

2. Click the links in the list to open any of the related records.

Data cert audit results



Export the certification list

Users with the certification_admin role can export the certifications list and save the list in Excel, CSV, XML, or PDF format. This list is useful when you have a long list of certification elements or if many different users are assigned to certify elements on a single certification schedule.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** > **All Tasks**
2. Open a task.
3. Open any column context menu in the certification data list and complete the export.

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Reset certifications

You cannot reset any element after all elements are certified.

- To reset individual certifications, right-click the element in the certification list and select **Revert Certification**.
- To reset the entire task to its starting point, click the **Reset all Certifications to Pending** related link.

Track a task with a certification instance

The Certification Tasks related list on the certification instance record provides information about associated tasks.

Before you begin

Role required: admin

About this task

The *State* field on the certification instance record is read-only and is based on the cumulative states of the certification tasks associated with the instance. The *Percent complete* column allows users with the certification_admin role to track task progress quickly. For more information, see Track Certification Tasks.

To track a certification instance:

Procedure

1. Navigate to **All** > **Data Certification** > **Schedules** > **Instances**.
2. Click a certification instance *Number*.
3. View and edit the following fields as necessary.

Certification instance

Field	Description
Number	[Read-only] Automatically generated identification number for the instance.
Certification Schedule	The certification schedule used to create the certification instance.
State	[Read-only] Current state of the certification instance: Work in Progress, Complete, Closed Incomplete, or Cancelled. For more information, see Track Certification Tasks.
Created	[Read-only] Date and time the certification instance was created. Date is filled in automatically when the Execute Now button clicks the associated certification schedule.
Complete by	[Required] Date and time when the certification instance must be completed. The system updates this field when it executes the schedule, using the deadline specified on the instance. All certification tasks associated with the certification instance must be marked Complete, Closed Incomplete, or Cancelled before the instance is complete.
Percent complete	Percentage of the instance that has reached the Closed Complete state. This field is automatically filled in based on the Percent Complete fields on the associated certification tasks.

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Field	Description
Task Description	Information about the certification instance. This field automatically displays the text from the Task description field of the associated certification schedule.
Instructions	Field for providing instructions to the user or group performing the certification. This field is automatically filled in with information from the Instructions field on the associated certification schedule.

Cancel a certification instance

Users with the certification_admin role can cancel a certification instance.

Before you begin
Role required: admin

About this task
The instance must have a *State* of *Work in Progress*. Canceling a certification instance:

- Changes the certification instance *State* to *Cancelled*.
- Changes all associated *Work in Progress* certification tasks to *Cancelled*.

To cancel a certification instance:

Procedure

1. Navigate to **All** > **Data Certification** > **Schedules** > **Instances**.
2. Click a certification instance *Number*.
3. Click **Cancel**.

Track a certification task

Use the certification task state to track the progress of a task.

Before you begin
Role required: admin

About this task
The available task states are *Work in Progress*, *Closed Complete*, *Closed Incomplete*, and *Cancelled*.

When the state of a certification task changes, the certification instance state also changes in the following cases:

- If any certification task is in *Work in Progress* state, the certification instance is placed in *Work in Progress* state.
- If all certification tasks are in *Cancelled* state, the certification instance is placed in *Cancelled* state.
- If all certification tasks are in *Cancelled* or *Closed Complete* state, the instance is placed in a *Closed Complete* state. For example, if three certification tasks are *Cancelled*, and one task is *Closed Complete*, the instance state is changed to *Closed Complete*.
- When one certification task is *Closed Incomplete* and the remainder of the tasks are *Cancelled* or *Closed Complete*, the instance is placed in *Closed Incomplete*.

To view the state of certification tasks:

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Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** and select **My Tasks** or **All Tasks**.
2. View the *State* column for each task.

Escalate a certification task

Users with the certification_admin role can escalate a task in the Work in Progress state. To escalate a task, the task owner identified in the Assigned to field on the task record must have an associated manager.

Before you begin
Role required: admin

About this task
Personalize the User form to see the *Manager* field.

Escalating a task:

- Sends an email message to the task owner and the manager of the task owner stating that the task has been escalated.
- Sets the manager as the new task owner.

The event that triggers the escalation is named cert_task.escalate and the email notification is named *Escalation Notification*. To edit the text of the email message that is sent, edit the *Escalation Notification* email notification directly.

For more information, see Email notifications.

To escalate a certification task from the Certification Task form:

Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** > **All Tasks**.
2. Select a certification task *Number*.
3. Select **Escalate**.
   If the *Escalate* button is not available, the user in the *Assigned to* field does not have an associated *Manager*.

Escalate a certification task from the certification task list

Escalate a certification task to notify the manager of the current task owner.

Before you begin
Role required: admin

To escalate a task, the task owner identified in the Assigned to field on the task record must have an associated manager.

Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** > **All Tasks**.
2. Select the check box to the left of a certification task *Number*, you can select multiple check boxes.

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3. From the *Actions on Selected Rows* menu below the list, select **Escalate**.
   If the *Escalate* button is not available, the user in the *Assigned to* field does not have an associated *Manager*. Select multiple tasks from the list. The menu option shows how many tasks are not eligible for escalation, such as *Escalate (4 of 6)*.

Reassign a certification task

If you have the certification_admin role, you can reassign any certification task in the *Work in Progress* state. Tasks in *Closed Complete*, *Closed Incomplete*, or *Cancelled* state cannot be reassigned. When a task is reassigned, the current task owner and the new task owner are sent a message.

Before you begin
Role required: certification_admin

About this task
The event associated with the reassignment is named cert_task.reassign and the email notification is named *Certification Task Reassignment*. To edit the text of the email message that is sent, edit the *Certification Task Reassignment* email notification directly.

For more information, see Email notifications.

To reassign a certification task:

Procedure
1. Navigate to **All** > **Data Certification** > **Tasks** > **All Tasks**.
2. Click a certification task *Number*.
3. Enter a new name in the *Assigned to* field.

Send certification task reminders

The Certification Task Escalations workflow sends automatic email reminders.

The Certification Task Escalations workflow sends automatic email reminders to the:

- Certification task owner.
- Assignment group, if the assignment group was specified on the *Certification Task* form.
- Manager of the certification task owner, if necessary and if a manager was specified on the User form.

The reminders are based on the *Complete by* field on the certification task record. If the *Complete by* date is changed, the reminder schedule automatically adjusts to reflect the new date.

Certification task reminders

Time elapsed to end date	Email reminder is sent to	Escalate field on task record reads
50%	task owner and assignment group (if specified)	Moderate
75%	task owner, assignment group, and manager of the task owner	High
95%	task owner, assignment group, and manager of the task owner	High

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Certification task reminders (continued)

Time elapsed to end date	Email reminder is sent to	Escalate field on task record reads
100%	task owner, assignment group, and manager of the task owner	High

To set reminders for different or more intervals, edit the workflow Certification Task Escalations. In addition to the email reminders sent automatically, users with the certification_admin role can send email reminders manually at any time.

Send an email reminder from the certification task form

How to manually send email reminders from the Certification Task form.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** > **All Tasks**.
2. Click a certification task *Number*.
3. Right-click the header bar and select **Resend email notifications**.

Send an email reminder from the certification task list

How to manually send email reminders from the Certification Task list.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** > **All Tasks**.
2. Select the check box to the left of a certification task *Number*, you can select multiple check boxes.
3. From the *Actions on Selected Rows* menu below the list, select **Resend email notifications**.
4. Select multiple tasks from the list.
   The menu option shows how many notifications are outstanding and how many were sent, such as *Resend email notifications (15 of 18)*.

Mark a certification task as closed incomplete

Mark a task as closed incomplete if, for example, only some of the elements can be certified.

Before you begin

Role required: admin

About this task

The following users can mark a task as closed incomplete:

- Users with the certification_admin role.
- User identified in the *Assigned to* field on the certification task record.

To mark a task as closed incomplete:

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Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** and select **All Tasks**, or **My Tasks**.
2. Click a certification task *Number*.
3. In *Work Notes*, enter information about why the task could not be completed.
4. Click **Close Incomplete**.

   If at least one task on a certification instance is marked *Closed Incomplete*, the *Completed* date and *Percent complete* fields on the certification instance record are not updated. A user with the certification_admin role can:

   - Complete the incomplete task or tasks.
   - Cancel the incomplete task or tasks.

   When all tasks on the certification instance are *Closed Complete* or *Cancelled*:

   - The system sets the *Completed* date field on the certification instance record to the current date and time.
   - The *Percent complete* field on the certification instance record is set to 100 percent.

Certification tasks cancellation

Users with the certification_admin role can cancel a certification task in the Work in Progress or Closed Incomplete state.

When a certification task is cancelled, a notification email is sent to the task owner or assignment group assigned to the task. The task owner or assignment group manager is not notified.

Cancel an individual task

Cancel a particular data certification tasks in the Work in Progress state.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Data Certification** > **Tasks** > **All Tasks**.
2. Find a task with a *State* of *Work in Progress*.
3. Click the task *Number*.
4. Click **Cancel**.

Cancel all tasks in an instance

Cancel data certification tasks in the Work in Progress state.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Data Certification** > **Schedules** > **Instances**.
2. Find an instance with a *State* of *Work in Progress*.
3. Click the instance *Number*.
4. Click **Cancel**.

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All tasks in the instance with a state of *Work in Progress* are cancelled. The task owner or assignment group is notified.

The email template used for the notification is named *certification.task.cancelled*. The email templates can be edited to change the email message text, for example.

Domain separation and Data Certification

Domain separation is supported in Data Certification processing. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Basic

- Business logic: Ensure data goes into the proper domain for the application's service provider use cases.
- In the application, the user interface, cache keys, reporting, rollups, aggregations, and so on, all consider domain at production run time.
- The owner of the instance needs to be able to set up the application to function normally across multiple tenants.

Use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the client must be able to see my response.

How domain separation works in Data Certification

- Data Certification has only basic domain separation. As long as the Certification Instances (CIs) or records that must be certified are correctly domain-separated and the users who must certify the CIs or records are in a domain that can view the data, Data Certification works as expected.
- Recommendation: The instance owner must be responsible for assigning Certification Tasks and Certification Instances to the correct domain. Changing the domain for these records does not change functionality, but limits the view of the records.

How to set up domain separation for Data Certification

After enabling the Domain Separation plugin, there are no additional steps required to set up domain separation for Data Certification.

- instance owners determine which CIs or records that need to be certified can be domain-separated.
- Customers can configure a domain-separated environment by assigning tasks to a domain, but if the data is already domain-separated, then only users with the right domain permissions can view the data in a certification task.

How tenant domains manage their own application data

It's not necessary to set the domain on the certification tables but it can be done if the instance owner should want that. As long as the CI's or records that must be certified are domain-separated, users with the correct domain permissions can view them.

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Domain-separated tables

- cert_instance – Changing the domain on this table does not change any functionality, nor does it change the domains of the tasks created from the table.
- cert_task – Changing the domain on this table changes the domain viewing permissions of the task.
- cert_element – It is not recommended to change the domain on these records. As long as the CIs or records to be certified are already domain-separated, cert_element records will reflect that.
- cert_filter – Changing the domain on this table changes the domain viewing and filtering of CIs or records.

Use cases

Instance owners who have multiple clients that certify the infrastructure they own can assign domains to those CIs and the Certification Tasks to restrict the view from one client to another.

Related topics

Domain separation for service providers

Components related to CMDB Data Manager

The following scheduled jobs, tables, roles, and properties, are related to CMDB Data Manager. Some of those, are installed with CMDB Workspace and Service Graph Workspace.

System properties

As a Data Manager Administrator (data_manager_admin) you can view CMDB Data Manager properties in CMDB Workspace.

1. Open either workspace:
   - Navigate to **Workspaces** > **CMDB Workspace** > **Management** and then select the **Data Manager** quick link in Management tools, in the Manage section.
   - Navigate to **Workspaces** > **Service Graph Workspace** and in the navigation panel, select the Governance icon. Then, in the Governance navigation pane, select **Data Manager overview**.
2. Select **Settings** in the left navigation bar.

Properties/Settings/Labels in the Data Manager settings page

Property/Setting/Label	Description
glide.cmdb.data.manager.delete.batch.size	Size of each batch of CIs that is deleted or archived (affects performance optimization). • Type: Integer • Default value: 1000
Retirement definitions	List of retirement definitions used in CMDB Data Manager life-cycle policies. For more information about the concept and usage of retirement definitions, see:

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Properties/Settings/Labels in the Data Manager settings page (continued)

Property/Setting/Label	Description
	• Retirement definitions • Manage retirement definitions for CMDB Data Manager
Scheduled job users	User group from which to select the user that scheduled jobs run as, when creating certification and attestation policies. The default value for the *Scheduled job default user* field is DataManager Job Runner which is a member of the default *User group* Data Manager Scheduled Job Users. The setting of this property determines the list of users available in the **Run policy scheduled job as** field on the Schedule form of a new policy.
sn_cmdb_ws.cmdb.dm.policy_types.due_date_notification Notifications	Notifications about certification and attestation incomplete tasks. When either is checked, the system notifies task owners as the due date for incomplete tasks is approaching. Notifications are sent when 50%, 70%, and 90% of the time to due date has passed. On the task due date, a past due notification is sent to the task owner and to the task owner's manager. Upon closing a task, sending notifications stops. For information about how the **Days to complete** setting is used to calculate when notifications are sent, see Create a CMDB Data Manager policy.
sn_cmdb_ws.glide.cmdb.data.manager.aging.policy.task.timeframe Aging policy task timeframe	Number of days before a Data Manager task is marked as aged. • Type: Integer • Default value: 30
glide.cmdb.data.manager.subflow.timeout Threshold for subflow run time	Threshold (in milliseconds) for subflow running time. A subflow that passes this threshold while running, is cancelled. • Type: Integer • Default value: 600,000 (10 minutes)

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Properties/Settings/Labels in the Data Manager settings page (continued)

Property/Setting/Label	Description
glide.cmdb.data_manager.default_archive_time Number of days CIs are archived before they get deleted permanently	Number of days that it is still possible to restore archived CIs from archive tables. After the specified number of days pass, archived CIs are permanently deleted from the archive tables. • Type: Integer • Default value: 120
cmdb.data.manager.stale.task.life.in.days Number of days after which task is considered stale	Number of days after which a task is considered stale and is set to **Closed Cancelled** by the *CMDB Data Manager - Stale Task Cleaner* daily scheduled job. Details: • Type: Integer • Default value: 90
sn_cmdb_ws.glide.cmdb.data_manager.rejected.system.notification.group Group to receive notifications for a rejected task	System identifier of a user group to notify about tasks that are being rejected. By default, this property has no value, in which case, all data manager administrators are notified about rejected tasks. For information about how this property is used when reviewing and rejecting life-cycle tasks, see Review CMDB Data Manager tasks.
cmdb.data.manager.stale.tasks.notifications.frequency	Number of days between notification reminders for stale tasks. • Type: Integer • Default value: 7

Scheduled jobs

Scheduled job	Description
CMDB Data Manager Archive/Delete Policy Processor	Processes all published polices of type Archive and Delete: • Applies policies only to CIs that are already retired. • Processes all Archive policies first, and if no errors encountered, continues to process any Delete policies.

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Scheduled job	Description
CMDB Data Manager Retire Policy Processor	Processes all published polices of type Retire: Applies policies only to CIs that are not retired.
CMDB Data Manager - Stale Task Cleaner	Cleans up stale CMDB Data Manager tasks by setting the task to **Closed Cancelled**. The *cmdb.data.manager.stale.task.life.in.days* system property determines the number of days after which a task is considered stale (90 by default). A task becomes stale if: • The task was created at least 90 days (by default) ago and it is still open. • The approval requests are older than 90 days (by default) and the task is not yet approved.
CMDB Data Manager Delete Related Entry Policy Processor	Processes the Delete CMDB Related Entry policy by deleting the specified related tables from the Related Entry [cmdb_related_entry] table.

Tables

Table	Description
CMDB Data Management Policy [cmdb_data_management_policy]	Details about CMDB Data Manager policies.
CMDB Data Management Policy Executions [cmdb_data_management_policy_execution]	Execution records that correspond to each policy run. As policies run according to their recurring schedule, for each run the system generates a record with a unique policy execution number for that run. A policy execution number has a prefix of 'PLCEXEC'. Execution records associated with certification policy runs, are used for populating the Data Certification Dashboard.
CMDB Data Management Policy Runtime Attributes [cmdb_data_management_policy_runtime_attributes]	Current policy metadata including status and summary.
CMDB Data Management Task Control [cmdb_data_management_task]	Open policy tasks generated by published policies.
CMDB Data Management Tasks to CIs	Associations of tasks to CIs.

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Table	Description
[cmdb_data_management_task_to_ci]	
CMDB Data Manager Task to Documents [cmdb_data_management_task_to_document]	Associations of task and to related items.
CMDB Data Management Attestation Tasks to CIs [sn_cmdb_ws_attestation_task_to_ci]	Associations of task and attestation CIs.
CMDB Data Management Tasks to CIs [cmdb_ci_state_management_task_to_ci]	Associations of task and CIs for 'Dependent CI Deletion' policy type.
Excluded CIs [cmdb_policy_ci_exclusion_list]	Tracks the CIs that are set to be excluded during policy evaluation.
CMDB Policy Type [cmdb_policy_type]	Policy types supported by the CMDB Data Manager.
CMDB Policy Type Categories [cmdb_policy_type_categories]	Associations of policy types to Workflow Studio Categories.
CMDB Retirement Custom Definitions [cmdb_retirement_custom_definitions]	Custom retirement definitions used in life-cycle policies (Retire/Archive/Delete).
CMDB Policy Scheduled Jobs [cmdb_policy_scheduled_job]	Policy scheduled Job details.
Dependent CI Relations Evaluation Config [cmdb_dependent_ci_extra_rels_config]	Information about CIs' extraneous relationships which is used for the delete and archive operations. Extraneous relationships are those relationships that are not in the CI's chain of dependency. For more information, see Dependent CIs management.
CMDB Dependent CI Class Exclusions [cmdb_dependent_ci_class_exclusion]	Excluded classes for dependent CI, which is used with the Archive/Retire/Delete policy types to determine which CIs are orphan dependent CIs. For more information, see Dependent CIs management.
CMDB Dependent CI Ledger [cmdb_dependent_ci_ledger]	Staging table for orphaned dependent CI related to the deletion or archival of the

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Table	Description
	main CI that they depend on. Also used in a cascade-retire dependent CIs operation. For more information, see Dependent CIs management.
CMDB CI End Of Life Ledger [cmdb_ci_end_of_life_ledger]	CIs that are being set as retired that belong to a class that has any downstream dependencies. Used in the Dependent CI Retire policy.

Roles

Role title [name]	Description	Contains roles
CMDB Data Manager administrator [data_manager_admin]	Can access all features in the CMDB Data Manager, including: • Full access to assigned tasks. • Full access to policies. • Ability to associate subflow categories to policy type. Can create, edit, and delete policies, calculate previews, approve tasks, and manage exclusion lists.	• task_editor • data_manager_user • cmdb_query_builder_read
CMDB Data Manager user [data_manager_user]	Can view CMDB Data Manager policies in read-only mode and calculate previews. Can perform the following tasks: • View assigned tasks. • Update, approve, or reject an assigned task. • Add a CI to an exclusion list from their task.	cmdb_read
DataManager Job Runner [dataManager.jobRunner]	Default user for the *Scheduled job default user* CMDB Data Manager property. The **Run policy scheduled job as** field on the Schedule form in a policy, is set to this user if no other option is chosen.	

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CMDB groups

A CMDB group is a collection of CIs that lets you apply CI actions collectively to all the CIs that are members in the group.

For example, a CMDB CI Lifecycle Management API can use a CMDB group scriptable API to retrieve the group's list of CIs, and then apply a CI Lifecycle Management action collectively to all the CIs. You can also use a CMDB group with the Dynamic CI Group service population method, to populate an application service.

Group type

You can configure a CMDB group with one of the following group types:

- Health: The CIs in the group can be monitored by CMDB Health, and the aggregated health is reported for the group as a whole in the CMDB group view dashboard. For example, you can monitor health only for CIs in a specific location.
- CMDB Workspace: Group appears in the Management view in the CMDB Workspace.

Create and populate a CMDB group

Depending on the group type, you can populate a CMDB group by manually adding individual CIs, selecting saved CMDB queries, or building encoded queries in the CMDB group itself. The resulting CIs from each query are added as members to the group.

Before you begin

Roles required:

- To view CMDB groups - itil
- To use a CMDB queries - cmdb_query_builder on top of itil
- To manually add CIs - itil or asset

Also, to populate a CMDB group using a CMDB query, a saved CMDB query must exist.

About this task

The system property *glide.cmdb.group.max_ci_limit* determines the maximum number of CIs that a CMDB group can contain (by default 10,000). Once the specified limit is reached, CIs can't be added to the group unless you increase the value of that property.

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Groups**.
2. In the CMDB Groups pane, select **New**.
3. Fill out the form, right-select the title bar and select **Save**.

CMDB Group form

Field	Description
Group Name	A unique name for the group.

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Field	Description
Group type	○ Default: Basic group type which can be populated by manually adding CIs, saved queries, and encoded queries. ○ Health: Sets CMDB Health to monitor the health of the group CIs and aggregate health results for the group as a whole. Can be populated only by encoded queries. **Note:** Dynamic filters are not supported when populating this type of CMDB groups. ○ CMDB Workspace: Custom class group which appears in the CI Overview panel in CMDB Workspace store app. Can be populated only by encoded queries.

4. To use saved CMDB queries:
   a. Select **CMDB Group Contains Saved Queries** and then select **Add Query**.
   b. Select a query from the **Query Builder Saved Query** list.
   c. Select **Submit**.
   The returned results consists of the CIs from all the classes that are referenced in the saved query. Those CIs become members of the CMDB group.
5. To manually add CIs:
   a. Select **CMDB Group Contains Configuration Items** and then select **Edit Manual CI**.
   b. **Optional:** Add filters.
   c. Select CIs in the **Configuration Item** list and select the '**+**' icon at the bottom.
   d. In the **Group members** list, select the CIs to add to the group.
   e. Select **Save** or **Save and Exit**.
   f. In the **Save Confirmation** dialog box, select **OK**.
   g. Select **Submit**.
6. To use encoded queries:
   a. Select **CMDB Group Contains Encoded Queries** and then select **New**.
   b. Fill out the CMDB Group Contains Encoded Query form with the query conditions that filter the CIs to be included in the group.

Note:
Dynamic filters aren't supported for CMDB health-type groups, even though it's possible to add them in a condition clause.

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Field	Description
Class	Class for which the encoded query applies to.
CI Overview Condition	Filter that is used in the calculation for the CI Overview chart in CMDB Workspace. Applies only if the *sn_cmdb_ws.ci_overview.enable_simple_condi* system property is set to **true** (**false** by default). Improves performance by yielding less results when there is a large amount of data in an environment that hasn't migrated to CSDM. This condition isn't used when selecting **Show All CI**.
Condition	Filters the CIs that are included in the group. Used if **CI Overview Condition** isn't applicable.

c. Select **Submit**.

What to do next
Select **Show All CI** to show all CIs from all the result columns of the query. However, only CIs from CMDB tables are shown.

Show CI Lifecycle Management details for CMDB group CIs

Display CI Lifecycle Management operational state and CI actions that apply to the CIs that are members of a CMDB group.

Before you begin
Role required: none

About this task
If the CMDB group is based on a CMDB query, then the query runs in real-time and displays the resulting CIs. If the query does not complete successfully due to timing out or for other reasons, then appropriate error messages are displayed.

Procedure
1. Navigate to **All** > **Configuration** > **CMDB Groups**.
2. On the **CMDB Groups** page, click a CMDB group.
3. Click **Show All CI**.

Field	Description
Configuration Item	CI group member.
Class	Class of CI group member.
Operational Status	CI Lifecycle Management operational state of the CI such as 'Repair in Progress'

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Field	Description
	or 'Operational'. Possible operational states are defined in the choice list of the *Operational status* field in the cmdb_ci table.
Actions	CI Lifecycle Management actions that apply to the CI such as 'Cloning' and 'Provision'. Possible actions are defined in the CMDB CI Actions [statemgmt_cmdb_actions] table.

CMDB Compliance

CMDB Compliance is a tool set that enables administrators to certify CMDB data for correctness and fix any discrepancies found in the data.

Note:
For compliance in the context of internal business goals and objectives, and external legislation and regulations, see Exploring Policy and Compliance Management.

Certification options

CMDB Compliance offers these certification options to suit the size and requirements of your organization:

Option	Description
Desired State	Automatically compares the actual attributes and relationships of specific ServiceNow records against the desired states for those records. For example, an audit can detect a Linux database server with insufficient RAM or whose Depends on relationships with another CI is incorrect. The system then publishes any discrepancies found and automatically assigns follow-on tasks to qualified users to bring that server into compliance.
Architecture Compliance	Automatically compares the actual attributes of specific CIs, such as CPU count, RAM, or disk size against the expected attributes for those CIs. The system publishes any discrepancies found and automatically assigns remediation tasks to qualified users.

Compliance Templates and Audits

The Templates and Audits modules on the top level of the Compliance menu enable a certification_admin user to create, edit, and delete all template and audit types.

You can use Compliance Templates and Audits to evaluate records for any table in the ServiceNow system, not just those tables extending the Configuration Item `[cmdb_ci]` table. Compliance audits certify record attributes only. Compliance templates can be used in Control Test Definitions in Governance Risk and Compliance.

Compliance Activation

Compliance functionality is provided by the Certification Core (com.snc.certification_core) plugin which contains shared functionality required for certification audits.

The Certification Core (com.snc.certification_core) plugin consists of the following plugins, and is activated by default.

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- Activated by default: Desired State Certification (com.snc.certification_desired_state)
- Activate : Architecture Compliance (com.snc.architecture_compliance), which automatically activates the Version Management (com.snc.version) plugin that manages certification filter and template versions.
- Activate : Data Certification (com.snc.certification_v2), which automatically activates the Version Management (com.snc.version) plugin that manages certification filter versions.

Installed with Compliance

These components are installed with the Certification Core plugin.

Demo data is included with the Desired State and Architecture Compliance plugins.

The Certification Core plugin adds or modifies these tables.

Compliance Certification Core tables

Name	Description
Audit [cert_audit]	Contains all the data required to run an audit, including the users assigned to follow-on tasks and the run schedule.
Audit Result [cert_audit_result]	Contains the results of specific, certification audits.
Follow On Task [cert_follow_on_task]	Contains the tasks that were generated from an audit discrepancy.
Certification Template [cert_template]	Contains the definition of the desired state of the record. The template includes a filter that identifies the records to evaluate and the expected attributes and relationship values. Contains the records to certify, the expected attributes, and the expected relationship values.
Certification Condition [cert_cond]	Base table that defines the desired attribute or relationship conditions used in templates.
Certification Attribute Condition [cert_attr_cond]	Contains the conditions that define the desired CI attribute values. This table extends the Certification Condition [cert_cond] base table.
Certification CI Relationship Condition [cert_ci_rel_cond]	Contains the CI to CI relationship conditions. This table extends the Certification Condition [cert_cond] base table.
Certification User Relationship Condition [cert_user_rel_cond]	Contains the CI to user relationship conditions. This table extends the Certification Condition [cert_cond] base table.
Certification Group Relationship Condition [cert_group_rel_cond]	Contains the CI to group relationship conditions. This table extends the Certification Condition [cert_cond] base table.
Certification Related List Condition [cert_related_list_cond]	Contains the related list conditions. This table extends the Certification Condition [cert_cond] base table.

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Compliance Certification Core tables (continued)

Name	Description
Certification Filter [cert_filter]	Contains a certification filter, including the table that contains the records to audit and the filter conditions.

User roles

The certification role is automatically assigned to all users with the itil role when the Certification Core plugin is activated or when compliance applications are upgraded. Certification core installs two business rules, both called **Add Certification Role To Manager**, that perform similar tasks on different tables. One rule checks for a manager specified on the User [sys_user] table, and the other checks for the certification role on the User Role [sys_user_has_role] table. When both a manager and the certification role are specified for a user, the system automatically grants the certification role to the manager. This functionality ensures that a certification task can be escalated successfully to the next level. The system grants this automatic role to the user's immediate manager only and not to others up the management chain.

Note:
When a manager has only the certification role and no other role, the manager is considered a Requester and is not counted as a subscribed user (Fulfiller).

Compliance Certification Core user roles

Name	Contains roles	Description
certification	none	Can read and update certification tasks to resolve discrepancies.
certification_filter_admin	none	Can create, read, and update certification filters.
certification_admin	certification, certification_filter_admin	Can manage the entire certification process. These users can create, edit, and delete all certification records.

UI policies

Compliance Certification Core UI policies

Name	Table	Description
Make table read only	Audit [cert_audit]	Sets the table field derived from the selected filter to read-only.
Hide Audit Type	Audit [cert_audit]	Hides the Audit type field.
Hide next scheduled run	Audit [cert_audit]	Hides the Next scheduled run date when an audit is inactive or on-demand.
Show task fields when create tasks is set to true	Audit [cert_audit]	Displays all fields related to creating tasks when the user selects the Create tasks check box.
Make name mandatory	Audit [cert_audit]	Makes Name a mandatory field.

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Compliance Certification Core UI policies (continued)

Name	Table	Description
Prevent editing of Last run date	Audit [cert_audit]	Makes Last run date field read-only.
Show User field	Audit [cert_audit]	Shows or hides fields based on the Assignment type selected. The system shows the User field when you select the following assignment types: • User Field if the Assign to empty option is Create Assigned Task. • Specific User
Show Assign to fields	Audit [cert_audit]	Shows or hides fields based on the Assignment type selected. The system shows the Assign to field when the assignment type is User Field.
Show Assignment Fields	Audit [cert_audit]	Shows or hides fields based on the Assignment type selected. The system shows the Assign to empty field when you select either of the following assignment types: • User Field • Group Field
Show Group field	Audit [cert_audit]	Shows or hides fields based on the Assignment type selected. The system shows the Group field when you select either of the following assignment types: • Specific Group • Group Field if the Assign to empty option is Create Assigned Task.
Hide "run" associated fields when active is set to false	Audit [cert_audit]	Hides these scheduling fields when the audit is inactive: • Run • Day • Time • Last scheduled run
Show script window on Scripted Audit	Audit [cert_audit]	Displays the Run this script field when the audit type is Scripted.
Make table read only	Certification Condition [cert_cond]	Sets the table field derived from the selected filter to read-only.

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Script includes

Compliance Certification Core script includes

Name	Description
DesiredStateUtil	Utility functions for desired state, used to clone a template for Insert functionality.
CMDBRElationshipAjax	Tool to get all relationships for a given table.
RelationshipQueryParseAjax	Parses condition filters. This script include is the internal code used in generating the compliance conditions.
CertificationUtils	Utility functions for certification that find Next run time value, and so on.
CertTaskEscalationTimerPercentage	Utility method for setting escalation timer durations.
ConditionUtilsAjax	AJAX utilities for parsing queries into a human-readable format.
DeleteInactiveVersionsAjax	AJAX server-side script to delete all inactive versions of a record.

Client scripts

Compliance Certification Core client scripts

Name	Table	Description
Make audit type read only if not new	Certification Template [cert_template]	Sets the correct audit type for new records, and if the record is not new, sets the Audit type field to read only.
Update table name (filter)	Audit [cert_audit]	Updates the table Name field when the filter is updated.
Update table name	Audit [cert_audit]	Updates the table Name field when the template is updated.
Set table name on new	Audit [cert_audit]	Returns the table name from the template or filter.
Update table name	Certification Template [cert_template]	Updates the table Name field when a new filter is chosen and checks all existing conditions to see if they work for the new table.
Show conditions when table is set	Certification Template [cert_template]	Shows and hides conditions appropriately when the table is set.
Reset filter when audit type changes	Certification Template [cert_template]	Clears the filter and updates the lists shown when the audit type is changed.

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Business rules

Compliance Certification Core business rules

Name	Table	Description
Clone condition	Certification Condition [cert_cond]	Part of certification versioning. This business rule retains the original ID when a condition is changed.
Copy audit type from audit	Audit Result [cert_audit_result]	Ensures that all audit results have the same audit type as the audit that generated them.
Copy values from template	Audit [cert_audit]	When a user selects a template, and updates the table, filter, and audit type from the template.
Delete condition	Certification Condition [cert_cond]	Part of certification versioning that deletes a condition.
Prevent deletion of audit with results	Audit [cert_audit]	Prevents deletion of an audit containing results.
Prevent delete of Filter with Template	Certification Filter [cert_filter]	Prevents deletion of a filter still linked to a template or audit.
Prevent deletion of result with task	Audit Result [cert_audit_result]	Prevents deletion of an audit result with an attached task.
Prevent delete of Template with Audit	Certification Template [cert_template]	Prevents deletion of a template still being used by an audit.
Update conditions' tables	Certification Template [cert_template]	When storing template conditions, properly run all workflows and update the condition fields to contain the display version of the conditions.
Update filter version	Certification Filter [cert_filter]	Creates a version when the filter changes in any meaningful way.
Update next run time	Audit [cert_audit]	Updates the time in the Next scheduled run field when an audit is modified.
Update next run time during execution	Audit [cert_audit]	When the audit runs, update the Next scheduled run field to the next time the audit is scheduled to run.
Update table	Certification Template [cert_template]	Update the stored table to the table of the filter.
Update template version	Certification Template [cert_template]	Creates a version when the template changes in any meaningful way.

Compliance Overview module

The Compliance Overview module is a type of a homepage.

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About this task

The Compliance Overview module summarizes:

- Current audit states
- Outstanding certification tasks
- Compliance discrepancies
- Upcoming audits
- General state of compliance audits for Data Certification, Desired State, Architectural Compliance, and Scripted audits

Only users with certain roles can access the Overview module. The different levels of access are:

Access levels per role

Role	Access
certification	View (view overview page and refresh reports)
certification_admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) View, customize
admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) • Edit (can edit gauges)

Procedure

1. Navigate to **All** > **Compliance** > **Overview**.
2. Select elements within the reports to obtain more information.
   For example, select a bar in the Compliance Discrepancies chart to open a list of audit results filtered by the respective attributes.

Architecture Compliance

Architecture Compliance manages scheduled or on-demand audits of CMDB data to determine which configuration items (CI) match expected attributes. The compliance audits check servers to ensure that their physical resources, such as CPU speed or memory, comply with certain standards.

The compliance process checks servers to ensure that their resources, such as CPU speed or memory, comply with standards set by your organization. Audit reports show any discrepancies in the attributes of the target CIs, and ServiceNow automatically assigns follow-on tasks to qualified users who can remediate those discrepancies.

The administrator responsible for compliance checking creates template definitions of expected attributes and then schedules an audit to check CIs for compliance. The audit results identify CIs that pass certification and itemize the discrepancies in those CIs that fail. ServiceNow automatically generates and assigns follow-on tasks to track the process of getting the CIs back into compliance. Users with the admin role activate Architecture Compliance.

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Architecture Compliance roles

To access or configure certification elements, a user must have the certification_admin role. These users can create, update, and delete filters if they have the proper access to necessary tables.

In the base system, certification_admin users have limited system rights and do not have access to all the necessary tables. When assigning compliance resources, make sure to grant additional roles to the certification_admin user as needed. For example, the certification administrator needs roles that grant access to these tables:

- Company `[core_company]`
- Cost Center `[cmn_cost_center]`
- Schedule `[cmn_schedule]`

Architecture Compliance Process

Perform these tasks in this order to certify configuration items with Architecture Compliance.

1. Create a filter.

   Create a filter that defines a subset of configuration items to certify. You can create multiple versions of a filter, and then activate the version you want to use for compliance checking. Architecture compliance only supports filters on the Configuration Item [cmdb_ci] table and all tables that extend it.

2. Create a template.

   Create template conditions using values from reference fields in a related list or conditions that define the expected physical attributes of each CI in an audit. The template uses a filter to determine which configuration items the system examines based on these conditions.

3. Create and run an audit.

   Create and schedule an audit or run an audit on demand. The audit generates a set of results based on the conditions in the template you specify.

4. View audit results.

   View the audit results which display any discrepancies between the expected state, as expressed by the template conditions, and the actual state of the target configuration items.

5. Correct discrepancies.

   Correct the discrepancies the audit found by completing the follow-on tasks created by the system.

Architecture Compliance Overview module

The Architecture Compliance Overview module displays various architecture compliance reports. The Overview module is a type of homepage.

Only compliance users with certain roles can access the Overview module. The different levels of access are:

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Access levels per role

Role	Access
certification	View (view overview page and refresh reports)
certification_admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) View, customize
admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) • Edit (can edit reports)

Using the Architecture Compliance Overview module

To use the Architecture Compliance Overview module, navigate to **Compliance** > **Architecture Compliance** > **Overview** and click elements within the gauges to obtain more information.

The available reports are:

Architecture Compliance Overview module gauges

Report	Description	Table
30/60/90 Day Task Aging	All outstanding follow-on tasks grouped by age in 30-day increments	Certification Task
Architecture Compliance Discrepancies	All audited attribute discrepancies	Audit Results
Hierarchical Task Roll Up	All follow-on tasks grouped by **Assigned to** user	Follow On Task
Outstanding Architecture Compliance Tasks	All follow-on tasks in the **Pending**, **Open**, or **Work in Progress** state	Follow On Task
Upcoming Architecture Compliance Audits	All scheduled audits	Audit

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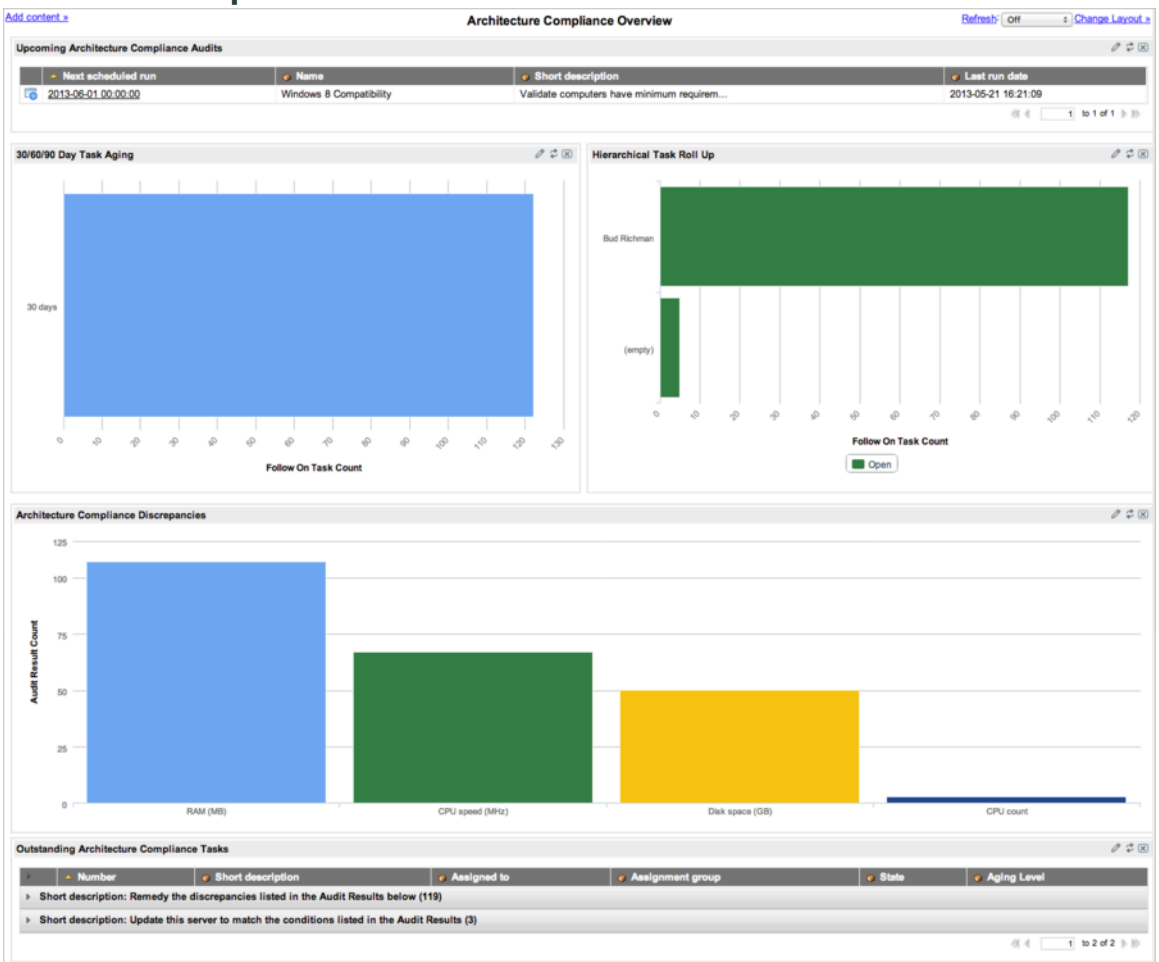
Architecture Compliance module



Desired State

Desired State performs scheduled or on-demand audits of CMDB data to determine which records match the expected attributes, CI relationships, and relationships to other records in the system.

For example, desired state can determine if a computer has a license for a particular software program. The compliance process checks configuration items (CI) to ensure that their attributes and relationships comply with standards set by your organization. Audit results show any discrepancies in the desired state of a record, and ServiceNow automatically assigns follow-on tasks to qualified users who can remediate those discrepancies.

Desired State roles

To access or configure certification elements, a user must have the certification_admin role. These users can create, update, and delete filters if they have the proper access to necessary tables.

In the base system, certification_admin users have limited system rights and do not have access to all the necessary tables. When assigning compliance resources, make sure to grant additional roles to the certification_admin user as needed. For example, the certification administrator requires roles that grant access to these tables:

- Company [`core_company`]
- Cost Center [`cmn_cost_center`]
- Schedule [`cmn_schedule`]

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Desired State process

The desired state certification process can mean checking servers to ensure that their physical resources, such as CPU speed or memory, comply with certain standards. This process also ensures that all critical business services have a manager, support group, and approval group assigned.

The administrator responsible for certification creates definitions of desired states and then schedules an audit to check CIs for compliance. The audit results identify CIs that pass certification and itemize the discrepancies in those CIs that fail. The ServiceNow system automatically generates follow-on tasks to track the process of adjusting the CIs to the desired state.

Desired state differs substantially from data certification. Data certification is a manual process to ensure that your data matches reality. Desired state examines the same data and determines when the configuration of each item is in the desired and approved state.

1. Create a certification filter: Create a filter that defines a subset of configuration items to certify. You can create multiple versions of a filter, and then activate the version you want to use for certification. You can create filters on the Configuration Item [`cmdb_ci`] table and all tables that extend it.
2. Create a template: Create a template with conditions that define the desired state of the physical attributes, related records, and relationships for a CI. The certification filter you select for the template determines which configuration items the system examines.
3. Create and run an audit: Create an audit using the template. Set the audit to run on a schedule or on demand. The audit generates a set of results based on the conditions from the template you specify. Determine usage of follow-on tasks:
   - Determine if the audit creates follow-on tasks and assignment.
   - Determine if the same follow-on task is used for the same audit failure across multiple runs. The system property *`glide.allow.new.cert_follow_on_task`* is set to true by default, allowing for new follow on tasks to be created for the same failure, at each audit run (this system property applies only to audits that aren't scripted).
4. View audit results: View the audit results which display any discrepancies between the desired state, as specified by the template, and the actual state of the target configuration items.
5. Correct discrepancies: Correct the discrepancies the audit found by completing the follow-on tasks created by the system.

Desired State Overview module

The Desired State Overview module displays various desired state reports. The Overview module is a type of homepage.

Desired State Overview module roles

Only compliance users with certain roles can access the Overview module. The different levels of access are:

Access levels per role

Role	Access
certification	View (view overview page and refresh reports)

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Access levels per role (continued)

Role	Access
certification_admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) View, customize
admin	• View (view overview page and refresh reports) • Customize (refresh, add, delete, and rearrange reports) • Edit (can edit reports)

The different levels of access are:

- View: can view the overview page and refresh reports.
- Customize: can refresh, add, delete, and rearrange reports.
- Edit: can edit reports.

Use the Desired State Overview module

The Desired State Overview module displays various desired state reports.

Before you begin

Role required: none

Procedure

1. Navigate to **All** > **Compliance** > **Desired State** > **Overview**.
2. Move or add reports where needed.
3. Click elements within the reports to obtain more information.

   The Desired State Overview Module in the base system contains these reports:

   - Upcoming Desired State Audits: All scheduled audits.
   - Outstanding Desired State Tasks: All follow-on tasks in the **Pending**, **Open**, or **Work in Progress** state.
   - Hierarchical Task Roll Up: All follow-on tasks grouped by **Assigned to** user.
   - Desired State Discrepancies: All audit discrepancies for attributes and relationships.
   - 30/60/90 Day Task Aging: All outstanding follow-on tasks grouped by age in 30-day increments.

Desired State reporting

The Desired State application includes reports to assess your audit results.

These reports are available to all users whose role gives them access to the Reporting application. Users with the admin role can share these reports with specific users of groups or change the display options.

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Navigate to **Reports** > **View / Run**. In the *Reports* search field, enter all or part of the report name such as `Desired State`. You can also scroll to the designated category and select one of the reports.

In addition to these reports, you can generate your own reports.

Desired state report table

Report	Description	Category
Desired State Discrepancies	This report displays all desired state audit results that have a follow-on task that is not yet in the Closed Complete state. This report displays by column name. • Type: bar chart • Table: Audit Result [cert_audit_result]	Audit Result
Desired State Result with Stability Unstable	This report displays all audit results where the Stability field has the value Unstable. This report displays by CI and stacked by audit. • Type: bar chart • Table: Audit Result [cert_audit_result]	Audit Result
Desired State Result with Threshold Exceeded	This report displays all audit results where the Threshold field has the value Exceeded. This report displays by CI and stacks by each audit. • Type: bar chart • Table: Audit Result [cert_audit_result]	Audit Result
Upcoming Desired State Audits	This report displays the desired state audits that are scheduled to run in the next two quarters. • Type: List (tabular) report • Table: Audit [cert_audit]	Audit
30/60/90 Day Desired State Task Aging	This report displays the number of follow-on tasks that are not Closed Complete for desired state audit types. The report is grouped by aging level. • Type: Horizontal bar chart • Table: Follow On Task [cert_follow_on_task]	Follow On Task
Desired State Hierarchical Task Roll Up	This report displays similar data to the Task Aging report, but groups the results by manager. • Type: Horizontal bar chart • Table: Follow On Task [cert_follow_on_task]	Follow On Task
Outstanding Desired State Tasks	This report displays similar data to Task Aging report, but groups the results by short description.	Follow On Task

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Desired state report table (continued)

Report	Description	Category
	• Type: List (tabular) report • Table: Follow On Task [cert_follow_on_task]	

Certification audits

A certification audit compares the actual attributes of certain ServiceNow records. This audit selects a filter, against the expected attributes, relationships, and related record values defined by template conditions or a script.

You can configure the audit to create and assign follow-on tasks to remediate any discrepancies the audit finds. Audit records use a standard ServiceNow scheduler to determine when to run. After an audit runs, the results and follow-on tasks appear in related lists in the audit record.

Users with the certification_admin role can create, update, delete, and run audits. Users with the certification role can view audits, audit results, and follow-on tasks.

Create a compliance audit

Create a compliance audit. Compliance offers two types of audits: one uses templates to define conditions and the other uses a script.

Before you begin

Role required: certification_admin

Procedure

1. Ensure that an appropriate template record was created for this audit.

   Note:
   Conditions in the template define the values to audit.

2. Use the CI Class Manager:
   a. Navigate to **All** > **Configuration** > **CI Class Manager**.
   b. Select a class from the **Class Hierarchy**.
   c. In the sidebar, check **Advanced** and then select **Audit** in the **Compliance** group.
3. Or, navigate to one of these modules:
   - **All** > **Compliance** > **Audits**
   - **All** > **Compliance** > **Architecture Compliance** > **Audits**
   - **All** > **Compliance** > **Desired State** > **Audits**
   - **All** > **Compliance** > **Scripted Audits** > **Audits**
4. Select **New**.
   The system opens a new record for the audit type associated with the navigation path you selected. The **Audit type** field is read-only.
5. Complete the form using the fields described in the table below.
6. Right-click the header bar and select **Save**.

   The Audit Results and the Follow On Tasks related lists appear on the form.

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7. To run the audit immediately, select **Run Audit**.

   When template audits run, ServiceNow updates the date and time in the **Last run date** field and populates the related lists. For scripted audits, the **Last run date** field is not populated.

8. View the records that passed and the discrepancies found by the audit in the **Audit Results** related list.

   You can open template records and any follow-on tasks directly from this related list. Notice that the value in the **Task description** field appears as the **Short description** in the follow-on tasks.

Note:
You cannot delete audit records that have audit results or audit results that have follow-on tasks. ServiceNow disables the **Delete** option in records and lists where these dependent records exist.

Creating Audits

Field	Description
Name	Name for this audit.
Filter	Filter to use when the audit type is Scripted. This field is required for scripted audits, but is hidden for all other audit types.
Template	[Required] Template to use when this audit runs. Audit type filters the list of available templates, and only the active versions of templates are available for selection. For example, when you create an audit from Desired State, only templates of the Desired State audit type are available for selection. For the Desired State and Architecture Compliance audit types, only templates for tables that extend the Configuration Item [cmdb_ci] table are available. This field is hidden when the audit type is **Scripted**.
Table	[Read-only] Table for the template.
Create tasks	Option to create follow-on tasks for correcting discrepancies (selected). In a scripted audit, you can create the logic for either task state by using **true** to create tasks or **false** to not create tasks. By default, this check box is cleared (**false**) in a new audit record.
Assignment type	Method for assigning follow-on tasks. This field is visible only when the **Create task** check box is selected. Choices are: ○ User Field: Select a user reference field on the table being audited. For example, you choose the user identified in the **Managed by** field on the failed record to perform the tasks. This selection displays the **Assigned to** and **Assign to empty** fields. If the reference field on the record is empty, the value in the **Assign to empty** field is used. ○ Specific User: Select a specific user to perform the tasks. This selection displays the **User** field. ○ Group Field: Select a group reference field on the table being audited. For example, you choose the group identified in the **Support group** field on the failed record to perform the tasks. Tasks are assigned to all members of the group. This selection displays the **Assign to group** and **Assign to empty**

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Field	Description
	fields. If the reference field on the record is empty, the value in the **Assign to empty** field is used. ○ Specific Group: Select a specific group to perform the tasks. This selection displays the **Group** field. All members of the selected group are assigned to the tasks.
User	Specific user this audit assigns to follow-on tasks. This user must have the certification role. This field is available under these conditions: ○ Assignment type is set to **Specific User**. ○ Assign to empty is set to **Create Assigned Task**, and **Assignment type** is set to **User Field**.
Assign to group	Group field that defines which group this audit assigns to the follow-on task. This field is available only when the **Assignment type** is **Group Field**.
Group	Specific group this audit assigns to follow-on tasks. This field is available only when the **Assignment type** is **Specific Group**.
Assign to	User field that defines which user this audit assigns to the follow-on task. This field is available only when the **Assignment type** is **User Field**.
Assign to empty	Behavior to use if the field selected in **Assign to** or **Assign to group** is blank on the record being audited. For example, if a follow-on task must be assigned to a manager, but no manager is identified, the **Assign to empty** setting determines what happens. This field appears only when the **Assignment type** is **User Field** or **Group Field**. Choices are: ○ Do Not Create Task: No follow-on task is created when the **Assign to** or **Assign to group** field is empty. ○ Create Unassigned Task: Create a follow-on task, but do not assign it to any user or group. The task can be manually assigned later. ○ Create Assigned Task: Create a follow-on task and assign it to the user or group specified. If the assignment type is **User Field**, the **User** field becomes available. If the assignment type is **Group Field**, the **Group** field becomes available. The audit automatically creates follow-on tasks for all records that have **Assign to** populated, regardless of the **Assign to empty** setting.
Short description	Brief description of the purpose of the audit.
Task description	General description of the work required for the follow-on tasks for the audit. All follow-on tasks created by this audit inherit this description.
Active	Activation control for this audit record. Clear this check box to prevent this audit from running and creating follow-on tasks.
Run	How often to run the schedule that generates the audit. ○ Daily ○ Weekly ○ Monthly ○ Periodically ○ Once ○ On Demand

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Field	Description
Day	○ If **Run** is **Weekly**, the day of the week when the audit runs. ○ If **Run** is **Monthly**, the day of the month when the audit runs. If the day is 29, 30 or 31, for shorter months the audit runs on the last day of the month.
Repeat Interval	If **Run** is **Periodically**, the frequency that the audit runs, based on a 24-hr. clock. Enter the number of days between audits and the time of day that you want the audit to run. For example, set **Days** to **10** and **Hours** to **14:00:00** to run the audit every 10 days at 2:00pm.
Starting	If **Run** is **Periodically** or **Once**, the date and time when the audit runs.
Time	If **Run** is **Daily**, **Weekly**, **Monthly**, or **Once**, the time of day, on a 24-hour clock, when the audit runs.
Last run date	[Read-only] The last date and time the audit ran, either on its regular schedule or manually. Audit previews do not update this field.
Next scheduled run	[Read-only] The next date and time when the audit runs. The system recalculates this field when you change the schedule.
Audit type	[Read-only] The type assigned to this audit. The system selects the audit type based on the application from which the audit is created. The type can be: ○ Desired State ○ Architecture Compliance ○ Compliance ○ Scripted
Health window	Duration of the evaluation period for threshold and stability. The health window value defines the number of Health window units in an evaluation period for an audit. This value is expressed as a positive integer. The default value for this field is **7**.
Health window unit	Unit of measurement that defines the duration of a health window. The default value for this field is **Days**. Choices are: ○ Minutes ○ Hours ○ Days ○ Months
Threshold count	Acceptable number of audit failures for the desired state field that can occur within the specified health window for a CI. The audit results indicate when a desired state field is within or has exceeded this threshold limit. The default value for the threshold is 5.
Stability count	Acceptable number of times that audit results for a CI can switch between **Certified** and **Failed** within the specified health window. The audit results for a CI indicate whether it is stable or unstable. The default value for stability is 1.
Run this script	Audit script to run which contains the conditions that a CI need to comply with to pass the audit. This field is available only when the audit type is **Scripted**. The Audit form includes a sample script with instructions for performing the audit and generating the follow-on tasks.

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Copy an audit

New audits can be created from an existing audit.

Procedure

1. Open the audit record you want to copy.
2. Change the name or short description to distinguish this audit from the original.
3. Make any other changes you need.
4. Right-click in the header bar and select either Insert or Insert and Stay from the context menu.
   The system clears the **Last run date** field and inserts the record into the database.

Schedule and run an audit

The system performs audits automatically from the schedule you configure.

Users with the certification_admin or admin role can generate on-demand audits directly from the Audit form by clicking **Run Audit**. When an audit runs, ServiceNow populates the **Audit Results** related list in the form and shows follow-on tasks, if any, in the **Follow On Tasks** related list. Click **Preview Audit Results** to generate an audit preview that tests your template conditions without generating any audit results.

Certification audit results

Audit results show the records that have passed or failed an audit and itemize any discrepancies detected.

A discrepancy is considered any departure from the expected conditions defined in the template or script used for the audit. Audit results provide links to the source records and to the follow-on tasks for bringing failed records into compliance. Records that pass an audit have a single entry in the results table with a state of Certified. Records that fail an audit show all discrepancies, each with a state of Failed.

ServiceNow displays results from a certification audit in these locations:

- Audit Results list
- A related list in the Audit record
- A related list in the compliance view of a CI record

View an audit result

To generate certification results, you must first create and run an audit.

Before you begin

Role required: none

Procedure

1. Navigate to one of the following locations:
   - **Compliance** > **Desired State** > **Audit Results**
   - **Compliance** > **Architecture Compliance** > **Audit Results**
   - **Compliance** > **Scripted Audits** > **Audit Results**
   - **Data Certification** > **Schedules** > **Audit results**
2. From any audit results list, you can edit the filter to show the results for any audit type.
   The results filter by audit type and grouped by audit number. Within the groups, results list by date, from oldest to newest.

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3. You can open the audit record, the CI record, or the follow-on tasks from this list.

Note:
The **Audit type** field was set automatically when the audit result was created and cannot be changed. For scripted audits, the audit type is set when you create the audit record.

Audit results show this information:

Audit Results

Field	Description
Created	Date and time the audit ran.
Document	Record that was certified, such as a configuration item (CI).
State	Results of certification for each condition evaluated. The three possible states are: ○ *Certified* A certified record is one that passed all conditions. The instance generates only one audit result for a certified record. ○ *Failed* Records that are not certified have an audit result for each failed condition. The **Column name**, **Desired value**, **Discrepancy value**, and **Follow on task**are only populated for failed results. ○ *Pending* A pending state indicates that the audit is incomplete. Data certification audits use this state when a result is awaiting user input.
Column name	Audited field, relationship, or related list column that did not match the expected state.
Desired value	Attribute or relationship required for this record that was not found, from the condition in the expected state template. For data certification, this column is blank if the record has a state of *Failed* or *Pending*.
Discrepancy value	Actual value of the attribute that did not match the expected state. The follow-on task, if provided, tracks resolution of this discrepancy. In a list of results for the **Data Certification** audit type, this column is blank if the record has a state of *Certified* or *Pending*.
Follow on task	Link to the follow-on task generated for remediating a discrepancy.
Audit	Link to the audit record that produced the results.
Threshold	State of an audited, desired state field with a defined failure threshold. This threshold is the acceptable number of failures for a desired state field within a specified health window and is configured in the Audit form. Possible threshold states for the results are: ○ *In Limit* ○ *Exceeded*
Stability	Stability state of a CI. Stability state is based on the number of times the audit result for a desired state field changes from Certified to Failed within a specified health window. Possible stability states are: ○ *Stable* ○ *Unstable*

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Delete an audit result

While audit results can be deleted, you cannot delete an audit result that has a follow-on task associated with it.

Before you begin
Role required: none

Procedure

1. Navigate to one of these modules:
   - **Compliance** > **Desired State** > **Audit Results**
   - **Compliance** > **Architecture Compliance** > **Audit Results**
   - **Compliance** > **Scripted Audits** > **Audit Results**

   The list groups by audit name.
2. Select the check box for a result in the list, and then select **Delete** from the **Actions on selected rows** menu at the bottom of the list.

   Note:
   If the result record has a follow-on task, the **Delete** option is not available. If you select multiple records, some with and some without tasks, the system only deletes those records that do not have tasks.

3. Click a date/time link to see the results for a specific CI.

   Note:
   The **Delete** button only appears on the form if the audit result does not have a follow-on task.

4. Click **Delete**.

View an audit result in the Compliance view

After an audit has run, you can view the results and follow-on tasks from the Compliance view in the records of every CI audited.

Before you begin
Role required: none

About this task
This view is available only for systems that use the default CI classes provided with the base ServiceNow system, such as Hardware, Software, and Computer. For information about creating views, see View Management.

Procedure

1. Navigate to **All** > **Configuration** and open the record of a CI that was included in a compliance audit.
2. Select the view to configure by performing the appropriate action for your list version.
   The Audit Results Compliance View appears.

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Audit Results Compliance View List Descriptions

Lists	Description
Passed Audit Results	Lists audits for this CI that passed without discrepancies. The information includes the versions of the template and filter used. Records are grouped first by audit, and then by creation date and time.
Failed Audit Results	Lists all failed audits for this CI. The information includes the discrepancy data, the follow-on task, and the versions of the template and filter used. Records are grouped first by audit, and then by creation date and time.
Follow On Tasks	Lists all follow-on tasks generated from audit discrepancies for this CI.

3. Right-click the header bar and select **View** > **Compliance** from the context menu.

Results preview

You can preview an audit to view potential results without saving audit results or generating follow-on tasks. For example, use this feature to test template conditions for correctness without creating thousands of result records.

In an audit record, click **Preview Audit Results** under **Related Links** to show a summary of the potential audit results appears at the top of the audit record.

Previewing does not change the **Last run date** field.

Health windows

A health window is a trailing time frame in which the ServiceNow system evaluates audit results from CIs that have desired state fields defined.

The **Health window** and **Health unit** fields define each window, and ends when an audit runs. For example, an audit runs on the fifteenth of the month with a seven-day window. It evaluates the threshold values of a desired state field from the eighth to the fifteenth. When the same audit runs the next day, the system evaluates the threshold from the ninth to the 16th, and so on. The audit counts backward seven days from the current day. ServiceNow evaluates a CI threshold value for each health window, without considering the results from the previous window. As a result, the health of a CI can fail for one audit and then pass in a subsequent audit that runs in a new window.

ServiceNow evaluates stability by recording the number of times a desired state threshold value for a CI switch between **Failed** and **Certified** within the health window. In the example shown here, a 5-minute health window was set for the desired state field on a UPS unit that measures the remaining battery time. The threshold was set at 2, which allows the field to fail two audits in the same health window.

In the initial audit, the system evaluated the threshold value for the **Seconds on battery** field within a 5-minute window. This window ran from 13:52:51 to the time of the audit at 13:57:51. The desired state field showed In Limit for that audit and the second audit conducted less than a minute later. The next two audits were conducted within five minutes of the first audit and both showed that the threshold (set at 2) was Exceeded. A subsequent audit was conducted five minutes after the audit in which the desired state field threshold was first exceeded. Since the health window had moved forward enough units, the **Seconds on battery** field was within limits again with only one failure in the 5-minute window being evaluated.

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Certification filters

A certification filter creates a subset of ServiceNow records to audit, typically from configuration items (CI) of a certain type, such as all UNIX servers in a specific datacenter.

However, you can define a filter for any ServiceNow table by using any set of system-supported conditions. Audited records identified by a filter for expected attributes or relationships, depending on the audit type.

You can create multiple versions of a filter, reactivate inactive versions, and select the version you want to use in a template or a certification schedule. Only the active versions of a filter are available for selection in template records. You can use a single filter for multiple certification templates or schedules.

Certification filters

Filter	Description
Data Certification	Validates CMDB data.
Architecture Compliance	Manages reviews of CMDB data in architecture compliance audits to determine which configuration items (CIs) match expected attributes.
Desired State	Manages reviews of CMDB data to determine which CIs match a desired state for both attributes and relationships.
Compliance	Manages reviews of records from any ServiceNow table to determine which records match an expected set of attributes and related record conditions.
IT Governance Risk and Compliance	Generates audits and tests to ensure that controls are being followed and creates tasks to track corrective actions.

Roles

In the base ServiceNow system, users with the certification_admin role have limited system rights and do not have access to the tables required for creating a filter.

When assigning compliance resources, make sure certification_admin users have any additional roles they need. For example, a user requires roles that grant access to the Company `[core_company]` table.

Compliance filter

The compliance filter for license bases uses the following fields to define entitled users or CIs.

These field values can be used independently or together to calculate compliance.

Compliance Filter

Value	Description
Entitled company	All users or configuration items (CI) at all locations of this company, in all departments are entitled to use this software package. Compliance at this level calculates how many licenses are purchased for the company at large and how many entitled users or CIs consume them.
Entitled location	CIs and users who are assigned to this company location in any department are entitled to use this software package. Compliance at this level calculates how many licenses are purchased for this company location and how many users and CIs consume them.

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Compliance Filter (continued)

Value	Description
Entitled department	Only the users or CIs in this department at this company location are entitled to use this software package. Compliance is calculated for a single department only.

The license form can display information about all CIs or named users who are using this software package. The form indicates when license reconciliation is necessary and displays all compliant users or CIs.

Possible compliance levels are:

Compliance

Level	Description
Non applicable	Compliance levels for all infrastructure licenses that are related to cluster licenses are set to **Non applicable** automatically. Compliance levels are calculated in the cluster license only, and not in the related infrastructure licenses.
Out of compliance	More licenses are being consumed than were purchased. There are more users or CIs using this license than the license allows, and some users or CIs are not be entitled to use this software package.
Unused	The licenses for this software package are currently unused.
Reconciliation required	CIs or users who are not entitled to use this software are consuming licenses. Licenses that require reconciliation are considered out of compliance. Reconciliation requires action to ensure that unentitled users are not using the software. Reconciliation involves uninstalling software or increasing license counts to match actual user counts.
Nearly out of compliance	For a software package to be at this compliance level, more than 95% of the licenses are in use by entitled users or CIs. License bases at this level are considered to be **In compliance**.
In compliance	This software package has unused licenses. All users or CIs using a license are entitled to use this software package.

Create a filter

You can create as many versions of a filter as necessary. You can then designate which versions are active and available for selection in Compliance template records, Governance Risk and Compliance control test definitions, or Data Certification schedule definitions.

Before you begin

Role required: none

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**, and:

   a. Click **Hierarchy** to display the CI Classes list.
   Select the class to create a filter for.

   b. In the class navigation bar, expand **Health**, select **Compliance**, and then click **Certification Filter**.

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2. Or, navigate to one of these modules:
   - **Compliance** > **Filters**
   - **Data Certification** > **Schedules** > **Certification Filters**
3. Select an existing filter to edit, or click **New**.
4. Fill in the fields (see table below).
5. Click **Submit**.
   This action saves the filter as version 1.
6. To create another version of this filter, open the record and modify the name, table, or conditions.

   Note:
   You can change a filter Description without incrementing a version.

7. Click **Update**.

   The system saves a new version of the current filter and makes it the Active version. The previous version is marked inactive. The system displays only active filter versions for selection when you create templates or schedules.

Creating Filters

Field	Description
Number	[Read-only] Displays the automatically assigned filter identification number. All versions of a filter have the same number.
Name	[Required] Filter name.
Description	[Optional] Describes this filter. You can change the description of a filter without incrementing a version.
Table	Specifies the table containing the records to select. The template or schedule that uses this filter works on this table. For example, select the ESXi Server `[cmdb_ci_esx_server]` table to select VMware ESX servers.
Active	Makes this filter available for use from the **Filter** field on the Certification Template or Schedule Definition form. Multiple versions of a filter can be active. You can activate or deactivate a filter without incrementing the version.
Version	[Read-only] Indicates the version of this filter. Any changes to this filter, except to the description or the **Active** check box, makes it inactive. The system increments the version of the updated filter and marks it as active. The system saves all versions of the filter and makes them available for reactivation.
Filter condition	Specifies the fields, operators, and values that create the filter. The available fields are based on the selected table. The condition builder shows the number of records that match the conditions. Click the refresh icon **Refresh Conditions** to recalculate the number of matching records when you edit the conditions.

Copy a filter

New filters can be created from an existing filter.

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Before you begin
Role required: none

Procedure
1. Navigate to **All** > **Configuration** > **CI Class Manager**, and:

   a. Click **Hierarchy** to display the CI Classes list.
   Select the class to create a filter for.

   b. In the class navigation bar, expand **Health** and select **Compliance**.
   Then click **Certification Filter**.

2. Or, navigate to one of these modules:
   - **Compliance** > **Filters**
   - **Data Certification** > **Schedules** > **Certification Filters**
3. Open the filter record that you want to copy.
4. Make sure to change the filter name or description to distinguish the new filter from the original.
5. Make any other necessary changes.
6. Right-click in the header bar and select either **Insert** or **Insert and Stay** from the context menu.
   The system increments the record number and sets the version to 1 for the new record. Both the original filter and the copy are Active and appear in the record list. Showing all copies of a filter allows you to see the entire history of the filter.

Delete a certification filter

Delete certification filters that are no longer needed and no longer in use.

Before you begin
Role required: certification_admin or admin

About this task
You can't delete a certification filter that is being used in a template or a scripted audit.

Procedure
1. Navigate to **All** > **Configuration** > **CI Class Manager**, and:
   a. Select **Hierarchy** to show the CI Classes list.
   b. Select the class to delete a filter for.
   c. In the class navigation bar, expand **Health**.
   d. Select **Compliance** and then **Certification Filter**.
2. Or, navigate to one of these modules:
   - **Compliance** > **Filters**
   - **Data Certification** > **Schedules** > **Certification Filters**
3. Open the filter record you want to delete.

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a. To delete a single filter version, open that version record and click **Delete**.

   The system hides the **Delete** button for filters that are in use. If you delete the latest version of a filter that is active, the previous version of that filter is reset to Active.

b. To delete all unused and inactive versions of a filter, open any version of that filter and click **Delete inactive versions** under **Related Links**.

4. When prompted, select **OK** to proceed.
   The system deletes unused filter versions. A message in the header bar identifies filter versions that cannot be deleted because they are used in a template or scripted audit.

Manage a filter version in a form

You can view and manage all versions of a filter from the Certification Filter form.

Before you begin
Role required: none

About this task
Versions can be displayed in a list. The default list of filters displays only the active version of each filter. To see all filter versions in the list view, select **All** in the breadcrumbs.

Procedure

1. Open any version of a filter.
   The Other Versions related list displays all other versions of this filter, both active and inactive. The system prevents you from editing either the filter version or the record number in the list view.
2. Click any version in the related list to display the record for that version.
3. To make an inactive filter the current version, open the filter, edit it if desired, and then click **Revert**.

   This action:

   - Deactivates the previous active version of the filter.
   - Copies the inactive filter.
   - Makes this new copy current and active.

Certification follow-on tasks

The ServiceNow system can automatically generate and assign follow-on tasks to correct discrepancies detected during compliance audits.

The system property *glide.allow.new.cert_follow_on_task* is set to true by default, allowing for new follow on tasks to be created for the same failure, at each audit run. You can set this property to false, to configure audit to use the same follow-on task for the same audit failure across multiple runs.

The system property *glide.allow.new.cert_follow_on_task* applies only to audits which aren't scripted.

The system property *glide.allow.new.cert_follow_on_task* applies only to audits which aren't scripted.

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You configure and assign follow-on tasks to qualified users or groups in the audit record. A user with the certification_admin role can reassign any follow-on task. The Audit Results related list in the Follow On Task form contains links to the records that failed.

Access follow-on tasks

Users with the certification role can only access follow-on tasks assigned to them but can reassign these tasks to other users.

Procedure

1. Navigate to **All** > **Compliance** > **My Follow On Tasks**.
   The list contains all active follow-on tasks assigned to the logged in user.
2. Open a task.

   The record shows the specifics of the task, the task activity, and the failed audit results.
3. Open records from the **Audit Results** related list to see each discrepancy.
4. Go to the CI named in the record and perform the work to bring it into compliance.
5. Update the **State** field in the follow-on task record and add work notes as you correct each discrepancy.

   When you change the state, the system updates the task activity appropriately.

   When the task is **Closed Complete** it no longer appears on the **My Work** list.

Manage follow-on tasks

Users with the certification_admin or admin role can see all follow-on tasks.

Before you begin
Role required: none

About this task
Tasks are pre-assigned to a user or group as specified in the audit record, but users with the certification_admin role can reassign the task.

Procedure

1. Navigate to the appropriate application:
   - **Compliance** > **Architecture Compliance** > **Follow On Tasks**
   - **Compliance** > **Desired State** > **Follow On Tasks**
   - **Compliance** > **Scripted Audits** > **Follow On Tasks**

   The list of follow-on tasks appears, filtered by audit type.
2. Open a task.

   The **Audit** and **Configuration item** fields are read-only for all users.
3. Edit the **Change group** or the **Assigned to** field if necessary.
4. Edit the **Short description** field if necessary.

   The short description is inherited from the **Task description** field in the Audit form.

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5. Use the links in the **Audit Results** related list to open the individual records that failed the audit.
6. If you update the follow-on task record, be sure to add work notes.

Certification templates

Certification templates can define attributes, relationships, and reference field values that indicate what a record is expected to contain.

These values are used to perform audits on ServiceNow records. The certification filter selected in the template identifies the table and records to audit, and the template conditions set the expected state for those records. The type of audit you create determines which tables and template conditions are available.

Users with the certification_admin role can create, update, and delete templates. Users with the certification role can view template versions.

Certification template audit types

When you create a template, ServiceNow assigns an Audit type that determines which tables and conditions are available in the certification template. This value is based on the application from which the template is created. Each application lists only the templates with the associated type.

Available Condition Builders

The available condition builders for each audit type:

- *Compliance*: Runs audits on any set of ServiceNow records, not only configuration items (CI). This audit type provides the following types of conditions for any ServiceNow table:
  - *Attribute*: Sets conditions for the attributes of the records.
  - *Related List*: Runs audits on records in tables that reference the table defined in the template.
- *Architecture Compliance:* Defines the following types of conditions for tables that extend the Configuration Item [cmdb_ci] table.
  - *Attribute:* Sets conditions for physical attributes of CIs, such as memory or disk size.
  - *Related List:* Runs audits on records in tables that reference the table defined in the template.
- *Desired State*: Defines the following types of conditions for tables that extend the Configuration Item [cmdb_ci] table.
  - *Attribute*: Sets conditions for physical attributes of CIs, such as memory or disk size.
  - *CI relationship*: Defines the relationships these CIs have with other CIs. An example of a relationship is a business service, such as Outlook Web Access, that depends on a server.
  - *User relationship*: Defines the user who reviewed the log records. The only operator available with this condition builder.
  - *Group relationship*: Defines user groups who backed up this CI. The only operator available with this condition builder.
  - *Related List*: Runs audits on records in tables that point toward the table defined in the template.

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Certification Template Record List

The default Templates list displays only the active version of each template, but you can update the breadcrumbs to display all template versions.

- Default Templates List: The default Templates list displays only the active version of each template, filtered by **Audit type**.
- All Template Versions: To view all template versions for an audit type, click the arrow before **Active=true** to remove that condition from the breadcrumbs.

Create or edit a certification template

To create a certification template, follow these instructions.

Before you begin

Activate the Certification Core plugin to enable the Compliance functionality. See Compliance Activation for details.

Procedure

1. Ensure that you have an appropriate filter that defines the records the template evaluates.

   The template applies its conditions to these records.

2. Use the CI Class Manager to navigate to the Certification Template form:

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

   b. Select **Hierarchy** to display the CI Classes list.
   Select the class for which to create a certification template.

   c. In the class navigation bar, expand **Health** and then select **Compliance**.

3. Select **Certification Template**.
4. Or, navigate using one of these paths:
   - **All** > **Compliance** > **Architecture Compliance** > **Templates**
   - **All** > **Compliance** > **Desired State** > **Templates**
   - **All** > **Compliance** > **Templates**
   - **All** > **Audit Definitions** > **Templates**
5. Select **New** or select a certification template to edit.

   The following fields are completed automatically:

   - **Number**: Each new template has a unique number. All versions of the same template use the same number.
   - **Active**: All new templates are set to *Active*.
   - **Version**: The version of a new template is set to *1*.
   - **Audit type**: The system sets the default type to *Architecture Compliance*, *Desired State*, or *Compliance*, depending on the application in which the template was created. You can select a different type when you create the template, but the field becomes read-only when you submit the record. The system uses audit types to filter record lists for appropriate data and determine which conditions are visible on the template form.

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6. Complete the following mandatory fields.
   - **Name**: Enter a descriptive name for this template. The name helps identify the purpose.
   - **Filter**: Select the filter that identifies the records to be certified. You can select either active or inactive filter versions. By default, the system presents only active versions for selection. If you start enteringthe name of a filter, the auto-complete feature displays all versions for selection. For architecture compliance and desired state templates, only filters that use a table extended from Configuration Item [cmdb_ci] appear on the choice list. All filters appear on the choice list for a compliance template. After you select a filter, the template condition builder appears. The template operates on the table specified in the filter.
7. Enter a description for this template.
8. Define certification conditions using the condition builders.

   All conditions are AND conditions. The audit type of the template determines which conditions are available.

   - **Certification Attribute Conditions**: [All audit types] Select configuration item attributes or specifications to certify, such as CPU count, memory, or disk space. Available fields in the attribute condition builder depend on the table from the filter. Typical ServiceNow conditions for attributes are available, including the *between* operator for setting numerical conditions with high and low boundary values. This operator was added specifically for desired state conditions.

     The **Show Related Fields** item supports dot-walking, enabling you to include referenced fields in a certification attribute condition. Select **Show Related Fields** or **Remove Related Fields** to add or remove referenced fields (in the form of <field> => <field>). Select a referenced field to drill down to the next level of referenced fields.

     See Dot walking.
   - **Certification CI Relationship Conditions**: [Desired State audit types] Define the CI relationships to certify, such as *Runs on* or *Depends on*.
   - **Certification User Relationship Conditions**: [Desired State audit types] Select the desired user relationship for this configuration item. The relationship provided in the base system is *Log reviewed by*.
   - **Certification Group Relationship Conditions**: [Desired State audit types] Select the desired group relationship for this configuration item. The relationship provided in the base system is *Backed up by*.
   - **Certification Related List Conditions**: [All audit types] Select field values from tables that reference the template table, or user-defined related lists ,which are created via custom relationships in the sys_relationship table. To create a condition that evaluates all servers in the Server [cmdb_ci_server] table for the presence of Microsoft Word 2007, as referenced in the Software Installation [cmdb_sam_sw_install] table. The resulting condition is *[Software Installation->Installed on] [Display name] [is] [Microsoft Word 2007]*.

     Check **All** to include all records in the condition requirements of the related list. If there are no records in the related list, then:
     - If **All** is checked, the condition requirement is met.
     - If **All** is cleared, the requirement is not met.

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Note:
By default, the condition builders for relationships display only suggested relationships. To see all possible relationships, select the **Show all relationships** check box on the side of the form.

a. Select **Insert a new row** to insert a condition.
You cannot insert an empty condition.

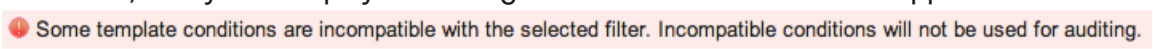
b. Select the green check mark icon to save a condition.
Make sure to save the condition before performing any other operation. Updating the form does not save the condition.

c. To delete a condition, select the red **X** beside the condition.
The system marks the condition as inactive.

d. To reactivate a condition, select the gray **X**.
If another condition for the same field exists, the system prevents reactivation and warns you of the conflict.

9. Select **Submit**.
ServiceNow saves the template as version 1.
10. To create another version of the template, change the name, edit the conditions, or select a different filter.
Updating the template description does not create a new version.

Note:
If you select a filter whose table is incompatible with the existing template conditions, the system displays a warning that the conditions cannot be applied.



11. Select **Update**.
The system saves a new version of the current template and makes it the *Active* version. The previous version is marked inactive.

Clone a Certification template

New templates can be cloned from an existing template.

Procedure

1. Open the template record to be copied.
2. Make any necessary changes.
3. Change the template name or description to distinguish it from the original.
4. Click **Clone**.
ServiceNow increments the record number above the highest template number and sets the version of the new record to *1*. A message appears under the header bar naming the source record for the clone.Both templates are *Active* and appear in the record list. The record list allows you to see the entire history of the template.

Manage Certification template versions

You can view and manage all versions of a template from the Template form.

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Procedure

1. Open any version of a template.
   The **Other Versions** related list displays all other versions of this template, both active and inactive.
2. Click any version in the related list to display the record for that version.
3. Update the template to create a new version.
   The system increments a version of the template when you edit any field except **Description** and **Active**. You can manage the template versions without returning to the list view.
4. To make an inactive template the current version, open that version, edit it if desired, and then click **Revert**.
   This action does:
   - Deactivates the previously active version of the template.
   - Copies the inactive template.
   - Makes the new copy the current, active version.
5. Select the **Audits** related list to view all audits configured to use this template.
6. Click **New** to create a new audit record with the template selection and table pre-populated.

Delete a Certification template

Certification templates can be deleted.

About this task

Only users with the certification_admin or admin role can delete template versions. You cannot delete a template version that is being used for an audit.

Procedure

1. To delete a single template version, open that version record and click **Delete**.

   The system hides the **Delete** button for templates that are in use. If you delete the latest, active version of a template, the previous version of that template is reset to *Active*.

2. To delete all unused and inactive versions of a template, open any version of that template and click **Delete inactive versions** under **Related Links**.
   This control appears on all versions, whether they are used in an audit.
3. When prompted, click **OK** to proceed.
   The system deletes only template versions that are not used in an audit. All protected versions are named in a message that appears in the header bar.

Scripted audits

A scripted audit enables users with the certification_admin role to conduct an audit from a script rather than using restrictive template conditions.

A scripted audit uses a certification filter to select the records to audit, and then creates standard follow-on tasks for remediation of any discrepancies. Use this type of audit to query for any values or states that a script can define. A scripted audit is a specific audit type that is activated together with the Desired State plugin. ServiceNow provides a sample audit script with configuration instructions.

Create a scripted audit

A scripted audit is an audit whose conditions are defined by a script.

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Procedure

1. Navigate to **All** > **Compliance** > **Scripted Audits** > **Audits**.

   An audit type of *Scripted* filters the list.

2. Click **New**.
3. Complete the form (see table).
4. Create the audit script.

   The *Run this script* field includes a sample script with instructions for performing the audit and generating the follow-on tasks. This field appears only when you access audits from the Scripted Audits module.

5. Click **Submit**.

   Sample script:

```
/*
////////////////////////////////////////////////////
/// This script works with Data Center Zones filter //
////////////////////////////////////////////////////

var desiredFloorSpaceUsage = 30;  // Value to audit against
var assignToUser = '46d44a23a9fe19810012d100cca80666';  // Beth
 Anglin
var assignToGroup = '8a5055c9c61122780043563ef53438e3'; //
 Hardware group
var taskMsg = 'See the audit results below for the
 discrepancies that must be addressed';

// API call to retrieve records based on the filter
var gr = new
 SNC.CertificationProcessing().getFilterRecords(current.filte
r);

// Loop over all records defined by the filter
while(gr.next()) {
 var sysId = gr.getValue('sys_id'); // Sys ID of audited record
 var floorSpaceInUse = gr.getValue('floor_space_in_use'); //
 Value to audit

 // Determine if certification condition passes or fails
 if (floorSpaceInUse < desiredFloorSpaceUsage) {
  var columnNameSpace = gr.floor_space_in_use.getLabel(); //
 String value of column audited against

  // Call create Follow on Task API and save the returned
 sys_id for use in logging audit result fail
  // Params:
  // auditId - Sys id of the audit record executed
  // ciId Sys - id of the configuration item.  Empty string if
 not a cmdb ci
  // assignedTo - Sys id of user to assign task to.  Can be
 empty
  // assignmentGroup - Sys id of group to assign task to.  Can
 be empty
```

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```
  // shortDescr - Short description for the Follow On Task.
 Can be empty
  // Return value: Sys id of the created follow on task
  var followOnTask = new
 SNC.CertificationProcessing().createFollowOnTask(current.sys_
id, sysId, assignToUser, '', taskMsg);

  // Call log failed result API
  // Params:
  // auditId - Sys id of audit record executed
  // auditedRecordId - Sys id of the record audited
  // followOnTask - Sys id of the follow on task associated
 with the audited record(@see auditedRecordId). Can be empty
  // columnDisplayName - Label of the column audited(ex. Disk
 space (GB)).  Can be empty
  // operatorLabel - Label of the operator used to audit the
 column(ex. is not empty, greater than). Can be empty
  // desiredValue - Desired value of the column.  Can be empty
  // discrepancyValue - Discrepancy value.  Can be empty
  // isCI - True, if audited record is a CI. False, otherwise.
  // domainToUse - Sys domain of the "cert_audit" record.  Can
 be empty
  new
 SNC.CertificationProcessing().logAuditResultFail(current.sys_
id, sysId, followOnTask, columnNameSpace, 'greater than',
 desiredFloorSpaceUsage, floorSpaceInUse, true);
 } else { // If certification condition pass, write a Audit
 Result Pass via API
  // Params:
  // auditId - Sys id of audit record executed
  // auditedRecordId - Sys id of the record audited
  // isCI - True, if audited record is a CI. False, otherwise.
 Can be empty.
  // domainToUse - Sys domain of the "cert_audit" record.  Can
 be empty.
  new
 SNC.CertificationProcessing().logAuditResultPass(current.sys_
id, sysId, true);
 }
}
*/
```

New scripted audit table.

Field	Description
Name	Name for this audit.
Filter	Filter to use when the audit type is Scripted. This field is required for scripted audits, but is hidden for all other audit types.
Template	[Required] Template to use when this audit runs. Audit type filters the list of available templates and only the active versions of a template are available for selection. This field is hidden when the audit type is Scripted.
Table	[Read-only] Displays the table for the template.
Create tasks	Creates follow-on tasks for correcting discrepancies when selected. In a scripted audit, you can create the logic for either task state by using true to

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Field	Description
	create a task or false if no task is created. By default, this check box is cleared (false) in a new audit record.
Assignment type	A choice list to select how the audit assigns the follow-on tasks. This field is visible only when the Create task check box is selected. Choices are: ○ User Field: elect a user reference field on the table being audited. As an example, select the user named in the Managed by field on the failed record to perform the tasks. This selection displays the Assigned to and Assign to empty fields. If the reference field on the record is empty, the value in the Assign to empty field is used. ○ Specific User: Select a specific user to perform the tasks. This selection displays the User field. ○ Group Field: Select a group reference field on the table being audited. As an example, select the Support group from the failed record to perform the tasks. This selection displays the Assign to group and Assign to empty fields. All members of the group from the reference field on the failed record are assigned to the tasks. If the reference field on the record is empty, the value in the Assign to empty field is used. ○ Specific Group: Select a specific group to perform the tasks. This selection displays the Group field. All members of the selected group are assigned to the tasks.
User	The specific user this audit assigns to follow-on tasks. This field is available under these conditions: ○ Assignment type is set to Specific User. ○ Assign to empty is set to Create Assigned Task, and Assignment type is set to User Field. **Note:** Ensure that the specified user has the certification role.
Assign to group	The group field that defines which group this audit assigns to the follow-on task. This field is available only when the Assignment type is Group Field.
Group	The specific group this audit assign to follow-on tasks. This field is available only when the Assignment type is Specific Group and you have selected Group Field as the assignment type.
Assign to	The user field that defines which user this audit assigns to the follow-on task. This field is available only when the Assignment type is User Field.
Assign to empty	The behavior to use if the field selected in Assign to or Assign to group is blank on the record being audited. For example, if a follow-on task must be assigned to a manager, but no manager is identified, the value in this field determines what happens. This field appears only when the Assignment type is User Field or Group Field. The possible selections are: ○ Do Not Create Task: No follow-on task is created when the Assign to or Assign to group field is empty. ○ Create Unassigned Task: Create a follow-on task, but do not assign it to any user or group. The task can be manually assigned later.

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Field	Description
	○ Create Assigned Task: Create a follow-on task and assign it to the user or group specified. If you selected an assignment type of User Field, the User field becomes available. If you selected the Group Field type, the Group field becomes available. The audit automatically creates follow-on tasks for all records that have Assign to populated, regardless of which selection you make for Assign to empty.
Short description	Brief description of the purpose of the audit.
Task description	General description of the work required for the follow-on tasks created by this audit. All follow-on tasks created by this audit inherit this description.
Active	Activates this audit schedule and generates follow-on tasks at the scheduled date and time. Clear this check box to hide scheduling fields on the form (except Last run date) and not generate follow-on tasks.
Run	How often to run the schedule that generates the audit. ○ Daily ○ Weekly ○ Monthly ○ Periodically ○ Once ○ On demand
Day	○ If Run is Weekly, the day of the week when the audit runs. ○ If Run is Monthly, the day of the month when the audit runs. If the day is 29, 30 or 31, for shorter months the audit runs on the last day of the month.
Repeat Interval	If Run is Periodically, the frequency that the audit runs entered in time, days, or both. For example, set Days to 10 and Hours to 14:00:00 to run the audit every 10 days at 2:00pm.
Starting	If Run is Periodically or Once, the date and time when the audit runs.
Time	If Run is Daily, Weekly, Monthly, or Once, the time of day, on a 24-hour clock, when the audit runs.
Last run date	[Read-only] The last date and time the audit ran, either on its regular schedule or manually. Audit previews do not update this field.
Next scheduled run	[Read-only] The next date and time on which the audit runs. The system recalculates this field when you change the schedule.
Audit type	[Read-only] The type assigned to this audit. The system selects the audit type based on the application from which the audit was created and can be: ○ Desired State ○ Architecture Compliance ○ Compliance ○ Scripted

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Field	Description
Run this script	Audit script to run. This field is available only when the audit type is Scripted. The Audit form includes a sample script with instructions for performing the audit and generating the follow-on tasks. See Script Methods for a list of the methods provided and the accepted parameters.

Script methods

ServiceNow provides four methods for creating the audit script.

Script methods

Name	Description	Parameters
getFilterRecords	public GlideRecord getFilterRecords(String filterId)	filterID: The sys_id of the filter to use.
logAuditResultPass	public void logAuditResultPass(String auditId, String auditedRecordId, boolean isCI, String domainToUse)	auditId: Sys_id of audit record executed auditedRecordId: Sys_id of the record audited. isCI: True, if the audited record is a CI, false if otherwise. domainToUse: Sys_domain of the cert_audit record.
logAuditResultFail	public void logAuditResultFail(String auditId, String auditedRecordId, String followOnTask, String columnDisplayName, String operatorLabel, String desiredValue, String discrepancyValue, boolean isCI, String domainToUse)	auditId: Sys_id of audit record executed. auditedRecordId: Sys_id of the record audited. followOnTask: Sys_id of the follow-on task associated with the audited record and can be an empty string. columnDisplayName: Label of the column audited. For example, Disk space (GB). operatorLabel: Label of the operator used to audit the column. For example, is not empty or greater than can be the label. desiredValue: Desired value of the column.

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Script methods (continued)

Name	Description	Parameters
		discrepancyValue: Discrepancy value. isCI: True, if the audited record is a CI, false if otherwise. domainToUse: Sys_domain of the cert_audit record.
createFollowOnTask()	public String createFollowOnTask(String auditId, String ciId, String assignedTo, String assignmentGroup, String shortDescr)	auditId: Sys_id of the audit record executed. ciId: Sys_id of the configuration item. This string is empty when the table is not extended from the cmdb_ci table. assignedTo: Sys_id of the assigned user of the task. This string can be empty. assignmentGroup: Sys_id of the group the task is assigned to. This string can be empty. shortDescr: The text to use for the short description of the follow-on task.

Managing proposed changes

The proposed changes feature allows you to pre-configure changes to configuration items and their associated relationships. These pre-configured changes are prepared to be implemented, but do not actually happen until they are applied at a later time.

When you view a CI, the proposed changes can be displayed so that you can see what is planned.

This feature is useful when you want to make modifications while a change process is in the approval stage, and only implement the changes after the approvals are complete. If the change is never approved, no changes to records have to be reversed. If the change is approved, a quick command applies all the proposed changes.

You can make the following proposed changes to a CI:

- Modify any field on the CI form.
- Add or delete a relationship to that CI.

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To modify a relationship, you must delete the current relationship and add a new relationship. You cannot delete a proposed change.

View CI history

You can view the history of changes to a CI in a list, calendar, or timeline format.

View the proposed changes of a CI

You can view the proposed changes so that you can see what is planned for the CI.

Before you begin
Role required: personalize_form

About this task
To view any proposed changes, configure the CI form layout to display the **CMDB Scheduled Changes** field. Proposed changes are not displayed in a CI form by default.

Procedure

1. Navigate to **All** > **Change** > **Open** and open a change request.
2. In the **Affected CIs** related list, open the **Configuration Item**.
   You may also navigate directly to the CI form.
3. Right-click the form header bar.
4. Select **Configure** > **Form Layout**.
5. Move the **CMDB Scheduled Changes** field to the **Selected** pane.
6. Click **Save**.
   The CI form shows the details of any proposed changes in the **Scheduled changes** area.

Add a proposed change to a CI

Proposed changes to a CI can be made while viewing a change request or any task-related record.

Before you begin
Role required: itil

Procedure

1. In the Change Request form, go to the **Affected CIs** related list.
   If there are no CIs in the Affected CIs list, click **Edit** to add CIs that are affected by this change request.
2. Right-click the CI that you want to configure for a proposed change, and select **Proposed Change**.
3. Complete the form to make the proposed changes, and click **Save Proposed Change**.
   Click **Update** to apply the changes immediately. Click **Delete** to delete the CI.
4. To propose an addition or a removal of a CI relationship:

   a. Click the plus icon in the **Related Items** section.

   b. In the Relationships section, add or delete a relationship.
   For information about using the relationship editor, see Create or edit a CI relationship.

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c. Click **Save Propose Change**.

d. Confirm saving the proposed change.

Click **Update** or **Delete** to commit the changes immediately.

Note:
Use only with CI relationships. Proposing additions or removal of relationships is not valid for user relationships and group relationships.

What to do next
After the proposed changes are saved, the **Apply Proposed Changes** button appears on the Change Request form. This button lets the user commit the proposed changes to the CI. Your business processes determine the appropriate time to commit the changes. The CI retains the existing data until the proposed changes are committed. However, users can see that changes have been proposed.

Apply a proposed change to a CI

When you apply the proposed changes, all the proposed changes for that change request are applied to the configuration item. You can apply proposed changes without verification, or if verification tests of the proposed changes have failed.

Before you begin
Role required: itil

About this task
After you apply the proposed changes, the **Scheduled changes** part of the form displays **No scheduled changes found**. You can configure proposed change verification rules which you can use to verify proposed changes before applying the changes.

Procedure

1. Navigate to the **Change Request** form.
2. Click the **Apply Proposed Changes** button.
   You may have to right-click the form header and select the **Reload Form** option to see the changes.

Create or edit a proposed change verification rule

Ensure that proposed changes meet business requirements and do not introduce invalid data to the CMDB, create a rule that includes a script to verify the proposed changes.

Before you begin
Role required: asset or itil

About this task
When you configure proposed change verification rules for a CI, you have an option to verify that the proposed changes pass the verification test script in the rule. The verification test results are logged as passed or failed, and you can view the results. Running the verification test is not mandatory, and a failed verification test does not prevent you from applying proposed changes.

Procedure

1. Navigate to **All** > **Configuration** > **Change Verification** > **Proposed Change Verification Rules**.
2. Click **New** or select an existing rule to edit.

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3. Fill in the fields, as appropriate.

Proposed Change Verification Rules form

Field	Description
Rule name	The name of this rule.
Table name	The table to which the rule applies.
Filter condition	Conditions to apply this rule to specific CIs.
Active	Check box to activate this rule.

Rule script	A verification Java script that needs to return true or false. For example:
	`validateRule()`
	`{`
	`var os = current.getValue("os");`
	`var cpu = current.getValue("cpu_count");`
	`//Use current.getValue(fieldName) to get the proposed change value, eg. var os = current.getValue("os");`
	`//Your verification code`
	`if (os != "SunOS" || cpu < 2)`
	`return false;`
	`//Return true to pass the verification and false if the verification failed`
	`return true;`
	`}`

4. Click **Submit** or **Update**.

Result

On the **Change Request** form, you can click **Verify Proposed Changes** to verify proposed changes for the affected CIs.

Verify proposed changes

Before applying proposed changes to affected CIs, use proposed change verification rules to verify that the changes meet business requirements and do not add invalid data to the CMDB.

Before you begin

Create or edit the rules used to verify proposed changes. For details, see Create or edit a proposed change verification rule.

Role required: none

About this task

You can apply proposed changes even if they are unverified or fail a verification test.

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Procedure

1. Open the **Change Request** form that affects the CI.
2. Click **Verify Proposed Changes**.
   The proposed changes are verified against any proposed change verification rules in which the CI meets the **Filter condition** criteria.
3. Review the message that appears at the top of the form after the verification process is finished.
   The message states whether the verification tests passed or failed.

What to do next

To view the details of any verification tests that were performed for the change request in the past two days, click the **Proposed Change Verification Log** related link.

Create or edit a planned change validation script

Create a custom script that checks if a change to a class was valid according to business requirements, and whether the change was planned or not. A planned change validation script is used whenever a CI change is viewed in the CI timeline or change history.

Before you begin

Role required: admin or itil

About this task

The system attempts to validate each CI change as follows:

- If a custom script exists for the CI or one of the CI parents, then the script is executed and the results are used to flag the change as valid or invalid. Parent CIs are examined in the hierarchical order.
- If a custom script does not exist for the CI or any of its parents, then a predefined validation script is used. The change is determined as a planned change if the change occurred between the **Work start** and **Work end** dates of the change request associated with the changed CI.

  However, this check is not always reliable because a user might have manually modified the CI within the work dates, which flags the change as valid even if it is invalid.

The script needs to return a boolean, true or false, which depends on meeting the test criteria in the script. You can define a separate script for each CI class, and you can define multiple planned change validation scripts for a single class. For example, to maintain different versions of the script. Only one script can be active for a CI class at any given time.

These are the parameters that uniquely characterize a change:

- The fields that were changed
- The data source that performed the change
- The time stamp of the change

To correctly determine the validity of a change, examine the parameters and apply business logic to evaluate if the validation tests are met. A planned change validation script can test any of these characteristics and determine when a change meets pre-established criteria. For example, the custom script can check if the mode of the CI is operational or maintenance, or who initiated the change.

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Procedure

1. Navigate to **All** > **Configuration** > **Change Verification** > **Planned Change Validation Script**.
2. Click **New** or select a validation script to edit.
3. Complete the form.

Planned change validation script form

Control	Description
Active	Check box to activate this script for validating changes.
Applies to	Class that this script applies to.
Script	Script to run to validate a change. If the script does not return a boolean value, then it is configured to false.

The script has a template which displays the input variables of the script.

Template script input variables

Variable	Type	Description
current	GlideRecord	Current record that is being processed.
updatedOn	GlideDateTime	Time stamp of the change.
updatedBy	String	Entity responsible for the change.
fieldsChanged	String	Comma-separated list of the names of all fields that were changed.

Example

This sample script checks who initiated the record update. It returns true if admin initiated the record update. Otherwise, the script returns false.

```
isValidChange();

function isValidChange(/*GlideRecord current, GlideDateTime
 updatedOn, String updatedBy, String changedFields*/)
{
   //Return true if the user that updated the record has an
 admin role
   return isUserAdmin(updatedBy);
}

function isUserAdmin(userName)
{
   var grUser = new GlideRecord("sys_user");
   grUser.addQuery('name', userName);
   grUser.query();
   if(grUser.next())
   {
       var roles = new GlideRecord ("sys_user_has_role");
       roles.addActiveQuery();
       roles.addQuery('user', grUser.sys_id);
       roles.query();
```

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```
        while(roles.next())
        {
           if(roles.role.name == 'admin')
              return true;
        }
    }
    return false;
}
```

4. Click **Submit**.

Intelligent Search for CMDB

Use everyday natural language query (NLQ) in a search string to query for a set of CIs in the CMDB. Intelligent Search for CMDB, parses, resolves ambiguities, and converts your search string into a valid CMDB query. Complex search strings open fully constructed on a canvas of CMDB Query Builder where you can continue and refine, or run.

Intelligent Search for CMDB is supported only on English language instances and isn't supported when the instance preferred language is set to a language other than English.

Integration with CMDB Workspace

Intelligent Search for CMDB is integrated into Home view in the CMDB Workspace store app. For more information, see:

- Home view in CMDB Workspace (Intelligent Search section) for details about how to use Intelligent Search, sample search strings, and helpful tips.
- CMDB Workspace for additional details about CMDB Workspace.

Integration with CMDB Query Builder

Intelligent Search for CMDB is integrated with the CMDB Query Builder in the ServiceNow AI Platform. This integration is controlled by the system property *glide.cmdb.query.nlq.activated*, which is set to **true** by default. Intelligent Search for CMDB lets you use natural language processing in the CMDB Query Builder to find CIs and their relationships using Intelligent Search for CMDB functions.

Using Intelligent Search for CMDB

Intelligent Search is tailored to the CMDB, searching only through the CMDB class hierarchy for tables, and for CIs and their relationships.

Use the Intelligent Search search field to construct a search string using everyday natural language. Your queries can span multiple CMDB classes and involve many CIs that are connected by different relationships. After resolving any ambiguities with table names or relationship types, Intelligent Search converts your search string into a query that the CMDB can run. The CMDB query is constructed dynamically as you type into the search box and spell checker is applied if needed. A dynamic list of relevant suggestions appears as you type, with items such as table names, matching single words or part phrases in the typed-in text.

Use Intelligent Search:

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- **Search tips**: Shows details and tips about the usage, and examples for single and multi-table search, advanced filtering, and relationships in Intelligent Search. The Relationships tab contains a link to the CMDB Implicit Relationships table.

- **Search**: Depending on whether the search string is already fully converted into a valid CMDB query and whether the search is for a single or multiple tables.

  - If the search string has no ambiguities with the table name or relationships, then the query runs and the results appear in a list view format.

    If the constructed CMDB query contains more than a single table, then the **View in Query Builder** button appears. Click the button to open the CMDB Query Builder with your query fully constructed on the Query Builder canvas. You can use the Query Builder to continue editing the query.

  - If there are any ambiguities with table names or relationship types in the search string, then the search string can't be converted into a valid CMDB query. In this case, the Refine your query dialog box appears to continue and parse your search string into a valid CMDB query. The dialog box contains suggested synonyms and labels for phrases in your search string. Use the drop-down lists to select the synonyms that match your intended search and then click **Go** to run the query.
  - If Intelligent Search is unable to convert your search string into a valid CMDB query, then clicking **Search** does not generate any query results. Instead, a feedback form appears. Fill out the form and click **Submit Feedback** to send your feedback to ServiceNow analysis.
- **Results Feedback**: Submit feedback to ServiceNow analysts, to express your assessment of the results. Choose descriptions that capture any gap between the results and your expected results, and add any helpful details.

Sample searches

When you click the search box, the drop-down list of pre-defined sample searches appears. The list consists of more common searches, or searches that are more difficult to construct such as searches that involve application services. Run any of those searches to get started.

- Sample searches are stored in the NLQ Sample Search [sn_cmdb_ws_nlq_sample_search] table
- Referenced tables are stored in the NLQ Sample Search Table [sn_cmdb_ws_nlq_sample_search_table] table

CMDB Admins (sn_cmdb_admin user role) can modify a sample search by directly editing its record in the NLQ Sample Search table. Click **All** and then in the Filter navigator, enter `sn_cmdb_ws_nlq_sample_search.list`. In the NLQ Sample Searches list view edit the record for a search that you want to modify.

Any modification to sample searches is reflected in both, the CMDB Workspace and the CMDB Query Builder.

Synonyms

The NLQ Synonym [nlq_synonym] table is pre-populated with synonyms for natural language strings for CMDB table and column names, and relationships. This table is used to match natural language search words to the CMDB query language. For example, the phrase ‘linux server’ has synonyms such as ‘Linux Server’, ‘Server’, and ‘Virtual Machine Instance’.

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For details about viewing and adding synonyms customized to your business needs, see NLQ synonyms.

CMDB Implicit Relationships

You can help Intelligent Search find more results by defining some of the relationships between classes as implicit relationships. Implicit relationships can be useful in queries that involve service offering and application services.

NLQ admins can create new implicit relationships by navigating to **All** > **NLQ** > **CMDB Implicit Relationships**.

An implicit relationship defines the relationship between two tables and includes any filters you want to apply. When creating an implicit relationship, you set the following items:

- From table (from_table): The class that acts as the parent
- Filters: Conditions that are applied to the columns of the from_table
- To table: The class that acts as the child
- Relationship: How the from_table interacts with the to_table. For example, Contains: Contained by means the from_table contains the to_table
- Skipped table: The class that is implied and not captured by the CMDB Query Builder

For example, in CMDB Query Builder, you want to see your service offerings that have had a P1 incident in the last 10 days. However, if you were to type `show me all business service offerings with p1 incidents in the last 10 days`, NLQ wouldn't understand the relationship.

Implicit relationships are stored in the NLQ CMDB Implicit Relationship [nlq_cmdb_implicit_relationship] table and are used in the CMDB Workspace and if integrated, also in CMDB Query Builder.

For more information about NLQ in the ServiceNow AI Platform, see Natural Language Query (NLQ).

Unified Map

The Unified Map feature displays a graphical hierarchical map of the CMDB — CIs and the connections between them. Unified Map combines some of the capabilities of Dependency Views and of Service Mapping into a single map experience.

Get started

Explore	Administer	Use
Explore map tools and controls.	Set up uniform map experiences for users.	View and manage the displayed data.

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Unified Map

The Unified Map feature displays a graphical hierarchical map of the CMDB — CIs and the connections between them. Unified Map combines some of the capabilities of Dependency Views and of Service Mapping into a single map experience.

Unified Map

Unified Map is included in CMDB Workspace.

Nodes on the map represent CIs in the CMDB and lines represent connections between CIs (relationships, references, and other kinds of connection). The relationships help you, for example, to assess the impact of a change to a selected node by showing CIs that are connected to it through relationships. Products such as Change Management, Incident Management, and Event Management benefit from such information.

When the Service Mapping application is active, the map also shows the composition of service instances — useful with products such as Event Management and Incident Management. For example, you can view all CIs that are members of the 'Revenue App' service instance. You can review historical changes and then, for example, filter the CIs so that only application CIs appear on the map.

Opening a map

Use any of the following methods to open Unified Map:

- Navigate to **All** > **CMDB Workspace** > **Unified Map**.
- While working in the Service Graph Workspace, select **Use Unified Map to view CI relationships** in the Recommended tools section.
- While working in the CMDB Workspace, select **Unified Map** in the Quick Links section.
- On a CI form for any CI in an **operational** state, select **Open Map** to open a map with the CI as the home node.

Note:
An admin can specify additional *`operational status`* values for this option. For more information, see Configure CIs to appear based on life cycle stage value.

Tip:
To view a map in full-screen mode, select the Unpin All icon.

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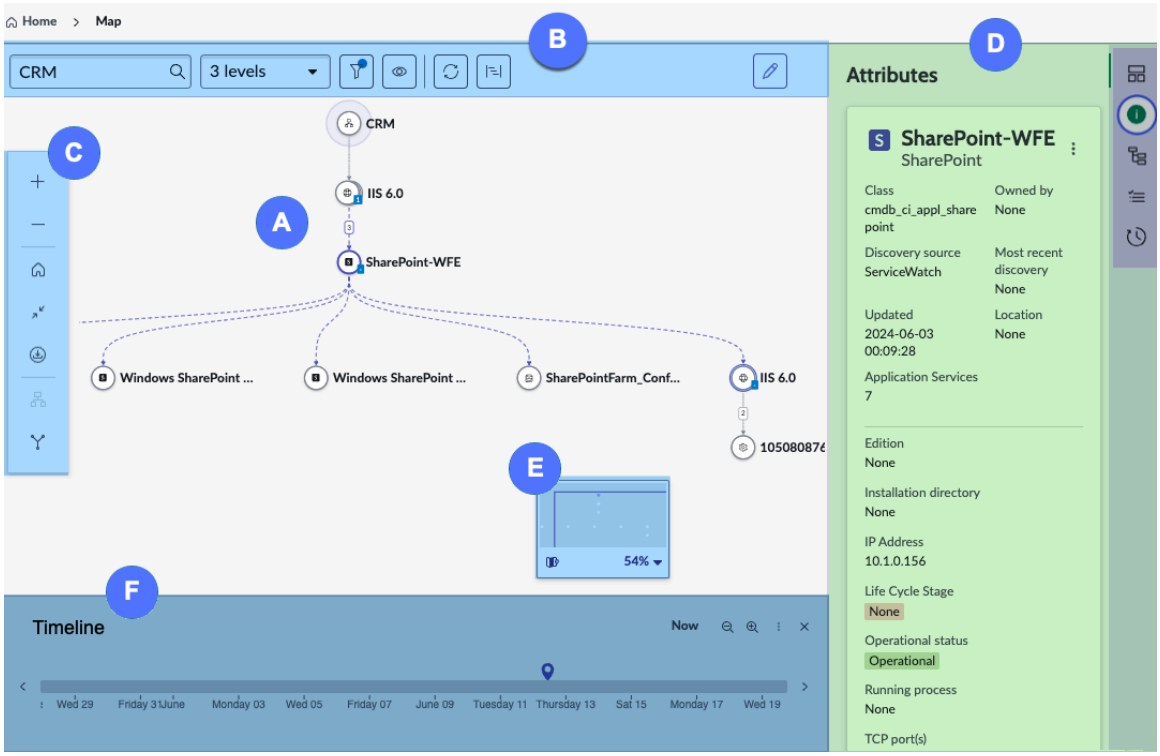
Work areas on the map



A: Map

The map displays specified CIs and their connections (CI relationships, references, and endpoint chains). In the example, the CRM CI is the home node and the connections represent relationships with other CIs. Select any node to view details like related service instances, change history, and so on. For more information, see Controlling Unified Map contents and appearance.

Two CIs might be connected by one or more relationships (stored in the CI Relationship [cmdb_rel_ci] table). For example, two CIs might be connected by the *`Runs On::Runs`*, *`Depends On::Discovered From`*, and by the *`Owned By::Owns`* relationships.

- A solid line indicates a relationship. The arrowhead indicates the dependent node.
- A dashed line indicates a reference.
- A badge on a line indicates the number of relationships between the CIs.

B: Content controls

- **Home node search box:** Search for and select the home node — the node to focus on (CRM in the image). For more information, see Controlling Unified Map contents and appearance.
- **Levels:** Specify the number of CI relationship levels that should appear on the map.
- **Filters** : Customize the map to focus on the CIs that you want to work on by filtering out (hiding) irrelevant CIs. You can filter by layer count, CI class, relationship type, discovery source, location, and CI ownership. Select the view icon to hide or show filtered CIs as dimmed view-only nodes. For more information, see Use filters to specify which nodes should appear on a map.

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- **Reload map** : Reload the map after making changes.
- **Timeline** : The timeline indicates related items like incidents, problems, and changes over a specified period of time for the selected CI. You can use the timeline to visualize the history of changes to a CI and how they affect the topology of the CMDB. For more information, see Viewing related items on the Unified Map timeline.
- **Map editor** : Use the map editor to add CIs to or remove CIs from the map and to update relationships in the CMDB. For more information, see Editing maps in Unified Map

C: Toolbox

- Use the toolbox to control visual aspects of the map such as zoom level or layout mode. For more information, see Controlling Unified Map contents and appearance.
- In the toolbox, select the Export map icon to save the current appearance of the map as a PDF document on your local drive.

D: Contextual side panel

- The **Overview** panel ( ) displays summary data for all CIs that are associated with the home node — counts and types of CIs and connections, discovery sources, and so on. For more information, see View a summary of map contents on the Overview panel.
- The **Attributes** panel ( ) lists attributes like location and operational status for the selected CI or relationship. For more information, see View the attributes of a CI or a relationship.
- The **Service instances** panel ( ) lists details of mapped application services (service instances) associated with the selected CI. The Service Mapping application generates this type of map content. For more information, see View service instances for a CI.
- The **Related items** panel ( ) shows related items such as changes, active incidents, or active problems for the selected CI. For more information, see View related items for a CI.
- The **Changes** panel ( ) lists changes to the selected CI such as changes to life cycle stage or operational state. For more information, see View historical changes for a CI.

  Changes are also indicated on the timeline. For more information, see Viewing related items on the Unified Map timeline.

E: Mini-map navigator

Use the navigator to set the zoom level or move the view to an area of interest. Select the icon to show or hide the navigator. For more information, see Controlling Unified Map contents and appearance.

F: Timeline

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The timeline indicates related items like incidents, problems, and changes over a specified period of time for the selected CI. You can use the timeline to visualize the history of changes to a CI and how they affect the topology of the CMDB. For more information, see Viewing related items on the Unified Map timeline.

Related topics

CMDB Workspace store app

Configuring Unified Map — Admin settings

Administrators can configure general Unified Map settings to control the initial content and appearance of maps for all users in a workspace.

Activating Unified Map

To activate Unified Map, set up the CMDB Workspace ServiceNow Store app and then enable the *sn_sm_scoped_app.sa.unified_map.enabled* system property.

For more information, see Set up CMDB Workspace.

Unified Map settings that admins can configure

These workspace-specific configuration settings affect all users of the CMDB Unified Map page. The settings do not affect other copies of the Unified Map template.

- Create or manage a shared preset
- Configure how many nodes can appear on a map
- Configure the default or maximum number of levels on maps
- Configure endpoint de-duplication on maps
- Configure CIs to appear based on life cycle stage value
- Configure how to display related items on the map
- Configure which attributes to display in the Attributes panel
- Configure display of connections to a referenced class
- Create a class profile of visible layers for classes
- Create or manage a shared preset

How configuration settings for Unified Map are stored

See How configuration settings for Unified Map are stored.

Unified Map settings that non-admin users can configure

Non-admin users can customize some aspects of their personal experience with Unified Map, but can't configure instance-wide workspace-specific settings. Non-admin users can control which elements appear on the map, isolate and analyze relationships between CIs, and simplify the map to isolate issues.

For more information, see Controlling Unified Map contents and appearance.

Related topics

Configuration identifiers framework

How configuration settings for Unified Map are stored

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Create or manage a shared preset

Admins can save a set of Unified Map map filter settings (layer, CI class, relationship type, and other CI attribute settings) as a shared preset that any user can apply to their map view.

Before you begin

Role required: sn_cmdb_config_admin

About this task

Follow this procedure to save specified filter settings as a shared preset. The workspace-specific filter criteria in a shared preset are available for all users of the current CMDB Unified Map page. Shared presets defined in one workspace are not available in other workspaces.

Configuration settings for shared presets are saved in the **Unified Map shared presets** profile in the configuration identifier that is applied to the workspace.

- When a user applies a shared preset or a user preset, all filter settings are overridden. Filter attributes from a shared preset or a user preset that do not apply to the current map are listed in the **Unused filter attributes** section of the filter panel. The order of filter-setting precedence from the various sources is as follows:
  1. user presets
  2. shared presets
  3. shared presets that are defined in a **Unified Map shared presets** profile
  4. class profile (Class profiles contain only layer settings and are defined in the **Node Map Profiles** related list.)
- You can include a shared preset in a node map profile. Layer settings in the shared preset will override the layer settings defined in the class profile.
- A shared preset defined in a profile will be applied when the map opens. If the user has explicitly defined a shared preset or a user preset, then the preset takes precedence as outlined earlier.
- An individual user can apply a shared preset and then save it as a user preset. For more information, see Create or manage a user preset.
- Unused filter criteria in the current filter are saved with a preset.

Procedure

1. While working in a map, select the Map filter icon and then select or clear criteria in any filter category.
   Only attributes of elements currently on the map are listed as filter criteria. Attributes that do not apply to the current elements are listed in the **Unused filter attributes** list.
2. Select the Manage presets icon, and in the Manage shared presets list, select **Create shared preset**.
3. Enter a preset name and then select **Save**.
4. Close the Map filter panel.

Result

The new shared preset is listed in the **Unified map shared presets** related list on the Configuration Identifier form. In addition, shared presets used in a map profile are listed in the **Node Map Profiles** related list. For more information, see How configuration settings for Unified Map are stored

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What to do next

To apply a preset:

1. While working in a map, select the open filter panel icon
2. Select the View preset list icon and then select the preset.

To update a preset or save an updated version as a new preset:

1. While working in a map, select the open filter panel icon
2. Apply the preset that you want to update and then make the desired changes.
3. Select the Manage presets icon and then select **Update preset** or **Update shared preset**.
4. Select one of the following actions:
   - Select **Update preset** to update the current preset with the current filter settings.
   - Select **Save as new preset** and then enter a new name.
5. Select **Save**.

To delete a preset:

1. While working in a map, select the open filter panel icon
2. Apply the preset that you want to delete.
3. Select the Manage presets icon and then select **Delete preset** or **Delete shared preset**.
4. Select **Yes**.

To apply the home CI default filter settings

Select **Reset filter**.

Related topics

Use filters to specify which nodes should appear on a map

Create or manage a user preset

Create a class profile of visible layers for classes

Configure how many nodes can appear on a map

Configure the maximum number of nodes that can be loaded when a map in this workspace opens. These are general settings that only sn_cmdb_admin can configure.

Before you begin

Set the application scope in your instance to **CMDB Workspace**.

Role required: sn_cmdb_admin

About this task

Admins can set the maximum node count using the *unifiedmap.map_search.max_nodes* property in the workspace-specific [sn_cmdb_ws_config_property] table.

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These workspace-specific configuration settings affect all users of the CMDB Unified Map page. The settings do not affect other copies of the Unified Map template.

Procedure

1. Navigate to **All** and then, in the filter box in the main navigation bar, enter `sn_cmdb_ws_config_property.list`.
2. Select the *`unifiedmap.map_search.max_nodes`* property.
3. Select **New** or select the configuration identifier to update and then fill in the form.

Workspace Config Property table
Settings that configure the maximum number of nodes that can appear on a map.

Field	Description
Config identifier	Unique name of the configuration identifier that specifies the settings for the current workspace. **Note:** The base system includes a configuration identifier named **Default** that specifies the default settings for Unified Map.
Name	The name of the property that you're updating: unifiedmap.map_search.max_nodes.
Value	Maximum count of nodes that are loaded when a map in this workspace opens.
UX application	The top-level **UX Application ID** to which this configuration applies. This is the application ID of your workspace. This value is referenced from the record associated with the **Config identifier** setting.

4. Select **Submit** or **Update**.
   The updated settings appear in the appropriate related list on the Configuration identifier form, as described in Configuring Unified Map — Admin settings.

Configure the default or maximum number of levels on maps

Configure the default or maximum number of levels on maps. These are general settings that only sn_cmdb_admin can configure.

Before you begin

Set the application scope in your instance to **CMDB Workspace**.

Role required: sn_cmdb_admin

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About this task

Admins can set default and maximum levels using the *unifiedmap.map_search_filter.default_levels* or *unifiedmap.map_search_filter.max_levels* property in the workspace-specific [sn_cmdb_ws_config_property] table.

These workspace-specific configuration settings affect all users of the CMDB Unified Map page. The settings do not affect other copies of the Unified Map template. Non-admin users can customize some aspects of their personal experience with Unified Map, but can't configure instance-wide workspace-specific settings.

Procedure

1. Navigate to **All** and then, in the filter box in the main navigation bar, enter `sn_cmdb_ws_config_property.list`.
2. Select the *unifiedmap.map_search_filter.default_levels* or *unifiedmap.map_search_filter.max_levels* property, as needed.
3. Select **New** or select the configuration identifier to update and then fill in the form.

Workspace Config Property table

Settings that configure the maximum number of nodes that can appear on a map.

Field	Description
Config identifier	Unique name of the configuration identifier that specifies the settings for the current workspace. **Note:** The base system includes a configuration identifier named **Default** that specifies the default settings for Unified Map.
Name	The name of the property that you're updating: unifiedmap.map_search.max_nodes.
Value	Maximum count of nodes that are loaded when a map in this workspace opens.
UX application	The top-level **UX Application ID** to which this configuration applies. This is the application ID of your workspace. This value is referenced from the record associated with the **Config identifier** setting.

4. Select **Submit** or **Update**.
   The updated settings appear in the appropriate related list on the Configuration identifier form, as described in Configuring Unified Map — Admin settings.

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Configure endpoint de-duplication on maps

Configure how duplicate edges are displayed on maps. These are general settings that only sn_cmdb_admin can configure.

Before you begin

Set the application scope in your instance to **CMDB Workspace**.

Role required: sn_cmdb_admin

About this task

These workspace-specific configuration settings affect all users of the CMDB Unified Map page. The settings do not affect other copies of the Unified Map template. Non-admin users can customize some aspects of their personal experience with Unified Map, but can't configure instance-wide workspace-specific settings. Non-admin users can customize some aspects of their personal experience with Unified Map, but can't configure instance-wide workspace-specific settings.

Note:
This property setting is typically not altered for Unified Map.

Procedure

1. Navigate to **All** and then, in the filter box in the main navigation bar, enter `sn_cmdb_ws_config_property.list`.
2. Select the *`unifiedmap.map_search_filter.endpoint_deduplication_fields`* property.
3. Select **New** or select the configuration identifier to update and then fill in the form.

Workspace Config Property table

Settings that configure endpoint de-duplication.

Field	Description
Config identifier	Unique name of the configuration identifier that specifies the settings for the current workspace. **Note:** The base system includes a configuration identifier named **Default** that specifies the default settings for Unified Map.
Name	The name of the property that you're updating: unifiedmap.map_search_filter.endpoint_deduplication_fields.
Value	The default value of `sourceId,targetId,_label,endpoints` means: Collapse the edges (show only one connection between edges on the map) whenever multiple endpoints between source CI and target CI result in the same labeled edges.

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Field	Description
	Note: This setting is typically not changed for Unified Map.
UX application	The top-level **UX Application ID** to which this configuration applies. This is the application ID of your workspace. This value is referenced from the record associated with the **Config identifier** setting.

4. Select **Submit** or **Update**.
   The updated settings appear in the appropriate related list on the Configuration identifier form, as described in Configuring Unified Map — Admin settings.

Configure CIs to appear based on life cycle stage value

By default, only CIs for which *Life cycle stage* is **Operational** or empty appear on maps. You can configure the map to display CIs with other *Life cycle stage* values. These are general settings that only sn_cmdb_admin can configure.

Before you begin

Set the application scope in your instance to **CMDB Workspace**.

Role required: sn_cmdb_admin

About this task

- By default, non-operational CIs are filtered out and do not appear on maps.
- Search results don't include CIs that are filtered out based on operational state.
- The **Open Map** button (for viewing details) on the CI form isn't available for CIs that are filtered out based on operational state.

These workspace-specific configuration settings affect all users of the CMDB Unified Map page. The settings do not affect other copies of the Unified Map template. Non-admin users can customize some aspects of their personal experience with Unified Map, but can't configure instance-wide workspace-specific settings.

Procedure

1. Navigate to **All** and then, in the **Filter** box in the main navigation bar, enter `sn_cmdb_ws_operational_lifecycle_for_unified_map.list` to open the *Operational life cycle modes* table.
2. Select the list of selected live cycle stage values.

   For Unified Map, the default list of selected live cycle stage values is named **CMDB Workspace Unified Map View**.

   a. Unlock the **Life cycle list** field and then select the Edit multiple icon .
   b. In the Edit Members pop-up, move the life cycle stage values for CIs that should appear on maps into the **Selected life cycle stages** list and then select **Save**.
   c. On the record form, select **Update** or **Save**.

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- The updated settings appear in the appropriate related list on the Configuration identifier form, as described in Configuring Unified Map — Admin settings. The updated list of life cycle stage values is added to the **CMDB Workspace Unified Map View** life cycle mode on the **Operational life cycle modes** related list for the affected configuration identifier.
- You can also perform this operation from the **Operational life cycle modes** related list.

Configure how to display related items on the map

Add related items categories, specify which information should appear on cards on the Unified Map **Related items** panel, and specify how related items (events) appear on the timeline and on badges. These are general settings that only sn_cmdb_admin can configure.

Before you begin

Set the application scope in your instance to **CMDB Workspace**.

Role required: sn_cmdb_admin

About this task

These workspace-specific configuration settings affect all users of the CMDB Unified Map page. The settings do not affect other copies of the Unified Map template. Configuration settings that non-admin users can specify are described in Configure the Related items panel.

Related items are grouped by category in the **Related items** panel. Related items also appear for CI badges on the map and timeline.

The [sn_cmdb_ws_node_map_related_item] table contains the settings that determine which related items and associated details appear. By default, common categories of related items, such as active incidents and other events for example, are configured to appear. You add or modify records to globally manage related items on maps.

Procedure

1. Navigate to **All** and then, in the search box on the main navigation bar, enter `sn_cmdb_ws_node_map_related_item.list` to open the Node Map Related Item table.
2. Select an existing record or select **New** and then fill in the form.

Node Map Related Item table — general section

Settings that configure how categories appear.

Field	Description
Name	The category label that appears on the **Related items** panel for a selected CI.
Table	Tables from which records for the category are retrieved.
Order	Order that the category appears within all related items categories. The list of related items categories is sorted in ascending order. The category with the smallest order number appears at the top of the list.

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Field	Description
Active	Enables the appearance of the related item category.
Reference field	Reference attribute in the specified **Table** that references the CIs for the category. Typically set to **Configuration Item [cmdb_ci]**.

3. Select the Related fields and conditions tab and then fill in the settings.

Related fields and conditions tab
Settings that configure how data appears on cards.

Number field	Numeric attribute from the specified table that uniquely identifies each record in the category. This attribute is used in the record link that appears on each card when drilling down the related item category.
Title field	Attribute from the specified table that appears as the title of each card when drilling down the category in the panel.
Fields	Set of attributes from the specified table that appears on each card when drilling down the related item category. For example, when drilling down alerts, the set of attributes that appears on each alert card.
Sort fields	Order of appearance of the fields specified in the **Fields** setting.
Footer field	Attribute from the specified table that appears at the bottom of individual cards when drilling down the related item category, regardless of the sort order specified in the **Sort fields** setting.
Conditions	Conditions to apply to the specified table that retrieve the set of records for the category.

4. Select the Badge and timeline configuration tab and then fill in the settings.

Badge and timeline configuration tab
Settings that configure badge and timeline operation.

Badge and timeline icon	Icon that appears on CI badges and on the timeline for the specified related item.
Badge and timeline highlight field	Highlight configuration for applying colors to timeline and map icons.

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Date field	The date field to position the event on the timeline.
End date field	Optional end date field to use for a range on the timeline.

5. Select **Submit** or **Update**.
   The updated settings appear in the appropriate related list on the Configuration identifier form, as described in Configuring Unified Map — Admin settings.

Related topics

View related items for a CI

Viewing related items on the Unified Map timeline

Configure which attributes to display in the Attributes panel

Each class has a unique set of extended attributes that appear in the bottom section of the **Attributes** panel for a CI. For any class, you can specify which extended attributes should be displayed. These are general settings that only sn_cmdb_admin can configure.

Before you begin

Set the application scope in your instance to **CMDB Workspace**.

Role required: sn_cmdb_admin

About this task

In the base system, extended attributes are preconfigured for many common classes. You can modify the default settings and configure settings for additional classes. This example shows where base attributes (A) and extended attributes (B) appear in the Attributes panel. For more information on the Attributes panel, see View the attributes of a CI or a relationship

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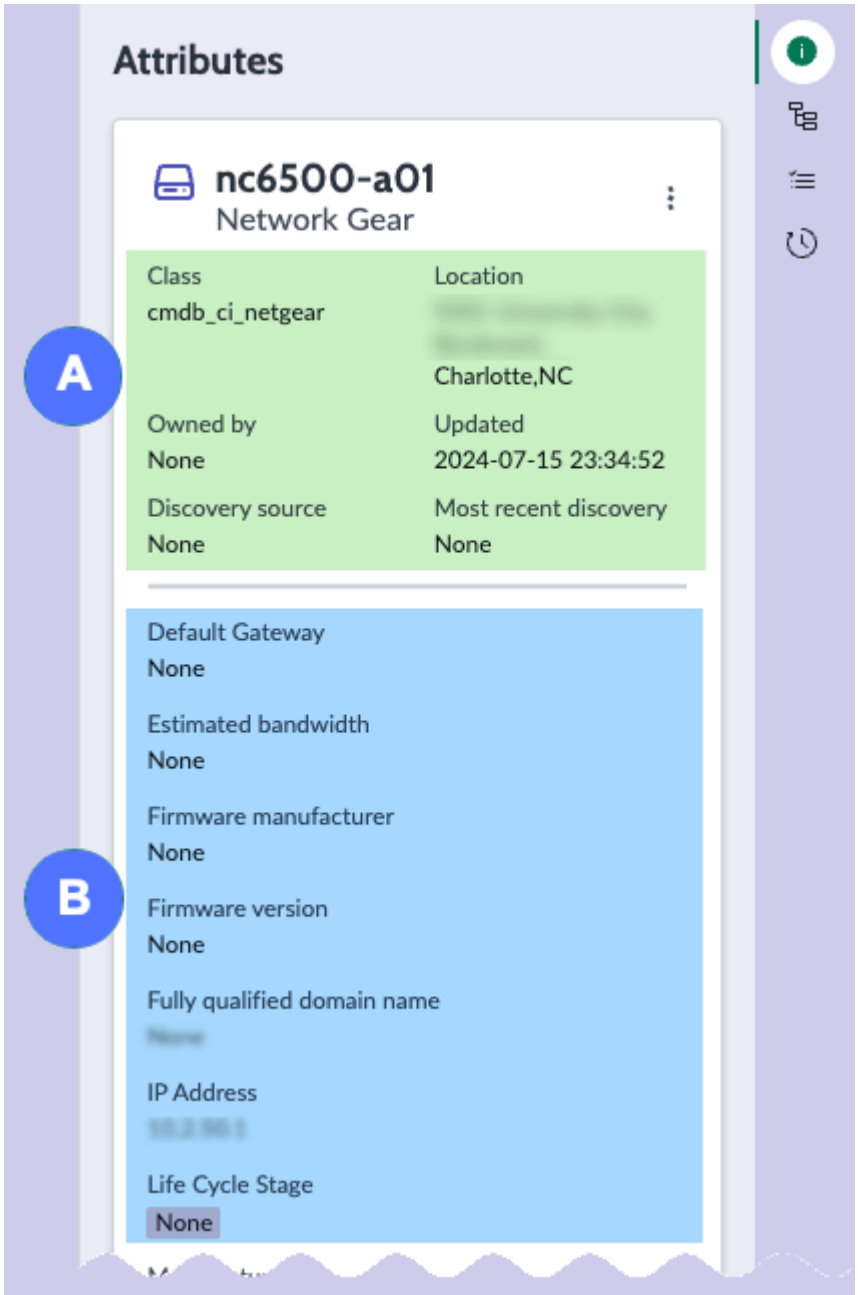

These workspace-specific configuration settings affect all users of the CMDB Unified Map page. The settings do not affect other copies of the Unified Map template. Non-admin users can customize some aspects of their personal experience with Unified Map, but can't configure instance-wide workspace-specific settings.

Procedure

1. Navigate to **All** and then, in the search box on the main navigation bar, enter `sn_cmdb_ws_node_map_table_attributes.list`.
2. In the Table Attributes table, select the configuration identifier to update or select **New** and then fill in the form:

Table Attributes form

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Settings that specify which extended attributes to display on the Attributes panel.

Field	Description
Config identifier	Unique name of the configuration identifier that specifies the settings for the current workspace. **Note:** The base system includes a configuration identifier named **Default** that specifies the default settings for Unified Map.
CMDB Class Name	The class that this configuration applies to.
Display attributes	List of attributes that appear as extended attributes on the **Attributes** panel for CIs in the class that is specified by **CMDB Class Name**. You can select from attributes for the class. Unlock the field to add attributes to the **Selected** list.
UX application	The top-level **UX Application ID** to which this configuration applies. This is the application ID of your workspace. This value is referenced from the record associated with the **Config identifier** setting.
Active	Option to set the profile as available for use.
Follow hierarchy	If selected, use the following process to determine which attributes to display. **a.** Start with the attributes specified in **Display attributes**. **b.** Move up the class hierarchy and add each parent's display attributes until encountering a parent where **Follow hierarchy** is deselected. **c.** Add that parent's display attributes and then stop collecting display attributes. For nodes that have highlight colors defined: If a display attribute value appears more than once, use the highlight color for the least specific CMDB layer. The setting provides the following options:

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Field	Description
	○ **Follow hierarchy** selected: A derived CI class uses its own display attributes and inherits display attributes from parents. ○ **Follow hierarchy** not selected: A derived CI class displays only attributes that are specified in its **Display attributes** setting.

3. Select **Submit** or **Update**.
   The updated settings appear in the appropriate related list on the Configuration identifier form, as described in Configuring Unified Map — Admin settings.

Related topics

View the attributes of a CI or a relationship

Configure display of connections to a referenced class

Configure how to display connections to a referenced class and from a referencing class on Unified Map. A reference connects two CIs from differing classes that aren't connected by a relationship. These are general settings that only sn_cmdb_admin can configure.

Before you begin

Set the application scope in your instance to **CMDB Workspace**.

Role required: sn_cmdb_admin

About this task

These workspace-specific configuration settings affect all users of the CMDB Unified Map page. The settings do not affect other copies of the Unified Map template. Non-admin users can customize some aspects of their personal experience with Unified Map, but can't configure instance-wide workspace-specific settings.

References connect CIs from two classes that don't have a direct relationship connection between them. On the map, any two CIs from the referenced class and from the referencing class appear connected by a dotted line. The relationship type is **Reference**. There are several preconfigured map references that you can modify, and you can also add map references.

For example, you want the map to display references to records in the File System table for Windows Server CI records. In that case, Server ABC (referencing CI) shows connections to the C:\ and D:\ file systems (referenced CIs).

Procedure

1. Navigate to **All** and then, in the filter box on the main navigation bar, enter `sn_cmdb_ws_node_map_reference.list`.
2. On the Node Map References table, select an existing record or select **New** and then fill in the form.

Node Map References table

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Settings that configure how to display referenced-class and referencing-class connections.

Field	Description
CI class	The referencing class that this configuration applies to.
Referenced CI class	Class that the specified **Reference field** references.
Reference field	Attribute in the specified **CI class** that contains the reference.
Show Reverse	Creates a map reference for the reverse reference between the specified **CI class** and **Referenced CI class**.
Active	Enables the configuration so that the connection appears on maps — the map displays referenced CIs.

3. Select **Submit** or **Update**.
   The updated settings appear in the appropriate related list on the Configuration identifier form, as described in Configuring Unified Map — Admin settings.

Create a class profile of visible layers for classes

Configure a class profile that specifies which layers should appear for a particular class: application, service instance, business, or infrastructure. For example, you can configure that the mapped application service (service instance) [cmdb_ci_service_discovered] class should display only Service Mapping data and not infrastructure elements.

Before you begin

Set the application scope in your instance to **CMDB Workspace**.

Role required: sn_cmdb_admin

About this task

These workspace-specific configuration settings affect all users of the CMDB Unified Map page. The settings do not affect other copies of the Unified Map template. Non-admin users can customize some aspects of their personal experience with Unified Map, but can't configure instance-wide workspace-specific settings.

Class profiles let you configure the **Layers** filter. Several common classes such as the mapped application service (service instance) [cmdb_ci_service_discovered] class are preconfigured with class profiles.

Class profiles are applied when no filter preset is used for the current map. This typically happens when you load a map without a filter preset or when you set the filter preset to **Default view**.

Procedure

1. Navigate to **All** and then, in the search box on the main navigation bar, enter `sn_cmdb_ws_node_map_profiles.list`.
   The Node Map Profiles table lists all classes for which the **Layers** property is set.
2. Select an existing record or select **New** and then fill in the form.

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Node Map Profiles table

Settings that configure map filters and map orientation for a class.

Field	Description
Config identifier	Unique name of the configuration identifier that specifies the settings for the current workspace. **Note:** The base system includes a configuration identifier named **Default** that specifies the default settings for Unified Map.
Layers	**Layers** value to apply when the map opens with a home node that is in the class specified by the **CMDB CI class** setting. ○ Application, ○ Service instance (formerly application service) ○ Business ○ Infrastructure On the map display, in the **Layers** category, the listed filter values are selected and values that are not in the list are deselected.
CMDB CI class	Class of CI that this profile applies to. Whenever a map opens with a home node of the specified class, the **Layers** values are applied.
Orientation	○ Vertical layout: Displays nodes in a vertical tree pattern: upstream relationships top and downstream bottom. This is the default layout for displaying mapped application services and service instances. In the toolbox, select the Vertical layout icon . ○ Force layout: Displays nodes in a clustered arrangement around the home node, regardless of upstream or downstream relationships. In the toolbox, select the Force layout icon .
UX application	The top-level **UX Application ID** to which this configuration applies. This is the application ID of your workspace. This value is referenced from the record associated with the **Config identifier** setting.

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Field	Description
Active	Option to set the profile as available for use.

3. Select **Submit** or **Update**.
   The updated settings appear in the appropriate related list on the Configuration identifier form, as described in Configuring Unified Map — Admin settings.

Related topics

Create or manage a user preset

How configuration settings for Unified Map are stored

General configuration settings that control Unified Map are collected in a configuration identifier. A configuration identifier is a set of properties and table-driven configurations that specify the appearance and content of an instance of a UX application. The *CMDB Workspace* UX application contains Unified Map.

Important:
Because each configuration identifier is unique to an instance of a UX application, the settings for one UX application do not affect the user experience of any other UX application. This means that your admin settings for this instance of Unified Map will not affect Unified Map users in another instance.

Viewing Unified Map configuration settings

The configuration identifier form displays all configurations settings for Unified Map. To view the configuration identifier, navigate to **All** and then, in the filter box in the main navigation bar, enter `sn_cmdb_ws_config_identifier.list`.

On the form, each related list displays property settings or a table of configuration settings.

The base system includes a configuration identifier named **Default** that specifies all default settings.

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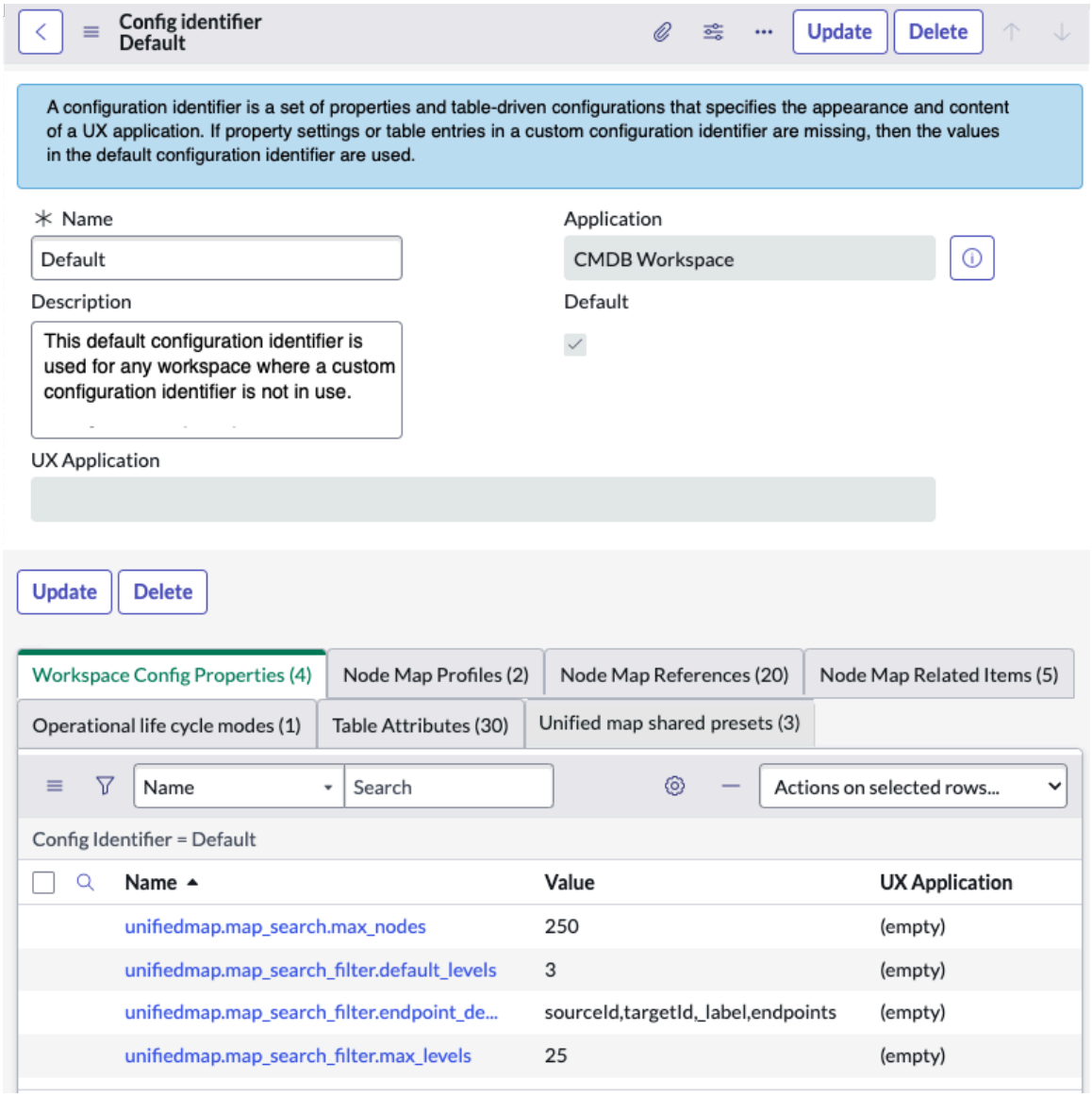

Defining custom settings for your CMDB Workspace instance

To create a custom configuration identifier for your workspace, modify the default settings and then save the updates with a new name.

Note:
When a custom configuration identifier doesn't specify a particular property setting or table entry, the value in the default configuration identifier is used.

Working in Unified Map

Unified Map presents a graphical display of CMDB CIs and the connections between to enable powerful insights.

Opening a map

Use any of the following methods to open Unified Map:

- Navigate to **All** > **CMDB Workspace** > **Unified Map**.
- While working in the Service Graph Workspace, select **Use Unified Map to view CI relationships** in the Recommended tools section.

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- While working in the CMDB Workspace, select **Unified Map** in the Quick Links section.
- On a CI form for any CI in an **operational** state, select **Open Map** to open a map with the CI as the home node.

Note:
An admin can specify additional *operational status* values for this option. For more information, see Configure CIs to appear based on life cycle stage value.

Tip:
To view a map in full-screen mode, select the Unpin All icon.

Map operations

- Controlling Unified Map contents and appearance
- Use filters to specify which nodes should appear on a map
- View a summary of map contents on the Overview panel
- View the attributes of a CI or a relationship
- View service instances for a CI
- View related items for a CI
- Viewing related items on the Unified Map timeline
- View historical changes for a CI
- Editing maps in Unified Map

Controlling Unified Map contents and appearance

Controlling the contents and layout of a map can greatly assist with becoming familiar with and optimizing your CMDB. You can control which elements appear on the map, isolate and analyze relationships between CIs, and simplify the map to isolate issues.

Important:
This topic describes changes that you can make to your view of the map. The changes do not affect other users. In contrast, administrators can configure general settings that affect all users in the workspace, as described in Configuring Unified Map — Admin settings.

Save a map as a PDF document

In the toolbox, select the Export map icon to save the current appearance of the map as a PDF document on your local drive.

Controlling map content

Controlling map content

Change	Tool and actions
Specify or change the home node	The home node is the CI that all other CIs on the map are associated with, directly or indirectly. The home node icon has a thicker border that pulsates. The map is redrawn when you specify a home node. Use either of the following methods:

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Controlling map content (continued)

Change	Tool and actions
	• Use the **Search** box to find and select a CI. • Select and hold (or right-click) a node on the map and select **Set as home node**. **Note:** Connecting lines between nodes represent relationships and references, not data flow. • In the vertical layout, the home node appears at the center of CI connections. Upstream connections appear at the top and downstream at the bottom. This is the default layout for displaying mapped service instances (formerly application services) [cmdb_ci_service_discovered]. • In the force layout, the home node appears at the center of CI connections.
Reload the map after a change	Select the Reload map icon
Configure a filter to display only pertinent items	Select the Filter icon When a user applies a shared preset or a user preset, all filter settings are overridden. Filter attributes from a shared preset or a user preset that do not apply to the current map are listed in the **Unused filter attributes** section of the filter panel. The order of filter-setting precedence from the various sources is as follows: **1.** user presets **2.** shared presets **3.** shared presets that are defined in a **Unified Map shared presets** profile **4.** class profile (Class profiles contain only layer settings and are defined in the **Node Map Profiles** related list.) **Note:** Filter settings that would filter out the home node might appear in the list. You can't, however, filter out the home node even if it meets filter settings.

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Controlling map content (continued)

Change	Tool and actions
	For more information, see Use filters to specify which nodes should appear on a map.
Show/hide filtered items	Select the Show/Hide filtered items icon to expose the filtered items on the map as dimmed view-only nodes. For more information, see Use filters to specify which nodes should appear on a map.
Show complete CI details	Select a CI (CI border thickens) to display its details in the **Overview**, **Attributes**, **Service instances**,**Related items**, or **Changes** panel. For group CIs, such as a service instance or a dynamic CI group, the **Attributes** panel also shows detail cards for the CIs that are members of the group.
Show relationship details	Two CIs might be connected by one or more relationships (stored in the CI Relationship [cmdb_rel_ci] table). For example, two CIs might be connected by the *Runs On::Runs*, *Depends On::Discovered From*, and by the *Owned By::Owns* relationships. • A solid line indicates a relationship. The arrowhead indicates the dependent node. • A dashed line indicates a reference. • A badge on a line indicates the number of relationships between the CIs. Select a connection to display its attributes in the **Attributes** panel. For a CI with multiple relationships, select the badge to view details for all relationships.
Set the number of relationship levels to display on the map	Use the **Levels** drop-down list to specify how many relationship levels to display on the map (default 3). A low setting is useful for viewing a simplified map that shows only direct connections and for limiting the overall size of a map. A higher setting enables you to review more complex CMDB structures. When a mapped application service (service instance) CI is set as the home node, the **Levels** setting has no effect and all levels of relationships appear.

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Controlling map content (continued)

Change	Tool and actions
	Note: Connecting lines between nodes represent relationships and references, not data flow.
Highlight the relationships between CIs	Move to a CI to animate the connections between CIs. Connected nodes are highlighted for a few seconds. Two CIs might be connected by one or more relationships (stored in the CI Relationship [cmdb_rel_ci] table). For example, two CIs might be connected by the *Runs On::Runs*, *Depends On::Discovered From*, and by the *Owned By::Owns* relationships. • A solid line indicates a relationship. The arrowhead indicates the dependent node. • A dashed line indicates a reference. • A badge on a line indicates the number of relationships between the CIs. **Note:** Connecting lines between nodes represent relationships and references, not data flow.
View mapped application services (service instances)	The Service Mapping app might use mapped application services. Mapped application services appear as group CIs that you can expand to show members. Mapped application services [cmdb_ci_service_discovered] are descendents of the Service Instance [cmdb_ci_service_auto] class, such as service instances and dynamic CI groups. • A badge shows the number of members in the group. • Select the badge to expand the group and show its member CIs. Select again to collapse. • In the expanded mode, move to any member CI to temporarily highlight all group members.

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Controlling map content (continued)

Change	Tool and actions
Show or hide the timeline	Select the Show/Hide timeline icon. For more information, see Viewing related items on the Unified Map timeline.
View non-operational CIs	• Non-operational CIs do not appear in search results or on the map. • The **Open Map** button on a CI form isn't available for non-operational CIs. • Only CIs for which the *Life Cycle Stage* attribute is **Operational** or empty appear on maps. An administrator can change the default behavior to show non-operational CIs or CIs of any combination of *Life Cycle Stage* values. For more information, see Configure CIs to appear based on life cycle stage value.

Controlling map appearance

Controlling appearance of the map

Change	Tool and actions
Zoom in or out	Use any of the following methods: • Select + or - in the toolbox. • Scroll up or down in the map pane. • Specify a zoom value in the mini-map navigator.
Align the map to the home node	In the toolbox, select the Align to home node icon.
Fit all CIs on the map	Select the Fit to map icon. Result: Center the map on the canvas and set the zoom level to the maximum level that enables the entire map to fit on the canvas. By default, up to 250 nodes can appear on a map. CIs in a collapsed group CI are counted.

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Controlling appearance of the map (continued)

Change	Tool and actions
	Note: Admins set the maximum node count using the *unifiedmap.map_search.max_nodes* property in the workspace-specific [sn_cmdb_ws_config_property] table. Higher values can decrease performance.
Move a CI to another location	Drag a CI to a different place on the map. Map elements that are connected to that CI might be moved to accommodate the new placement.
Move the entire map on the canvas and set the zoom level	Use either of the following methods: • Drag the rectangle in the mini-map navigator. • Select an empty area on the map and drag.
Show CI key details on the map	Move to a CI to show its full name and class (or zoom into the map until those details appear), its related items details, and the direction of the CI relationships. If there are multiple related items associated with a CI, then the CI badge contains the string 'Multiple' and a badge showing the count of related items appears on the timeline. You can move to the badge on the timeline to show all related items.
Switch the layout of the map	• Vertical layout: Displays nodes in a vertical tree pattern: upstream relationships top and downstream bottom. This is the default layout for displaying mapped application services and service instances. In the toolbox, select the Vertical layout icon . • Force layout: Displays nodes in a clustered arrangement around the home node, regardless of upstream or downstream relationships. In the toolbox, select the Force layout icon . **Note:** Connecting lines between nodes represent relationships and references, not data flow.

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Use filters to specify which nodes should appear on a map

Customize the map to focus on the CIs that you want to work on by filtering out (hiding) irrelevant CIs. You can filter by layer count, CI class, relationship type, discovery source, location, and CI ownership.

Before you begin

Role required:

- To access maps: sn_cmdb_user, sn_cmdb_editor or sn_cmdb_admin
- To access maps with operational service instances: app_service_user, and sm_user or sm_admin
- To access maps with operational and non-operational service instances: app_service_admin, and sm_user or sm_admin
- To access and view related items: itil

About this task

When a user applies a shared preset or a user preset, all filter settings are overridden. Filter attributes from a shared preset or a user preset that do not apply to the current map are listed in the **Unused filter attributes** section of the filter panel. The order of filter-setting precedence from the various sources is as follows:

1. user presets
2. shared presets
3. shared presets that are defined in a **Unified Map shared presets** profile
4. class profile (Class profiles contain only layer settings and are defined in the **Node Map Profiles** related list.)

> **Note:**
> Filter settings that would filter out the home node might appear in the list. You can't, however, filter out the home node even if it meets filter settings.

Procedure

1. While working in a map, select the Map filter icon and then select or clear criteria in any filter category.
   Only attributes of elements currently on the map are listed as filter criteria. Attributes that do not apply to the current elements are listed in the **Unused filter attributes** list.
2. Close the Map filter panel.
   - A dot appears on the Map filter icon to indicate that filters are applied.
   - To expose filtered CIs and relationships on the map as dimmed view-only images, select the Show filtered items icon .
   - You can save filter settings for reuse. For more information, see Create or manage a user preset.
   - Maps show up to 250 CMDB elements. Remaining elements are truncated and don't appear on the map.

What to do next

To apply the home CI default filter settings, select **Reset filter**.

Admins can save filter settings as a shared preset that all users can apply. For more information, see Create or manage a user preset.

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Related topics

Create or manage a user preset

Create or manage a user preset

Save useful Unified Map filter settings as a user preset that you can apply to a map at any time. For example, define a filter to display only CIs of a particular class and then save the filter settings as a user preset.

Before you begin

Role required:

- To access maps: sn_cmdb_user, sn_cmdb_editor or sn_cmdb_admin
- To access maps with operational service instances: app_service_user, and sm_user or sm_admin
- To access maps with operational and non-operational service instances: app_service_admin, and sm_user or sm_admin
- To access and view related items: itil

About this task

- Follow this procedure to create a user preset that applies specified filter settings. Only you can apply your user presets to your personal view of the map.
- In addition, admins can define shared presets that you and other users can access. For more information, see Create or manage a shared preset.

  When a user applies a shared preset or a user preset, all filter settings are overridden. Filter attributes from a shared preset or a user preset that do not apply to the current map are listed in the **Unused filter attributes** section of the filter panel. The order of filter-setting precedence from the various sources is as follows:

  1. user presets
  2. shared presets
  3. shared presets that are defined in a **Unified Map shared presets** profile
  4. class profile (Class profiles contain only layer settings and are defined in the **Node Map Profiles** related list.)

  Note:
  Filter settings that would filter out the home node might appear in the list. You can't, however, filter out the home node even if it meets filter settings.

Procedure

1. While working in a map, select the Map filter icon and then select or clear criteria in any filter category.
   Only attributes of elements currently on the map are listed as filter criteria. Attributes that do not apply to the current elements are listed in the **Unused filter attributes** list.
2. Select the Manage presets icon and then, in the Manage my presets list, select **Create preset**.
3. Enter a preset name and then select **Save**.
4. Close the Map filter panel.

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What to do next

To apply a preset:

1. While working in a map, select the open filter panel icon
2. Select the View preset list icon and then select the preset.

To update a preset or save an updated version as a new preset:

1. While working in a map, select the open filter panel icon
2. Apply the preset that you want to update and then make the desired changes.
3. Select the Manage presets icon and then select **Update preset** or **Update shared preset**.
4. Select one of the following actions:
   - Select **Update preset** to update the current preset with the current filter settings.
   - Select **Save as new preset** and then enter a new name.
5. Select **Save**.

To delete a preset:

1. While working in a map, select the open filter panel icon
2. Apply the preset that you want to delete.
3. Select the Manage presets icon and then select **Delete preset** or **Delete shared preset**.
4. Select **Yes**.

To apply the home CI default filter settings

Select **Reset filter**.

Related topics

Use filters to specify which nodes should appear on a map

View a summary of map contents on the Overview panel

The Overview panel displays summary data for items on the map that are associated with the home node — counts and types of CIs and connections, discovery sources, and so on.

Before you begin

Role required: sn_cmdb_user

About this task

Note:
The information on the Overview panel isn't affected by zoom settings or by filter settings even if nodes that are associated with the home node are not visible on the map.

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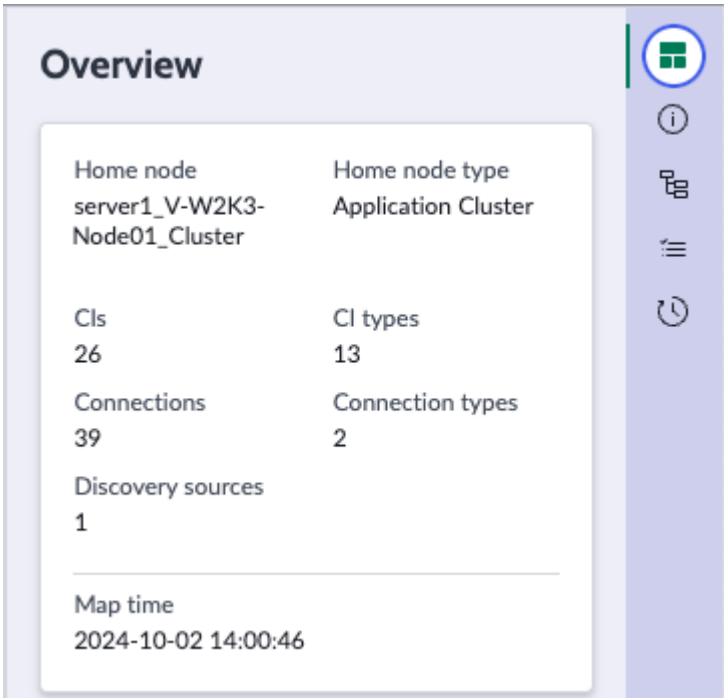
Procedure

While working in a map, in the Search bar, search for and select the CI to set as the home node and then select the Overview icon .



Information on the Overview panel

Field	Description
Home node	The CI that is currently the home node. For more information, see Specify the home node.
Home node type	The CI type of the home node CI.
CIs	Count of CIs that are associated with the home node.
CI types	Count of types of CI for CIs that are associated with the home node.
Connections	Count of connections for CIs that are associated with the home node.
Connection types	Count of connection types for the CIs that are associated with the home node.
Discovery sources	Count of discovery sources related to the CIs that are associated with the home node.
Map time	The timestamp that is specified on the timeline. The time is set to "now" when you

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Field	Description
	first open a map. For more information, see Viewing related items on the Unified Map timeline.

View the attributes of a CI or a relationship

Open the **Attributes** panel in Unified Map to view attributes like location and life cycle stage for a CI or a relationship.

Before you begin

Role required:

- To access maps: sn_cmdb_user, sn_cmdb_editor or sn_cmdb_admin
- To access maps with operational service instances: app_service_user, and sm_user or sm_admin
- To access maps with operational and non-operational service instances: app_service_admin, and sm_user or sm_admin
- To access and view related items: itil

About this task

When you select a group CI such as a service instance or a dynamic CI group as the home node, the **Attributes** panel shows the attributes of the group CI itself and a card for each CI and relationship member of the group. When you open a map for a service instance CI, a badge on group CIs shows the number of members. Select a badge to expand or collapse the group.

Procedure

While working in a map, select a CI or a relationship on the map and then select the Attributes icon .

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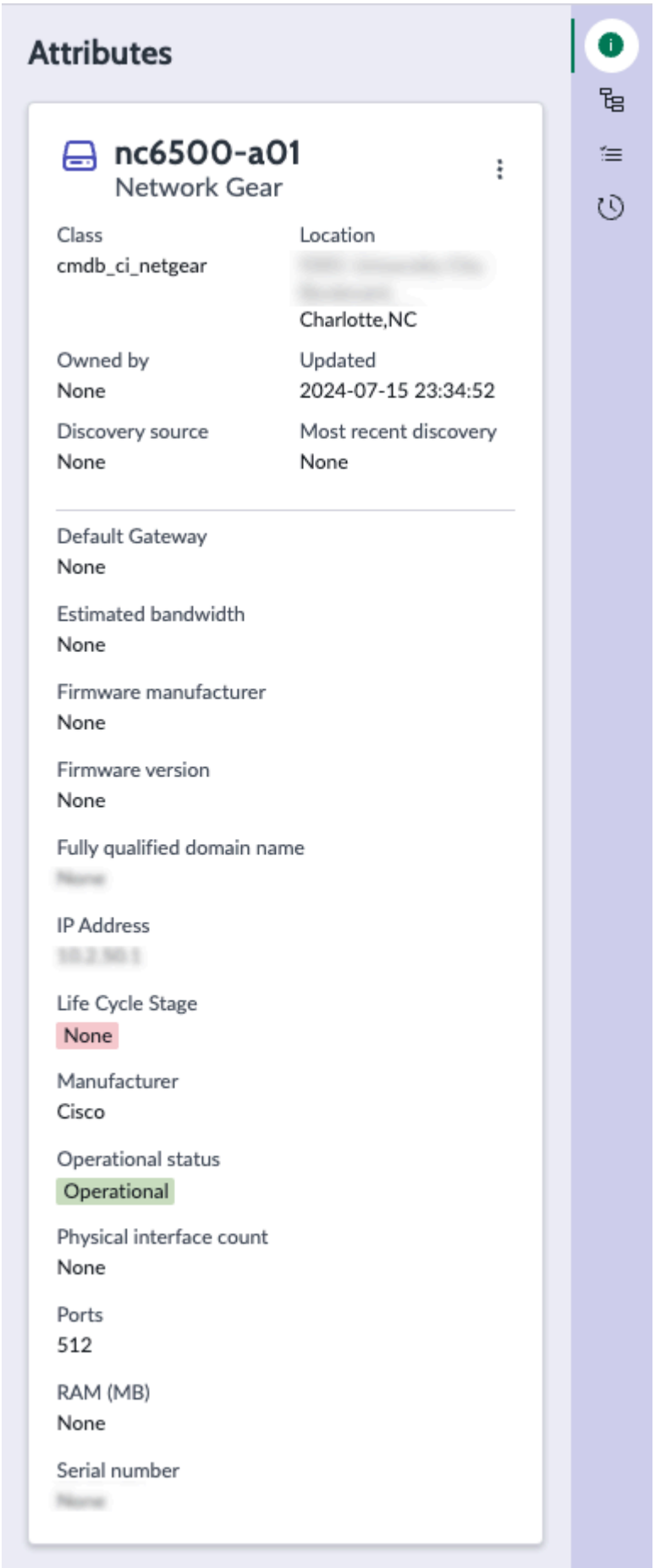

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The **Attributes** panel shows the following details:

- For a non-group CI: The top section displays base properties — common key attributes, such as *`Class`* and *`Discovery source`* that appear for CIs of any class (other than service instance CIs). You cannot change the group of properties that appear in this section.
- The bottom section displays extended properties — attributes that uniquely extend the class of a CI in the CMDB hierarchy. You can specify the properties that should appear in this section. For more information, see Configure which attributes to display in the Attributes panel.
- For a group CI: The top card shows attributes of the group CI. The cards in the Configuration items section display attributes for each of the group member CIs.
- For a single relationship: A card with the attributes for the selected relationship.
- For a multi-relationship badge: A card for each of the relationships in the relationship set that shows the attributes for the relationship. The number of cards is equal to the number on the relationship badge, which is a count of the different types of relationships between the two CIs in that direction. Relationship connections are based on records in the CI Relationship [cmdb_rel_ci] table.

Note:
If an attribute has highlighting defined on the Highlighted Value Conditions form, then it is highlighted on the **Attributes** panel. For more information, see Highlight list fields.

What to do next

In a CI card on the **Service instances** panel, select the **Actions** menu and then select any of the following options:

- Select **View CI details** to open the CI form for the CI.
- Select **Open in new map** to open an additional map with the current CI set as the home node.
- Select **Set CI as home** to set the selected CI as the home node for the map.

Select a mapped service instance (formerly application service) CI [cmdb_ci_service_discovered] on the map to display its entry points on the **Attributes** panel.

View service instances for a CI

For a selected CI, the **Service instances** panel in Unified Map lists details in the Service Mapping application for all associated service instances (formerly application services).

Before you begin

Service Mapping must be installed. For more information, see Service Mapping.

Role required:

- To access maps: sn_cmdb_user, sn_cmdb_editor or sn_cmdb_admin
- To access maps with operational service instances: app_service_user, and sm_user or sm_admin
- To access maps with operational and non-operational service instances: app_service_admin, and sm_user or sm_admin
- To access and view related items: itil

About this task

The information that appears on a service instance card is described in Service Mapping data.

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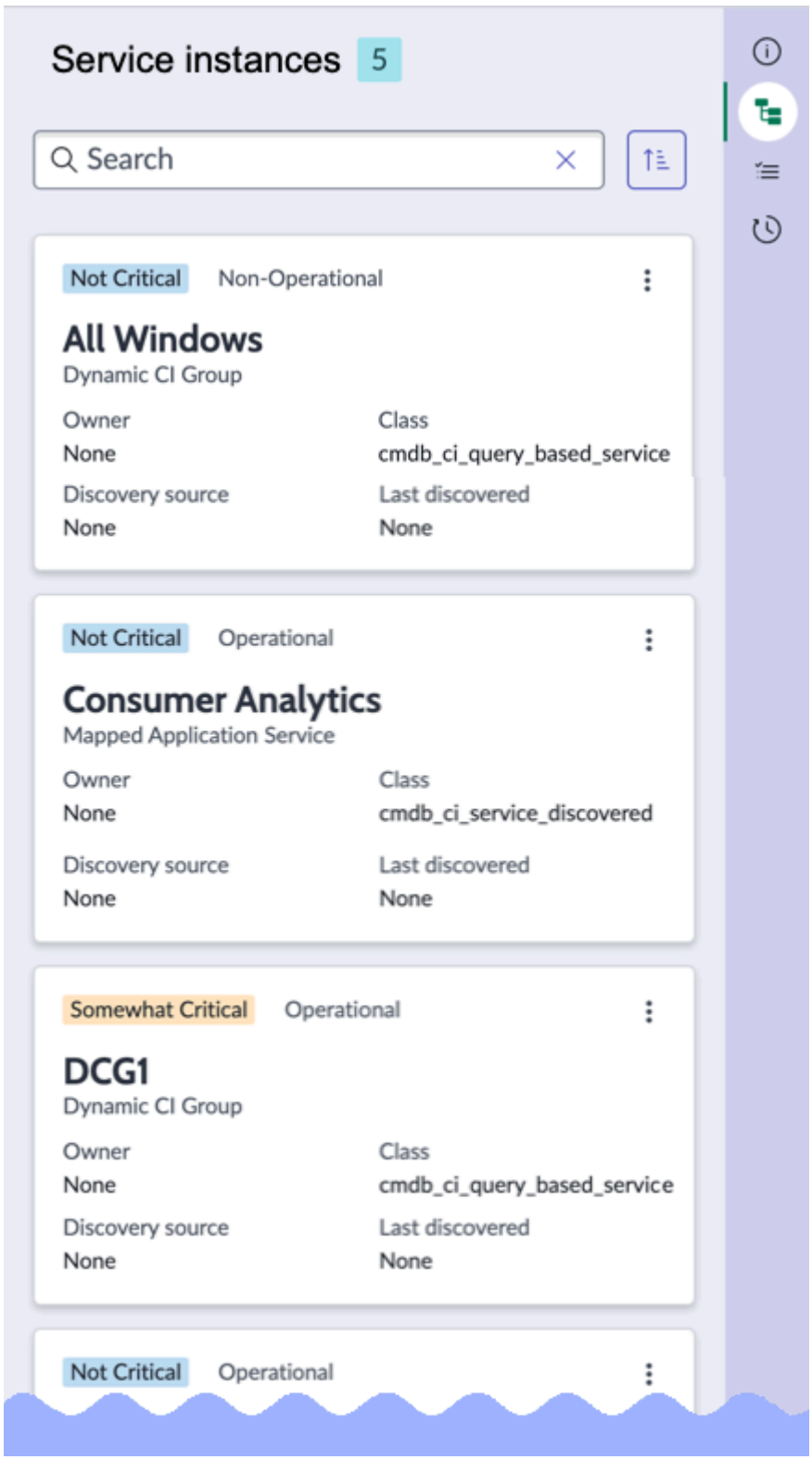
Procedure

While working in a map, select a CI on the map and then select the Service Instances icon .

The panel displays a card with details for each related service instance.



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What to do next

- Select another CI on the map to show its related service instances.
- Select an empty space on the map to show all service instances for any of the CIs on the map.
- In the **Service instances** (formerly Application services) panel:
  - Use the Search box to search for a specific service instance.
  - Select the Open filter icon to open the filter panel, and then select a category and a sort order by which to sort the service instance cards. Close the filter panel to apply your settings.
- On an individual service instance card, select the additional actions icon and then select one of the following options:
  - Select **View CI details** to open the CI form for the service instance CI.
  - Select **Open in new map** to open a new map in which the service instance is set as the home node.
  - Select **Set CI as home** to set the service instance as the home node on the map and redraw the map accordingly.

  Some fields, such as *Business criticality*, are color-coded to denote specific values. For example, a status of Most Critical is highlighted with a red background.

Related topics

Service Mapping data that appears on maps

Service Mapping data that appears on maps

Service instances that are populated using Service Mapping methods are included in maps. Service Mapping provides significant information for mapped service instances (application services) [cmdb_ci_service_discovered] such as relationships and grouping.

Considerations

If Service Mapping is installed and the *sn_sm_scoped_app.sa.unified_map.enabled* system property is enabled, you can access Unified Map from the Service Mapping workspace. For more information, see Access the Unified Map feature from the Service Mapping Workspace.

If Service Mapping is not installed, only service instances that are populated by CMDB-related methods appear on maps. Unified Map traverses the CMDB hierarchical data both up and down using user-specified levels.

Related topics

Configuring Service Mapping

View related items for a CI

Open the **Related items** panel in Unified Map to show all related items (typically, events such as changes, active incidents, or active problems) for the selected CI.

Before you begin

Role required:

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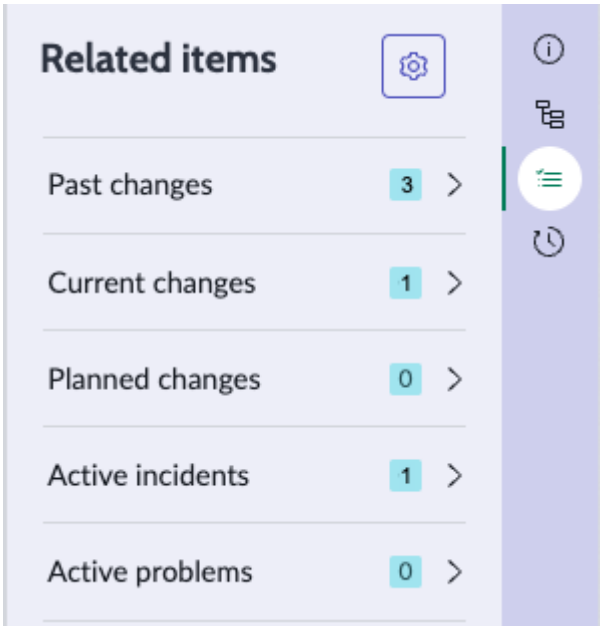
- To access maps: sn_cmdb_user, sn_cmdb_editor or sn_cmdb_admin
- To access maps with operational service instances: app_service_user, and sm_user or sm_admin
- To access maps with operational and non-operational service instances: app_service_admin, and sm_user or sm_admin
- To access and view related items: itil

About this task

Note:
The timeline also indicates related items (events). One important difference is that the timeline indicates only historical related items — events that occurred before the timeline's map time. In contrast, the **Related items** panel lists all related items. For more information, see Viewing related items on the Unified Map timeline.

Procedure

1. While working in a map, select a CI on the map and then select the Related items icon .
   Related items are grouped by category. Badges show the count of related items for the selected CI (or for all CIs if no CI is selected).



   To specify which related item categories should appear on the **Related items** panel, see Configure the Related items panel.

2. Select an arrow to view the details of the related item record.
   Details of the change, incident, or problem appear on a card in the Related items panel. Select a card to highlight the associated CI on the map.

What to do next

- Select another CI on the map to show its related items.
- Select an empty space on the map to show all related items for all CIs on the map.
- Select a related item category with one or more items to view detailed related item cards. On a card:

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- Select the related item link to drill down to the related item record.
- Open the filter panel to set a sorting category and order for the cards.
- Some details, such as *Priority* and *Risk*, are color-coded using the default platform color code settings.

Configure the Related items panel

Configure which categories of related items, such as active incidents and active problems, appear on the Unified Map **Related items** panel.

Before you begin

Role required:

- To access maps: sn_cmdb_user, sn_cmdb_editor or sn_cmdb_admin
- To access maps with operational service instances: app_service_user, and sm_user or sm_admin
- To access maps with operational and non-operational service instances: app_service_admin, and sm_user or sm_admin
- To access and view related items: itil

About this task

The Related items panel groups related items by category on the side panel. Administrators configure which related item categories are globally available, and you can further customize the settings.

Procedure

1. While working in a map, select the Related items icon .
2. In the **Related items** panel, select the User preferences icon .
3. In the Related items settings pop-up, move desired items to the **Selected items** list and undesired items to the **Available items** list.
4. Select **Apply**.
   When you select a CI on the map, the desired related item categories appear.

Viewing related items on the Unified Map timeline

The timeline indicates related items like incidents, problems, and changes over a specified period of time for the selected CI. You can use the timeline to visualize the history of changes to a CI and how they affect the topology of the CMDB.

Viewing related items

- When you first open a map, CIs and relationships appear as they are at the current moment in time. When you select a CI on the map, the timeline displays related items for the CI.
- You can drag the map time marker (A in the image) on the timeline to specify the end date (the map time) for data that should appear on the map and on the timeline. The default map time is "now", but you can specify a particular date or drag the marker to a date.
- The map and the timeline are synchronized. The map shows the selected CI and its connections as they existed (based on the creation date of nodes) at the specified map time.

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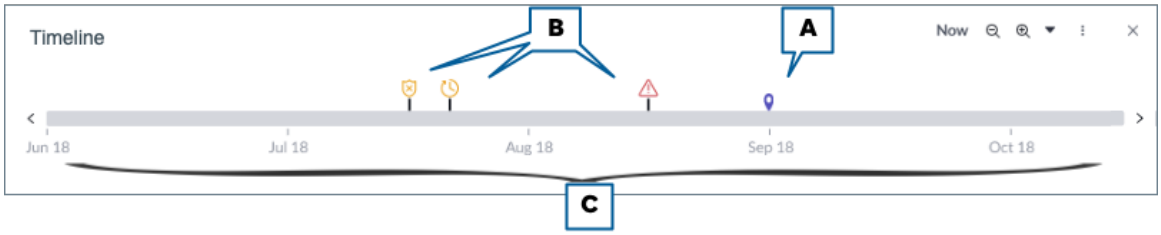
The timeline displays markers (B in the image) to indicate related items that happened at or before map time.



- You can also specify the overall time span (C in the image) of the timeline view.
- CIs that were created after the map time don't appear on the timeline and don't affect items on the timeline.
- Multiple related items on the same date are indicated by a badge that shows the count of related items.

Actions on the timeline

Desired result	Action
Show or hide the timeline	Select the Timeline icon .
Set the map time marker (and therefore the items on the map) to the current time	Select **Now**.
Set map time to a particular date and time	Drag the map time marker.
Scroll the timeline toward the past or the future	Select an arrow at the side of the timeline.
View the date and time for a related item marker	Move to the marker.
View the details for a related item	Move to the badge for the related item.
Change the time span of the timeline	Select a zoom icon or . The time span can range from six months in the past to six months in the future. A related item that has occurred or that will occur outside the range doesn't appear on the timeline. Such related items, however, still appear in the corresponding **Related items** panel. In addition, a badge in the map might show data for the related item.
Manage a marker	Select the marker, select the more actions icon , and then select one of the following actions:

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Desired result	Action
	• **Replace marker**: Replace the current marker with a marker for the specified date. • **Clear marker**: Clear all markers. • **Add marker**: Add a marker for the specified date.
View related items for all CIs on the map	Select an empty space on the map.

Configuring general timeline properties

Admins can configure some properties of the timeline that affect all users, such as which related item details appear on timelines. For more information, see Configure how to display related items on the map.

View historical changes for a CI

The **Changes** panel in Unified Map displays change details such as changes to life cycle stage or operational state for the selected CI.

Before you begin

Role required:

- To access maps: sn_cmdb_user, sn_cmdb_editor or sn_cmdb_admin
- To access maps with operational service instances: app_service_user, and sm_user or sm_admin
- To access maps with operational and non-operational service instances: app_service_admin, and sm_user or sm_admin
- To access and view related items: itil

About this task

Changes are also indicated on the timeline. For more information, see Viewing related items on the Unified Map timeline.

Procedure

1. While working in a map, select a CI on the map and then select the Changes icon .

   All changes for the selected CI appear on the panel.

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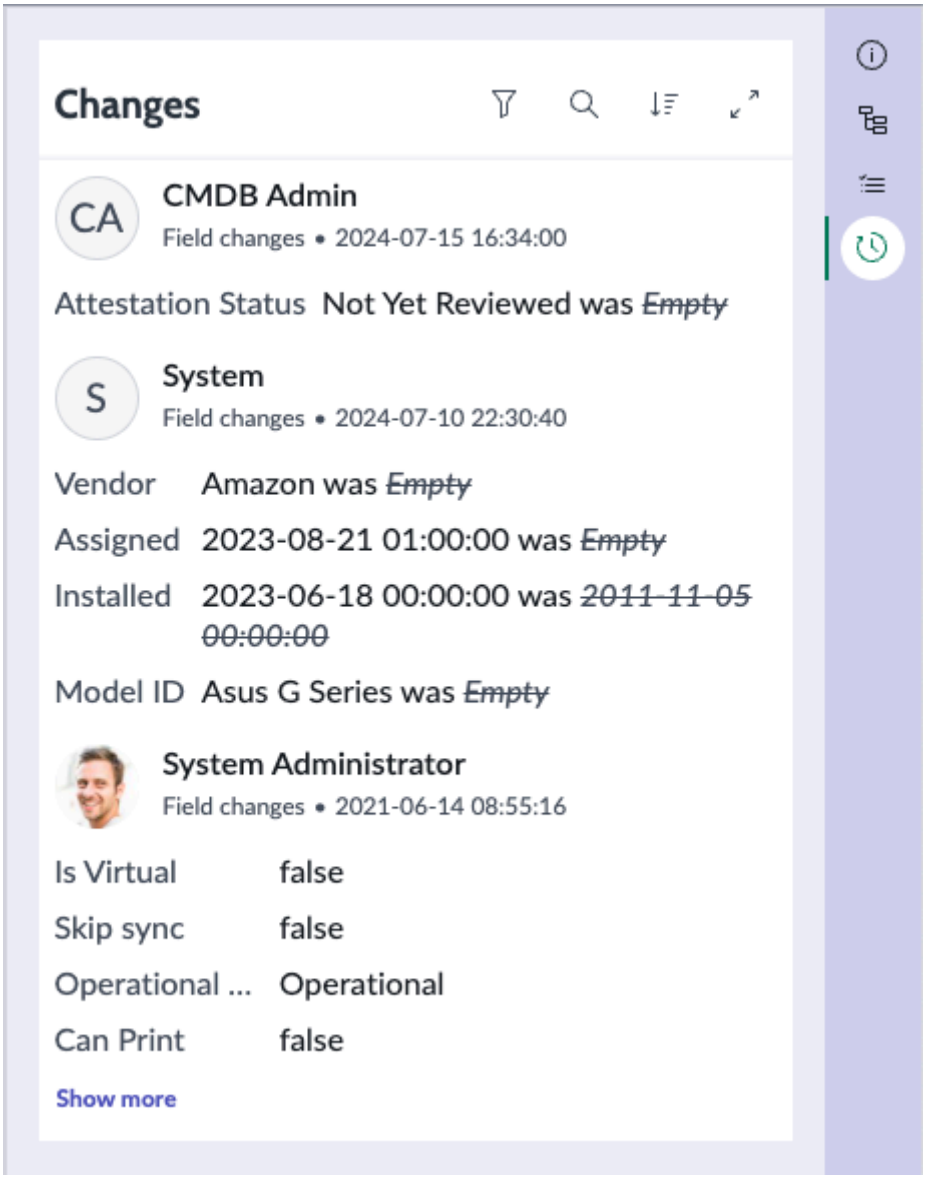

- Select **Show more / Show less** for details on a card.
- To flag a change as important, hold the cursor over a change and then select the Flag as important icon.

2. Perform other tasks.
   - Select another CI on the map to view its changes.
   - Select the Open filters and then select and configure any of the following filter types:
     - Post types
     - Field changes
     - Flagged
     - Filter sets
   - Select the Search icon and enter text in the **Search Activity Stream** field to find specific changes by entering terms.

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- Select the ascending or descending sort icon to toggle between ascending or descending sort.
- Create a filter set to supplement the existing filtering options on the Changes panel. You can save filter settings for reuse. For more information, see Create or manage a user preset.

Related topics

Viewing related items on the Unified Map timeline

Editing maps in Unified Map

While you work in the map editor, you can add a CI to the map and remove (hide) a CI from the map. Removing a CI node from a map deletes the records of the CI relationships, but does not delete the CI record from the CMDB. You can also add, modify, and delete CI relationships in the CMDB.

Actions you can take in the map editor

You can perform the following actions in the map editor:

- Select and hold (or right-click) a CI, relationship, or anywhere in the map to open a context menu.
- Select the Attributes icon to manage CIs and relationships.
- Select the Add CI icon to add an existing CI and its existing relationships to the map.
- Select a relationship or CI and then select the Manage relationship icon to add, update, or delete relationships.
- You can remove (hide) a CI from the map only if you added it during the current editing session and have not yet saved the map. You cannot remove a CI that was on the map when you started the editing session. Select **Remove** for a CI to delete the CMDB records for all relationships to and from the CI. The CI is removed from the map, but the CI record isn't deleted from the CMDB. For more information, see Delete a connection using the map editor

Working in the map editor

- You must have either the sn_cmdb_admin or sn_cmdb_editor role to use the map editor.
- Before editing a map, prepare it to optimize your experience. Use filters and levels to display the minimum set of CIs to work on. Minimizing the map makes it easier to understand and control the effects of changes that you make.
- To edit a map, select the edit map icon . A thick blue outline on the map indicates that the map editor is active.
- While you work in the map editor, no changes are made to the CMDB until you select **Save**.
- During an editing session, related items and associate badges are not shown on the map.
- At any time, select the reset icon to undo all unsaved changes.
- End an editing session by selecting **Exit**. You must exit the editor to access the timeline and controls (search, filter, zoom, and so on).

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Adding a CI to or removing a CI from the map

- You can view an existing CI on the map to enable you to create, modify, or delete its connections.
- You can add only CIs that have existing records in the CMDB.
- If you try add a CI that already has a connection to another CI on the map, the map re-centers and the CI is highlighted. In some cases, due to filter settings, the CI isn't displayed.
- An added CI appears on the map but its CMDB record isn't changed unless you change its connections and save the changes. After you add a CI, it can be saved to the map only if it has a path (direct or indirect) to the home node.
- You can remove (hide) a CI from the map only if you added it during the current editing session and have not yet saved the map. You cannot remove a CI that was on the map when you started the editing session. When you remove (hide) a CI from the map, the record of the CI in the CMDB is not deleted. In contrast, connection records for a removed CI are affected as described in Deleting a connection.
- When you delete all connections between one CI and another CI so that no connection path remains to the home node, the isolated CI and all of its downstream connections are considered an island branch. When you save, changes that you made to downstream connections are saved and the island branch CI is removed from the map (hidden). The CI record is not, however, removed from the CMDB.

Creating or modifying a connection (relationship or reference) between CIs

Use the map editor to add a connection between two CIs or to modify an existing connection.

To learn more, see CI relationships in the CMDB.

Deleting a connection

> **Warning:**
> Deleting a connection might result in an invalid CMDB state. Attempting to save a map that includes an orphan CI generates a warning.

Connections that are not editable are dimmed and view-only.

- When you delete a connection, the connection is removed from the map (hidden). The relationship is deleted from the [cmdb_ci_rel] table only when you save your changes.
- When you delete all connections between one CI and another CI so that no connection path remains to the home node, the isolated CI and all of its downstream connections are considered an island branch. When you save, changes that you made to downstream connections are saved and the island branch CI is removed from the map (hidden). The CI record is not, however, removed from the CMDB.
- When you delete all connections to and from a CI and save the change, the following actions occur:
  - The records of all relationships — both upstream to and downstream from — the CI are deleted from the CMDB [cmdb_ci_rel] table.
  - The CI is removed from the map (hidden).
  - The record of the CI in the CMDB is not deleted.

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Limitations

The map editor does not support the following actions:

- Editing mapped application services (service instances).
- Deleting a CI record from or adding a CI record to the CMDB.
- Attempting to save a map that includes an orphan CI generates a warning.
- Adding endpoint CIs to or removing endpoint CIs from the map.
- Deleting reference or endpoint connections or removing from the map a CI that has reference or endpoint connections.
- Updating the applicative flow relationship type (connection between endpoint CIs).

Related topics

CI relationships in the CMDB

Suggested class relationships

Add a suggested relationship

Add a CI to a map using the map editor

Create or modify a connection using the map editor

Delete a connection using the map editor

Add a CI to a map using the map editor

You can view an existing CI on the map to enable you to create, modify, or delete its connections.

Before you begin

Role required: sn_cmdb_admin or sn_cmdb_editor

About this task

- You can add only one CI at a time.
- You can remove an added CI from the map if you have not yet saved the CI to the map.
- You can add only CIs that have existing records in the CMDB.
- If you try add a CI that already has a connection to another CI on the map, the map re-centers and the CI is highlighted. In some cases, due to filter settings, the CI isn't displayed.
- An added CI appears on the map but its CMDB record isn't changed unless you change its connections and save the changes.
- The map editor doesn't support adding endpoint CIs.
- After you add a CI, it can be saved to the map only if it has a path (direct or indirect) to the home node.

Procedure

1. While working in a map, select the edit map icon and then take one of the following actions:
   - Right-click in a blank spot on the map and select **Add CI**.
   - Select the Add CI icon .
2. On the Add a CI panel, specify the class of CI to add.
3. Define a filter that will generate a list of CIs of the class that you specified.

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a. Select one CI in the filtered results list and then select **Apply filters**.

b. **Optional:** Save the condition set as a custom filter for future use.

Select the save custom icon and specify a name for the filter. You can select the filter whenever you add a CI.

4. To add a CI that is already connected to another CI on the map, select **Add to map** or skip this step for a CI that is not yet connected to another CI on the map.

The map re-centers on the added CI. Skip the remaining steps.

5. To add a CI that is not yet connected to another CI on the map, select **Add to map and connect**.

The map re-centers on the added CI and the Manage connection panel opens.

6. On the Manage connection panel ( ), specify the settings.

Manage connection panel

Field	Description
Source CI	You can select the swap icon to swap source and target. **Note:** In the context of a CI relationship, this is the parent CI.
Target CI	You can select the swap icon to swap source and target. **Note:** In the context of a CI relationship, this is the child CI.
Show suggested relationships	Option to control the contents of the **Relationship type** selection box: The relationship types that are most appropriate for the two CIs appear at the top of the list.
Relationship type	The relationship between the CIs. For example, the relationship between the parent 'Tomcat' and the child 'WAR File' is *`Contains::Contained By`*.

7. When you have specified all connection settings, select **Create connection**.

Remove a CI from a map using the map editor

You can remove (hide) a CI from the map only if you added it during the current editing session and have not yet saved the map. You cannot remove a CI that was on the map when you started the editing session.

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Before you begin
Role required: admin

About this task
When you remove (hide) a CI from the map, the record of the CI in the CMDB is not deleted. In contrast, connection records for a removed CI are affected as described in Deleting a connection.

Procedure

While editing a map, take one of the following actions:

- Select the CI and then select **Remove** in the Attributes panel.
- Right-click the CI and then select **Remove**.

Create or modify a connection using the map editor

Use the map editor to add a relationship between two CIs or to modify an existing relationship.

Before you begin
Role required: sn_cmdb_admin or sn_cmdb_editor

About this task
- A solid line indicates a relationship. The arrowhead indicates the dependent node.
- A dashed line indicates a reference.
- A badge on a line indicates the number of relationships between the CIs.

Two CIs might be connected by one or more relationships (stored in the CI Relationship [cmdb_rel_ci] table). For example, two CIs might be connected by the *`Runs On::Runs`*, *`Depends On::Discovered From`*, and by the *`Owned By::Owns`* relationships.

You can learn more about relationships at CI relationships in the CMDB.

The map editor does not support the following actions:

- Editing mapped application services (service instances).
- Deleting reference or endpoint connections or removing from the map a CI that has reference or endpoint connections.
- Updating the applicative flow relationship type (connection between endpoint CIs).

Note:

At any time, select the reset icon to undo all unsaved changes.

Procedure

1. While editing a map, specify whether to create or modify a connection.

2. On the Manage connection panel ( ), specify the settings.

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Manage connection panel

Field	Description
Source CI	You can select the swap icon ↕ to swap source and target. **Note:** In the context of a CI relationship, this is the parent CI.
Target CI	You can select the swap icon ↕ to swap source and target. **Note:** In the context of a CI relationship, this is the child CI.
Show suggested relationships	Option to control the contents of the **Relationship type** selection box: The relationship types that are most appropriate for the two CIs appear at the top of the list.
Relationship type	The relationship between the CIs. For example, the relationship between the parent 'Tomcat' and the child 'WAR File' is *`Contains::Contained By`*.

3. When you have specified all connection settings, select **Change** to change an existing connection or **Create connection** to add a connection.

Related topics

- CI relationships in the CMDB
- Suggested class relationships
- Add a suggested relationship
- Editing maps in Unified Map
- Delete a connection using the map editor

Delete a connection using the map editor

While editing a map, you can delete a connection (a relationship record) from the CMDB. The CIs that are involved in the connection are not deleted from the CMDB.

Before you begin

Role required: sn_cmdb_admin or sn_cmdb_editor

About this task

Warning: Deleting a connection might result in an invalid CMDB state. Attempting to save a map that includes an orphan CI generates a warning.

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The map editor does not support the following actions:

- Editing mapped application services (service instances).
- Deleting reference or endpoint connections or removing from the map a CI that has reference or endpoint connections.
- Updating the applicative flow relationship type (connection between endpoint CIs).

- When you delete a connection, the connection is removed from the map (hidden). The relationship is deleted from the [cmdb_ci_rel] table only when you save your changes.
- When you delete all connections between one CI and another CI so that no connection path remains to the home node, the isolated CI and all of its downstream connections are considered an island branch. When you save, changes that you made to downstream connections are saved and the island branch CI is removed from the map (hidden). The CI record is not, however, removed from the CMDB.
- When you delete all connections to and from a CI and save the change, the following actions occur:
  - The records of all relationships — both upstream to and downstream from — the CI are deleted from the CMDB [cmdb_ci_rel] table.
  - The CI is removed from the map (hidden).
  - The record of the CI in the CMDB is not deleted.

You can learn more about relationships at CI relationships in the CMDB.

At any time, select the reset icon to undo all unsaved changes.

Procedure

1. While editing a map, take one of the following actions:

   Note:
   No deletions happen until you select **Save**.

   - To delete a single connection, select it and then select **Delete** in the Attributes panel. Alternatively, right-click the connection and then select **Delete**.
   - To delete only particular connections for a CI, select the CI. In the editing panel, scroll to the connections and select **Delete**.
   - To delete all connections both upstream and downstream of a CI, select the CI and then select **Remove CI**.
2. Deletions happen when you select **Save**.

Related topics

CI relationships in the CMDB

Suggested class relationships

Add a suggested relationship

Create or modify a connection using the map editor

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Dependency Views

ServiceNow® Dependency Views graphically displays an infrastructure view for a configuration item (CI) and the application or business services that it is part of and that it supports. Dependency Views indicates the status of its configuration items, and allows access to CIs related alerts, incidents, problems, changes, and services.

If Service Mapping is activated, Dependency Views maps are enhanced to display dependencies that reflect connections in service maps.

Explore	Administer	Use
• Zurich • Domain separation and Dependency Views	• Create or modify map indicators • Create or modify map icons • Create a predefined filter • Create or modify Map Related Items • Create or modify Dependency Views menu actions • Create or edit a dependency type	• Dependency Views map • Dependency Views map menus and controls • View a Dependency Views map • Change the layout of Dependency Views map • Filter the view of a Dependency Views map • Perform actions on nodes in a Dependency Views map • Supported browsers for Dependency Views

Develop	Integration	Troubleshoot and get help
• Developer training • Developer documentation • Properties for Dependency Views • Components installed with Dependency Views		• Ask or answer questions in the Now Community • Search the Known Error Portal for known error articles • Contact Customer Service and Support

Supported browsers for Dependency Views

The latest version or service pack of internet browsers are required to view and manipulate Dependency Views maps.

The Dependency Views module supports the latest version or service pack of the following browsers:

- Firefox with the latest ESR
- Chrome latest version

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- Safari version 8 or later (latest is recommended)
- Microsoft Internet Explorer (IE) version 11 and Microsoft Edge.

The Dependency Views module is not supported on tablets and on mobile devices.

Domain separation and Dependency Views

Domain separation is unsupported in Dependency Views. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Basic

- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

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

How domain separation works in Dependency Views

Dependency views are generated using both Configuration Item [cmdb_ci] and CI Relationship [cmdb_rel_ci] tables. The [cmdb_ci] table is domain separated, but the [cmdb_rel_ci] table is not. You can create relationships only by selecting two CIs. They should be in the same domain for you to be able to see them.

To be successful with domain separation in Dependency Views, make sure that relevant CIs are visible for the current domain. If the instance is domain separated, ServiceNow domain separation rules apply (see Related information link below).

Tenant domains will be able to see only their domain and global CIs.

Related topics

Domain separation for service providers

Dependency Views map

ServiceNow® Dependency Views maps graphically display CIs that support application or business services and the relationships between the CIs.

The CMDB Workspace and Service Graph Workspace store apps provide the Unified Map feature as an alternative to using Dependency Views. Unified Map combines the capabilities of Dependency Views and Service Mapping into a single map experience.

A ServiceNow service (application service or business service) is work or goods that are supported by an IT infrastructure. For example, delivering email service to an employee can require services such as email servers, web servers, and the work to configure the user's account.

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A Dependency Views map has one starting point, called the root CI or root node of the map. The root CI is surrounded by a darker frame that repaints itself with a pulsing effect drawing the attention to the root CI. The maps can show both upstream and downstream dependencies for the root CI. By default the Dependency Views map displays 3 levels, both upstream and downstream relationships. Administrators can configure the number of levels displayed. The map collapses and expands clusters to make them easier to view. By default, clusters are collapsed.

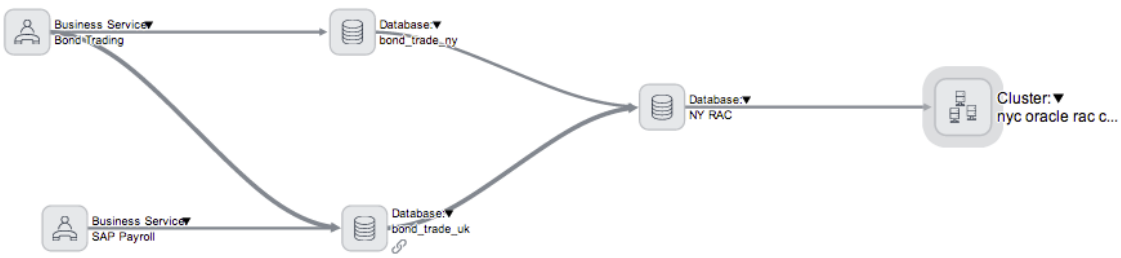
In a Dependency Views map, map indicators indicate if a CI has any active, pending issues. You can investigate the tasks that are connected to a CI to get more details. When you return to the map from another form, the system restores the last map viewed, using the default filter and layout settings. When you click the icon ( ) on a CI record or on a task record that identifies a CI, the map opens.

Many of the relationships in map are created through the discovery process. You can also create, define, and delete CI relationships in the map. You can display the map from different perspectives and open specific records that relate to configuration items. The system refreshes the map automatically to reflect changes to the CMDB.

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

The Dependency Views module is active in all instances, and includes demo data.

Dependency Views sample map



When you click the map icon [ ] on a CI record or on a task record that identify a CI, a map opens.

Roles

Users with the itil and ecmdb_admin roles can view maps and perform all actions in the map. Actions include access to the map views and saved filters, both from the lists in the map and from the **Saved Filters** module.

Dependency Views map menus and controls

Dependency Views maps contain the following menus and controls.

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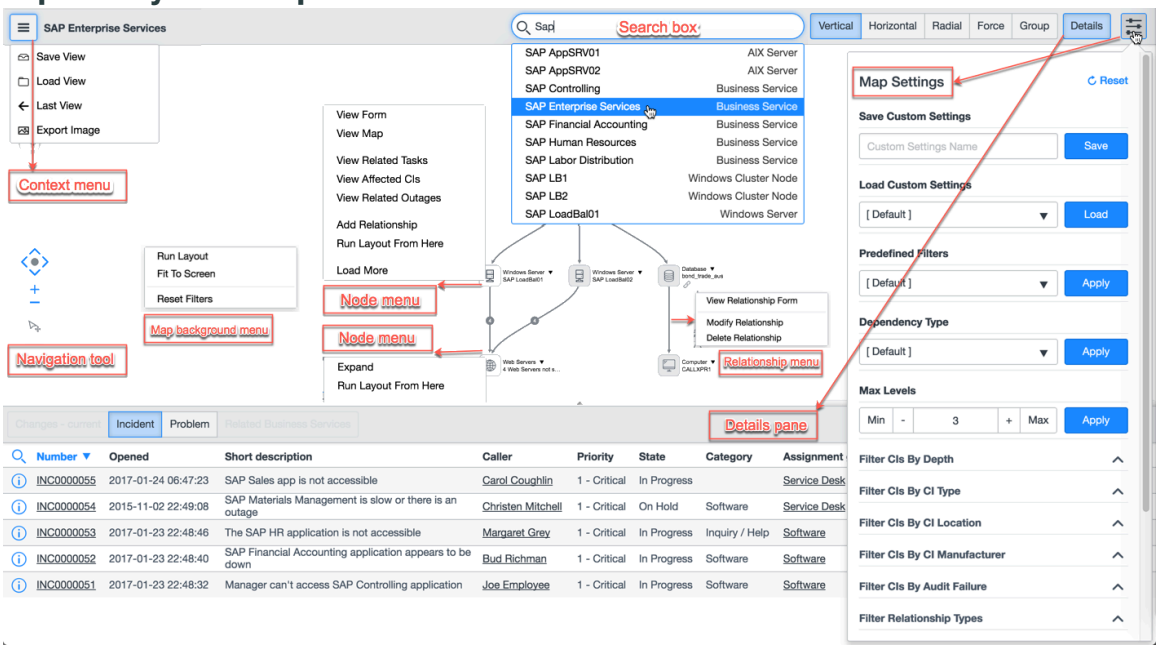
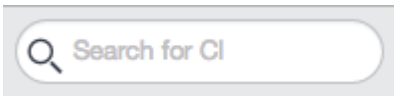
Dependency Views map



Map options

The following options are available across the top of the map.

	Menu to save, load and export views of the map.
<Root CI>	Next to the menu icon is the name of the current root node (CI) of the map.
	Enter the name of a CI, application service, or business service to load into the map. Alternatively, you can start typing to have the auto-complete feature present a list of CIs and services that match your partial value.
Vertical	Display the map in vertical view.
Horizontal	Display the map in horizontal view.
Radial	Display the map in radial view.
Force	Centers the elements around the parent CI, regardless of upstream or downstream relationships.
Group	Groups the elements according to their CI type.
Details	Displays related lists such as Problems, Changes and Related Services that are associated with the selected CI. • Click a service to highlight the CIs that are associated with that service. • Click **Related Services**, then double-click a service to display the map in the Event Management dashboard. If the Event Management plugin is active, then events and alerts are also displayed.
Settings	Set filters for the map.

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	Use the navigation tools to increase or decrease the view of the map, rearrange the icons on the map, and move the map on the page. • Use the plus sign (+) to increase magnification of the map. • Use the minus sign (-) to decrease magnification of the map. • Click the center dot to center the map on the page. • Use the direction arrows to move the page in that direction. • Use the selection tool under the navigation tool to toggle between moving the entire map or moving one CI on the map.

Map menu

The following options are available if you right-click the map background.

Run Layout	Redraws the map with the current layout option.
Fit To Screen	Resizes the map to fit all the nodes in the map window.
Reset Filters	Performs the same action as the **Filters** > **Reset** option.

Node menu

The following options are available if you right-click a node.

View Form	Displays the CMDB record of the selected CI in a new tab of the browser.
View Map	Reloads the map using the selected CI as the new root node, with the currently defined layout setting. This option does not display on the root node.
View Related Tasks	Displays all tasks or outages associated with the selected CI, including incidents, problems, change requests, and follow-on tasks. This option is always available, even if there are no tasks associated with the CI. This option does not appear on collapsed nodes.
View Affected CIs	Shows a list of all tasks that have the CI listed as an Affected CI. This option is only visible when you access the map from the map icon in a task record's Configuration item field.
View Related Outages	Displays all outages involving the selected CI. This option only appears when there is an outage associated with the CI. This option does not appear on collapsed nodes.
Add Relationship	This option displays a dotted green line that you can drag to another CI to create a relationship link. A popup dialog allows you to define the relationship type.
Expand	Displays all CIs and components within a clustered node, or virtual groups (virtual nodes that appear when *`glide.bsm.too_many_children`* is reached). This option appears only if the node is a cluster node or a virtual group node. If **Load More** was previously used, then **Expand** reverts the results of the **Load More** operation.

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	The number of additional icons to display is bound by the value of the *glide.bsm.max_nodes* property.
Collapse	Collapses all CIs and components within a cluster node back to a single node. Also, collapses a virtual group that has been expanded. This option only appears if the node has been expanded using the **Expand** menu item. If **Load More** was previously used, then **Expand** reverts the results of the **Load More** operation.
Run Layout From Here	This option re-runs the chosen layout using the current node. Use this option to get a new or clearer view on the same map.
Load More	Starting at the selected icon, loads the next level of the map, past the setting of **Max Levels**. Virtual grouping is not applied at the newly loaded level even if the criteria for virtual grouping is met. The number of additional icons to display is bound by the value of the *glide.bsm.max_nodes* property.

Relationship menu

The following options are available if you right-click a relationship link.

View Relationship Form	Opens the **CI Relationship** form. You can modify the **Parent**, **Type**, and **Child** of the relationship from this form.
Modify Relationship	Searches for and selects a new relationship for this link.
Delete Relationship	Deletes a relationship. The relationship is deleted after prompting for confirmation.

Cluster nodes in a Dependency Views map

Dependency Views maps can display cluster group nodes alongside individual CI nodes, and the child nodes of these cluster groups.

Clusters are CIs in the Cluster [cmdb_ci_cluster] table. A cluster CI is an organized set of computer CIs that work together as a single system. Each node in a cluster group represents a CI, typically a server, that can have referenced hardware, such as disks and network adapters.

Cluster nodes on a Dependency Views map can display in two modes:

- Collapsed mode: Displays only the cluster CI node without its child CI nodes. This mode avoids unnecessary clutter in large maps.
- Expanded mode: Displays the cluster CI node and all its child CI nodes.

Menu options available for a clustered node include **Collapse** and **Expand**, which allow you to control the density on the map.

By default, Dependency Views collapses all cluster groups and displays clusters in collapsed mode on the map.

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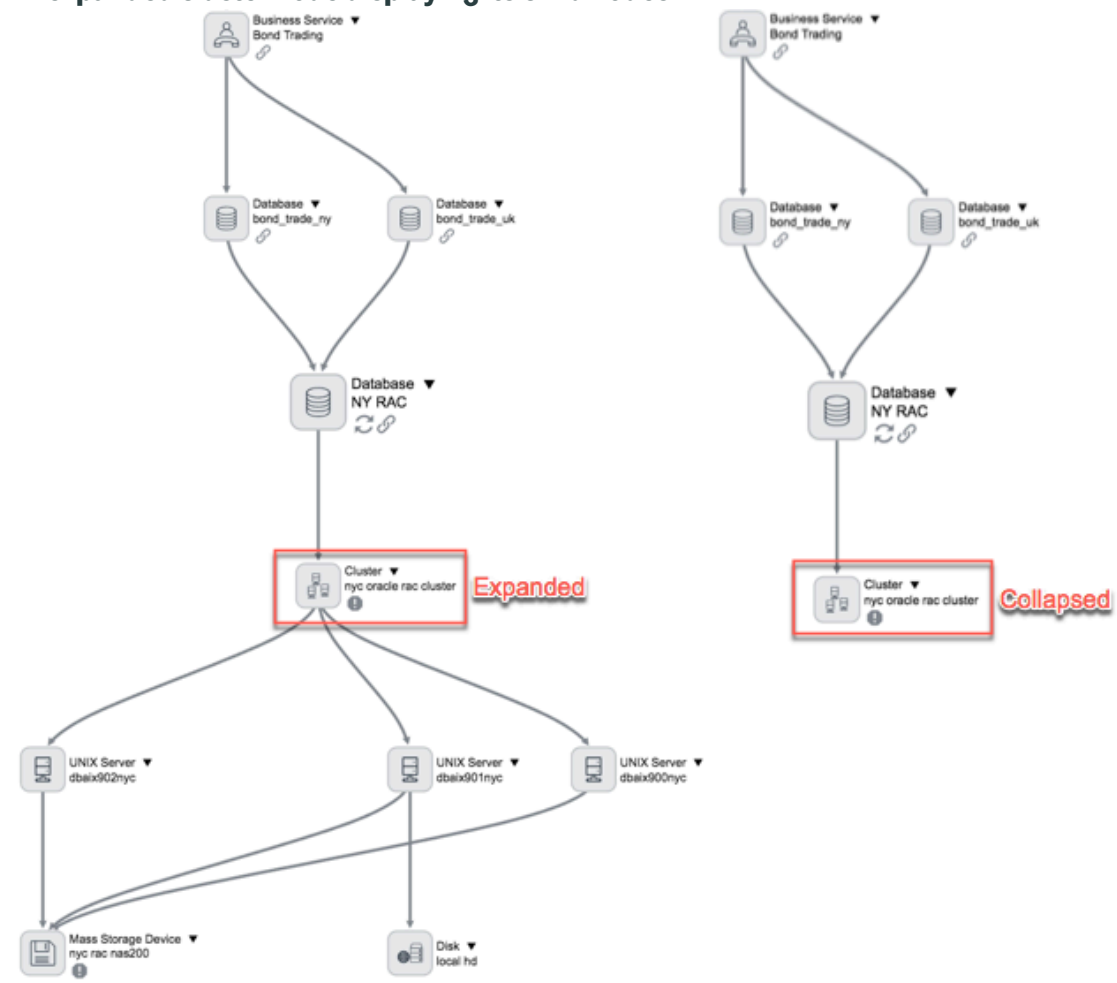
Annotation

Icons for cluster nodes and cluster group CI nodes are noted by the string "Cluster" and by a unique cluster icon. The system searches through all the component nodes in a cluster CI or collapsed node looking for tasks, outages, and trouble, such as incidents, problems, or change requests. This search evaluates only the number of levels that are displayed in the diagram.

An expanded cluster node displaying its child nodes



Virtual grouping of nodes in a Dependency Views map

To reduce the density on a map, Dependency Views automatically groups CIs of a similar CI type from the same level.

A large number of nodes can cause a Dependency Views map to become too dense to be helpful. Therefore, if the number of nodes with a similar CI type from same level, exceeds the value of the *Maximum number of nodes (of a similar CI type and at the same level) to display before applying virtual grouping* property, then those nodes are automatically grouped into a virtual group. A single node, the virtual group node is displayed to represent the virtual group, while all actual nodes in the virtual group (that are of a similar CI type), are hidden. Virtual group nodes represent CIs of a similar CI type but are not CIs by themselves and cannot have tasks assigned to them. The number of actual collapsed nodes in the virtual group is noted on the virtual group node.

By default, child nodes of a virtual group are not displayed. You can enable the *Show children of virtual groups* property to display child nodes underneath virtual groups.

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Virtual grouping is not applied at the level underneath a virtual group even if the criteria for virtual grouping is met (the number of nodes with a similar CI type from that level exceeds the preconfigured property value). However, virtual grouping can happen at the following level if that criteria is met. This behavior does not depend on any property settings, and you cannot change it.

Menu options for a virtual group include **Expand** and **Collapse**, which allow you to apply virtual grouping and display only the virtual group node, or to undo the virtual grouping and display all actual nodes.

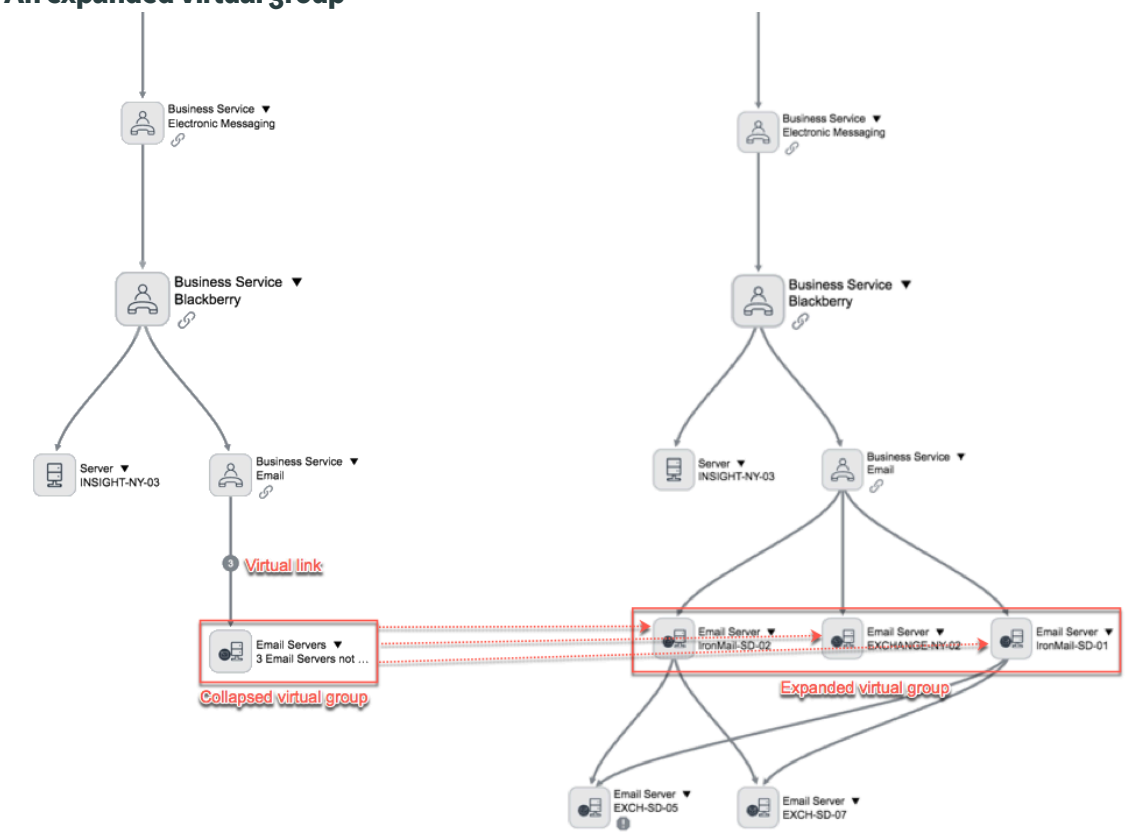
Virtual links

A virtual node is connected to other nodes with a virtual link. A virtual link denotes that there such link between at least one CI in the virtual group, to another CI node on the map.

Note:
Predefined filters do not apply to virtual groups. Therefore a virtual group displays even if it contains CIs that a predefined filter would have excluded. Upon the expansion of a virtual group, predefined filters are applied, and any or all of the CIs that were previously virtually grouped, might no longer display on the map.

Also, when using the node menu option **Load More**, virtual grouping is not applied at the newly loaded level even the criteria for virtual grouping is met.

An expanded virtual group



Related topics

Properties for Dependency Views

Use Dependency Views

Use the layout controls on a Dependency Views map to display elements in different configurations for easier management. Use the filter panel on the map to display fewer levels

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or to filter out elements you don't want to see, then save the filter for use later. Draw new relationships between elements or edit existing relationships.

View a Dependency Views map

When you display a Dependency Views map, the map is centered on the root CI and displays the layout and number of levels defined in the map properties. If Operational Intelligence is activated, then a Dependency Views map provides a mode that lets you directly access metrics information for the CIs on the map.

Before you begin

Role required: dependency_views (see general requirements)

General role requirements:

- To access a Dependency Views map from either the navigation menu, a script API, or directly from a URL, the minimum role required is the dependency_views. Some operations that are related to icons, indicators, and menu actions require the ecmdb_admin role. Some operations that are related to properties and dependency types require the admin role.
- Dependency Views enforces ACL permissions on CIs, and visually hides them and their relationship from the map if the permission requirement is not met.

About this task

The maps generated by Dependency Views are based on D3 and Angular technology, providing a modern interactive graphical interface to visualize configuration items and their relationships.

If Service Mapping is activated, Dependency Views maps are enhanced to display dependencies that reflect connections in service maps. In addition, the list of related services in the **Details** section, includes application services, and technical and manual services if Event Management is activated. All CIs that are included in a service, are displayed underneath the service node on the map.

Maps provided by Service Mapping are for application services, including comprehensive maps from the perspective of application services. For more information, see Service Mapping.

Administrators can configure the setting for the default layout of the map and number of levels displayed. When you access the map from a saved view, the map opens using the properties in the saved view, and not the default map properties.

Procedure

Navigate to **All** > **Dependency Views** and open one of these modules:

- **View Map in New Tab**: Opens the map in a new, full screen tab without the application navigator.
- **View Map**: Opens the map in the content pane of the current tab.
- **Saved Views**: Opens a view of a map that you previously saved.

  Click a number in the **Version** column, and then click the Display Dependency Views map icon ( ).

Save or load a Dependency Views map

In the **View Map** module, use the menu icon to save and load Dependency Views maps.

Before you begin

Role required: None

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Procedure

1. Navigate to **All** > **Dependency Views** > **View Map**.
2. Click the View menu icon ( ).
3. Select **Save View**, **Load View**, or **Last View**.

Delete a saved Dependency Views map view

Use the **Saved Views** module to delete a previously saved view.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Dependency Views** > **Saved Views**.
2. Select the check box for map view that you want to delete.
3. Select **Delete** from the **Actions on selected rows** drop-down menu.

Change the layout of Dependency Views map

You can select from different layout options for your Dependency Views map.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Dependency Views** > **View Map**.
2. Select one of the following layout options from the menu across the top of the view.
   - **Vertical**: Displays the elements in a vertical tree pattern according to their upstream and downstream relationships. This is the default value for the initial display of the map.
   - **Horizontal**: Displays the elements in a horizontal tree pattern according to their upstream and downstream relationships.
   - **Radial**: Displays the elements in a radial pattern according to their upstream and downstream relationships.
   - **Force**: Centers the elements around the parent CI, regardless of upstream or downstream relationships.
   - **Group**: Groups the elements according to their CI type.
   - **Details**: Displays related alerts, incidents, problems, and related services.

     Related Services displays application services related to the CIs currently displaying in the map. If Event Management is activated then technical services and manual services are included. You can double-click a service to display the map in the Event Management dashboard.

Filter the view of a Dependency Views map

Filter a Dependency Views map to display specific types or categories of configuration items.

Before you begin
Role required: admin

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About this task

Use the filter panel to control which elements of the map are displayed and to save versions of a filter for later use.

Procedure

1. Navigate to **All** > **Dependency Views** > **View Map**.
2. Click the Map settings icon to open map settings.

Map settings

Filter panel strips and options	Description
Save Custom Settings	Configure desired custom settings, then enter a name and click **Save**. Custom settings can be loaded by using the **Load Saved Custom Settings** option. Navigate to **Dependency Views** > **Saved Settings** > to display all saved custom settings.
Load Custom Settings	Apply previously saved custom settings to the current map.
Predefined Filters	Apply previously defined filters consisting of configuration type, CI type, and relationship filters. You can Set a predefined filter as default. This filter is applied first, before any other filters (such as **Filter CIs by Depth**) are applied.
Dependency Type	Apply a filter that runs in real time and generates a custom view of a service map for a specific CI.
Max Levels	Designate how many levels from the root CI display on the map.
Filter CIs by Depth	Designate which levels of CI display on the map.
Filter CIs by CI Type	Designate what CI types display in the map.
Filter CIs By CI Location	Designate what CI locations display in the map.
Filter CIs By CI Manufacturer	Designate what CI manufacturers display in the map.
Filter CIs By Audit Failure	Hides CIs that failed the CMDB health staleness test. This option is available only if there are any such CIs.
Filter Relationship Types	Designate what relationship types display in the map.
Map Indicators	Designate what types of tasks display and get counted in the map.
Remove Filtered Items	**Off:** Gray out filtered items on the map. **On:** Do not display filtered items on the map.

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Filter panel strips and options	Description
Run Layout Automatically	**On:** The configured layout to the map is reapplied whenever the filter is changed. **Off:** The map layout remains static when the filter is changed.
Fit to Screen Automatically	**On:** The map magnification will increase or decrease automatically to display all CIs on the map. **Off:** The map magnification remains unchanged when the map is reloaded.

3. Click a filter strip to expand or collapse it, and to set filter items.

Perform actions on nodes in a Dependency Views map

You can view various related items for the nodes in a Dependency Views map.

Before you begin

Role required: None

About this task

If the node is a collapsed node or represents a cluster, the incidents, problems and change requests are for all the collapsed nodes.

Procedure

1. Navigate to **All** > **Dependency Views** > **View Map**.
2. Click the Node menu icon ▼ next to a node or right-click a node on the map to access the following menu items:

Node Menu

View Form	Displays the CMDB record of the selected CI in a new tab of the browser.
View Map	Reloads the view using the selected CI as the new root node, with the currently defined layout setting. This option does not display on the root node.
View Related Tasks	Displays all tasks or outages associated with the selected CI, including incidents, problems, change requests, and follow-on tasks. This option is always available, even if there are no tasks associated with the CI. This option does not appear on collapsed nodes.
View Affected CIs	Shows a list of all tasks that have the CI listed as an Affected CI. This option is only visible when you access the view from the view icon in a task record's Configuration item field.
View Related Outages	Displays all outages involving the selected CI. This option only appears when there is an outage associated with the CI. This option does not appear on collapsed nodes.
Add Relationship	This option displays a dotted green line that you can drag to another CI to create a relationship link. A popup dialog allows you to define the relationship type.
Expand	Displays all CIs and components within a cluster node or a collapsed node. This option only appears if the node is a collapsed or cluster node.

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	The number of additional icons to display is bound by the value of the *glide.bsm.max_nodes* property.
Collapse	Collapses all CIs and components within a cluster node or a collapsed node back to a single node. This option only appears if the node has been expanded using the Expand menu item.
Run Layout From Here	This option re-runs the chosen layout using the current node. Use this option to get a new or clearer view on the same map.
Load More	Starting at the selected icon, loads the next level of the map, past the setting of **Max Levels**. The number of additional icons to display is bound by the value of the *glide.bsm.max_nodes* property.

Export a Dependency Views map

Export a Dependency Views map to an image in PNG format.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Dependency Views** > **View Map**.
2. Configure the map view as you want the image to appear.
   The exported image displays the current view of the map.
3. Click the view menu icon ( ).
4. Click **Export Image**.
5. Right-click the image and select **Save Image As**, **Print**, or any other menu option.

   Note:
   You can't export images from a Dependency Views map using Internet Explorer as your browser.

6. Click the "X" button to close the **Export Image** window.

View collapsed nodes in a Dependency Views map

Cluster and virtually grouped nodes can be displayed in a collapsed mode to avoid unnecessary clutter in large maps.

Before you begin
Role required: None

Procedure

1. To expand a collapsed node, right-click the CI and select **Expand** from the context menu.
2. To collapse an expanded cluster node with children, right-click the CI and select **Collapse** from the context menu.

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Administer Dependency Views

Users with the admin role can control the appearance and behavior of Dependency Views by configuring map indicators, map related items, map icons, and menu actions.

Create or modify map indicators

Dependency Views maps and application service maps, use icons to display additional information for a CI by displaying its related records such as alerts, outages, incidents and problems. These icons are called map indicator.

Before you begin

Role required: admin

About this task

The default configuration includes map indicators for the following record types:

- Open incident.
- Open alert.
- Unplanned current outage.
- Planned current outage, or an open problem.
- Current, planned, or recent change request.

You can filter out the display of affected CIs, alerts, current change requests, incidents and problems from the map settings menu.

The Affected CI's map indicator appears for CIs in two related but not identical situations. It appears for CIs for which tasks such as change request, incident, or problem were directly created for, and for any CIs that were added in those tasks (parent tasks) as Affected CIs (The CI for which a task is directly created for, is automatically added as an affected CI in that task). The state of affected CI's depends on the status of the respective parent task. For as long as the parent task is active, the associated affected CIs continue to be impacted by the task issue. In a map, the Affected CI's indicator displays for all affected CIs for as long as the parent task is active. On a map, the Affected CI tooltip displays the details of the task records in which the CI was added as an affected CI. However, the **Details** pane does not contain an Affected CI's tab, and no further details about affected CIs, or the associated tasks are displayed. After the parent task is closed, the Affected CI's indicator no longer displays for any of the tasks' affected CIs. For information about affected CIs in Change Management, see Associate CIs to a change request.

Note:
Details about affected CIs are derived from the *task* and the *cmdb_ci* tables and their extensions. Therefore, if you use custom tables to store CIs for incidents, problems and changes, it affects the details that are displayed for affected CIs.

For more information on how map indicators are used to show tasks and outages in clusters and collapsed nodes, see Cluster nodes in a Dependency Views map.

Procedure

1. Navigate to **All** > **Dependency Views** > **Map Indicators**.
2. Click **New** to create a new map indicator, or click the name of an indicator from the **Table** column to modify an existing map indicator.
3. Fill in the fields on the form, as appropriate.

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Map Indicator form

Field	Description
Table	Name of the table represented by this map indicator. **Note:** The list shows only tables and database views that are in the same scope as the map indicator. Views are not supported, although included in the list.
Name	Name of the indicator.
Order	Priority order of the task. The highest priority task is the indicator with the lowest order number.
Icon	File name and path of the icon image file, which can be a system image. ○ To create a new icon, see Create or modify map icons ○ To create or use a system image see Storing images in the database.
CMDB CI field	Name of the field on the selected table that contains the configuration item.
Start field	Record property that determines the time-point on the metric chart timeline for placing records in the Insights Explorer. Possible values depend on the selected **Table**. For example, the incident indicator has values such as **Actual end**, **Actual Start**, and **Approval Set**.
Description field	Name of the field on the selected table that contains the description of the configuration item.
Description	Text to display when hovering over the indicator. Alphanumeric characters and spaces are valid for this field.
Conditions	Condition builder that specifies for which CIs to apply this indicator. For example, a CI that has a current past outage is highlighted for 5 days. You can configure a condition to designate a different timeframe for what is considered to be current.
Active in Service Map	Toggle that you can enable to make the specified table available in the Settings dialog box for application service maps. You can then toggle between displaying or not displaying the respective records on the map.
Active Dependencies	Toggle that you can enable to make the specified table available in the Settings dialog box for Dependency Views maps. You can then toggle between displaying or not displaying the respective records on the map.
Active in Metrics	Enable to make the toggle for the specified table available in the Settings dialog box for the Insights Explorer. You can then toggle between displaying or not displaying the respective records on the Insights Explorer.
Label	Text to display for the indicator on the map.
Tooltip Label	Prefix portion of the tooltip (Tooltip Label : Tooltip info).
Tooltip Info	Suffix portion of the tooltip (Tooltip Label : Tooltip info).

4. Click **Submit** to enter a new map indicator or click **Update** to modify an existing map indicator.

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Result
For an indicator to appear in a Dependency Views map, a CI must meet all filter conditions, and **Active Dependencies** must be selected.

Create or modify map icons

Upload new icons or modify existing icons to customize the icon displayed for a CI in maps in Dependency Views, Service Mapping, and Event Management.

Before you begin
Role required: admin

About this task
The icons used in Dependency Views maps are listed in the Map Icons module. Records in the **Map Icons** list are arranged by CI classes, such as cmdb_ci_linux_server. The path to the default image files is https://<instance name>.service-now.com/images/app.ngbsm/<image name.svg>. For information about uploading images to the database, see Storing images in the database.

Role required: admin or cmdb_admin roles are required to access the records in this table [ngbsm_icon] to upload new icons.

Procedure
- Navigate to **All** > **Configuration** > **CI Class Manager**, and do the following actions:
  1. Click **Hierarchy** to display the CI Classes list.
  2. Select a class to modify the icon for.
  3. In the class navigator bar, expand **Class Info** and then select **Basic Info**.
  4. On the Basic Info form, click **Icon**.
  5. In the Icons dialog box, select an icon and then click **Update**.
  6. On the **Basic Info** form, click **Update**.
- Navigate to **All** > **Dependency Views** > **Map Icons**, and do the following actions:

  1. Click **New** to create a new map icon or click the name of an existing icon in the **Label** column to modify an existing icon.

  2. On the form, fill in the fields.

Map Icons form

Field	Description
CI Type	Label or the informal name of the CI table that this icon represents in the view.
Icon	Name of the icon.
URL	Path to the icon image using the following format: `/image name.svg` Click the lock icon to enter a new path.

  3. Fill in the fields on the form, as appropriate.

  4. Click **Submit** to enter a new icon or click **Update** to modify an existing icon.

What to do next
You can modify a Dependency Views map indicator to use the new icon.

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Create a predefined filter

Create filters to narrow down the CIs that are displayed on a Dependency Views map. You can create filters that are based on CIs' class, CIs' attributes, or CIs' relationships.

Before you begin

Role required: ecmdb_admin

About this task

Create a predefined filter that you can then select to determine the scope of the CIs that are displayed in a Dependency Views map. **Configuration type** filters filter by CI class, **CI filters** filter by CI attributes, and **relationship filters** filter by relationships. Only CIs that match at least one of the configuration type filters (if any exists), and at least one of the CI filters (if any exists), and at least one of the relationship type filters (if any exists) - are displayed on the map. If no filters are defined, then no filtering is applied.

Note:
Predefined filters do not apply to virtual groups. Therefore a virtual group displays even if it contains CIs that a predefined filter would have not included. Upon the expansion of a virtual group, predefined filters are applied, and any or all of the CIs that were previously virtually grouped, might no longer display on the map.

Procedure

1. Navigate to **All** > **Dependency Views** > **Predefined Filters**.
2. On the **Predefined Filters** page, click **New**.
3. Type in a **Name** for the filter.
4. Click **Roles**, and in the **Roles** dialog box, select the roles that this filter will be available for.
5. Right-click on the page header, and click **Save**.
6. Create a configuration type filter:
   a. Click **Configuration Types**, and then click **Edit**.
   b. In the **Collection** list collector, select the classes that CIs must belong to in order to be displayed on the map, and move them to the **Configuration Types List**.
   c. Click **Save**.
7. Create a CI filter:
   a. Click **CI Filters**, and then click **New**.
   b. In the **CI Filters** page enter conditions to filter CIs by specific attribute values.
   c. Click **Submit**.
8. Create a relationship type filter:
   a. Click **Relationship Type**, and then click **New**.
   b. In the **Collection** list collector, select the relationships that CIs must have in order to be displayed on the map, and move them to the **Relationship Types List**.
   c. Click **Save**.

What to do next

After creating a predefined filter, you can apply it to a map:

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1. Click the Map settings icon to open **Map Settings**.
2. Select a filter from the **Predefined Filters** list.
3. Click **Apply**.

Related topics

Filter the view of a Dependency Views map

Set a predefined filter as default

You can set a custom predefined filter as the default predefined filter for viewing maps.

Before you begin
Role required: admin

Procedure

1. Create the custom predefined filter to be used as the default predefined filter.
2. On the predefined filter form, click the context menu and select **Copy sys_id**.
3. Navigate to **User Administration** > **User Preferences**.
4. Click **New** and create a new user preference record using these values:
   - **Name**: ecmdb.ciview
   - **Type**: String
   - **Value**: Paste the sys_id of the custom predefined filter
   - **User**: Leave blank to create a system-wide setting
   - **Description**: Description of the predefined filter
   - **System**: Selected
5. Click **Submit**.

What to do next
In **Map Settings**, when you select the `Default` option for **Predefined Filters**, the custom predefined filter that was set, will be applied.

Related topics

Filter the view of a Dependency Views map

Create or modify Map Related Items

The Map Related Items module relates referenced CIs to one another, which allows them to be displayed in a Dependency Views map.

Before you begin
Role required: admin

About this task
The base system configuration includes the following tables and relates them to items in the Computer [cmdb_ci_computer] and Server [cmdb_ci_server] tables.

- Disk [cmdb_ci_disk]
- Network Adapter [cmdb_ci_network_adapter]
- Database [cmdb_ci_database]

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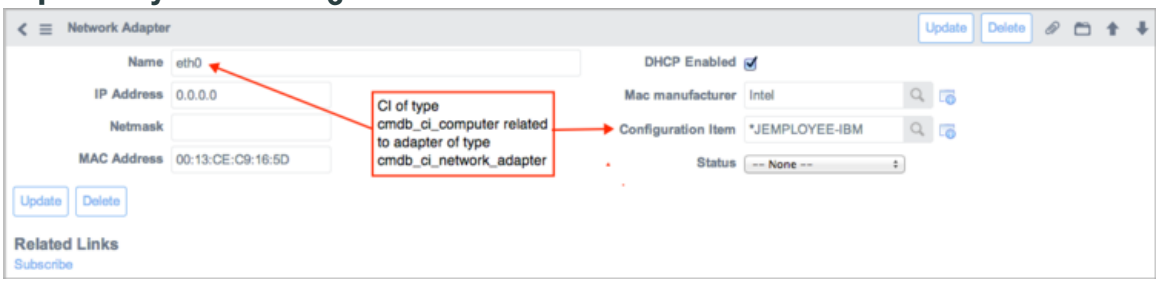
Some additional referenced CIs that can be related in this manner are file systems and running processes.

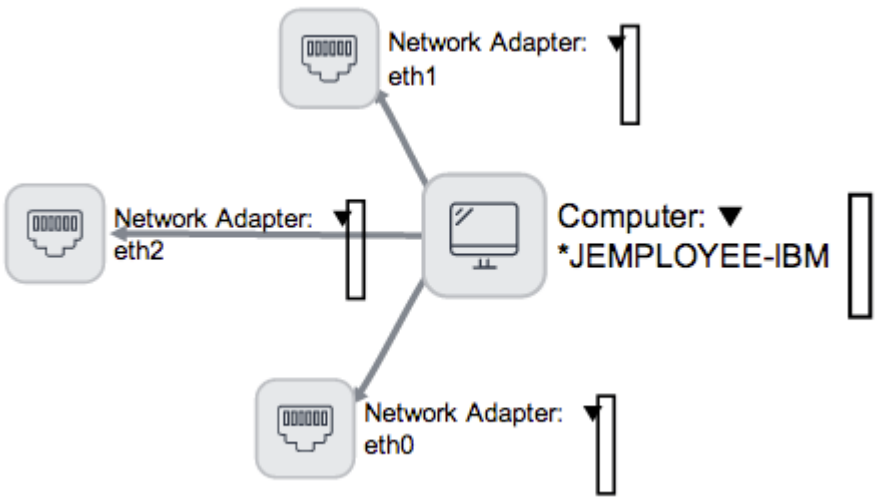
In the following example, computer nodes in the map are related to network adapter nodes if the **Configuration Item** field of the adapter records reference the specific CI node. Access or create a network adapter record from the Network Adapter related list in the cmdb_ci_computer record.

Dependency Views Configuration Item field



The Dependency Views map for the *JEMPLOYEE-IBM computer shows the network adapter attached to the computer.

Dependency Views map Related Items example



You can configure Dependency Views to display CIs that have no relationship record, but are related to other CIs by reference fields.

Procedure

1. Navigate to **All** > **Dependency Views** > **Map Related Items**.
2. Click **New** to create a new related item, or click in the row of an existing CI to modify an existing map related item.
3. On the form, fill in the fields.
   See the Related Items form table.
4. Click **Submit** to enter a new map related item or click **Update** to modify an existing map related item.

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Related Items form

Control	Description
Configuration item	CI that represents the base node or a CI in a table that extends the base node table. In the base system, the configuration item that represents the base node is Computer [cmdb_ci_computer], which includes all types of workstations and servers.
Related item	Table name of the related item. Only the cmdb_ci table and tables that extend it are displayed in the choice list.
Related field	Field that links this related item to the configuration item. In many cases, the appropriate value is automatically populated in the field after the first two fields are selected. Select the drop-down menu for additional options.
Active	Check box to enable or disable this record.

Create or modify Dependency Views menu actions

To modify an existing menu option, first you create a copy of the original menu action record, and then you modify the copy.

Before you begin
Role required: admin

About this task
This ensures that your instance can update the record normally during the upgrade process and allows you to quickly restore the original menu option, if necessary.

Procedure

1. To create a new menu option, navigate to **Dependency Views** > **Map Menu Actions** and click **New**.
   Fill in the fields on the form, as appropriate. See the Menu Action form table.
2. To modify an existing menu option, navigate to **Dependency Views** > **Map Menu Actions**.
3. Open the menu action you want to edit.
4. Right-click in the header and click **Insert and Stay**.
   This step creates a duplicate copy of the menu action and leaves it open for editing.
5. Change the name of the copied record to avoid confusion.
6. Modify the form fields as necessary and save the record.
7. Open the original record and disable it by clearing the **Active** check box.

Menu Action form

Control	Description
Name	Descriptive name that appears as the menu option.
Active	Check box that allows you to enable or disable this record.
Condition	Condition that triggers the display of this menu option. If the condition evaluates to **false** the menu option does not display. Script is evaluated in JavaScript in the user's browser and does not have access to all the APIs that Business Rules do. For details on available parameters, see Condition Parameters. .
Item	Map element for which the menu option displays. Valid values are:

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Control	Description
	○ **Canvas** for the menu on the map background. ○ **Node** for the menu on a CI. ○ **Relationship** for the menu on a relationship link.
Order	Physical location of the option in the menu. The option with the lowest order number appears first in the menu. All editable and custom options appear below the permanent menu options.
Script	Script that is executed in the browser when the menu option is selected. Script is evaluated in JavaScript in the user's browser and does not have access to all the APIs that Business Rules do.
Type	Menu action type being created, either a menu option or a menu separator. The menu separator is a single line. When the type is a separator, the **Script** field is ignored.

Condition and script parameters for menu actions

You can use the following condition and script parameters for menu actions.

Condition parameters

Note:
The usual regular expression conventions are valid in the condition field, such as ! for NOT, && for AND, and || for OR.

The **Condition** field contains a boolean expression that evaluates to true or false. If the condition is true or if there is no condition, the specified option appears in the menu when you right-click a CI or a relationship link. When you select the option from the menu, ServiceNow executes the associated script.

Common Elements for Building a Condition

Text	Description
item	Node or reference link's data on which you performed the right-click action.
item.label	Label of the node.
item.ci_type	CI's type (table), such as `cmdb_ci_service`.
item.name	Name of CIs. CI's type name or the table label.
item.location	Location of the CI, such as New York.
item.manufacturer_name	Name of the CI’s manufacturer, such as Dell Inc.
item.id	The sys_id of the CI.
item.is_selected	The item that is selected in the map.
item.level	The current default level.
item.locationId	The sys_id of the CI node's location.
item.locationName	The full address of the location.
item.manufaturerId	The sys_id of the CI's manufacturer.

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Valid Conditions for Condition Parameters

Condition	Description
item.is_collapsed	The node is a collapsed node.
item.is_cluster	The node is a cluster node.

Script parameters

Menu action scripts are executed on the client when a user clicks the menu option. You can use the same building blocks in scripts as in conditions. Menu action scripts do not function on separators. These are some additional, useful expressions for scripts:

Condition	Description
item.id	The sys_id of the CI node or relationship link.
item.source	The sys_id of the relationship's parent or child.
item.target	The sys_id of the relationship's parent or child.
item.label	The name of the CI node, such as IronMail-SD-02.
item.location	The sys_id of the CI node's location.
item.location_name	The full address of the location, such as 4616 Clairemont Drive, North Clairemont, San Diego CA.
item.manufacturer_id	The sys_id of the CI's manufacturer.

Create or edit a dependency type

Use one of the dependency types provided, or create a custom dependency type with a script that will execute in real time to generate a custom view of a Dependency Views map for a specific CI.

Before you begin

Role required: none

About this task

Create a JavaScript to customize the map. The script must comply with JavaScript syntax guidelines and the directions in the default script template, and it can call platform APIs. Use a dependency type, for example:

- To narrow down and simplify a map, leaving out CIs that are not important for a specific task.
- To include only specific CIs that are hidden by default, such as qualifiers, end-points, and entry points.
- To display virtual relationships that are calculated, and that otherwise do not exist in the CMDB.
- As a tool to plan a new topology deployment that is based on existing resources.

The following dependency types are available in the base system:

Default

The default setting in the base system. With this setting, there is no processing of the dependency map through any dependency type scripts that might filter or modify the map.

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Show All Relationships

Returns all qualifiers, end points, and entry points. This dependency type is available in the base system and is disabled by default. Typically, you would enable this dependency type for debugging and tracking purposes.

The following dependency types are available with Service Mapping:

Application to Network Devices

Returns the network devices in the network paths leading to/from the given CI.

Network Device to Applications

Returns the applicative CIs which are target or source of network paths containing the given network device. In addition, returns the hosts of those applicative CIs, and for an applicative CI that is an inclusion, its parent CI is returned too.

Physical Network Connections

Returns hosts/network devices that are physically connected to the given host or network device.

Flow Dependencies

Returns all the server to server connections that were discovered using the Netflow collector. The script builds a graph based on data in the [sa_flow_server_comm] table. This table contains pairs of services represented by an IP and a listening port that are communicating with each other. For more information, see Data collection and discovery using Netflow and Data collection and discovery using VPC Flow Logs.

Procedure

1. Navigate to **All** > **Dependency Views** > **Dependency Types**.
2. In the **Load Filter Scripts** list view, select an existing depenency type, or click **New**.
3. Enter or modify a script, adhering to the guidelines and requirements in the script template that is provided.
4. Click **Submit**.

Result

In a Dependency Views map, you can click **Dependency Type** to apply a custom script defined in a dependency type.

Related topics

Data collection and discovery using Netflow

Properties for Dependency Views

Use Dependency Views properties to configure how data appears in Dependency Views maps.

These properties are available for Dependency Views. To view and edit these properties, the admin role is required.

Properties for Dependency Views

Property	Description
Maximum number of CIs to display on a map at once.	The maximum number of nodes to retrieve from the database. If more nodes exist in

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Properties for Dependency Views (continued)

Property	Description
glide.bsm.max_nodes	the database, they are not displayed in the map. • Type: Integer • Default value: 1000 • Location: **Dependency Views** > **Map Properties**
Maximum level depth from the root CI that can be initially displayed in Dependency Views. glide.bsm.max_levels	Level depth is the graph distance between the root CI and a node. • Type: Integer • Default value:: 3 • **Other possible values**: 1-49 • Location: **Dependency Views** > **Map Properties**
Display the continuation of the map underneath virtual group. Virtual links are used to connect virtual groups to their child nodes. glide.bsm.show_virtual_node_children	• Type: Yes | No • Default value: No • Location: **Dependency Views** > **Map Properties**
Maximum number of child nodes to display (the rest will be collapsed). glide.bsm.too_many_children	Maximum number of nodes (of a similar CI type and at the same level) to display before applying virtual grouping. Nodes are collapsed for the map to meet this limit. • Type: Integer, valid values 1 or greater • Default value: 10 • Location: **Dependency Views** > **Map Properties**
A value of true indicates that filtered out items will be removed from the graph along with any disconnected children while a value of false indicates that the items will be dimmed in color. glide.ngbsm.filters_remove_filtered_items	• Type: Yes | No • Default value: Yes • Location: **Dependency Views** > **Map Properties**
Maximum number of relations per node. glide.bsm.max_num_rels	The maximum number of relations to retrieve from the database. If more

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Properties for Dependency Views (continued)

Property	Description
	relations exist in the database, they are not displayed in the map. • Type: Integer • Default value: 100 • Other values: 1 or greater • Location: **Dependency Views** > **Map Properties**
A value of true indicates that when filters are changed the graph will recalculate it layout using the currently selected layout algorithm. glide.ngbsm.filters_run_layout_automatically	• Type: Yes | No • Default value: Yes • Location: **Dependency Views** > **Map Properties**
A value of true indicates that when filters are changed the graph will be fit to the screen automatically. glide.ngbsm.filters_fit_to_screen_automatically	• Type: Yes | No • Default value: No • Location: **Dependency Views** > **Map Properties**
A value of true allows relationship lines to be drawn using smooth curves instead of straight line segments. These curves can be more taxing on the browser, setting to false may improve fluidity of animation and interaction for Dependency Views. glide.ngbsm.performance_allow_curves	• Type: Yes | No • Default value: Yes • Location: **Dependency Views** > **Map Properties**
Amount of time in milliseconds a notification stays on the screen. glide.ngbsm.notification_display_time	• Type: Integer • Default value: 5000 • Location: **Dependency Views** > **Map Properties**
The maximum amount of results displayed when searching for CIs. glide.ngbsm.search_ci_limit	• Type: Integer • Default value: 10 • Location: **Dependency Views** > **Map Properties**

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Properties for Dependency Views (continued)

Property	Description
The maximum amount of results displayed when searching for Relationship Types. glide.ngbsm.search_rel_type_limit	• Type: Integer • Default value: 5 • Location: **Dependency Views** > **Map Properties**
When available, the map should display the class labels for each CI. glide.ngbsm.show_class_labels	• Type: Yes | No • Default value: Yes • Location: **Dependency Views** > **Map Properties**
Truncate node labels to a single line and to fit available space (default). Disable to display entire labels on multiple lines and wrapped as needed. glide.ngbsm.truncate_long_labels	If *`glide.ngbsm.show_class_labels`* is enabled, then the class label always displays on top of the CI label, and wrapping applies to both the class and the CI labels. • Type: Yes | No • Default value: No • Location: **Dependency Views** > **Map Properties**
Minimum horizontal distance between nodes in horizontal layout. glide.bsm.layout_horizontal_spacing_x	The distance is measured in pixels between one node's center to another node's center. • Type: Integer • Default value: 200 • Location: **Dependency Views** > **Map Properties**
Minimum vertical distance between nodes in horizontal layout. glide.bsm.layout_horizontal_spacing_y	The distance is measured in pixels between one node's center to another node's center. • Type: Integer • Default value: 100 • Location: **Dependency Views** > **Map Properties**

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Properties for Dependency Views (continued)

Property	Description
Minimum horizontal distance between nodes in vertical layout. glide.bsm.layout_vertical_spacing_x	The distance is measured in pixels between one node's center to another node's center. • Type: Integer • Default value: 125 • Location: **Dependency Views** > **Map Properties**
Minimum vertical distance between nodes in vertical layout. glide.bsm.layout_vertical_spacing_y	The distance is measured in pixels between one node's center to another node's center. • Type: Integer • Default value: 125 • Location: **Dependency Views** > **Map Properties**

Components installed with Dependency Views

Several types of components are installed with the activation of the Next_Gen BSM (com.snc.ng_bsm) plugin, such as tables.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Tables installed

Table	Description
Available CI icons [ngbsm_ci_icons]	Stores all available CI class icons.
Icons for CI types [ngbsm_ci_type_icon]	Maps icons to CI class names.
Map Script [ngbsm_script]	Custom scripts that run in real time and generate a custom view of a map for a specific CI.
Map View [ngbsm_view]	Serialized map views saved by users.

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Table	Description
Map Filter [ngbsm_filter]	Filters saved by users.
Menu Action [ngbsm_context_menu]	Default and custom context menu actions that appear when users right click a map.
Related Item [ngbsm_related_item]	Stores which reference fields should be treated as relationships when building the map. This allows users to include CI's that are related via a reference field instead of a relationship.
Edge Colors [bsm_edge_color]	Color definitions to use when drawing the relationships between nodes based on relationship type.
Map Indicator [bsm_indicator]	Stores all map indicators.
BSM Saved Map [bsm_graph]	Details of maps.
BSM Map Actions [bsm_action]	Actions on the map.
BSM Map View [map_view]	Parents' predefined filters.
Map View Configuration Types [map_view_ci_type]	Configuration type filters, limiting the CI class types to be displayed, per predefined filter.
Map View Relationship Types [map_view_rel_type]	Relationship type filters, limiting the links to be displayed between CIs, per each predefined filter.
[map_viewroles]	Roles that a specific predefined filter should be applied to.
CI Filters [map_filters]	CI attribute filters, limiting the CIs to be displayed, per predefined filter.

CMDB Query Builder

The CMDB Query Builder enables you to build complex infrastructure and service queries that span multiple CMDB classes, non-CMDB tables, and that involve many CIs that are connected by different relationships.

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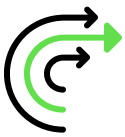
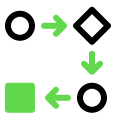
Get started

Explore Build complex infrastructure and service queries.	Configure Configure settings and properties	Build a CMDB query Construct the classes, and the relationships and references that connect them, to query on.
Build a Service Mapping query Construct the pattern of classes and their relationships to query Service Mapping services on.	Run a partial query  Run only a section of a query for a quick validation.	Schedule a query Schedule a saved query to run once at a scheduled time or on a recurring schedule, and to email the query results to users.
Create a report Create a basic report, or a dynamic report that continuously updates with the latest query results and add it to Performance Analytics dashboards.	Export or import queries  Export and then import and run a saved query definition between instances, such as between a development and a production environment.	Reference Reference topics provide example queries and descriptions of navigation and property settings.

Troubleshoot and get help

- For tips and basic troubleshooting, see CMDB Query Builder [KB0681251].
- KB0546686: CMDB Resources Page
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

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Exploring CMDB Query Builder

The CMDB Query Builder enables you to build complex infrastructure and service queries that span multiple CMDB classes, non-CMDB tables, and that involve many CIs that are connected by different relationships.

The CMDB Query Builder provides a canvas into which you drag the CI classes that you want to include in a query. Then you add relationships, AND/OR operators between the CI classes, and define the relationship properties to query for. You can use saved queries to populate a CMDB group with CIs, and then use scriptable APIs to retrieve the CI list and apply actions collectively to all the CIs in the group.

There are two query types: CMDB Query and a Service Mapping query, which you can use separately or in combination to create queries such as:

- All hardware in my service offering that has Windows installed.
- All CIs of a certain type in an application service. For example, all Apaches/Web Servers/Linux servers per service.
- All virtual servers and the physical servers that host them.
- All servers that are not mapped to any application service.
- All application services and their associated servers and the cost of each server. This query helps evaluate the cost of technology for each application service.

Starting node: The starting point of the query which is labeled as **STARTING NODE** on the Query Builder canvas. The first class that you drag to the canvas becomes automatically the starting node of the query and you cannot select a different starting node. In a complex query, the starting node must always be the only node connected to an AND/OR operator. If you try to connect a second node to an operator that the starting node is connected to, the query fails to run and a prompt to select a different starting node appears.

Additional information

For a webinar, see CMDB Query Builder Queries and Reporting - Platform Analytics Academy blog post in the ServiceNow Community.

Intelligent Search for CMDB integration

By default, Intelligent Search for CMDB functionality is integrated into the CMDB Query Builder. When opening the Query Builder, you can use the Intelligent Search search box which appears above the Query Builder canvas. Intelligent Search lets you use everyday natural language query (NLQ) to build a query. Intelligent Search parses, resolves any ambiguities in table names and relationship types, and then converts your search string into a valid query. The query appears fully constructed on the Query Builder canvas where you can run or continue and develop the query.

The integration of Intelligent Search for CMDB with the CMDB Query Builder is controlled by the system property *glide.cmdb.query.nlq.activated*, which is set to **true** by default. If you set the property to **false**, Intelligent Search for CMDB will not be available within the Query Builder.

AI Search and CMDB

NLQ Genius Results for AI Search use natural language queries to find CMDB tables that match your search without leaving a portal or workspace. For more information, see NLQ Genius Results.

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Note:
AI Search is a complementary search experience that allows you to surface CMDB records in your normal flow of work, without having to access the CMDB Query Builder. It doesn't replace intelligent Search for CMDB, which is purpose-built and integrated into CMDB Query Builder.

Query types

There are several types of CMDB queries:

CMDB Query

A query type that queries the infrastructure for CI classes and the relationships and references that connect them. You can optionally add the context of non-CMDB tables to a CMDB query.

You can include Application services in a CMDB query, to find, for example:

- All critical application services in your database.
- All infrastructure in a particular application service.
- All incidents for a particular CI in an application service, or all incidents for all the CIs of an application service.
- All application services with a pattern of a service connected to a database, and where the database has incidents.

The list of available non-CMDB tables includes a subset of tables within the system, which have a reference to the Configuration Item [cmdb_ci] class or its children. The list of non-CMDB tables, includes tables such as Asset, Task, and Problem. You can use the system property glide.cmdb.query.non_cmdb.black_listed_tables to narrow down the list of non-CMDB tables to choose from.

Service Mapping Query

A query type that queries application services. The query is framed within an application service map. You define a pattern, and query for application service maps that have that pattern in their definition. The relationships in Service Mapping queries are matched by single-level direct relationships which is similar to the CMDB queries, and in addition, they are also matched by multi-level indirect relationships if they exist. A query for a relationship between two CI classes is satisfied even if the two CI classes are connected by intermediate CI classes that are not specified in the query.

Combination Query

You can combine the two query types by incorporating a saved Service Mapping query into a CMDB query. For example, create a CMDB query for Windows Servers that are connected to Tomcat WAR. Then connect the Tomcat WAR CI class to a Service Mapping query. The query changes to find Windows Servers that are connected to Tomcat WAR which is included in the services that returned by the Service Mapping query. You can inverse that query by choosing **Does Not Belong To Service**. This changes the query to find Windows Servers that are connected to Tomcat WAR that is not included in services returned by the Service Mapping query.

Related topics

CMDB groups

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CMDB Query Builder engine execution modes

The CMDB Query Builder engine uses two execution modes to run queries. By default, the system is configured to use the enhanced mode V2 which is designed for performance optimization. V2 is supported for most queries and enables running complex queries significantly quicker and process larger result sets without performance degradation.

The CMDB Query Builder can be set with the following engine execution modes for running queries:

V2

An enhanced query execution engine designed for improved performance and scalability. This is the default execution engine. In V2 mode, compared to V1 mode, the CMDB Query Builder engine is capable of running complex queries significantly quicker and process larger result sets without performance degradation.

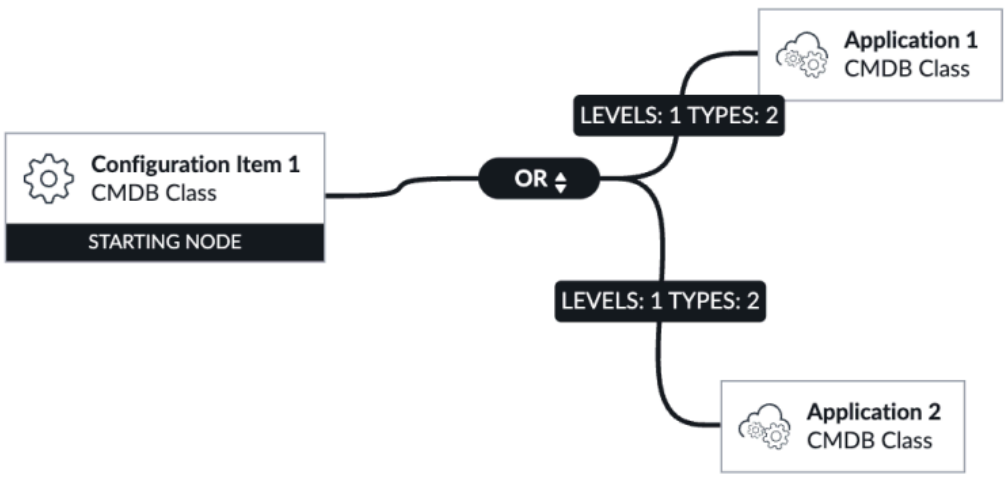
However, some query structures aren't supported for the V2 mode, in which case such queries will automatically run using the legacy mode (V1).

V1

Legacy execution engine which is used when the system is explicitly configured to use V1. This mode is also used even if the system is configured to run in V2 mode, to run queries with a structure that isn't supported for the V2 mode.

Considerations for the 'OR' operator

Setting the execution mode for queries that contain 'OR' operators, such as the sample query below, require some special considerations:



Running a query with 'OR' structures can be significantly faster in V2 mode than in V1, but the results are presented differently between V1 and V2 execution modes. The difference is because 'OR' operator nodes generate coalesced and cross-product result sets. In V2 mode, related results are merged into a single result item. In V1, the same results are represented by separate result items.

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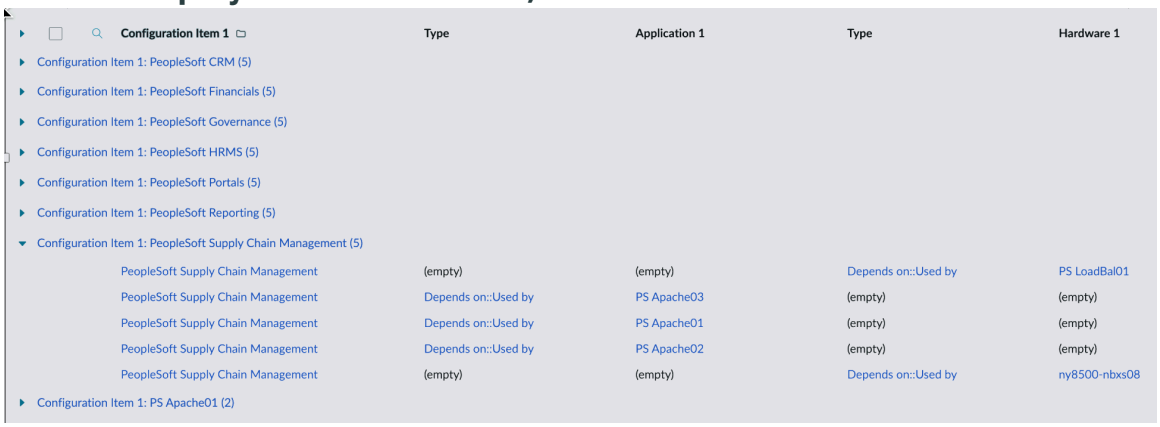
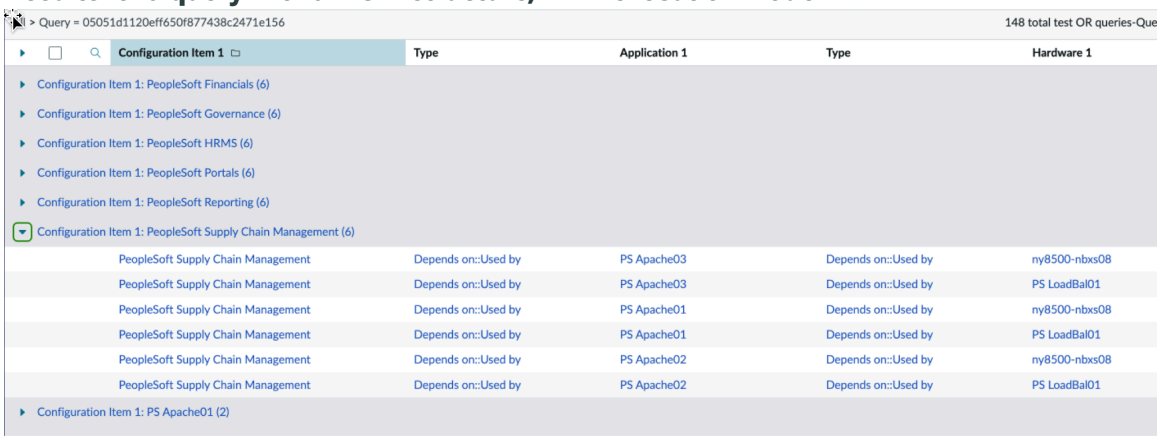
Results for a query with an 'OR' structure, in V1 execution mode



Configuration Item 1	Type	Application 1	Type	Hardware 1
Configuration Item 1: PeopleSoft CRM (5)				
Configuration Item 1: PeopleSoft Financials (5)				
Configuration Item 1: PeopleSoft Governance (5)				
Configuration Item 1: PeopleSoft HRMS (5)				
Configuration Item 1: PeopleSoft Portals (5)				
Configuration Item 1: PeopleSoft Reporting (5)				
Configuration Item 1: PeopleSoft Supply Chain Management (5)				
PeopleSoft Supply Chain Management	(empty)	(empty)	Depends on::Used by	PS LoadBal01
PeopleSoft Supply Chain Management	Depends on::Used by	PS Apache03	(empty)	(empty)
PeopleSoft Supply Chain Management	Depends on::Used by	PS Apache01	(empty)	(empty)
PeopleSoft Supply Chain Management	Depends on::Used by	PS Apache02	(empty)	(empty)
PeopleSoft Supply Chain Management	(empty)	(empty)	Depends on::Used by	ny8500-nbxs08
Configuration Item 1: PS Apache01 (2)				

Results for a query with an 'OR' structure, in V2 execution mode



> Query = 05051d1120eff650f877438c2471e156 — 148 total test OR queries-Que

Configuration Item 1	Type	Application 1	Type	Hardware 1
Configuration Item 1: PeopleSoft Financials (6)				
Configuration Item 1: PeopleSoft Governance (6)				
Configuration Item 1: PeopleSoft HRMS (6)				
Configuration Item 1: PeopleSoft Portals (6)				
Configuration Item 1: PeopleSoft Reporting (6)				
Configuration Item 1: PeopleSoft Supply Chain Management (6)				
PeopleSoft Supply Chain Management	Depends on::Used by	PS Apache03	Depends on::Used by	ny8500-nbxs08
PeopleSoft Supply Chain Management	Depends on::Used by	PS Apache03	Depends on::Used by	PS LoadBal01
PeopleSoft Supply Chain Management	Depends on::Used by	PS Apache01	Depends on::Used by	ny8500-nbxs08
PeopleSoft Supply Chain Management	Depends on::Used by	PS Apache01	Depends on::Used by	PS LoadBal01
PeopleSoft Supply Chain Management	Depends on::Used by	PS Apache02	Depends on::Used by	ny8500-nbxs08
PeopleSoft Supply Chain Management	Depends on::Used by	PS Apache02	Depends on::Used by	PS LoadBal01
Configuration Item 1: PS Apache01 (2)				

In some situations, it might be important to run a query with an 'OR' structure, using the V1 engine mode to retain the legacy format of the results in support of existing organizational reports. You can use the *glide.cmdb.query.or_execution_mode* system property as described below to control execution mode for queries with 'OR' structures.

Settings

The system uses the following settings of execution mode to determine which execution mode to use to run a query:

- Query-level setting:

  The *Query Execution Mode* attribute in the Saved Queries [qb_saved_query] table sets the engine mode for the respective query. For more information about this setting, see Set execution mode for running a query.

  The query-level setting has precedence over system property settings.

- Global setting:

  System property *glide.cmdb.query.execution_mode* sets the system-wide default mode to use when a query's mode isn't set at the query level.

- Global setting:

  System property *glide.cmdb.query.or_execution_mode* sets the system-wide default execution engine mode for queries that contain at least one logical OR condition.

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Because the results of a query with an 'OR' structure are formatted differently between V1 and V2 mode, this property setting also affects which format is used for the results.

This property has precedence over the *glide.cmdb.query.execution_mode* system property.

For more information about the engine mode system properties, see Property settings for CMDB Query Builder.

Unsupported query structures for V2 mode

The following query structures aren't supported in V2 and therefore are executed using V1 mode even if the system is configured to use V2 mode:

- Queries with filters containing related list conditions.
- No relationships combined with a filter containing configuration item conditions: Node that has no relationships configured and the target node's filter has configuration item conditions.

  For example: `Server NOT connected to Router WHERE Router.status = Active`.
- Service Mapping query with related edges (Applicative flow, Not Applicative flow, Belongs To, Not belongs to). Service Mapping query with service query properties set to **Find Related CIs** or **Find Unrelated CIs**, or a combination query in which a service query connection property is set to **Does Not Belong to Service**.

Decision flow

The system uses a decision flow that checks all relevant settings and the query structure to determine which execution mode to use for running a query. First, the system checks the query-level and the system-level settings. Then, if the settings are configured for using V2 to run a query, the system checks the query structure to determine if the V2 execution mode supports the query's structure. If the query contains a structure that isn't supported in V2, execution automatically falls back to using V1 mode even though the settings are configured to using V2. This automatic fallback mechanism supports a successful execution of all queries while maximizing performance benefits where possible.

Using default settings, if a query structure is supported by the V2 execution mode, the query executes using V2 mode.

The following decision flow examines settings and query structures, to determine whether a query runs in V1 or V2 engine execution mode:

1. Check the setting in the *Query Execution Mode* attribute in the query record in the Saved Queries [qb_saved_query] table:
   - If '**V1**': Use V1
   - If '*V2*': Skip to step #4 — Perform V2 support check
   - If '**None**': Check system properties as described in the next step
2. Check system property *glide.cmdb.query.execution_mode*:
   - If not set: Use V2 pending support check
   - If '**V1**': Use V1
   - If '**V2**':

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- If no logical OR conditions: Skip to step #4 — Perform V2 support check
- If one or more logical OR conditions: Perform 'OR'-specific check as described in the next step

3. Check the value of *glide.cmdb.query.or_execution_mode*:
   - If '**V1**': Use V1
   - If '**V2**': Skip to step #4 — Perform V2 support check
   - If empty: Use V2
4. Perform V2 support check:
   - If the query contains a structure that isn't supported in V2: Use V1
   - If query structure is supported in V2: Use V2

The *Query Execution Mode* attribute in table Query Status [qb_query_status] shows the execution mode assigned to each query.

Configuring CMDB Query Builder

You can configure settings that affect some functionality of the CMDB Query Builder.

Configuration overview

Configure CMDB Query Builder settings

Configure settings that control the appearance and operation of the CMDB Query Builder canvas.

Configure the relationships to query on

Configure relationships between CIs, such as the parent/child (direction) relationship or first- or second-level relationships.

Configure batch size for queries

If necessary, override the default global batch size (100) that is allocated for every Query Builder query run. Or, optimize the batch size value per saved query.

Set execution mode for running a query

Set the query execution mode for running a query, to use either the legacy engine or an performance-enhancing engine.

Configure CMDB Query Builder settings

Configure settings that control some of the functionality of the CMDB Query Builder.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. On the **CMDB Query Builder** page, select the Settings icon and then configure the settings.

Setting	Description
Display Relationships in Results	Display the relationship between CIs in the query results.
Display Suggested Connections	This setting applies only to CMDB queries.

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Setting	Description
	Filter the CMDB classes and the non-CMDB tables lists in the side-panel to display only classes and tables with which the selected node on the canvas has a relationship. You can then drag any item from the filtered list to the canvas and connect it to the selected node on the canvas.
Display Results in New Tab	Display query results in a separate browser tab titled **Query Results**.

3. Select the Settings icon again to close the dialog box.

Configure the relationships to query on

Configure the type of relationships that you want to query for in CMDB Query Builder. For example, configure which CI on the canvas is the parent and which is the child in the relationship or the level of relationships to query on.

Before you begin

Role required: cmdb_query_builder_read

About this task

When you connect CI classes on the canvas, the CMDB Query Builder displays the Connection Properties in the right-side bar, where you can configure the properties of the relationship to query on. For Service Mapping queries, you can also configure whether to query for related or unrelated CIs.

Note:
Newly added relationships between CI classes might take up to 30 minutes to appear in the relationship list.

Procedure

1. While adding CIs to the canvas, select a connection box on a CI and then select the connection box on another CI that you want to create a relationship with.
2. Configure the relationship properties in the Connection Properties side-bar.

Section	Field	Description
Relationship Direction	**Parent** **Child**	Set the relationship direction. Which CI class is the parent and which CI class is the child in the relationship.
Relationship Levels	**Level**	Query only on first-level relationship or also on second-level relationships.
Relationship Types and Related Items	**No Relationships**	Select to query for CIs which have no relationships to the set class.

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Section	Field	Description
Relationship Types and Related Items	Select **Add Relationship Types**	Query for CIs and descending classes with specific relationship types.
Relationship Types and Related Items	Select **Add a Related Item**	Query on related CIs using a field that the parent and ancestor parent CI classes use to reference the child CI class.

3. Select **Save**.

Related topics

CMDB groups

Batch size for CMDB Query Builder queries

In a base system, a global batch size of 100 is allocated for every Query Builder query run. If needed, you can use a system property to override the default global batch size, or optimize the batch size value per saved query.

Queries can differ widely as they can be configured to query a wide variety of classes. Therefore, the batch size in the base system might not be optimal for every query, and some queries might time out or take a long time to complete. The optimal batch size for running queries depends on system load such as amount of data and number of relationships in your system. Contact Support for assistance in calculating the batch size for your query.

Batch size is applicable and behaves the same in all query run scenarios, regardless of how the run was initiated:

- Query Builder user interface (ad hoc or saved query)
- Query Builder Scriptable API
- Scheduled jobs
- CMDB groups

The batch size for query runs is allocated in the following priority order:

1. The value in the *Execution Batch Size* field in the Saved Queries table, for a specific saved query. If set, this value applies only to the saved query, and has priority over the global value of 100 and the value of the glide.cmdb.query.batch_size system property.
2. The value of the system property glide.cmdb.query.batch_size, if exists, determines globally the batch size that is allocated to all query runs. If you add and set this property, the value applies to all queries, other than saved queries with *Execution Batch Size* value set.
3. A global value of 100, if the previous two options are not configured.

Modifying batch size for queries

If you are experiencing performance problems when running queries, you can modify the batch size value:

- Globally for all queries: By adding (if necessary) and setting the value of the system property glide.cmdb.query.batch_size.
- Per saved query: Set batch size for a specific saved query

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Set batch size for a specific saved query

Configure a custom batch size for a CMDB Query Builder saved query that takes a long time to complete or that times out. A custom batch size overrides the global batch size in the base system and the value of the *glide.cmdb.query.batch.size* system property.

Before you begin
Role required: admin

About this task
Contact Support for assistance in calculating the batch size for your query.

Procedure

1. In the Filter navigator, enter `qb_saved_query.list` and press Enter to navigate to the Saved Queries table.
2. In the Saved Queries list view, locate the saved query for which you want to change batch size.
3. Set or modify the value in the *Execution Batch Size* field.
   Set the value to be greater than the global value in the glide.cmdb.query.batch.size property, or increase any existing value.

Set execution mode for running a query

Configure the execution mode to use when running a query. The execution mode setting determines whether the query runs using a performance-enhancing engine (V2) or the legacy engine (V1).

Before you begin
Role required: cmdb_query_builder

About this task
A query can run in either of the following execution modes:

- V1: Runs the query using the legacy query execution engine.
- V2: Runs the query using an enhanced query execution engine which is designed for improved performance and scalability.

Note:
When running queries that contain 'OR' nodes, the format of the returned results is different between the two modes.

The system uses query-level settings and system-wide properties, and also checks the query structure, to determine which mode to use. The query-level setting described in this procedure has precedence over system property settings in the decision flow of which engine to use to run a query.

For more information, see CMDB Query Builder engine execution modes.

Procedure

1. Navigate to **All** and then, in the navigation filter, enter `qb_saved_query.list` to open the Saved Queries table.
2. In the Saved Queries list view, select the query for which you want to set execution mode.
3. On the query's form, set **Query Execution Mode** to '**v1**' or '**v2**'.
4. Select **Update**.

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Navigation in CMDB Query Builder

Use the navigation tools to enlarge or shrink the query, to move the query, or to border a section of the query to run.

Use the buttons in the navigation tool as follows:

- Use the plus sign (+) to increase magnification of the query.
- Use the minus sign (-) to decrease magnification of the query.
- Select the center dot to center the query on the canvas.
- Use the direction arrows to move the query in that direction.
- Use the selection tool under the navigation tool to toggle between two states:
  - Moving the entire query on the canvas.
  - Bordering a section of the query, which you can then run as a partial query.

Build a CMDB query using the CMDB Query Builder

A CMDB query type that queries the infrastructure for CI classes and optionally non-CMDB tables, and the relationships and references that connect them.

Before you begin

Role required: cmdb_query_builder_read to only view and run saved queries, and cmdb_query_builder (contained for itil, itil_admin, and asset) to create and save queries, modify saved queries, and run queries. For reporting on queries, report related ACLs are required.

Authorized users can update and delete a query created by another user.

About this task

Build the query by dragging the CI classes and non-CMDB tables that you want to include in the query. Then dropping them as nodes on the canvas, and defining relationship properties between them. You can filter on the attributes of any node to narrow down the results to a specific set of CIs of that class or to a single specific CI. You can also select which property columns appear in the query results.

As you step through building a query, list options and other user interface elements of the CMDB Query Builder, are dynamically filtered as appropriate to your selections.

To learn more about using Query Builder, see the CMDB Query Builder Queries and Reporting - Platform Analytics Academy ServiceNow Community video. For a step-by-step walk through of building CMDB queries in the Query Builder, including queries with application services, see Example queries.

Procedure

1. Navigate to **All** > **Configuration** and select **CMDB Query Builder**.
2. On the **CMDB Query Builder** page do either of the following steps:

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- Select **Create new**. Type in a **Name**, choose **CMDB Query** as the **Query type**, and then select **Create**.
- Select a widget of a saved query to continue building an existing query. Search for a saved query first if needed.
- Point to the upper right corner of a saved query widget, and select the **Duplicate Query** icon to edit a copy of a saved query. The default name of the new query contains the string 'copy'.

3. On the canvas, you can do any of the following operations:
   - Add CI classes to the query: On the **CMDB Classes** tab, select classes from the hierarchy list and drag them to the canvas.
   - Add an Application Service CI to the query: On the **CMDB Classes** tab, select the **Application Service** class from the hierarchy list and drag it to the canvas.

     In Application Service Properties on the right-side bar, you can select **Convert attached nodes to pattern** to query on patterns between the application service and other CMDB class nodes. When querying on a pattern, the nodes on both ends of the pattern connection, can be any number of levels apart. If **Convert attached nodes to pattern** is not selected, then the connection between the application service node and other CMDB class nodes, represent direct relationships.
   - Add non-CMDB tables to the query: Select a table from the **Non-CMDB Tables** list and drag it to the canvas.

     Note:
     A non-CMDB table cannot be the starting node in the query.
   - Add connections (relationships or patterns for application services) between two nodes on the canvas:
     a. On the first node in the connection, select the small square at the center of the right side.
     b. On the second node in the connection, select the small square at the center of the left side to create the connection.

     Connection UI Notations

Notation	Description
Full line	A relationship in a CMDB query.
Red asterisk at the center of the connection line	Information such as relationship type is missing, invalidating the query.
Levels:<n> Types:<n> or a **<Reference type>** notation on the connection line	As applicable: The number of relationship levels and the number of relationship types included for the connection. Or, a reference type for a relationship that is a reference.
Dashed line	A pattern connection between an application service node and another node.

   - In Connection Properties on the right-side bar, configure relationship settings (select the connection line if necessary):

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a. In the Relationship Direction section, select the **Parent** node (the **Child** node automatically adjusts).

b. In the Relationship Levels section, set **Level** to **First level relationships** if the CIs are directly connected. Or, **Up to 2nd level relationships** if the CIs are connected either directly or indirectly through another CI.

c. In the Relationship Types and Related Items section, select either option:

Option	Description
No Relationships	To query for CIs with no connecting relationships, such as `All Tomcat WAR CIs which are not connected to a Windows Server`.
Add Relationship Types	To select specific or any relationship type.
Add a Related Item	To query for related CIs between the nodes.

- Configure CI reference column for a connection to a non-CMDB table: In the Connection Properties right-side bar, in the CI Reference Column section, select the column with a reference to a CI from the **Use CI reference column** list. If only one option is available, it is automatically selected.
- Configure the pattern between an application service node set with the **Convert attached nodes to pattern** option, and a non-CMDB table node: Select **Apply <table> reference filter to all nodes in the pattern** to apply the query to the application service CI itself and to the CIs within the application service.
- Add filters to a class node: Apply filters to narrow down a class query to a specific set of CIs or to a single specific CI.

  a. Point to the node to add a filter to, and then select the **Apply filters** icon that pops up above the node.

  b. In the Filters section, add attribute and related list conditions.

  c. Close the **Filters** section.
  For example: Add a filter for database location to query for databases located in Seattle.

  Select **Applied Filters** in the right-side bar to view all filters for each node on the canvas.

- Add And/Or operators to the query:

  a. Connect one node to two other nodes.

  b. Select the **And** box that appears on the connection line, to toggle between the **And**/**Or** operators.
  For example: C1 is Tomcat WAR, C2 is Linux Server, and C3 is Windows Server. Query for `All Tomcat WAR CIs which are connected either to Linux Server Or to a Windows Server`.

- Add property columns for a node, to appear in the query results:

  Note:
  For a relationship, the query results include the *parent*, *child*, and *type* columns. You cannot add any other columns from the [cmdb_rel_ci] table.

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a. Select **Properties** in the right-side pane.

b. Select a node once or twice, so that the Report Columns section appears in the right-side bar, and then select **Add Columns**.

c. Select properties and then select outside the properties list to close it.

- Create a combination query by integrating a Service Mapping query into a CMDB query:

a. When building a CMDB query, select **Saved Service Queries** in the left-side bar.

b. Select and then drag a Service Mapping query to the canvas.
This query returns all CIs that satisfy the CMDB query, and that are included in the services returned by the embedded Service Mapping query.

- Add a search tag that can then be used as a search criteria for saved queries:

a. Select the **Add Tags** icon at the top of the canvas.

b. Select **Add Tag** and in the **Query Tags** dialog box enter one or more tag strings.

c. Select the **Add Tags** icon again to close the **Query Tags** dialog box.

4. Select **Save**.

On the **Saved Queries** tab, point to a saved query widget and select **Query Information**. Query details such as the query type, last update date, CMDB groups associated with the query, and the query schedules appear.

What to do next

- Select **Run**.

Only the first 100 results of the query appear in the results pane.

- Select **Load More Results** to view the next set of 100 results.
- Select **Load All Results** to view the rest of the query results, up to the number specified by the glide.cmdb.query.max_results_limit system property (10,000 by default).

Select a CI to open its CI form, and on the CI form select **Open in CMDB Workspace** to view CI health in the CI Health tile in CMDB Workspace. This operation requires the sn_cmdb_user (CMDB user) role.

Note:

- Ensure that the glide.security.use_csrf_token property is set to true, allowing all results to appear.
- When **Level** is set to **Up to 2nd level relationships**, the relationship type does not appear in the query results.
- When a query is running, wait for it to complete or to time out before opening or running another query.

- Modify Query Builder settings: Select the Settings icon to open the **Query Builder Settings** dialog box.
- Copy and share the URL of a saved query with users that have access to the CMDB Query Builder. Pasting the shared URL in a new internet browser window, directly opens the saved query in the CMDB Query Builder.
- Create a report in CMDB Query Builder.

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- Create a schedule to run the query at a future time, and to email the results to interested parties.
- Export query results:

  Select the Query Results context menu and select **Export**. Even if the **Load More Results** button is visible, indicating that there are additional query results, only the results that are visible are exported.
- Export and import a CMDB query to port a query definition between instances.
- Populate a CMDB group using a saved query.
- Delete a CMDB query.

Related topics

Example queries

Build a Service Mapping query using the CMDB Query Builder

The Service Mapping query type is a pattern consisting of classes and relationships between those classes. After you build the pattern and run the query, the query returns all the Service Mapping services that contain that pattern.

Before you begin

Role required: cmdb_query_builder_read to only view and run saved queries, and cmdb_query_builder (contained for itil, itil_admin, and asset) to create and save queries, modify saved queries, and run queries.

Authorized users can update and delete a query created by another user.

About this task

Build the query by dragging the CI classes that you want to include in the query, dropping them as nodes on the canvas, and then defining relationship properties between them. For every class node in the query, you can filter on its attributes to narrow down the results to a specific set of CIs of that class or to a single specific CI. You can also select which property columns appear in the query results.

As you step through building a query, list options and other user interface elements of the CMDB Query Builder, are dynamically filtered as appropriate to your selections.

See Example queries for a step-by-step walk through of building a Service Mapping query in the CMDB Query Builder.

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. On the **CMDB Query Builder** page do either of the following:

   a. Select **Create new**.

   b. Enter a **Name**.

   c. Select **Service Mapping Query** as the **Query type**.

   d. Select **Create**.

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e. Select a widget of a saved query to continue building an existing query. Search for a saved query first if needed.

f. Point to the upper right corner of a saved query widget.

g. Select the **Duplicate Query** icon to edit a copy of a saved query.
The new query's default name contains the string 'copy'.

3. On the canvas, you can do any of the following:
   - Add CI classes to the query: Select classes from the **CMDB Classes** hierarchy list and drag them to the canvas.
   - Add connections (relationships) between two nodes on the canvas:
     a. On the first node in the relationship, select the small square at the center of the right side.
     b. On the second node in the relationship, select the small square at the center of the left side to create the connection.
     c. In **Connection Properties** on the right-side bar, configure the following (select the connection line if necessary):
        - In the Relationship Direction section, select the **Parent** node (the **Child** node automatically adjusts).
        - In the Service Query Properties section, select **Find Related CIs** or **Find Unrelated CIs** to query for a pattern in which the two classes have or do not have relationships with each other, respectively.

          For example, `All Tomcat WAR CIs which are not connected to a Windows Server`.

     Relationship UI Notations

Notation	Description
Dashed line	A relationship in a Service Mapping query.

   - Add filters to a class node: Apply filters to narrow down a class to a specific set of CIs or to a single specific CI.

     a. Point to the node to add a filter to, and then select the **Apply filters** icon that pops up above the node.
     b. In the Filters section, add attribute and related list conditions.
     c. Close the **Filters** section.
     For example: Add a filter for business criticality to query for businesses that are 'most critical'.

     Select **Applied Filters** in the right-side bar to view all filters for each node on the canvas.

   - Add And/Or operators to the query:
     a. Connect one node to two other nodes.
     b. Select the **And** box that appears on the connection line, to toggle between the **And** and the **Or** operators.

     For example C1 is Tomcat WAR, C2 is Linux Server, and C3 is Windows Server. Query for all Tomcat WAR CIs which are connected either to Linux Server Or to a Windows Server.

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- Add property columns for a node, to display in the query results:

  Note:
  For a relationship, the query results display the *parent*, *child*, and *type* columns. You cannot add any other columns from the [cmdb_rel_ci] table.

  a. Select **Properties** in the right-side pane.

  b. Select a node once or twice, so that the node's Report Columns section appears in the right-side bar, and then select **Add Columns**.

  c. Select properties and then select outside the properties list to close it.

- Select columns and add filters that will be applied to the resulting set of services:

  a. Select **Properties** in the right-side bar, and then select an empty space on the canvas to ensure that nothing is selected.

  b. Select **Add Columns** at the bottom of the right-side bar and select columns to add. Select outside the columns list to close it.

  c. Select the **Apply Service Mapping Query Filters** icon at the top of the canvas and add filters.

- Inverse the entire query and search for all Service Mapping services that do not include the query pattern: Select a node once or twice so that Query Properties appear in the right-side bar. In the Metadata section, toggle **Services Including This Pattern** to enable or disable the option.

- Add a search tag that can then be used as a search criteria for saved queries:

  a. Select the **Add Tags** icon at the top of the canvas.

  b. Select **Add Tag** and in the **Query Tags** dialog box enter one or more tag strings.

  c. Select the **Add Tags** icon again to close the **Query Tags** dialog box.

4. Select **Save**.

   On the **Saved Queries** tab, point to a saved query widget and select **Query Information** to view query details such as the query type, last update date, and the query schedules.

What to do next

- Select **Run**.

  The query results pane displays only the first 100 results of the query.

  - Select **Load More Results** to display the next set of 100 results.
  - Select **Load All Results** to display the rest of the query results, up to the number specified by the glide.cmdb.query.max_results_limit system property (10,000 by default).

  Select a CI to open its CI form, and on the CI form select **Open in CMDB Workspace** to view CI health in the CI Health tile in CMDB Workspace. This operation requires the sn_cmdb_user (CMDB user) role.

  Note:
  When a query is running, wait for it to complete or to time out before opening or running another query.

- Modify Query Builder settings: Select the Settings icon to open the **Query Builder Settings** dialog box.

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- Copy and share the URL of a saved query with users that have access to the CMDB Query Builder. Pasting the shared URL in a new internet browser window, directly opens the saved query in the CMDB Query Builder.
- Create a report in CMDB Query Builder.
- Create a schedule to run the query at a future time, and to email the results to interested parties.
- Export query results:

  Export query results that are visible: Select the Query Results context menu and select **Export**. Even if the **Load More Results** button is visible, indicating that there are additional query results, only the results that are visible are exported.

- Export and import a CMDB query to port a query definition between instances.
- Populate a CMDB group using the saved query.
- Delete a CMDB query.

Related topics

Example queries

Run a partial CMDB query

You can run a partial query in the CMDB Query Builder by defining a section of a query, and then running it.

Before you begin
Role required: cmdb_query_builder (contained for itil, itil_admin, and asset)

About this task
While building a query or reviewing a saved query, you can run only a section of the query. On the canvas in the CMDB Query Builder, highlight a section of the query which contains the nodes and relationships of the partial query that you want to run. You can then examine the results of the partial query, and update the query if needed.

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. On the CMDB Query Builder page, select a tile to open an existing query.
3. Select the selection tool under the navigation tool to switch to a section selection mode.
4. Border a section of the query:

   a. Select the upper left corner of the section.

   b. Drag and release at the bottom right corner of the section that you want to create.
   As the cursor moves, the selected section is highlight in light blue. The query nodes that are included in the partial query, appear with a blue border.

5. Select **Run**.
6. In the Pick Starting Node dialog box, select the starting node for the partial query and then select **Confirm**.

Result
The results of the partial query appear in the Results pane.

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Delete a CMDB query

Delete a CMDB query that is no longer used or needed.

Before you begin

The query that you want to delete must be already saved.

Role required: cmdb_query_builder (contained for itil, itil_admin, and asset). Authorized users can delete a query created by another user.

Procedure

1. Navigate to **All** > **Configuration** and select **CMDB Query Builder**.
2. On the **CMDB Query Builder** page, select the Saved Queries tab and set the viewing mode to Card view.
3. Move to the card with the query that you want to delete.
4. Select the Delete Query (X) icon that appears in the card.

Create a report in CMDB Query Builder

Use CMDB Query Builder reports to show the results of a CMDB query or a Service Mapping query. Create a basic report or a dynamic report that auto-updates when the results of the associated saved query change.

Create a basic report

After running a query in the CMDB Query Builder, you can create a basic report that is scoped to the query execution.

Before you begin

The Core UI plugin (com.glide.ui.ui16) must be activated.

Role required:

- View report: cmdb_query_builder or cmdb_query_builder_read
- Create report: cmdb_query_builder or cmdb_query_builder_read, and report_user

In a base system, the cmdb_query_builder role is contained in the itil and asset roles.

Procedure

1. Navigate to **All** > **Configuration** and click **CMDB Query Builder**.
2. Build a query.
3. In the query results pane, click **Load More Results** or **Load All Results** to load all the results that you want to include in the basic report.
4. In the query results pane, click the column context menu and select **Bar Chart** or **Pie Chart**.

Result

The Reports application creates a basic report, which is scoped to the query results that are currently loaded and is static.

Related topics

Reporting

Build a CMDB query using the CMDB Query Builder

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Build a Service Mapping query using the CMDB Query Builder

Run a partial CMDB query

Create a dynamic report

After running a saved query in the CMDB Query Builder, create a dynamic report that continuously updates to show the latest query results. You can use a dynamic report as any other report created using Reporting and you can add it to Performance Analytics dashboards.

Before you begin

Ensure that the query that you want to create a dynamic report for is a saved query, and that there is a specified schedule for the query. Also, run the saved query and ensure that all query results are visible.

Role required:

- To create: cmdb_query_builder and report_user
- To view: Reporting role requirements might apply, see Administering reports for Reporting role requirements.

In the base system, the cmdb_query_builder role is contained in the itil and asset roles.

About this task

The **Create Report** button in CMDB Query Builder which is used to create a dynamic report, is activated only if:

- The query is saved
- The query has a schedule
- The entire set of query results is present after a query run

The initial dynamic report that you create, is based on the results from the initial run of the saved query. Then, on every subsequent run of the saved query, the associated report automatically updates with the latest query results.

However, if you change the query definition itself, the query and the report are no longer in sync and you must create a new report.

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. In the **Saved Queries** tab, select the saved query for which you want to create a report. Ensure that the query has a specified schedule.
3. Select **Run** and ensure that all query results appear.
   Click **Load All Results** if available, to load all results. The **Create Report** button is enabled only if all query results are showing.
4. Click **Create Report**.
   If the CMDB Query Builder displays the query results in a new tab, then after the new tab opens with the query results, return to the CMDB Query Builder window.
5. In the Report Designer, click **Next** or **Back** to view and configure the new report in the **Data**, **Type**, **Configure**, and **Style** tabs.
   The report is pre-populated with the CMDB query results and a few other report details.
   - **Report name** is set to the name of the saved query.
   - **Source type** is set to **Data source**.

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- **Data source** is set to the table in which the query results are stored.
- **Query Sys ID** is the ID of the latest run of the query.

For more details about Reporting and about configuring a report in the Report Designer, see Reporting, Creating reports.

6. Click **Save** or **Run**.

Result

CMDB Query Builder creates a report source which you can attach to a report and use with dashboards. For more details about report sources, see Report sources.

What to do next

Use either of the following steps to view the new report source. The name of the new report source is set to the name of the CMDB query it was created from, and cannot be changed.

- In Query Builder, click **Saved Queries**. In the Saved Queries window, click the **Query Information** icon in the tile of the saved query. Scroll to the bottom of the information list and then click the link under **Report source**.
- Navigate to **All** > **Reports** > **Administration** > **Report Sources** and locate the new report source.

Search for a saved query

The CMDB Query Builder allows you to search for a specific saved query using any combination of search criteria such as the query's name, type, custom tags, and who created or updated the query.

Before you begin

To locate a saved query using a **Query Tags** search criteria, the query must have a query tag associated with it. For more information see Build a CMDB query using the CMDB Query Builder, or Build a Service Mapping query using the CMDB Query Builder.

Role required: cmdb_query_builder (contained for itil, itil_admin, and asset)

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
   The Saved Queries tab shows all saved queries in tiles, and also a tile for creating a new query.
2. On the Saved Queries tab, specify a **Sort by** criteria to filter the saved queries that are showing.
3. In the **Search Saved Queries** field, enter a search string that corresponds to the **Sort by** selection and then select an item from the list that gets populated as you type.
   The drop-down list includes search strings that can be applied to the sorting criteria such as 'Query name'.
4. Refine the search by entering additional **Search Saved Queries** search strings as needed.

Schedule a CMDB query

Schedule a saved CMDB query to run once at a scheduled time or on a recurring schedule, and to email the query results to specified users.

Before you begin

A saved CMDB query that was built in the CMDB Query Builder must exist.

Role required: cmdb_query_builder (contained for itil and asset)

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About this task

The query results are attached to the email as a file in the specified format.
The maximum number of result rows that can be attached is determined by the *glide.cmdb.query.max_results_limit* system property (10,000 by default).

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder** and then select a saved query.
2. Select **Create Schedule** and then fill in the form.

Scheduled Email of Query Builder form

Field	Description
Query	The query to run.
Users	Users who should receive query results email. To receive emails, users must have an Email address defined and have Notifications set to Enable in their user records.
Groups	Groups to email the query results to.
Zip output	Indicates whether the report should be sent as a zip file.
Active	Indicates whether to run the query according to the specified schedule.
Run	Frequency for running the query.
Time	Time of day to run the query.
Conditional	Indicates whether to display the **Condition** field, which allows you to specify conditions under which the query runs.
Omit if not records	Indicate whether to distribute email if the query returns zero results.
Email addresses	Email addresses of users who should receive the email but who are not in the system.
Subject	Text that appears in the subject line of the distribution email.
Introductory message	Additional message that is delivered with the query results.
Condition	User-created script that checks for certain conditions to be true before running the query. This field is visible only when **Conditional** is checked.

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Field	Description
Type	File format to use for the query results. **Note:** Configure the form layout to add this field to the form.

Export and import a CMDB query

Export a saved CMDB or Service Mapping query definition to an XML file which you can later import and run in the CMDB Query Builder. This process lets you port a saved query between instances, such as from a development environment to a production environment.

Before you begin

- You must save a query before you can export it.
- Domain in an exported query must be visible in both, source and destination instances.

Role required: cmdb_query_builder (contained in itil, itil_admin, and asset).

About this task

When exporting a combination query, the integrated Service Mapping query definition is included in the exported query.

For backward compatibility, you can alternatively Export and import a query as an update set.

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. Export a saved query:
   a. In the **Saved Queries** tab, in either list view or card view, select a saved query.
   b. Select the **Export query** icon at the top of the Query Builder canvas.
   c. Wait for the **Query Export Complete** message to appear and then select **Download**.
   You can now access the query XML file.
3. Import a saved query:
   a. In the **Saved Queries** tab, select the **Import query** icon at the top of the CMDB Query Builder window.
   b. In Finder, select the saved query XML file and select **Open**.
   The imported query is available in the **Saved Queries** tab of the CMDB Query Builder on the instance.

Export and import a query as an update set

Export a saved query definition to an XML file as an update set, which you can later import.

Before you begin

Role required: To export — cmdb_query_builder (contained in itil and asset). To import — user with permission to import an update set.

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Domain in the exported query must be visible in both, source and destination instances.

About this task

Export a query definition as an update set which you can later import and commit. This process lets you port a query between instances, such as from a development environment to a production environment. For more information about exporting and then committing update sets using XML files, see Save an update set as a local XML file.

When exporting a combination query, the integrated Service Mapping query definition is included in the exported update set.

Procedure

1. Export a saved query:
   a. In the **Filter navigator**, enter `qb_saved_query.list`.
   b. Select **Enter** to navigate to the Saved Queries table.
   c. In the Saved Queries list view, select the query that you want to export.
   d. Select **Actions on selected rows** and then **Export query**.
   e. Wait for the **Query Exporter** to complete the export.
2. Import the exported saved query:
   a. Navigate to **System Update Sets** > **Retrieved Update Sets**.
   b. On the Retrieved Update Sets form, select **Import Update Sets from XML**.
   c. On the Import XML page, select **Choose file**.
   d. Select the exported XML file.
   e. Select **Upload**.
   f. Open the new record that was added to the Retrieved Update Sets list view.
   g. On the Retrieved Update Set form, select **Preview Update Set Batch**.
   h. Close the Batch Update Set Preview dialog box.
   i. Select **Commit Update Set Batch**.
   j. Close the Commit Update Set Batch dialog box.

Result

The imported query is added to the Query Builder saved queries on the instance.

CMDB Query Builder reference

Reference topics provide example queries and descriptions of navigation and property settings.

Reference topics

Domain separation and CMDB Query Builder

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

Navigation in CMDB Query Builder

Use the navigation tools to enlarge or shrink the query, to move the query, or to border a section of the query to run.

Property settings for CMDB Query Builder

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Use the CMDB Query Builder properties to configure query processing.

Example queries

Use the example queries as models for building your custom CMDB queries and Service Mapping queries.

Domain separation and CMDB Query Builder

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

How domain separation works in the CMDB Query Builder

With the CMDB Query Builder you can easily build complex infrastructure and service queries that span multiple CMDB classes, and that involve many CIs that are connected by different relationships. Domain separation is set to be on by default.

- **Saved Query**

  The user creates a query by dragging a class node from the class hierarchy and dropping it to the canvas and connecting the nodes with the relationships type.

  The user can save the created query as an XML file to the database [qb_saved_query] table in the CMDB for future use. The saved query is domain separated.

- **Query results**

  With a saved query, the user selects **Run** and the query result is saved and displays in the platform list view.

  In the query results, domain separation behaves in the same way as the platform list view for the CI relationship [cmdb_rel_ci] table and CMDB CI [cmdb] table. Consequently, since the CI relationship is not domain separated, all relationships of the query result display, regardless of the domains. Conversely, if the query result is CI only, since the CMDB CI is domain separated, the results display only if visible in the current domain.

Related topics

Domain separation and Configuration Management Database (CMDB)

Property settings for CMDB Query Builder

Set property values to configure query processing.

Access and Role required

The admin role is required to view and edit Query Builder properties.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

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Properties for CMDB Query Builder

Property	Description
Limits the number of results for a scheduled query and in the results section in the Query Builder when you select **Load All Results**. glide.cmdb.query.max_results_limit	• Type: integer • Default value: 10000 • Location: **Configuration** > **CMDB Properties** > **Query Builder Properties**
Time limit (in seconds) for running one batch to get one batch of query results (100 results). glide.cmdb.query.batch_time_limit_in_sec	• Type: integer • Default value: 300 • Location: **Configuration** > **CMDB Properties** > **Query Builder Properties**
Time limit (in seconds) for running an entire query to get all results. glide.cmdb.query.query_time_limit_in_sec	• Type: integer • Default value: 1800 • Location: **Configuration** > **CMDB Properties** > **Query Builder Properties**
Exclude list of non-CMDB tables. The specified tables will not appear in the CMDB Query Builder when a user creates a query. glide.cmdb.query.non_cmdb.black_listed_tables	• Type: string • Default value: empty • Other values: Comma-separated list of table names (not labels). Can include '*abc' to exclude all tables containing 'abc' in their table name. • Location: **Configuration** > **CMDB Properties** > **Query Builder Properties**
glide.cmdb.query.batch_size	Batch size allocated globally when saved queries run. • Type: integer • Default value: 100 • Location: Add to System Properties [sys_properties] table.
glide.cmdb.query.execution_mode	Default execution engine to use when running a saved query when the query's execution mode isn't set (Query Execution Mode is 'None'). Used in combination with the *glide.cmdb.query.or_execution_mode* system property. • Type: string • Values:

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Properties for CMDB Query Builder (continued)

Property	Description
	○ v1: Use the legacy query execution engine. ○ v2: Use an enhanced query execution engine which is designed for improved performance and scalability. • Default value: v2 • Location: System Properties [sys_properties] table. • Learn more: Set execution mode for running a query
glide.cmdb.query.or_execution_mode	Default execution engine to use, applying only to queries that contain at least one logical OR condition. Used in combination of the *glide.cmdb.query.execution_mode* system property. • Type: string • Values: ○ v1: Use the legacy query execution engine. ○ v2: Use an enhanced query execution engine which is designed for improved performance and scalability. • Default value: v2 • Location: System Properties [sys_properties] table. • Learn more: Set execution mode for running a query

Example queries

Use the example queries as models for building your custom CMDB queries and Service Mapping queries.

CMDB — Servers connected to a database

Use this example to build a CMDB query to find all servers with a connection to a database.

CMDB — Critical application services

Use this example to build a CMDB query to find all critical application services, and their owner.

CMDB — Application services with incident or change

Use this example to build a CMDB query to find all application services for which there is an incident or a change request. Results are returned for either the application service itself or any CI within the service.

CMDB — Hardware with Windows installed

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Use this example to build a CMDB query to find all hardware in my service offering that has Microsoft Windows installed.

Service Mapping — Linux servers in services

Use this example to build a Service Mapping query to find all Linux servers in services.

CMDB — Servers connected to a database

Use this example to build a CMDB query to find all servers with a connection to a database.

Before you begin

Role required: none

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. Select **Create new** and then enter a name, for example `All servers with a connection to a DB`.
3. Choose **CMDB Query** and then select **Create**.
4. In the **CMDB Classes** list, locate the **Server** class and drag it to the canvas.

   Tip:
   Use the search box to find items quickly.

5. Locate the **Database** class, and place it to the right of the **Server** class node on the canvas.
6. Select at the center of the right side of **Server**, and then at the center of the left side of **Database** to create a connection line between the two class nodes.
7. Select once or twice on the connection line until the Connection Properties panel appears in the sidebar.
8. In the Relationship Types and Related Items section, select **Add Relationship Types** and add all the relationships from the list.

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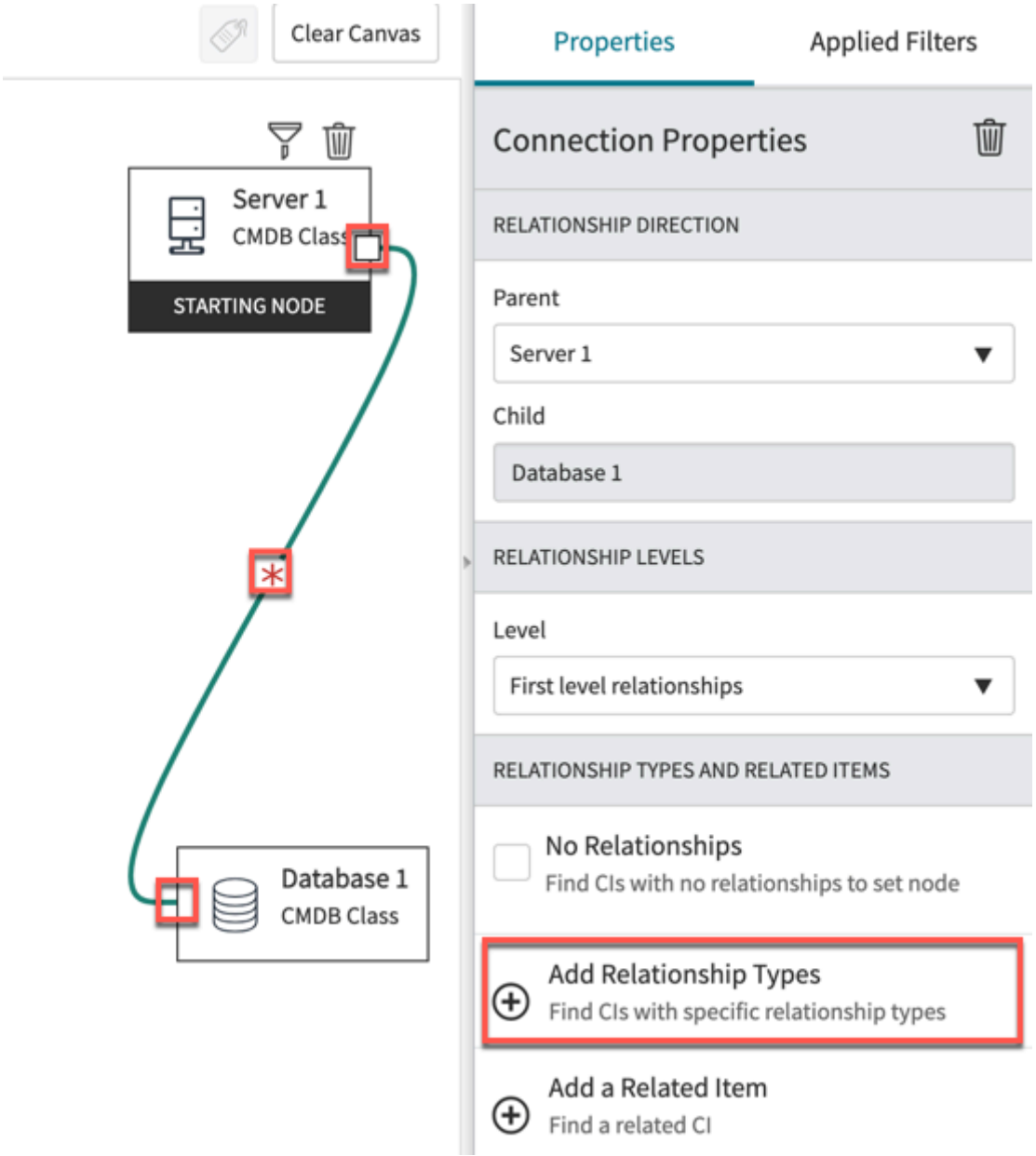

Settings in the Relationship Direction section reflect the parent-child direction in the relationship. If the Database class is the parent in the relationship, then the **Parent** and **Child** settings are switched.

9. Select **Save**, and then select **Saved Queries** on the left to see the widget for the saved query.
10. Select the query widget to return to the canvas in edit mode.
11. Select **Run** to execute the query.
    Review the query results. Each row displays the name of a server CI, the name of a database CI, and the relationship type between them.
12. Add columns to the query results.

    a. Select the **Server 1** node on the canvas once or twice so that the Server 1 Report Columns section appears in the right-side pane.

    b. Select **Add Columns**.

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c. Select **Manufacturer** and then select outside the columns list to close it.

d. Select **Run**.
The query results now include the **Manufacturer** column.

e. Select **Save** again to save your customization for this query.

CMDB — Critical application services

Use this example to build a CMDB query to find all critical application services, and their owner.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder** and then select **Create new**.
2. Enter `All critical application services` as the query **Name**.
3. Choose **CMDB Query** and then select **Create**.
4. In the **CMDB Classes** list, locate the **Application Service** class and then drag it to the canvas.

   Tip:
   Use the search box to find items quickly.

5. Add a filter to the application service node.
   a. Point to the application service node and then select the **Apply filters** icon.
   b. In the Filters section, add the condition **[business criticality] [is] [1 - most critical]**.
   c. Close the Filters section.
6. Add columns to the query results.
   a. In the Properties sidebar, select **Add Columns**.
   b. Select **business criticality** and **owned by**, and then select outside the columns list to close it.
7. Select **Save**.
8. Select **Run** and then review the results.
   You can, for example, locate any of the critical application services without an owner.

CMDB — Application services with incident or change

Use this example to build a CMDB query to find all application services for which there is an incident or a change request. Results are returned for either the application service itself or any CI within the service.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder**.
2. Select **Create new** and then enter `Application services with incidents or change requests` as the query name.

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3. Choose **CMDB Query** and then select **Create**.
4. In the **CMDB Classes** list, locate the **Application Service** class and then drag it to the canvas.

   Tip:
   Use the search box to find items quickly.

5. Select **Non-CMDB Tables**.
6. Locate the **Incidents** class in the class hierarchy, and then drag it to the canvas.
7. Locate the **Change Requests** class in the class hierarchy, and then drag it to the canvas.
8. Connect the Application Service and the Incidents nodes, and then, in the Properties right-side bar.
   a. Select **Apply Incidents reference filter to all nodes in the pattern**.
   b. Set **Use CI reference column** to **Configuration item**.
9. Connect the Application Service and the Change Request node, and then, in the Properties right-side bar.
   a. Select **Apply Change Request reference filter to all nodes in the pattern**.
   b. Set **Use CI reference column** to **Configuration item**.
10. Select the **And** operator between the Incidents and the Change Request nodes, and switch it to **Or**.
11. Select **Save**.
12. Select **Run** and then review the results.

CMDB — Hardware with Windows installed

Use this example to build a CMDB query to find all hardware in my service offering that has Microsoft Windows installed.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Query Builder** and then select **Create new**.
2. Enter `All hardware in my service offering that has Windows installed` as the query name.
3. Choose **CMDB Query** and then select **Create**.
4. In the **CMDB Classes** list, locate the following classes, and then drag them to the canvas:

   Tip:
   Use the search box to find items quickly.

   - **Service**
   - **Service Offering**
   - **Application Service**
   - Searching for infrastructure, **Hardware**
5. Connect the Service node to the Service Offering node.

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In the Properties sidebar, select **Add Relationship Type** and select the **Connect to::Connected by** relationship.

6. Connect the Serviced Offering node to the Application Service node.

   In the Properties right-side bar, select **Add Relationship Type** and select the **Connect to::Connected by** relationship.

7. Select the Application Service node.

   In the Properties right-side bar, select **Convert attached nodes to pattern** to include all CIs within the application service, in the query.

8. Connect the Application Service node to the Hardware node.
9. All infrastructure under Service,
10. Select **Save**.
11. Select **Run** and then review the results.

    You can select **Column options** of the Service column header, and select to **Group by Service**. Then expand a service to see all the hardware infrastructure under that service.

12. Return to the CMDB Query Builder window, to expand the query to include only infrastructure CIs on which Windows is installed.
13. Select **Non-CMDB Tables**, locate the **Software Instance** class, and drag it to the canvas.
14. Connect the Hardware node to the Software Instance node.

    In the Properties right-side bar, set **Use CI reference column** to **Installed on**.

15. Point to the Software Instance node, and select on the **Apply filters** icon that appears.
    a. In the Filters section, add the condition **[Product Name.Name] [is] [windows]**.
    b. Close the Filters section.
16. Select **Save**.
17. Select **Run** and review the new results.

Service Mapping — Linux servers in services

Use this example to build a Service Mapping query to find all Linux servers in services.

Before you begin

Role required: none

About this task

This example Service Mapping query finds all services that include Linux servers. Then, with a simple modification, the query can find all services that do not include a Linux server.

Procedure

1. Navigate to **All** > **Configuration** and select **CMDB Query Builder**.
2. Select **Create new** and then enter `Linux server in services` in the **Name** field.
3. Choose **Service Mapping Query** and then select **Create**.
4. In the **CMDB Classes** hierarchy list, locate **Linux Server** and drag it to the canvas.

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Tip:
Use the search box to find items quickly.

5. Select **Run**.

   Review the query results. Each row displays the name of a Service Mapping service and the name of a Linux server that is a member of that service.

6. On the right-side pane, disable **Services Including This Pattern** and then select **Run** again.

   Review the query results. Now, each row displays the name of a Service Mapping service that doesn't include the specified Linux server.

Monitor health in CSDM and CMDB Data Foundations Dashboards

The ServiceNow® CSDM and CMDB Data Foundations Dashboards store app contains dashboards with insights into the key foundational metrics of your CMDB and Common Service Data Model (CSDM). This app uses ServiceNow® health benchmarks to provide recommendations to ensure that the CMDB and CSDM are properly configured for optimal usage and to mitigate any potential risks.

Note:
CSDM and the CMDB Data Foundations Dashboards don't support domain separation.

For an introduction, watch the ServiceNow Data Foundations Dashboards for CSDM and CMDB video.

Request apps on the Store

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

The CSDM and CMDB Data Foundations Dashboards store app provides dashboards that complement each other. See the respective sections for each of the following dashboards:

CMDB Data Foundations dashboard

Evaluates various configurations and customizations in the CMDB. This dashboard checks that important data is valid and properly configured, and identifies and provides visibility into potential risks in the implementation. Use the CMDB Data Foundations dashboard to prevent issues and support continuous effective functioning of the CMDB.

CSDM Data Foundations dashboard

The CSDM Data Foundations dashboard displays key CSDM metrics on a single page to assist you in getting the full benefit from your ServiceNow AI Platform® products.

The CSDM and the CMDB Data Foundations dashboards capability is provided by the com.snc.cmdb.getwell plugin, which is activated by default in base systems.

Access the dashboards

Use either of the following steps to access the CSDM and the CMDB Data Foundations Dashboards:

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- In CMDB Workspace:
  1. Navigate to **Workspaces** > **CMDB Workspace**.
  2. Select **Management** in the CMDB Workspace menu bar.
  3. Select **CMDB Data Foundations Dashboard** or **CSDM Data Foundations Dashboard** in Management tools, in the Optimize section.
- Navigate to **All** > **Configuration**, and then select **CMDB Data Foundations Dashboard** or **CSDM Data Foundations Dashboard**.

You can toggle between the two dashboards by clicking the change dashboard icon ( ) on the title bar of either dashboard.

Manage performance

It might be useful to manage the performance impact of some metrics that are greatly affected by, for example, a large CMDB or a high number of non-compliant CIs. You can use any of the following methods to manage performance of those metrics to improve the overall performance of the dashboards:

Deactivate a metric

Deactivate any CMDB or CSDM metrics that aren't needed or that require extensive resources and affect performance. The active/non-active settings for metrics are preserved across family release upgrades.

To deactivate a metric:

1. Access the CMDB/CSDM Get Well Metrics [sn_getwell_metric] table where all CMDB and CSDM metrics are stored.
2. Navigate to the list view of the table [sn_getwell_metric].
3. Locate the metric that you want to deactivate and set its **Active** column to **false**.

Tiles on the dashboards that are associated with inactive metrics stop collecting data and aren't refreshed.

Limit a metric

For the following metrics, you can use metric-specific settings to limit their performance impact:

- CMDB metrics:
  - *CIs Processed via IRE*
  - *CIs with Relationships to Parent and Child*
  - *Hardware CIs with Serial Numbers*
- CSDM metrics:
  - *Application Services with 'Consumes::Consumed By' Relationship to Business Application*
  - *Application Services with Business Application Relationships*
  - *Business Application with Application Service Relationship*

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The following columns in the CMDB/CSDM Get Well Metrics [sn_getwell_metric] table are set with default values per metric that limit performance impact, some of which can be fine tuned. Review those settings for example, when there is a large number of non-compliant CIs for a metric. Another example is having a large CMDB where a small number of compliant CIs for a metric is already a sufficient indication of health and there is no need to process the rest of the CIs for that metric.

- *Aggregate limit*: The maximum number or percentage of non-compliant CIs that are reported for the metric. Once that threshold is reached, counting for the metric stops for the run and the score for the metric is set to 0 (you can't customize the default value).
- *Fail count threshold*: The threshold of the number of consecutive metric runs that failed due to exceeding the metric's *Runtime threshold*. When that threshold is reached, the respective metric is automatically deactivated.
- *Runtime threshold*: The time threshold in seconds that is considered too long for a metric run. When exceeded, the current metric run is considered failed.

For most metrics, when the number of consecutive runs that fail because the runtime exceeds *Runtime threshold*, is greater than the *Fail count threshold*, the system automatically deactivates the metric. You can manually reactivate a deactivated metric by setting its **Active** column to **true**. An exception to those column definitions and usage is the CMDB *CIs Processed via IRE* metric. For details, see CMDB Data Foundations dashboard.

CMDB Data Foundations dashboard

Use the CMDB Data Foundations dashboard to monitor foundational key health-related metrics in CMDB.

Requirements

- To access the CMDB Data Foundations dashboard, users must be configured with the sn_cmdb_admin, admin, itil_admin, or asset roles. Some metrics that let you drill-down to Performance Analytics (PA) data, might require additional roles for accessing specific tables. Those roles are specified as appropriate per metric.
- The CMDB Data Foundations dashboard adds the following scheduled jobs, which must be running:
  - *CMDB Get Well Metric Collection*: Calculates and stores details for compliant CIs associated with metrics, populating the list view of the metrics. Data appears on the dashboard only after the first run of this scheduled job. Metrics' scores are stored in the CMDB Data Foundations Metric Scores [sn_getwell_cmdb_score] table. This non-PA job runs daily by default.
  - *CMDB Data Foundations PA Metric Collection*: Calculates the total non-compliant CIs associated with metrics and populates the PA widgets on the dashboard. Also, provides trending data over time for the non-compliant CIs associated with metrics. This PA job runs daily by default.
  - *CMDB Get Well CIs Processed Via IRE Metric Batch Collection*: Invoked once a day (by default) by the *CMDB Get Well Metric Collection* job and repeatedly runs in 10 minute intervals, to process as many 1,000-CIs (default) batch files as possible. After each 10-minute run, the job stops for a minute.

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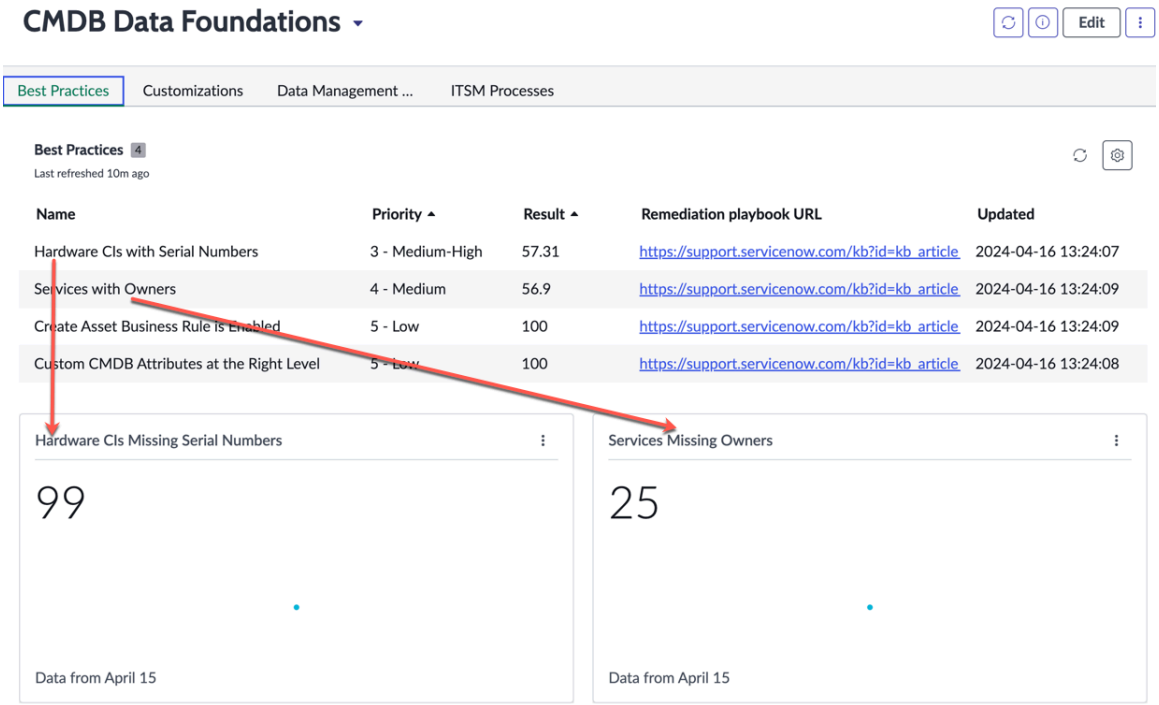
Overview of CMDB Data Foundations dashboard



The CMDB Data Foundations dashboard provides four tabs, each grouping a distinctive set of CMDB metrics:

- **Best Practices**: Checks if usage of tables and properties is as intended for supporting the health of the CMDB. This set of metrics checks adherence of CSDM-related standards, for example, for populating services and relationships.
- **Customizations**: Checks how customizations to the CMDB are used. This set of metrics checks that customizations are not used excessively, and that they are used only when needed and are correctly applied.
- *Data Management Practices*: Checks if importing third-party data into the CMDB is properly done without compromising the integrity of the CMDB. This set of metrics checks if the imported data is properly configured and formatted to provide the foundation for CMDB functions.
- **ITSM Processes**: Check if ITSM processes leverage CMDB data.

Columns in the list view of metrics

The following columns appear in the list view of metrics:

Name

Name of metric.

Priority

Priority of an metric. The priority for an metric is a calculation of the weight of the metric and the severity of the percentage score. Priority ranges from **1- Critical** as the highest priority, to the lowest priority which is **5 - Low**. Metrics are listed in their priority order, starting with the highest priority metric (lowest priority number).

Result

Percentage number of CIs (or the measured item) which are in compliance with the metric.

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Note:
Some metrics use a lower threshold value which impacts the result that appears in the dashboard. For these metrics, if the percentage of compliant CIs is less than the lower threshold value, then the result appears as 0 for the metric.

Remediation playbook URL

Links to remediation playbook articles in Now Support. These knowledge articles provide context for the respective issue, guidelines to help remediate the issue, and other necessary details to bring CIs into compliance. Click the link and use your Now Support credentials to access the knowledge article.

Performance Analytics widgets

Most metrics are associated with Performance Analytics (PA) widgets (tiles) that provide further details about CIs that are not in compliance with the metric. Drill down the tiles to access PA widgets, which are provided by the *CMDB Data Foundations PA Metric Collection* scheduled job.

On the Analytics Hub page:

- Click the **Breakdowns** context menu to see any available breakdowns.
- Ensure that the **Real-time** (

) option is selected and then click **Show Records** to see a list view of the respective CIs.

Best Practices metrics

The **Best Practices** tab contains the following metrics:

Create Asset Business Rule is Enabled

Checks for the existence of the *Create Asset on insert* business rule. If the business rule exists, the percentage score for the metric is 100. Otherwise, the percentage score is set to 0.

Custom CMDB Attributes at the Right Level

Percentage of custom attributes that should be added at a higher level in the CMDB hierarchy. For example, the custom attribute *Warranty duration* was added three times in the Computer class, instead of adding the attribute once at a higher level in the hierarchy, which is more efficient.

- If (total number of attributes that can be moved up > 10): Percentage is set to 0.
- Otherwise: Percentage is set to (10 – total number of attributes that can be moved up)*10.

Hardware CIs with Serial Numbers

Percentage of Computer or Network Gear CIs with a serial number versus those CIs without. The metric is based on the following conditions:

- Class is an instance of Computer or Gear
- Status = installed
- Operational status = operational
- Serial number is empty

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The complete set of CIs for this metric consists of the CIs that satisfy the first three conditions. The CIs that satisfy all conditions are counted as non-compliant Computer or Network Gear CIs, which are without a serial number.

> **Note:**
> If the percentage of compliant CIs is less than 70%, then the percentage score for this metric is set to 0.

The Hardware CIs Missing Serial Numbers tile shows the total number of CIs which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

The Hardware CIs Missing Serial Number by Key Classes chart shows those CIs that are missing a Serial Number, grouped by key classes. Point to a class bar on the chart to show more details, and click a class bar to access a list view of those CIs for class.

To manage a potential performance impact, other than deactivating the metric, you can limit the performance impact by adjusting the following performance management columns for the metric in the CMDB/CSDM Get Well Metrics [sn_getwell_metric] table. For this metric, those columns are set with the following default values:

- *Aggregate limit*: 30 (% of CIs in the metric)
- *Fail count threshold*: 3
- *Runtime threshold*: 3,600

For more information about these columns, see Performance management in Monitor health in CSDM and CMDB Data Foundations Dashboards.

Services with Owners

Percentage of operational services in which the *owned_by* field is populated versus those operational services in which this field isn't populated.

The complete set of CIs for this metric consists of all the operational services in the Service [cmdb_ci_service] table (where *operational_status* = **Operational**). The percentage score for this metric is calculated as (Compliant CIs/Complete set of CIs) *100.

The Services Missing Owners tile shows the total number of CIs which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

Customizations metrics

The **Customizations** tab contains the following metrics:

Base System Business Application Table Usage

Checks for the existence of a custom business application table, which is any table that extends [cmdb_ci], whose name starts with “u_” or “x_” and which contains the strings “bus” and “app”.

If such custom table exists, then is 0, and if not, the percentage is 100.

The Custom Business Application Tables tile shows any custom business application tables. Click the tile to drill down the PA widget for further details, such as the list all those tables.

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Base System CMDB Relationship Types Usage

Percentage of base system relationship types versus custom relationship types that were created by users. Creating custom relationship types can interfere with the integrity of the CMDB therefore this metric can help you prevent such problems.

This metric counts records in the Relationship Type [cmdb_rel_type] table where *sys_package* is "global" and *name* is not "Manages::Managed by". The percentage score for this metric is calculated as follows:

- If count is <= 0, then percentage is 100
- If count is > 10, then percentage is 0
- Otherwise percentage = (10 – count)*10

The Custom CMDB Relationship Types tile shows the relationships which are not in compliance with the metric. Those are the relationships that were not included in the base system and were custom created. Click the tile to drill down the PA widget for further details, such as the list all those relationships.

Base System Relationship Types Not Deleted or Recreated

Percentage of relationship types that exist in the base system and which were not deleted or recreated, versus those that were deleted and maybe recreated. Deleting and recreating base system relationships can interfere with the integrity of the CMDB, therefore this metric can help you prevent potential problems.

This metric counts the number of base system relationships that were deleted and possibly recreated. The percentage score for the metric is calculated as follows:

- If count is <= 0 then the percentage is set to 100
- If count is > 10 then the percentage is set to 0
- Otherwise, the percentage = (10 – count)*10

.

The Base System CMDB Relationship Types Deleted and/or Recreated tile shows the relationships which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those relationships.

Custom CMDB Tables Using Standard Naming

Percentage of custom CMDB tables whose name doesn't start with the standard string "u_cmdb_ci". The metric counts tables in the Tables [sys_db_object] table that extend from the CMDB table and whose name starts with the string "u_" (indicating that it is a custom table) but not with "u_cmdb_ci".

The percentage score for this metric is calculated as follows:

- If count <= 0 then percent is 100
- If count > 6 then percent is 0
- If count is between 0 and 6, then percent is (1-(count/6))*100

The Custom CMDB Tables Not Using Standard Naming tile shows the tables which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those tables.

Use of Custom Attributes

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Percent of custom attributes that were added to CMDB tables in the base system. Custom attributes are identified by a table name that starts with "cmdb_ci" and a column name that starts with “u_.”

The percentage score for the metric is calculated as follows:

- If (total custom attribute count > 50): Percentage is set to 0.
- If (total custom attribute count < 10): Percentage is set to 100.
- If (total custom attribute count is 10–50): Percentage is set to (total custom attribute count – 10)/(50-10)*100.

Data Management Practices metrics

The **Data Management Practices** tab contains the following metrics:

Active CIs Updated in Last 90 days

Percentage of Hardware [cmdb_ci_hardware] or Virtual Machine Instance [cmdb_ci_vm_instance] active CIs that were updated in the past 90 days versus those CIs that were not (stale CIs). The metric is based on the following conditions:

- Class is an instance of Hardware or VMware Virtual Machine Instance
- Status = installed
- Operational status = operational
- Updated >= 90 days

The complete set of CIs for this metric consists of CIs that satisfy the first three conditions. The CIs that satisfy all conditions, are counted as stale CIs of the Hardware [cmdb_ci_hardware] and Virtual Machine Instance [cmdb_ci_vm_instance] classes.

Note:
If the percentage of compliant CIs is less than 65%, then the result displayed for this metric is set to 0.

The Active CIs Not Updated in 90 Days tile shows the total number of CIs which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

CIs Processed via IRE

Percentage of Hardware [cmdb_ci_hardware] or Virtual Machine Instance [cmdb_ci_vm_instance] CIs processed via IRE versus those CIs not processed via IRE. CIs are counted as processed via IRE if they satisfy all of the following conditions:

- Instance of Hardware [cmdb_ci_hardware] or Virtual Machine Instance [cmdb_ci_vm_instance]
- Status = installed
- Operational status = operational
- Sys_id is IN (target_sys_id FROM sys_object_source table)

The CIs that satisfy only the first three conditions but fail the forth condition, are counted as CIs not processed via IRE.

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Note:
Viewing the data provided by PA for this metric, requires the additional role of admin or discovery_admin. However, the **Show Records** button on the Analytics Hub page isn't supported.

To manage a potential performance impact, other than deactivating the metric, you can limit the performance impact by adjusting the following performance management columns for the metric in the CMDB/CSDM Get Well Metrics [sn_getwell_metric] table. For this metric, those columns are set with the following default values:

- *`Aggregate limit`*: 1,000 (Number of records in each batch file processed by the *`CMDB Get Well CIs Processed Via IRE Metric Batch Collection`* job during its 10-minute run intervals. Non customizable).
- *`Fail count threshold`*: 3
- *`Runtime threshold`*: 72,000 (Daily limit of total runtime of all *`CMDB Get Well CIs Processed Via IRE Metric Batch Collection`* job runs)

For this metric, there is no trigger for automatically setting the metric score to 0. For more information about these columns, see 'Performance management' in Monitor health in CSDM and CMDB Data Foundations Dashboards.

CIs with Names

Percentage of Hardware, VMware Virtual Machine Instance, or Application CIs with a name up to 200. The metric is based on the following conditions:

- Class is an instance of Hardware [cmdb_ci_hardware], Virtual Machine Instance [cmdb_ci_vm_instance], or Application [cmdb_ci_appl]
- Status = installed
- Operational status = operational
- Name is empty

Non-compliant CIs are counted as the CIs that are missing a name, which are those CIs that satisfy all conditions.

The percentage score for the metric is calculated as follows:

- If count of CIs without names is > 200, percent is 0
- If count of CIs without names is < 200, percent is (200-(count of CIs without names)/200 * 100)

The CIs Missing Names tile shows the total number of CIs which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

CIs with Relationships to Parent and Child

Percentage of non-orphan CIs versus orphan CIs.

The complete set of CIs for this metric consists of CIs in records from the CI Relationship [cmdb_rel_ci] table. CIs in which [parent.sys_class_name=(empty)] OR [child.sys_class_name=(empty)], are counted as orphan CIs.

The Orphan CIs tile shows the total number of orphan CIs, correlating the darker portion of the metric bar. Select the tile to drill down to the list all those CIs.

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To manage a potential performance impact, other than deactivating the metric, you can limit the performance impact by adjusting the following performance management columns for the metric in the CMDB/CSDM Get Well Metrics [sn_getwell_metric] table. For this metric, those columns are set with the following default values:

- *Aggregate limit*: 1,000
- *Fail count threshold*: 3
- *Runtime threshold*: 3,600

For more information about these columns, see Performance management in Monitor health in CSDM and CMDB Data Foundations Dashboards.

Handled Duplicate CIs

Percentage of duplicate CIs of the Hardware or VMware Virtual Machine Instance classes, that were remediated, up to 200. If the number of unhandled duplicate CIs is greater than the upper threshold of 200, then is set to 0. The metric is based on the following conditions:

- Class is an instance of the Hardware [cmdb_ci_hardware] or the Virtual Machine Instance [cmdb_ci_vm_instance] class.
- Status = installed
- Operational status = operational
- Duplicate_of in not empty

Non-compliant CIs are counted as those CIs that satisfy all conditions. Non-compliant CIs are those Hardware [cmdb_ci_hardware] or Virtual Machine Instance [cmdb_ci_vm_instance] duplicate CIs that were not remediated. For more information, see Duplicate CIs remediation.

The percentage score for this metric is calculated as follows:

- If count of non-compliant CIs is > 200 then percent is 0
- If count of non-compliant CIs is < 200 then percent is (200-count of non-compliant CIs)/200*100

The Unhandled Duplicate CIs tile shows the total number of CIs which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

Installed Server CI Naming Reflecting Hostname

Percent of Server CIs where name reflects the host name, up to the first period in the name. The complete set of CIs for the metric are all the servers in the Server [cmdb_ci_server] table in which *install_status*=1 and *host_name* is not empty.

Examples of compliant CIs:

- Server Name is “abc”, and host name is “abc.1.2.3”
- Server Name and host name are the same

The percentage score for the metric is calculated as (Compliant CIs/Total CIs)*100.

The Installed Server CI Naming Not Reflecting Hostname tile shows the number of Server CIs which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

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Note:
If you need to manually refresh the Installed Server CI Naming Not Reflecting Hostname widget, then you must first run the CMDB Get Well Metric Collection job, and then run the CMDB Data Foundations PA Metric Collection job.

Managed CIs with Model Entries

Percentage of Hardware [cmdb_ci_hardware] CIs with a model ID versus those CIs without.

The complete set of CIs for this metric consists of all the CIs in the Hardware [cmdb_ci_hardware] table. Compliant CIs are those in which *model_id* is populated.

The Managed CIs Missing Model Entries tile shows the total number of CIs which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

Servers with Location

Percentage of Server CIs in which *Location* is populated versus Server CIs in which *Location* isn't populated. The complete set of CIs for this metric are the Server CIs in the Server [cmdb_ci_server] table in which install_status =1 and operational_status=1. Compliant CIs are those CIs in which also location is not null.

The percentage score for the metric is calculated as (Compliant CIs/Total CIs)*100.

The Servers Missing Location tile shows the number of Server CIs which are not in compliance with the metric. Those are the Server CIs in which *Location* is empty. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

Unique Locations

Percentage of unique locations versus non-unique (duplicate) locations.

The complete set of locations for this metric consists of all the locations in the Location [cmn_location] table records, in which *name* is not null. A duplicate location is counted as a record in which *name* is not null, and the same name is used more than once.

The percentage score for the metric is calculated as (Compliant CIs/Total CIs)*100.

The Duplicate Locations tile shows the total number of CIs which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

Note:
If you need to manually refresh the Installed Server CI Naming Not Reflecting Hostname widget, then you must first run the CMDB Get Well Metric Collection job, and then run the CMDB Data Foundations PA Metric Collection job.

ITSM Processes metrics

The **ITSM Processes** tab contains the following metrics:

Changes Referencing a CI

Percentage of change requests with a reference to CIs versus those change requests without. The complete set includes all change requests created in the last 90 days. Compliant records are those change requests in which the *cmdb_ci* field is not empty.

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The percentage score for the metric is calculated as (Compliant change requests/ Total change requests) * 100.

The Changes Not Referencing a CI tile shows the total number of records which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those change requests.

Note:
Viewing all the data provided by Performance Analytics for this metric (when drilling down), requires the additional role of sn_cmdb_editor, itil or sn_change_read.

Changes Relating to both a Service and a CI

Percentage of changes relating services to CIs versus those changes that don't. The complete set of CIs for this metric consists of all change request records. Compliant records are those change requests in which both, the *cmdb_ci* and the *business_service* fields, are not empty.

The Incidents Relating to Neither a Service nor a CI tile shows the total number of records which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

Note:
Viewing all the data provided by Performance Analytics for this metric (when drilling down), requires the additional role of sn_cmdb_editor, itil or sn_change_read. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

Incidents Referencing a CI

Percentage of incidents referencing a CI versus those incidents that don't. The complete set of records includes all incidents created in the last 60 days. Compliant incidents are all those in which the *cmdb_ci* field is not empty.

The percentage score for the metric is calculated as (Compliant Incidents/Total Incidents)*100.

The Incidents Not Referencing a CI shows the total number of incidents which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those incident records.

Note:
Viewing all the data provided by Performance Analytics for this metric (when drilling down), requires the additional role of sn_cmdb_editor, itil or sn_incident_read.

Incidents Relating to both a Service and a CI

Percentage of incidents relating to both a service and a CI versus those incidents that don't. The complete set for this metric is all incident created in the last 60 days. Compliant records are those incidents in which both, the *cmdb_ci* and the *business_service* fields, are not empty.

The percentage score for the metric is calculated as (Compliant Incidents/Total Incidents) * 100.

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The Incidents Relating to Neither a Service nor a CI shows the total number of records which are not in compliance with the metric. Click the tile to drill down the PA widget for further details, such as the list all those incident records.

Note:
Viewing all the data provided by Performance Analytics for this metric (when drilling down), requires the additional role of sn_cmdb_editor, itil or sn_incident_read. Click the tile to drill down the PA widget for further details, such as the list all those CIs.

CSDM Data Foundations dashboard

The CSDM Data Foundations dashboard displays key CSDM indicators on a single page to help you get the full benefit from your ServiceNow AI Platform products.

Access the dashboard

Use either of the following methods to open the dashboard:

Navigate to **All** > **Configuration**, and then select **CSDM Data Foundations Dashboard**.

1. In CMDB Workspace, navigate to **Workspaces** > **CMDB Workspace**.
2. Select **Management** in the CMDB Workspace menu bar.
3. Select **CSDM Data Foundations Dashboard** in the Optimize section of the Management tools.

Select the change dashboard icon ( ) to toggle between the CSDM and CMDB dashboards.

Example

The reports on each tab display the data metrics that are appropriate for the maturity of your organization's CSDM implementation stage (foundation, crawl, walk, run, and fly). A label on each report identifies the metric being displayed.

In this example, a report on the **Run** tab indicates that several business service offerings don't have the required relationships to service instances . With this knowledge, Service owners can add the relationships to promote that customer service agents get complete information on the impact of applications that are down.

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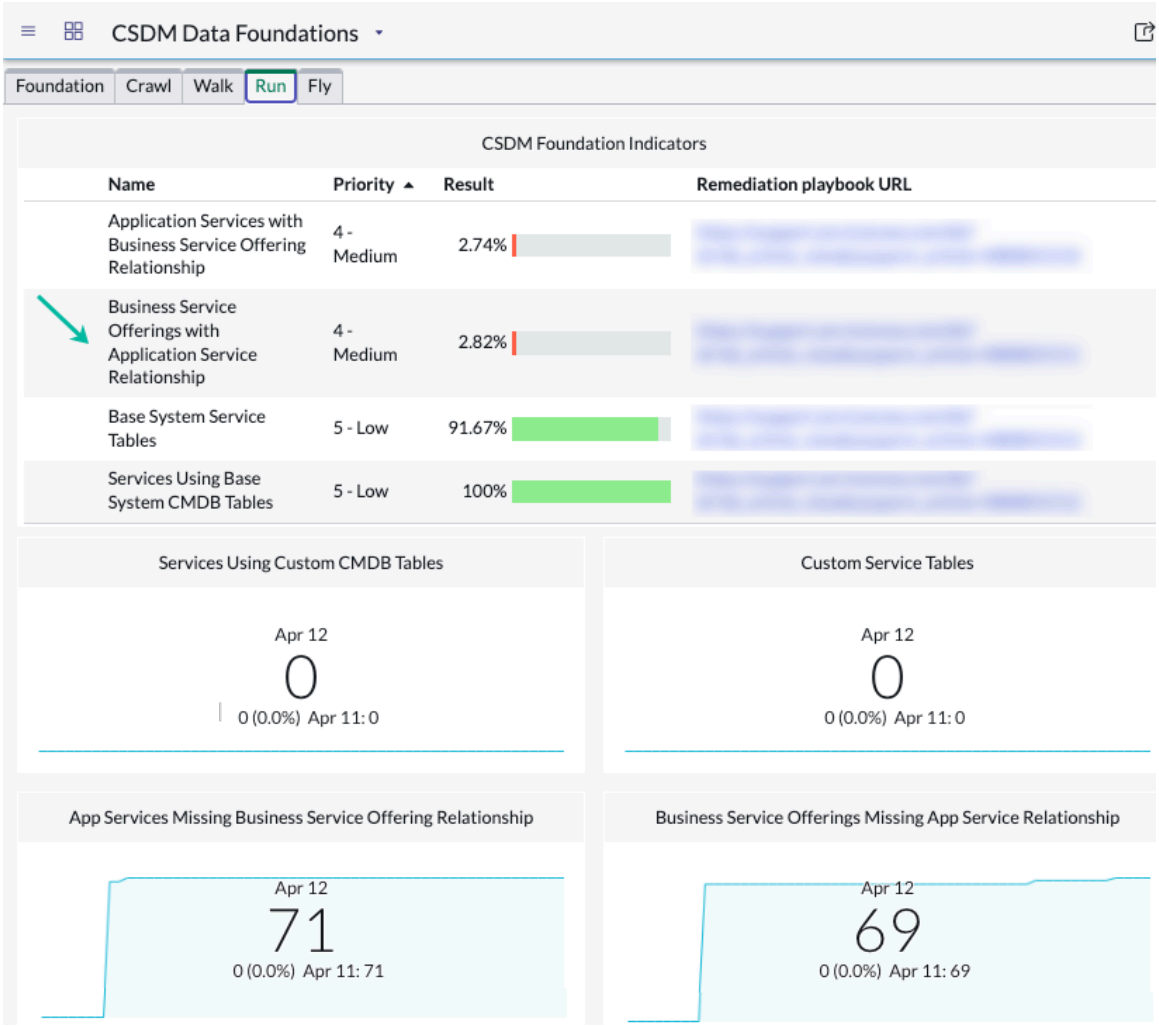

Tabs on the dashboard

- Tables in the Foundation domain contain base data that is referenced from or to objects in the other CSDM domains. Before you can use ServiceNow products, you must populate foundational data. See 'Foundation' stage reports on the CSDM Data Foundations dashboard.
- In the Crawl stage, you work on base-system CMDB tables that are associated with IT Service Management (ITSM). See 'Crawl' stage reports on the CSDM Data Foundations dashboard.
- In the Walk stage, you identify and populate the network infrastructure CIs and applications that your organization's technical teams support. See 'Walk' stage reports on the CSDM Data Foundations dashboard.
- In the Run stage, you set up the relationship between a technology and the business that sells and consumes the technology. See 'Run' stage reports on the CSDM Data Foundations dashboard.
- When you reach the Fly stage, you have accomplished all or most of the process of implementing the CSDM framework. The fly stage completes the process. See 'Fly' stage reports on the CSDM Data Foundations dashboard.

Managing performance of data collection

For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.

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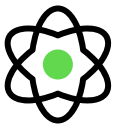
Related topics

- Configure the CSDM Data Foundations dashboard
- Monitor health in CSDM and CMDB Data Foundations Dashboards

CMDB Health

A healthy CMDB, based on health benchmarks in an organization, is essential to an effective and continuous use of the product. Health indicators such as duplicate CIs, required CI fields, and audits are evaluated and aggregated into health scores at the class, health group, and service levels. CMDB Health also provides a framework for applying standardized CI remediation.

Get started

Explore Explore the KPIs and metrics that are evaluated for health, and the health results dashboards.	Configure Select the health metric to monitor and configure any associated rules.	Use CMDB Health in CMDB Workspace or in Service Graph Workspace Access CMDB Health dashboards and related tasks in CMDB Workspace views.
Remediate  Create and apply remediation rules to CIs that failed health tests.	Track processes Use logging and other troubleshooting methods to resolve issues with CMDB Health processes.	Reference Details about properties, scheduled jobs, and tables, used by CMDB Health, and domain separation.

Troubleshoot and get help

- Ask questions and explore other resources for in the ServiceNow Community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

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Exploring CMDB Health

Learn more about CMDB Health and review the benefits it can provide for users in your organization.

CMDB Health overview

CMDB Health Monitors and helps maintain the integrity and effectiveness of the CMDB, using health benchmarks specified for the organization. CMDB Health evaluates Health indicators such as duplicate CIs, required CI fields, and audits and aggregates them into health scores at the class, health group, and service levels. CMDB Health also provides a framework for applying standardized CI remediation for health issues that are detected.

CMDB Health benefits

CMDB Health is configurable so you can track specific areas of concern. It provides dashboards with aggregated numbers that you can easily glance and drill-down to locate the source of a problem.

What to explore next

To learn more about configuring and using CMDB Health, see:

- Configuring CMDB Health
- CMDB Health experience in CMDB Workspace and in Service Graph Workspace
- View CMDB Health reports:
  - View CMDB Health Dashboard
  - View relationships health
  - View CI health
- Create a CMDB remediation rule
- Track CMDB Health processes
- CMDB Health reference

Overview of CMDB Health

Learn about the benefits, configuration, and usage of the CMDB Health feature.

The health of the CMDB data is monitored and reported for the following KPIs, each further consisting of sub-metrics:

Completeness

CIs are tested for required and recommended fields that are not populated.

Correctness

CIs are tested against predefined data integrity rules such as identification rules (to detect duplicate CIs), orphan CI rules, and stale CI rules.

Compliance

The CMDB data is audited for adherence to predefined certificates.

Relationships

The health of CI relationships is tested for indicators such as orphan and duplicate relationships, and for compliance with suggested relationships, hosting and containment rules.

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After CIs are tested for various health indicators (metrics), the results are aggregated at the class, health group, service, and relationship level, and appear on CMDB Health dashboards. For most metrics, you can configure the health tests themselves to determine how compliance and non-compliance of CIs are evaluated.

For more details about the KPIs and their associated metrics, see CMDB Health KPIs and metrics.

Note:
CMDB Health doesn't support non-CMDB tables.

CMDB Health dashboards and reports

You can view CMDB Health dashboards and reports in CMDB Workspace or in Service Graph Workspace. Those dashboards show CMDB Health aggregated results for compliant and non-compliant CIs for CMDB Health KPIs and their metrics.

Dashboard/Report	Use
CMDB Health Dashboard 1. Navigate to **Workspaces** > **Service Graph Workspace**. 2. On the navigation panel, select the Insights icon. 3. In the Insights navigation panel, select **CMDB Health**. or: 1. Navigate to **Workspaces** > **CMDB Workspace**. 2. Select **Home** in the CMDB Workspace menu bar. 3. In the Quick links section select the **CMDB Health Dashboard** link. or: 1. Navigate to **All** > **Configuration** > **CMDB Health Dashboard**. 2. Select one of the views.	Main CMDB Health Dashboard with the following views: **Class View** • Shows CIs and classes health reports with aggregations for metrics, KPIs, and class branches. • Access to remediation tasks that were generated for CIs that failed a health test. **Service View** • Shows service health reports. • Detailed health for CIs per service with aggregations for metrics and services. • Access to remediation tasks that were generated for CIs in a service that failed a health test. **Health Group View** • Shows health reports for CMDB groups of type *Health*. • Detailed health for CIs in the group, with aggregations for KPIs, metrics, and health groups. In either dashboard view you can select **CMDB Health settings** to manage the CMDB Health Dashboard jobs and configure other CMDB Health settings. For more information, see Configuring CMDB Health.
Relationship Health Dashboard	Shows various charts for relationships health, such as duplicate, orphan, and stale

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Dashboard/Report	Use
1. Navigate to **Workspaces** > **CMDB Workspace**. 2. Select **Home** in the CMDB Workspace menu bar. 3. In the Quick links section select the **Relationship Health Dashboard** link.	relationships. For more information, see View relationships health.
CI health report • On a CI form that isn't in CMDB Workspace, select **Open in CMDB Workspace**. • In CMDB Workspace, select a CI in a list view to open the CI's form. For example, on the CMDB Health Dashboard, drill down a KPI tile and then select a CI in the tile's list view.	On a CI form, the CI Health tile contains widgets that show CIs health reports. Select the right (>) or left (<) handles in the CI Health tile to scroll through the widgets.

Setup and configuration

To start gathering and aggregating health data, you must enable the CMDB Health-related jobs (CMDB Health Dashboard jobs) which are initially disabled. You also need to configure CMDB Health related system properties and health KPIs and metric test rules, to reflect health standards in your organization.

For details about setting up and configuring CMDB Health, see Configuring CMDB Health.

Location	Configuration
CI Class Manager **Configuration** > **CI Class Manager**	Central location to manage CI classes and to configure CMDB health settings. Use the CI Class Manager to Manage rules and definitions that are used for health tests, such as orphan rules, audit certificates, and recommended fields rule. For information about configuring KPI and metric tests, see CMDB Health KPIs and metrics.
CMDB Health Preferences Navigate to **Configuration** > **Health Preferences**, or perform the following steps:	Central location for configuring CMDB Health settings: • Configure CMDB Health system properties. • Enable and manage the CMDB Health Dashboard jobs.

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Location	Configuration
1. Navigate to **All** > **Configuration** > **CMDB Health Dashboard**. 2. Select a view. 3. On the CMDB Health Dashboard, select **CMDB Health settings**.	• Activate or deactivate KPIs and metrics. • Set the maximum failure threshold for the KPIs and metrics. • Configure creation of tasks for failed CIs.

CI remediation

CMDB Health provides a framework for configuring CI remediation. Remediation lets you proactively apply corrective actions to unhealthy CIs in a managed and standardized fashion.

Domain separation

CMDB Health is domain aware. If the domain separation plugin has been activated, then the CMDB Health Dashboard shows health based on data, rules, and settings from the logged-on user domain. If rules and settings aren't defined for a child domain, then the parent's settings are applied, recursively.

For more information, see Domain separation in CMDB Health.

CMDB Health KPIs and metrics

CMDB Health calculates an aggregated score for three Key Performance Indicators (KPIs) which are correctness, compliance, and completeness, each further consisting of sub-metrics.

You can configure which KPIs and metrics are included in CMDB Health evaluations and dashboards. In the base system, all KPIs and all their metrics are included.

To access the CMDB Health Dashboard and view CMDB health, see View CMDB Health Dashboard.

Correctness

A KPI which is an aggregation of the following metrics:

Orphan

Measures the percentage of orphan CIs in the CMDB. A CI can become orphan if it was unintentionally left in the CMDB when it is no longer needed. A CI is determined to be orphan if:

- The CI satisfies the criteria in an orphan rule. This criteria checks for specific attributes that a CI must have, and for CIs that have no relationships or that don't have specific relationships.
- Data is missing for the CI in its respective table, or in one of its parents' table.

Staleness

Measures the percentage of stale CIs in the CMDB. A CI is stale if it was not updated within the **Effective Duration** time period that is specified in the staleness rule that applies to the class.

The base system includes a default staleness rule for the Configuration Item [cmdb_ci] class, which sets the **Effective Duration** time to 60 days. This rule applies to all extended CMDB classes, and can be overridden by class specific staleness

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rules defined by the user. To determine CI staleness, a staleness rule for the CI's class is used if it exists, otherwise, the default staleness rule is used.

In addition, a relationship in which a stale CI is a parent or a child, is determined to be a stale relationship.

Note:

Discovery marks VMware vCenter CIs that no longer physically exist, as stale. By default, this setting takes precedence over a CMDB Health staleness rule defined for the CI. When drilling-down in the CMDB Health Dashboard to Health Results, the **Source** for CIs determined to be stale by Discovery, is Cloud Discovery.

For the aggregated score of the correctness KPI to include only health results generated by CMDB Health, set the *glide.cmdb.health.src.cmdb_health_audit_only* system property to **true**. In which case, drilling-down to the details of stale CIs still shows those CIs in which source is Cloud Discovery. For more information, see CMDB Health system properties and Discovery for VMware vCenter.

Duplicate

Measures the percentage of duplicate CIs in the CMDB using identification rules. Only independent CIs are evaluated for duplication. In a set of duplicate CIs, the count of duplicate CIs is the total number of CIs in the set, minus one. The detailed graphs for a duplicate set of CIs display all the CIs in the set.

For more details, examples, and troubleshooting information about duplicate metric, see the CMDB Health - Duplicate Metric - algorithm [KB0726425] knowledge base article.

Completeness

A KPI which is an aggregation of the following metrics:

Required

Measures the percentage of CIs in which fields that are defined as mandatory, are not populated. Missing fields are tagged as incomplete noting that for this CI some information is missing. Required fields are equivalent to the fields that are specified as mandatory in the system dictionary.

Recommended

Measures the percentage of CIs in which fields that are set as recommended, are not populated. Out-of-box, no recommended fields are specified.

You can use the Add Identifier Fields In Recommended Rules scheduled job to set criterion attributes from active identification rules, as recommended fields. You can use the Remove Identifier Fields In Recommended Rules scheduled job to unset criterion attributes from active identification rules, as recommended fields.

Compliance

Based on the results of actual CMDB audit runs.

Note:
Audit must be activated for the compliance KPI to show results. For more information, see Compliance Activation.

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Audit

Audit compares actual values of specified fields, against expected values defined in template and scripted audits. Based on the *Last run date* of audits, CMDB Health identifies the set of the most recent complete audit run, and uses those audit results. To pass the CMDB Health audit test, a CI must be in compliance with all audits for that CI. Create a compliance-type audit, for which the results are calculated into the CMDB Health compliance KPI.

When running scripted audits, the *Last run date* is not populated. Therefore, for the compliance KPI to include the results of a scripted audit, update the script in the audit to record the audit run time.

Relationships

Measures the health of CI relationships, consisting of the following metrics which are not-configurable:

Duplicate relationships

Relationships that have identical parent and child CIs, identical relationship type, and an identical port. Duplicate relationships are displayed per relationship type. In a set of duplicate relationships, the duplicate relationship count is the total number of duplicate relationships in the set, minus one. The detailed graphs for a duplicate set of relationships display all the relationships in the set.

Orphan relationships

A relationship that is missing either a parent CI, a child CI, or both.

Stale relationships

A relationship in which the parent CI or the child CI is a stale CI.

A single relationship can fail more than one health test. For example, a duplicate relationship can also be stale.

Also reports the following relationship-related summaries:

- Relations not compliant with suggested relations
- Relations not compliant with containment rules
- Relations not compliant with hosting rules

To access the Relationship Health Dashboard and view relationships health, see View relationships health.

Related topics

CMDB Health system properties

Configure KPI and metrics preferences

Configuring CMDB Health

Data collection for CMDB Health is highly configurable to reflect data health requirements and standards in your organization. Most importantly, the CMDB Health Dashboard jobs are disabled by default and health data isn't collected until you enable those jobs.

To report valuable and meaningful health data, review and adjust CMDB Health-related settings.

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1. Review CMDB Health KPIs and metrics to learn what CMDB Health can monitor, and what to configure to enable and support each metric. Deactivate any KPIs and metrics that you aren't interested in reporting, and set failure thresholds.
2. For each KPI and associated metric that you want monitored, define the necessary rules and fulfill other needed requirements. For example, you might need to:
   - Set a CI attribute to be mandatory
   - Set a CI field to be recommended
   - Create a CMDB Health orphan rule
   - Create a CMDB Health staleness rule
3. Narrow the scope of CIs that are included in health calculations - see Create health inclusion rule.
4. Examine and adjust as needed the CMDB Health system properties.
5. Enable the Health Dashboard jobs for the KPIs that you want reported - for more information, see Enable and configure a CMDB Health Dashboard job.

Configure KPI and metrics preferences

Include or exclude KPIs and metrics as needed in your organization, and configure system behaviour when CIs fail metric health tests.

Before you begin

To start collecting and reporting CMDB health KPIs and metrics, you must first enable and configure the CMDB health dashboard jobs.

Role required: sn_cmdb_admin or itil_admin (on top of sn_cmdb_editor or itil)

About this task

If Domain Support - Domain Extensions is activated, then you can configure aggregation preferences per domain.

Procedure

1. Navigate to **All** > **Configuration** > **Health Preference**.
2. Select **Health Metrics** on the right-hand side bar.

   a. In the **Select Metric** drop-down list select the **Completeness**, **Compliance**, or the **Correctness** KPI and toggle **Active** to included that KPI and its associated metrics in CMDB Health analysis and reporting.

   b. In the **Select Metric** drop-down list select a metric, such as **Required**, and configure its associated fields.

      For a metric:

Field	Description
Active	Activate the metric to include it in the aggregated health report for the respective KPI.
Failure Threshold	Threshold number of CIs that can fail the health metric test. When reached, health

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Field	Description
	processing stops for the metric for this cycle. Maximum number is 100,000, even if you specify a higher number.
Create Task	If a CI fails the metric test, create a task with details about the failure. You can then view any generated tasks in the CMDB Workspace store app or in Service Graph Workspace store app, and configure remediation for the task.
Task Assignee Group	An assignment group for the task.

3. Select **Save**.

Set a CI attribute to be mandatory

Configure a CI attribute as mandatory so it is included in the CMDB Health tests for the *required* metric if enabled. *Required* is a metric of the CMDB Health *completeness* KPI.

Before you begin

Role required:

- sn_cmdb_admin or Itil_admin and personalize_dictionary: For editing the dictionary table
- sn_cmdb_editor and itil has read access

About this task

When a field is configured as mandatory, then if the *required* metric is enabled, the CMDB health tests check whether that field is populated or not. The CMDB Health Dashboard shows the aggregated report of the percentage of CIs for which one or more required fields is empty.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to display the CI Classes list. Then select the class with the field that needs to be set as mandatory.
3. In the class navigation bar, expand **Class Info** and then select **Attributes**. In the Attributes view, click **Added**.
4. Locate the attribute that you want to set as mandatory, and then double-click its **Mandatory** value and set it to true.

   The next time the form is opened, a field status indicator appears next to the field label, indicating that a value is mandatory.

> **Note:**
> Mandatory fields are global. The field is marked as mandatory everywhere it appears on a form. Also, mandatory fields do not appear correctly when using Service Mapping tag-based discovery. For more information, see Tag-based discovery in Service Mapping.

Related topics

CMDB Health Dashboard for Helsinki | Overview

Make a field mandatory

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Set a CI field to be recommended

Define a list of CI fields as recommended, noting that it is desirable that they are populated by a data source such as Discovery. You can then configure the CMDB completeness KPI to include recommended fields in its aggregated health reports.

Before you begin

Role required:

- sn_cmdb_admin or Itil_admin and personalize_dictionary: For editing the dictionary table
- sn_cmdb_editor and itil has read access

About this task

Use this procedure for fields which should not be mandatory, but that might have useful information that the CI should have. For example, a field with information that might at some point help with diagnosis. Initially, a derived class is set with the recommended fields that are defined at the parent level. You can add or remove recommended fields for a derived class, setting it with its own recommended fields, without affecting the recommended fields at the parent or sibling levels. If all recommended fields for a derived class are removed, then the derived class automatically derives the recommended fields from its parent class.

The CI Class Manager doesn't support dot-walking for selecting fields from referenced tables, as recommended. See the steps at the end of this procedure to directly update tables with recommended fields, using one level dot-walking.

For more information about child and parent classes, see Table extension and classes.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to show the CI Classes list, and then select the class that contains the fields that need to be set as recommended.
3. In the class navigation bar, expand **Health**, select **Completeness**, and then select the Recommended Fields tab.
4. In the Recommended Fields tab, use the list collector to move the fields that you want to designate as recommended, from the **Available** list to the **Selected** list.
5. Click **Save**.

What to do next

To directly update the CMDB Recommended Fields [cmdb_recommended_fields] table, (outside the CI Class Manager), using dot-walking to designate a field from a referenced table, as recommended:

1. Select **All**.
2. In the Filter navigator, enter `cmdb_recommended_fields.list` to access the CMDB Recommended Fields table.
3. On the CMDB Recommended Field form, set **Table** to the table that you want to set with recommended fields.
4. Select **Recommended fields** and use the list collector to select recommended fields for the table. You can expand a reference field up to one level, and use dot-walking to select a field from a referenced table.
5. Select **Submit**.

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Create a CMDB Health orphan rule

Create an orphan rule to determine the percentage of orphan CIs in the CMDB. This sum is then aggregated into the correctness CMDB Health KPI. Orphan rules are defined per class, and only a single orphan rule can be defined per class.

Before you begin

Role required: sn_cmdb_editor and itil has read access, sn_cmdb_admin and itil_admin (on top) have full access.

About this task

Specify the conditions that CIs must meet to be considered an orphan CI. Specify attributes that a CI must have, relationships that a CI should not have, or both. In the relationship conditions, you can either specify that the CI has no relationships, or a set of specific relationships that the CI doesn't have.

Note:
If there is a health inclusion rule for the orphan metric, then the conditions in the health inclusion rule and the conditions in the health orphan rule, shouldn't be identical.

A health orphan rule can for example, identify a CI of the cmdb_ci_computer class as an orphan CI if the CI is not set with an owner or an asset. Or, for example, you can create an orphan rule for a CI in the Disk [cmdb_ci_disk] class. If that CI doesn't have a Contains::Contained by or Contained by::Contains relationship with a Computer CI, then it is an orphan CI.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to show the CI Classes list and then select the class for which to create an orphan rule.
3. In the class navigation bar, expand **Health**, select **Correctness**, and then select the Orphan Rule tab.
4. Select a rule to edit, if one exists, or select **New**, and then fill out the form.

Field	Description
Class	The class for which the orphan rule applies.
Attributes	Attribute conditions that a CI must satisfy to be considered an orphan CI. For example, the filter conditions in which both the *Assigned to* and the *Owned by* fields are empty, will identify the matching CIs as orphans.
Condition	And/Or operation between the **Attributes** conditions and the **Relationship** conditions.
Relationship	The relationship conditions that a CI must fail,based on records in the CI Relationship [cmdb_rel_ci] table, in order to be considered an orphan CI.

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Field	Description
	To specify that a CI must have no relationships, choose **Any Relation** and **Any Class** respectively.

5. Select **Submit** or **Update** to save the rule.

Related topics

CMDB Health Dashboard for Helsinki | Overview

Create a CMDB Health staleness rule

If the staleness metric is in effect, then staleness rules are used to determine the percentage of stale CIs in the CMDB. This sum is then aggregated into the correctness KPI.

Before you begin

Role required: sn_cmdb_editor and itil have read access, sn_cmdb_admin and itil_admin (on top) have full access

About this task

The Discovery setting of certain types of CIs as stale takes precedence over a CMDB Health staleness rule defined for the CI. For more information about Discovery marking CIs as stale, see Discovery for VMware vCenter.

Staleness rules are defined per class. If a rule isn't defined for a class, then the parent's rule is automatically derived by the child class and applies for the child class. If later a staleness rule is defined at the child class level, it overwrites the staleness rule that was derived from the parent class.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to show the CI Classes list and then select the class for which to create a staleness rule.
3. In the class navigation bar, expand **Health**, select **Correctness**, and then select the Staleness Rule tab.
4. Select a staleness rule to edit or select **New**, and then fill out the Staleness Rule form.

Field	Description
Applies to	The class for which the rule applies.
Effective Duration	The time period that is used for the staleness test. If the CI was not updated (based on Updated *sys_updated_on*) within the specified time period — the CI is determined to be stale. If you enter a value with a prefix that is valid and a suffix that is not, such as `15 x` — the valid portion of the value is used ('15'). If the

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Field	Description
	entire value is invalid — the value is ignored and the previous valid value is used.

5. Select **Submit** or **Update** to save the rule.

Related topics

CMDB Health Dashboard for Helsinki | Overview

Create health inclusion rule

Filter the CIs that are included in health calculations and that appear in the CMDB Health Dashboard by defining health inclusion rules. Use health inclusion rules to temporarily filter out classes that generate a large number of failures, until the problems are fixed.

Before you begin

Role required: sn_cmdb_editor and itil have read access, sn_cmdb_admin and itil_admin (on top) have full access

About this task

Evaluation for the required, orphan, recommended, duplicate and staleness health metrics, will apply only to CIs that satisfy health inclusion rules. For example, health inclusion rules can limit CMDB Health scores of the duplicate metric only for server and network CIs.

Note:

- You can specify health inclusion rules per domain.
- Creating health inclusion rules at the level of the base cmdb_ci table can potentially filter out health results of all classes in CMDB Health dashboards.
- Applying a health inclusion rule to the duplicate metric, is supported only in the global domain.
- Due to performance issues, dot-walking in health inclusion rules for the duplicate metric is not supported.

In addition to any health inclusion rules, identification inclusion rules also indirectly impact what appears in the CMDB Health Dashboard for duplicate CIs. The dashboard itself uses the identification engine (IRE) to identify duplicate CIs and therefore identification inclusion rules are applied.

Inheritance of health inclusion rules:

- If there are no health inclusion rules specified for a child class, then rules specified on a parent class are applied to the child class.
- If health inclusion rules are specified for a child class, then those rules take precedence over rules specified on a parent class.

In the base system, there are no predefined health inclusion rules, in which case all CIs are included in the CMDB Health calculations.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to show the CI Classes list and then select the class for which to create a health inclusion rule.
3. In the class navigation bar, expand **Health** and then select **Health Inclusion Rules**.

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4. Select an existing rule to edit or select **New** and then fill out the Health Inclusion Rules form.

Field	Description
Applies to	Class this rules applies to.
Active record condition	Criteria that CIs must meet to be included in the evaluation for the specified health metrics.
Applies to metric	Metrics that the rule applies to.

5. Select **Save** or **Update**.

What to do next
You can delete a health inclusion rules that is no longer needed by selecting that rule, and then on the CMDB Health Configuration form, selecting **Delete**.

Configure aggregation weights for CMDB Health scores

Metrics health scores are aggregated into their respective KPI (key performance indicator) scores, which in return are aggregated into the overall CMDB Health score. Modify the default aggregation weights for metrics and KPIs to reflect on the importance of one metric over another is assessing the health of CMDB in the organization.

About this task
The completeness KPI, for example, consists of the metrics required fields and recommended fields. By default, those metrics are configured to contribute 60% and 40% respectively to the aggregated score of the completeness KPI. You can modify that proportional weight of required fields and recommended fields within the completeness KPI to be, for example, 25% and 75% respectively. You can also modify the proportional weights of the completeness, compliance, and correctness KPIs within the aggregated overall score.

To modify aggregation weights, you must directly access the CMDB Health Metric Preferences [cmdb_health_metric_pref] table, where those settings are stored. However, custom settings are used only if the system is set to use legacy calculation methods.

If Domain Support - Domain Extensions is activated, then you can configure aggregation preferences per domain. By default, the weights of KPIs have default settings, and metrics are globally set.

Before you begin
Toggle the **Use legacy calculation methods** switch on the CMDB Health Dashboard to use legacy calculation methods. Custom weight settings are used in aggregated score calculations only if using legacy calculation methods is in effect.

Role required: itil or itil_admin

Procedure
1. Select **All** and then, in the navigation filter, enter `cmdb_health_metric_pref.list` to open the CMDB Health Metric Preferences table.
2. Select a metric, KPI, or the *`Overall`* entry, and set its *`Weighted average contribution`* attribute to the percentage number that you want.

   Ensure that the sum of the percentage weights adds up to 100% for the respective aggregation:

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- The sum of the percentage weights of all metrics for a KPI, must add up to 100.
- The sum of the percentage weights of all three KPIs (correctness, compliance, completeness) must add up to 100.

CMDB Health system properties

Configure the following system properties to customize how CMDB Health monitors and evaluates CIs health.

Role required: sn_cmdb_admin or itil_admin

Note:
To open the System Property [sys_properties] table, enter `sys_properties.list` in the navigation filter.

Property	Description
Max time in minutes for which individual metric processor will run in each scheduled cycle [glide.cmdb.health.metricProcessor.maxRunningTime]	If processing of a metric exceeds the specified time, CMDB Health processing halts until the next CMDB Health job is scheduled to run. • Type: integer • Default value: 120 • Location: Navigate to **All** > **Configuration** > **Health Preference**. In the right hand-side pane, select **System Properties**. For performance reasons, it is recommended not to set this property to a value greater than 120. **Note:** If you enter an invalid value, the default value is used.
Attribute in the [cmdb_ci] table that references the User or User Group table. CMDB Health Dashboard charts use this attribute to determine CIs' ownership. glide.cmdb.health.ci_ownership_field	Attribute in the [cmdb_ci] table that the CMDB Health Dashboard uses to determine CI ownership. • Type: string • Default value: managed_by_group • Location: Navigate to **All** > **Configuration** > **Health Preference**. In the right hand-side pane, select **System Properties**.
glide.cmdb.logger.use_syslog.CMDBHealth	A comma-separated list that controls the level of logging of CMDB Health jobs. Logging creates entries in the system logs to capture messages

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Property	Description
	generated by the health auditing process each time they run. This logging helps debugging if there is a failure. For example, to log error and info messages, set the value to 'error,info'. • Type: String • Default value: error • Other possible values: Comma-separated list with any of the following values: ○ info ○ error ○ warn Or '*' which is equivalent to including all possible values. • Location: System Property [sys_properties] table.
glide.cmdb.health.src.cmdb_health_audit_only	When set to true, disables health results from sources other than CMDB Health audit (such as Cloud Discovery). Only results generated by CMDB Health audit appear for KPIs in the CMDB Health Dashboard. For example, by default, if a CI is determined to be stale by Discovery, then that CI is counted as stale for the correctness KPI even though CMDB Health audit didn't determine that CI to be stale. However, in this case, drilling-down the stale CIs metric, still shows those CIs in which source is Cloud Discovery. • Type: true | false • Default value: false • Location: System Property [sys_properties] table. • Learn more: ○ CMDB Health KPIs and metrics ○ Discovery for VMware vCenter

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Property	Description
glide.cmdb.health.staleness_exclude_dependent_cis	Exclude dependent CIs for the staleness CMDB Health metric. When enabled, dependent CIs are not checked for staleness, regardless of any staleness or inclusion rules that are defined for the respective CI types. • Type: true | false • Default value: false • Location: System Property [sys_properties] table.

Enable and configure a CMDB Health Dashboard job

Enable and configure the CMDB Health Dashboard jobs that process CMDB Health tests, to start calculating CMDB Health scores for the *completeness*, *compliance*, *correctness* KPIs, associated metrics, and relationships.

Before you begin

Role required: sn_cmdb_admin or admin

About this task

In the base system, CMDB Health Dashboard jobs are disabled by default. Enable and configure the respective job for the CMDB health KPI that you want data collected and aggregated for. You can schedule a job to run on a recurring schedule, or run it once at any time.

For more information about how CMDB Health Dashboard jobs work, see the Understanding the CMDB HealthDashboard Numbers blog post in the ServiceNow Community.

Procedure

1. Navigate to **All** > **Configuration** > **Health Preference**.
2. Select **Scheduled Jobs** on the left-side bar and then select the job that you want to enable or configure.

CMDB Health Dashboard job	Description
CMDB Health Dashboard - Completeness Score Calculation	Script for calculating the completeness KPI of CMDB health.
CMDB Health Dashboard - Compliance Score Calculation	Script for calculating the compliance KPI of CMDB health.
CMDB Health Dashboard - Correctness Score Calculation	Script for calculating the correctness KPI of CMDB health.
CMDB Health Dashboard - Relationship Score Calculation	Script for calculating the CI relationships KPI of CMDB health.
CMDB Health Dashboard - Relationship Compliance Processor	Script for calculating compliance of relationships with suggested relationships, and with hosting and containment rules.

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3. Review the default configuration, and update as necessary.

Field	Description
Name	Job name. Leave this field with the pre-populated name.
Active	Select to activate the job.
Conditional	If selected, the scripted condition must evaluate to true before the job can run.
Run	Configure the schedule for job execution, or select **On Demand** to run the job manually when needed. If **Active** is selected, then additional fields appear according to your choice. For example, **Repeat Interval** (when **Run** is set to **Periodically**), and **Time** for various settings of **Run**. Fill in the details to set precise running times.
Time zone	Local time zone.
Run this script	The job's script. **Note:** Changes to the script might result in unexpected behavior.

4. **Optional:** Select **Execute Now** to immediately run the job once.

Result

After you enable a CMDB Health Dashboard job, the results for the KPI are aggregated and appear in the CMDB Health dashboard and CI Health widget on CI forms, at the CMDB, class, and CI levels.

CMDB Health experience in CMDB Workspace and in Service Graph Workspace

View CMDB Health dashboards and use other CMDB Health-related features in CMDB Workspace and in Service Graph Workspace.

CMDB Health is fully integrated into CMDB Workspace and Service Graph Workspace. CMDB Workspace or Service Graph Workspace are required in order to access CMDB Health features, primarily to:

- View CMDB Health Dashboard
- View relationships health
- View CI health

Use the CMDB Workspace landing page and its views to access CMDB Health tiles that are based on CMDB Health activities and aggregations. For example:

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- Use the Important actions tile on the landing page to access cards with CMDB Health-related tasks such as de-duplication tasks.
- Use the CMDB Health tile to see overall health scores for the completeness, compliance, and correctness KPIs, and to drill down to the CMDB Health Dashboard within CMDB Workspace.
- Use tiles throughout the CMDB Workspace to drill down to health overviews of specific CIs.

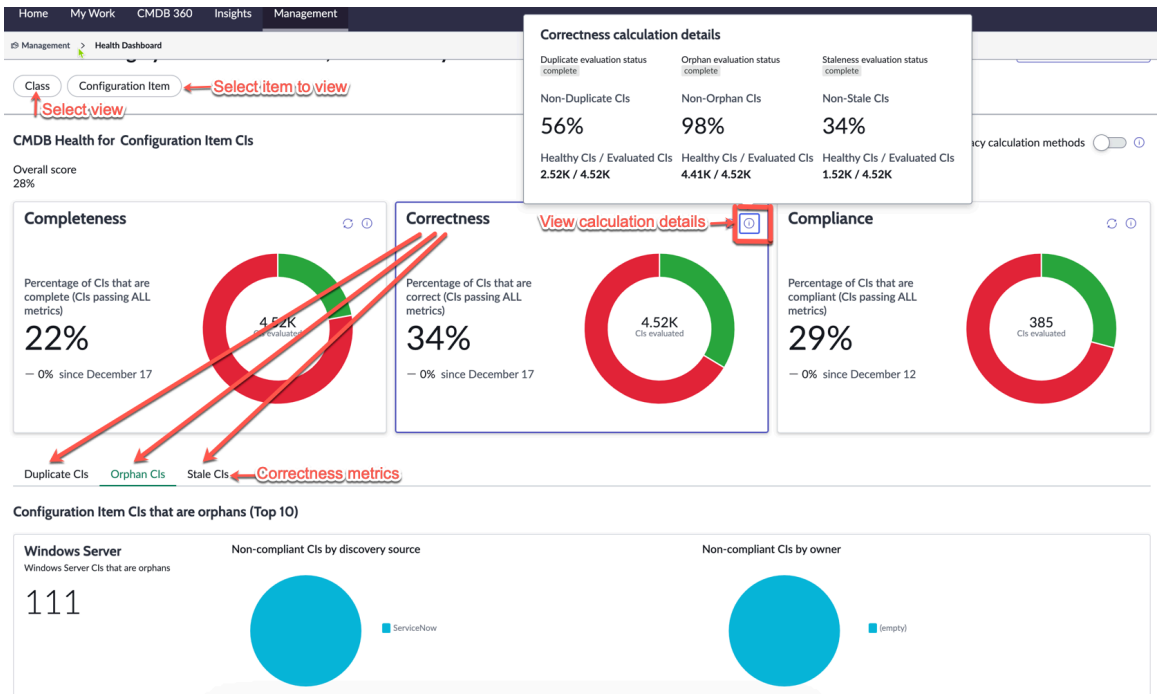
Access CMDB Health in CMDB Workspace by navigating to **Workspaces** > **CMDB Workspace**. Access CMDB Health in Service Graph Workspace by navigating to **Workspaces** > **Service Graph Workspace**, selecting the Insights icon in the navigation panel, and then selecting **CMDB Health** in the Insights navigation panel.

View CMDB Health Dashboard

The CMDB Health Dashboard serves as a central location to view detailed health reports for your CMDB at a glance. Also, it provides functions to remediate issues that CMDB Health detected, to improve CMDB health.

Once you configure CMDB Health and the CMDB Health Dashboard Jobs are enabled, the CMDB Health Dashboard shows meaningful data that is automatically collected and calculated on a recurring schedule. For more information, see Configuring CMDB Health.

CMDB Health Dashboard



Access

Use either of the following ways to access the CMDB Health Dashboard:

Service Graph Workspace:

1. Navigate to **Workspaces > Service Graph Workspace**.
2. Select the Insights icon in the navigation panel.
3. Select **CMDB Health** in the Insights navigation panel.

CMDB Workspace:

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1. Navigate to **Workspaces > CMDB Workspace**.
2. Select **Home** in the CMDB Workspace menu bar and then, in the Quick links section, select the **CMDB Health Dashboard** link.

Navigation filter

Navigate to **All** > **Configuration** > **CMDB Health Dashboard** and then select one of the following dashboard views:

- **Class View**: Default view for the CMDB Health Dashboard, showing health reports for CIs and classes in the CMDB hierarchy.
- **Service View**: Health reports for services with details for CIs per service.
- **Health Group View**: Health reports for CMDB groups of type Health with details for CIs per group.

Role requirement: Using the CMDB Health Dashboard requires the asset, sn_cmdb_editor, cmdb_user, or itil role.

Legacy calculation methods

By default, all metrics and KPIs are set with a specific percentage weight in score calculations. However, you can use legacy calculation methods which were used up until the Washington DC release by toggling the **Use legacy calculation methods** switch (requires the sn_cmdb_admin role) on the CMDB Health Dashboard. In those methods, calculating aggregation scores is based on weights settings for metrics within their KPI, and KPIs within the overall score. Use the legacy calculation methods when it is important to reflect on specific weights of metrics and KPIs in the assessment of CMDB health in your organization.

For more information about customizing calculation weights for metrics, KPIs, and the overall score, see Configure aggregation weights for CMDB Health scores.

KPI tiles

The Completeness, Correctness, and Compliance KPI tiles on the dashboard, show the aggregated health for CIs of the specified class (and its descendants), health group, or service. The KPI's aggregated percentage is represented on the donut as follows:

- Green: Represents the CIs that are compliant on all of the KPI's metrics
- Red: Represents the CIs that fail one or more metric

The distribution of metric compliance can vary greatly across CIs. For example, a single CI failing all metrics or 3 unique CIs each failing a different metric will result in a different KPI final score of aggregation.

You can show additional details and further drill down the CMDB Health Dashboard:

- Point to the green and red portions in the donut reports, to show details.
- Select the View calculation details icon ("i") in a KPI tile to show the calculation details of failure and success for each of the KPI metrics. Calculation details also show the status of the calculation, such as complete.
- Select a KPI tile and then select a tab for a metric that you want to see more details for. For each metric, the dashboard shows up to ten classes (each class in its own tile) with the highest number of non-compliant CIs for the metric. Each tile for a class shows the total number of non-compliant CIs and also pie reports of those non-compliant CIs by discovery source and by owner.

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For example:

1. Select the Correctness tile.
2. Select the Orphan CIs tab.
3. Assuming that the largest number of CIs that aren't compliant with the orphan metric are Windows Servers, the first tile shows details for those CIs. The tile shows the total number of Windows Server CIs that are orphans. This tile also shows pie reports of those CIs, one by discovery source and another by owner.
4. Select a CI in the list view to open its CI form.
5. Scroll in the CI Health tile to the CMDB Health widgets with details about the CI's health.

The '<x>% since <date>' shows the increase or decrease (in %) in the KPI health since <date>

(<date> being the previous time that change was noted). A icon indicates that the maximum failure threshold for the metric has been reached. The tests for the metric are halted for this cycle, and all associated aggregated summaries show 0%.

Overall score

The overall score appears on the dashboard above the KPI tiles and represents the aggregated health score for the CMDB. The overall score is calculated as an aggregation of the three KPIs (correctness, completeness and compliance). By default, the overall score is a simple average of the KPI scores. However, if using the legacy calculation methods is in effect, then the overall score is based on any weight settings of any of the KPIs.

Class view in the CMDB Health Dashboard

The class view shows health reports for CIs and classes in the CMDB hierarchy. Select any class in the CMDB hierarchy to filter all tiles on the dashboard to show health data only for CIs in the selected class and its child classes.

Select the **Class** drop-down to switch to the **Health Group** or the **Service** view.

Health Group view in the CMDB Health Dashboard

Select the **Health Group** view to show health reports for CIs of a CMDB health group. Select any health group to filter all tiles on the dashboard to show health data only for CIs in the selected health group.

Select the **Health Group** drop-down to switch to the **Class** or the **Service** view.

Service view in the CMDB Health Dashboard

Select the **Service** view to show health reports for CIs of a service class, such as *`Business Service`*, including the service CI itself. Select any service to filter all tiles on the dashboard to show health data only for CIs in the selected service.

Note:
The Event Management and Service Mapping Core plugin must be activated to enable meaningful data in the service view.

Select the **Service** drop-down to switch to the **Health Group** or the **Class** view.

Settings affecting the service view:

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- The service view uses the settings for the *Business Service*, *Manual Service*, and *Technology Management Service* classes.
- The service view doesn't include all services from the Service [cmdb_ci_service] table. Only services from the cmdb_ci_service_auto table and its descendants (cmdb_ci_service_discovered, cmdb_ci_service_manual, cmdb_ci_query_based_service), are included.
- Property settings, such as *glide.cmdb.services_query_limit*, *glide.cmdb.services_hierarchy_limit*, and *glide.cmdb.service_associated_ci_query_limit*. For information about how you can use these properties to control the number of items that appear in the service view, see Components installed with CMDB Health.

View relationships health

View health scores for relationship health such as orphan, stale, and duplicate relationships, in the Relationship Health Dashboard.

Before you begin

The CMDB Health Dashboard - Relationship Compliance Processor dashboard job must run to generate data for these reports.

Note:
As a general guideline, activate this job only if you need the relationship reports as this job can affect performance.

Role required: sn_cmdb_editor, asset, or itil

About this task

The Relationship Health Dashboard shows various scorecards for health indicators of CI relationships in your CMDB. It contains donut reports for duplicate, orphan or stale relationships, broken down by relationship type. You can drill down these charts for further details.

The warning that max failure is reached icon, indicates that the maximum failure threshold for the metric has been reached. The tests for the metric are halted for this cycle, and all associated aggregated summaries show 0%. Review the scorecard rules which might be ineffective, or the CMDB might be in an unstable state.

CMDB Health reports for the following metrics:

Duplicate relationship

Relationships that have identical parent, child, and relationship type.

Orphan relationship

A relationship that is missing parent, child, or relationship type.

Stale relationship

A relationship in which one of the CIs is stale. For a stale CI — its associated relationships are also stale.

In addition, the following relationship compliance reports with breakdown by relationship types, are available:

Relationships not compliant with all relationship rules

Relationships that do not comply with any relationship governance rule, including suggested relationships and dependent relationship rules.

Relationships not compliant with suggested relationships

Suggested CI relationships are used as rules to test if relationships comply with specified suggested relationships.

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Relationships not compliant with containment rules

Containment rules are used to test if relationships comply with specified containment relationships.

Relationships not compliant with hosting rules

Hosting rules are used to test if relationships comply with specified hosting relationships.

For each of the compliance reports, testing a relationship requires a rule (suggested relationship, hosting rule, or containment rule) in which the parent and child CI classes match the parent and child CI classes in the tested relationship. If the relationship types in the rule and in the tested relationship don't match, then the relationship isn't in compliance. If an applicable rule isn't found, then the relationship is considered to be in compliance. Rules apply to the classes specified in the rule, and also to descendant classes. Therefore, when testing a relationship, rules that apply to ascendant parents of the CIs in the tested relationship are used. If there are multiple rules that match the parent and the child CI classes of the tested relationship, then the tested relationship needs to satisfy only one of these rules to be in compliance.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. Select **Home** in the CMDB Workspace menu bar and then, in the Quick links section select the **Relationship Health Dashboard** link.
3. Examine the donut reports and the charts in the Relationship health overview and Relationship compliance overview sections on the dashboard.
   Report results are grouped by relationship type, and you can drill down for further details:
   - Point to a donut report to show more details about compliant and non-compliant relationships.
   - Point to a bar in a bar chart to show more details for the bar.
   - Select a bar in a bar chart to drill down to a list view of all the associated relationships that aren't compliant. The list view includes the **Failure Description** field which lists only a single rule that the relationship didn't comply with, even if there are additional rules that the relationship fails to comply with.

What to do next

For troubleshooting information, see the How to identify and delete duplicate CMDB CI Relationship records, or ones that have orphan or missing parent/child relationships [KB0780988] knowledge base article.

Related topics

Enable and configure a CMDB Health Dashboard job

View CI health

View CMDB Health report for an individual CI, on the CIs form in CMDB Workspace or in Service Graph Workspace.

Before you begin

Starting with CMDB Workspace version 7.0, CMDB Health is fully integrated into CMDB Workspace and is required in order to access CMDB Health features, including to view CI health.

Role required: sn_cmdb_user (CMDB user)

About this task

CI health scores are based on settings of CMDB Health KPIs and metrics. Aggregations are calculated in real-time from data stored in health-related tables which the CMDB Health

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Dashboard jobs update on a recurring schedule. The completeness and correctness KPIs are always up to date. However, the compliance KPI depends on audit cycles and on the *CMDB Health Dashboard - Compliance Score Calculation* dashboard job that might not have run yet.

To ensure that the latest updates to these KPIs are reflected, navigate to the respective CMDB Health dashboard job, and select **Execute Now**. For more information, see Enable and configure a CMDB Health Dashboard job.

Procedure

1. Open the CI form for a CI, in CMDB Workspace.
   - On a CI form that isn't in CMDB Workspace and in Service Graph Workspace, select **Open in CMDB Workspace**.

     Role required: sn_cmdb_user (minimum)
   - In CMDB Workspace, or in Service Graph Workspace select a CI in a list view to open the CI's form. For example, on the CMDB Health Dashboard, drill down a KPI tile and then select a CI in the tile's list view.
2. Select the right (>) or left (<) handles in the CI Health tile to see all CI health-related widgets.

Result

The widgets in the CI Health tile on the CI form show the aggregated health for the CI using the following color codes:

- Green: The CI passed the health test (for example, it isn't a duplicate).
- Red: The CI failed the health test (for example, it is a duplicate)
- Grey: The CI wasn't tested for this metric, because the threshold wasn't set for the CI (class) in the CI module.

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Note:
Missing rules or other class definitions can prevent some health scores from being evaluated for a CI. The results in the CI Health widget in these situations, are described below:

Duplicate

- If no identification rules ([cmdb_identifier]) are defined for the CI's class or its ancestors: A notification to that effect appears.
- If only dependent identification rules are defined: `Not applicable` notification appears.

Orphan

- If the CI is excluded by health inclusion rules: `Not applicable` notification appears.
- If no orphan rules (in the [cmdb_health_orphan_rule] table) are defined for the CI's class or its ancestors: A notification about missing a rule appears.

Staleness

- If the CI is excluded by health inclusion rules: `Not applicable` notification appears.
- If no staleness rules (in the [cmdb_health_staleness_rule] table) are defined for the CI's class or its ancestors: A notification about missing a rule appears.

Audit

- If no audits ([cert_audit]) are defined for the CI (The CI Health widget checks only desired states and scripted audits): `Not applicable` notification appears.
- If there are audits defined for the CI but the audits did not run: `Not applicable` notification appears.

Related topics

Enable and configure a CMDB Health Dashboard job

Timeline of CI changes

Create a CMDB remediation rule

A CMDB remediation rule is associated with a task that was created for a failed CMDB health test. A CMDB remediation rule is applied automatically or manually to execute a remediation workflow that can, for example, delete stale CIs.

Before you begin

You must first create and publish a remediation workflow that addresses the CI issue, stored in the Workflow [wf_workflow] table. The workflow can be a regular workflow or an Orchestration workflow, and must adhere to the following requirements:

- The table in the workflow must match the task type in the remediation rule.
- The workflow isn't configured with any filter conditions by setting **If condition matches** to `None`, so that the filters of the CMDB remediation rule will apply.

For more information about using Classic Workflows, see Classic Workflow.

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Role required: sn_cmdb_admin or itil_admin (on top of sn_cmdb_editor or itil)

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Remediations**.
2. Select **New** and then fill out the CMDB Remediation Rule form.

Field	Description
Name	Remediation name.
Task type	Type of CMDB health-related tasks to apply the remediation to.
Task filter	Filters tasks to apply remediation to. Also applies dot-walking on CI fields so that remediation is applied to tasks associated with matching CIs.
Execution	○ Manual: Remediation is applied manually. ○ Automatic: The workflow is applied once, upon the creation of a task that matches the **Task type** and **Task filter**.
Active	Allowing the workflow to run.
Workflow	The CMDB remediation workflow (regular or Orchestration) that will execute automatically or manually, depending on the **Execution** setting. You can click the **Lookup using list** icon, and then click **New** to create a new workflow.

3. Select **Submit**.

Result

If **Execution** is set to Automatic, then the business rule *`Run remediations for CMDBHealth task`* applies the remediation workflow to CIs that match the Task filter. If **Execution** is set to Manual, then you can manually apply the remediation workflow defined in the rule.

Related topics

Dot-Walking

Apply CMDB remediation

Manually initiate a workflow to remediate a CI that failed a CMDB health test. For example, you can remediate CIs that are orphan or stale.

Before you begin

Role required: sn_cmdb_admin or itil_admin

To manually apply a CMDB remediation, a CMDB remediation rule must exist, in which **Execution** is set to **Manual**.

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About this task

Except for the duplicate and audit health metrics, you can choose to create tasks for health test failures for a metric.
To remediate failures of the duplicate metric, use de-duplication tasks.

For all metrics except for audit, each CI that failed a metric test is associated with a single task. Because a CI can fail multiple audits, a single CI can be associated with multiple audit tasks. The first of those tasks is in the **Task** field, and any additional tasks are in the **Additional Tasks** field. To remediate failures of the audit metric, refer to the audit tasks for the audits that the CI failed.

CMDB remediation is applied in the CMDB Workspace store app or Service Graph Workspace store app.

Procedure

1. Open either workspace:
   - Navigate to **Workspaces** > **Service Graph Workspace**. Then, in the navigation panel, select the Insights icon and in the Insights page navigation panel, select **CMDB Health**.
   - Navigate to **Workspaces** > **CMDB Workspace**, and then in the CMDB Workspace menu bar, select **CMDB Health Dashboard**.

   Ensure that the CMDB Health Dashboard is in **Class** view.
2. Select one of the KPI tiles (Completeness, Correctness, or Compliance).
3. Select the metric tab that is associated with the remediation that you want to apply (such as Stale CIs) and then select one of the class tiles.
4. In the list view of the non-compliant CIs for the metric, select the task link (in the Task column) for a CI that you want to remediate.
5. On the remediation form, select **Remediate**.
6. In the Remediate dialog box, select the remediation workflow that you want to apply.
   The list of remediation workflows is based on the type of health metric (such as orphan, stale), and on the filter defined for the workflow in the associated remediation rule.
7. Select **Next**.

Related topics

Create a CMDB remediation rule

CMDB Health process tracking and troubleshooting

Use the following information to track and resolve issues with the CMDB Health processes.

Logging

By default, only error messages are logged to the syslog table, with the source name CmdbHealth. To enable logging of 'info' and 'warning' messages (which are typically logged at the start and end of each processing cycle), update the system property glide.cmdb.logger.use_syslog.CMDBHealth. For information about using this property, see CMDB Health system properties.

Processing status

If scheduled jobs are enabled, but data is not displaying on the <ph keyref="var.config-mgmt-database-short"/> dashboard, you can check the processing status in the CMDB Health Metric Status [cmdb_health_metric_status] table. Depending on the status of the *inactive* metric, decide how to proceed.

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Initially, the state of all metrics is 'In Progress'.

Possible final states of a metric:

Complete

All classes are processed and the number of failures is under the maximum failures threshold.

Max Failures

The number of failures for this metric reached the maximum failures threshold. Processing has been aborted and will start over in the next run.

Daily Time Out Pause

The processor reached the processing time limit. Processing is paused and will resume in the next run.

At the end of a processing cycle, the final state of a KPI depends on the final state of its associated metrics. Possible final state of a KPI:

Complete

All associated metrics are in Complete state and score calculation is complete.

Incomplete

Score is not calculated because one of the associated metrics reached its maximum failure thresholds.

Daily Time Out Pause

Timed out because one of the associated metrics has reached its processing time limit.

Processing time

If processing of a metric times out, you can find out which class takes too long to process. Use this information to find out if any validation rules are weak.

The progress of each metric is tracked in the CMDB Health Processor Status table [cmdb_health_processor_status]. Status for classes that have been processed for a metric is Complete, and for classes that are yet to be processed is Draft. By looking at the update time for each class, you can calculate the length of processing time for each class.

Orphan records due to broken hierarchy

Orphan rules might detect an orphan CI, which you are not able to access and delete. Or, there might be a mismatch between the list view that displays the orphan records, and the total number of records. These findings are due to records being deleted in the database from only one table in the CMDB hierarchy.

These CI records are not accessible via GlideRecord and must be deleted directly from the database. Therefore, in this case, to delete an orphan CI from the database you must contact Support to get help.

Orphan test results provide the details of where exactly the hierarchy is broken. For example, the message "This cmdb_ci_linux_server CI [91054fc24f22520053d6e1d18110c713] is missing record in cmdb_ci_computer table" means that a record of that sys_id must be deleted from the CMDB, cmdb_ci, cmdb_ci_hardware, cmdb_ci_server, and the cmdb_ci_linux_server tables (the Computer class is between the Hardware and the Server classes in the hierarchy.)

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Scripted audits Skipped

An error message is logged if the results from a scripted audit are not included in the compliance KPI. The reason can be that the script in the audit was not updated to populate its **Last ran date** field. Without a **Last ran date** value, CMDB Health is unable to identify these run results as part of a recent complete audit run, and skips those results.

CMDB Health process status: failure threshold reached

The CMDB Health Dashboard shows the string 'failure threshold reached' when the number of CIs that are failing the metric tests, reaches the failure threshold set for the metric.

CMDB Health stops processing for this metric in the current cycle, and therefore there is no aggregated health score for the metric. Processing will be attempted again in the next cycle. Also, status in the CMDB Health Metric Status [cmdb_health_metric_status] table is set to *`Max Failures`* for this metric.

When the health score of a metric cannot be evaluated, then the processing status of the respective KPI (for example, correctness) is set to *`Incomplete`*. The CMDB Health Dashboard shows the string *`Incomplete score`* for the respective KPI. Also, aggregated health scores for the metric are not available for any class in the CMDB hierarchy.

Review and refine the rules defined for the metric which has reached max failures. If a rule associated with the metric is too generic, resulting in large number of failures, attempt to refine it as follows:

- Completeness:

  Review the mandatory fields for the associated classes and remove those that aren't critical for the health score. Also, review the recommended fields that are causing failures and remove those that aren't critical for the health score.

  For more information see Set a CI attribute to be mandatory and Set a CI field to be recommended.

- Compliance:

  Review the audit failures from the audit jobs and adjust the audits to reduce the number of failures. For more information, see CMDB Health KPIs and metrics.

- Correctness:

  - Orphan: Review the orphan rules and adjust them to remove excessive orphan failures. For more information, see Create a CMDB Health orphan rule.
  - Staleness: Review the effective duration for the classes that are causing failures and adjust the duration to reduce the number of failures. For more information, see Create a CMDB Health staleness rule.
  - Duplicate: Review the de-duplication tasks and remediate the tasks to remove duplicate CIs and to avoid creating failure records. For more information, see Remediate a de-duplication task (manual).

For more troubleshooting information about failure threshold related issues, see How to Resolve Max Failure Threshold Errors for CMDB Health Dashboard [KB2487349].

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CMDB Health process status: incomplete score

The CMDB Health Dashboard shows the string 'incomplete score' for a metric when it fails to calculate the score for the metric.

'Incomplete score' is displayed when:

- The number of CIs that are failing the tests of one of its sub-metric, reaches the failure threshold set for the metric. In this situation, the processing status for the respective parent metric (for example, correctness) is set to 'incomplete' in the CMDB Health Metric Status [cmdb_health_metric_status] table. Processing for the failing metric in the current cycle stops, and therefore there are no aggregated health scores for the sub-metric or for the parent metric.

  To remediate, you need to resolve the underlying cause of CIs failing the sub-metric tests. See CMDB Health process status: failure threshold reached for more information about resolving the failures of the sub-metric.

- An error is encountered while processing the sub-metric.

  To remediate, examine the system logs to determine the cause of the error. After fixing the cause of the problem, restart processing by manually executing the respective parent metric dashboard job.

CMDB Health reference

Reference topics provide additional information about the KPIs and metrics that CMDB Health uses and about tables, scheduled jobs, and properties that are used by CMDB Health.

Domain separation in CMDB Health

This is an overview of domain separation as it pertains to CMDB Health. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

CMDB dashboards should be set up with their own set of rules to best accommodate how the user needs them. CMDB dashboard jobs adhere to those rules to produce reports. These are covered in separate sections below.

How domain separation works in CMDB Health

For dashboards to be the most effective, users should configure the dashboard accordingly. This is done by setting up the orphan, staleness, and inclusion rules to meet their needs, which then affect the reports displayed on the dashboard.

The settings and metrics define different aspects of each application because each domain can be configured differently. These rules are set up in addition to those that are included in the base system. There are different types of owners for different CIs; each domain has its own set of rules.

Metric tests from the global domain propagate to subdomains. However, subdomains can have their own local metric tests which override the global domain tests. Up until the San Diego release, subdomain local metric tests were applied to the subdomain CIs and also to the global domain CIs (which are visible on subdomains). Global domain CIs that failed metric tests of local subdomains, could have generated large amounts of data due to duplicated data.

Starting with the Tokyo release, CIs in the global domain are evaluated only against metric tests specified in the global domain. In subdomains, local metric tests are applied only to the CIs in that subdomain and are not applied to the global domain CIs (even though the global domain CIs

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are visible in the subdomain). Health results for CIs in the global domain appear on subdomains and health results on subdomains reflect this new behavior.

Note:
Domain separation is on by default, but each domain can be configured as needed.

Health Preferences

Configure these preferences during setup:

1. Global system properties that control CMDB Health – System properties are not domain separated. To learn more see CMDB Health system properties.

2. CMDB Health Dashboard Jobs – There is a dashboard job for each major KPI, such as Completeness. That job finds the health of the CIs across all the enabled domains. There is only one job run for all domains and jobs themselves are not domain separated.

   Users can define the frequency with which they want to run jobs; the report runs for all the domains. The more domains included in the job, the longer the job runs.

3. Health Metrics – These selections are domain-separated and adhere to the established "system overrides" logic of domain separation. Changes are made according to the domain for which the user is logged in. Base system values are defined at the global domain. The overriding domain logic means these values apply for all domains. If users want different values for a domain, they must be logged in to a specific domain and change the property from there. The new property setting applies only to that domain and any domain that inherits this domain. To learn more, see Health Metrics.

   Note:
   Regarding the Completeness, Compliance, and Correctness KPIs: Users can disable this KPI if they don't want to see that as part of the dashboard score. All these settings are domain-separated and the user can define specific properties for the domain.

   a. Active – This setting is the most important because it affects how long the jobs run. The more domains with flags set to *Active*, the longer the jobs take. It's best to select only those domains you wish to be *Active* and render the rest as *Active* = **false**. You can set this in Health Preferences. The default settings for global domain are *Active* = **true**, but you can modify or disable specific domains the user wants to see in the dashboard. Users should consider the domain hierarchy when changing these values. If there is a large number of domains (>100) the job can take a very long time. To mitigate this, set *Active* to **false** for all the root domains, thereby disabling all the other domains in the hierarchy. If there is a rule at the top, all child domains inherit that rule.

   b. *Failure Threshold*, *Create Task*, *Task Assignee Group* – All these settings can be set differently for different domains depending on what is needed in each domain.

   c. Exceptions – For Relationship metrics (relationship, duplicate relations, orphan relations, stale relations) the failure threshold setting is not domain separated. The Failure Threshold for the global domain is applied to all domains. For example, even if users were to override the Failure Threshold for a domain, the global domain setting for Threshold is still applied.

   d. Troubleshooting / Implementation detail – These settings are stored in the *cmdb_health_metric_pref* table, which is domain separated.

CMDB Health-related rules

See CMDB Health-related rules settings at:

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- Required
- Recommended
- Orphan
- Staleness

Most of the CMDB Health-related rules are domain separated and provided by the users. Users can define different rules for different domains by logging in to each domain and adding/overriding rules in the CI Class Manager.

1. Completeness
   a. Required fields – These are based on the class schema defined in the platform's System dictionary and is fixed for all domains. These cannot be changed.
   b. Recommended fields – These are domain separated. The table used is CMDB Recommended Fields [cmdb_recommended_fields], which is domain separated. The user can set these up for different domains.
2. Correctness
   a. Duplicates – Duplicates are based on Identification rules, which are not domain separated, so the same rules apply to all domains.
   b. Orphan – Orphan rules are domain separated; there are different orphan rules for different domains. The table used in the CMDB Health Orphan Rule [cmdb_health_orphan_rule] table and is domain separated.
   c. Staleness – Staleness rules are domain separated. The table used is cmdb_health_staleness_rule. The base system rule (60 days) is set for global domain so is inherited by all domains as the default rule.
3. Compliance

   Audit – Audit scores are based on the desired state or scripted audits defined in the compliance module by the user.Audits themselves are domain separated. When audit score evaluation is enabled for a domain, scores become based only on the audits visible in that domain.

Health inclusion rules:

- Health inclusion rules are domain separated. The rules are stored in the cmdb_health_config table which is domain separated.
- Each domain can have its specific health inclusion rules and domain-specific rules for each sub-metric.
- When a health inclusion rule is defined globally, all sub-domains inherit the rule according to the domain structure and the rule can be overridden at any domain.
- When a health inclusion rule is defined at the Configuration Item [cmdb_ci] class level, all descending classes inherit the rule and the rule can be overridden at any class level.

CMDB Health Dashboard

If the Domain Support — Domain Extensions Installer plugin is activated, then the CMDB Health Dashboard is domain aware:

- The CMDB Health Dashboard aggregates and reports health failures and scores based on user's domain visibility of CIs. If domain visibility lets a user see a CI, then the audit rule in that user's domain applies to that CI, whether the CI is in the user's domain or in a contained

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domain. If a CI fails health tests from different user domains, then separate failure records are created.

- Users can configure KPI and metric settings specific to the needs in their domain. So different domains can have different settings such as active/inactive, and thresholds.
- A child domain derives its immediate parent's domain health configurations if the child domain does not configure its own. A child domain can override parent's configurations by modifying them.

Health Dashboards (Class View/Service View/Health Group View)

In general, CMDB Health dashboards are domain aware and show data according to the logged-on domain user. If a user is logged into a domain and views a health dashboard:

1. Only scores for enabled metrics in that domain display (based on the Health Preferences *Active* flag as discussed above).
2. All scores are based on CIs that are visible from the specific domain. (These are regular domain visibility rules: From that domain you can see CIs in global domain, the specific domain, any child domain of that domain or any domain that gets directly or indirectly contained by that domain.)
3. The dashboard view is based on domain rules defined in domain mapping, as opposed to those provided by the logged-in user. This view overrides any additional domain visibility rules that a logged-in user might have. The admin sets the basic rules, but does not set each individual domain. The admin can give specific users or user groups additional visibility to other domains and the dashboard still does not change. The dashboard strictly follows the domain rules mentioned above, based on the domain hierarchy for the domain in which the user is logged in.
4. As explained in the Health Preferences section, users can define different preference values for any domain which impact the scores reported in the dashboard. Preferences that can impact scores include **Failure Threshold** and **Active**.
5. As explained in the CMDB Health Rules section, the scores reported for the metrics are based on the health rules defined for them (staleness, orphan, recommended, audit, and inclusion rules) which can be defined differently for a specific domain (in the CI Class Manager). Only the required metric and duplicate metric are based on rules that apply in all domains.
6. Service View/ Group View – These reports also largely follow the above points. Typically, these views differ from various views/filters for the Health Report. One is based off business rules, the other is based off CMDB Health groups.

Related topics

Domain separation and Configuration Management Database (CMDB)

Components installed with CMDB Health

Several types of components are installed with CMDB Health (included in the com.snc.cmdb plugin), such as tables, properties, and scheduled jobs.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

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Properties installed

Property	Description
glide.cmdb.services_hierarchy_limit	Maximum number of service CIs that can appear in the CMDB service dashboard. This limit applies to any child class of the Service Instance [cmdb_ci_service_auto] class. • Type: integer • Default: 10,000 • Range: 0-100,000 • Location: Add to System Properties [sys_properties] table. • Learn more: View CMDB Health Dashboard

Scheduled jobs installed

Scheduled job	Description
CMDB Health Dashboard - Completeness Score Calculation	Script for calculating the completeness KPI of CMDB health.
CMDB Health Dashboard - Compliance Score Calculation	Script for calculating the compliance KPI of CMDB health.
CMDB Health Dashboard - Correctness Score Calculation	Script for calculating the correctness KPI of CMDB health.
CMDB Health Dashboard - Relationship Score Calculation	Script for calculating the CI relationships KPI of CMDB health.
CMDB Health Dashboard - Relationship Compliance Processor	Script for calculating compliance of relationships with suggested relationships, and with hosting and containment rules.
Add Identifier Fields In Recommended Rules	Sets all criterion attributes from all active identifier entries from all active identification rules, as recommended fields. These added recommended fields are then checked by the CMDB Health Dashboard - Completeness Score Calculation scheduled job when evaluating the recommended health metric.

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Scheduled job	Description
Remove Identifier Fields In Recommended Rules	Identifies any recommended field that is a criterion attribute in any active identifier entry in any active identification rule. Then removes the recommended setting for that field.

Tables installed

Table	Description
CMDB Health Metric [cmdb_health_metric]	Details such as if a KPI or metric is enabled, maximum failure threshold, and other settings for all CMDB Health KPIs and metrics.
CMDB Health Result [cmdb_health_result]	Results from the most recent CMDB Health processing cycle.
CMDB Health Scorecard [cmdb_health_scorecard]	Current and historic health scores. Status of historic score records is 'Historic', and of latest score records is 'Complete'.
CMDB Health Orphan Rule [cmdb_health_orphan_rule]	Rules for calculating orphan records per class.
CMDB Recommended Fields [cmdb_recommended_fields]	Recommended fields per class.
CMDB Health Metric Status [cmdb_health_metric_status]	Internal table that tracks the status of each KPI and metric that is being processed. Includes status, processing time, and processing start date. State for a KPI or metric changes from 'In Progress' to either of: • Complete • MaxFailures • Daily Processing Time Out Processing of a timed out KPI or metric continues on the following day.
CMDB Health Processor Status [cmdb_health_processor_status]	Internal table that tracks the processing progress of each KPI and metric. Contains a list of tables that are processed for each KPI and metric, and processing status. Classes are processed sequentially, changing status from Draft -> In Progress -> Complete.
CMDB Relationship All Rules Health Results [cmdb_health_result_rel_all]	Stores results about relationship health, to be used by the All Relationships report.

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CMDB Coverage

The ServiceNow® CMDB Coverage application enables you to assess and improve the quality of the Configuration Management Database (CMDB). Improved CMDB coverage provides organizations with better visibility into their network coverage, reliable asset data, and stronger IT operational control.

Get started

Explore Learn about the benefits of CMDB Coverage	Configure Configure the application
Use Create discovery schedules, set up or review IPAM connectors, and review CMDB tables	Reference Details about the properties, scheduled jobs, and tables used by CMDB Coverage

Helpful resource

CMDB Coverage – Additional Guidance, FAQs, and Operational Notes [KB2817579]

Exploring CMDB Coverage

Learn about CMDB Coverage and review the benefits it can provide for users in your organization.

CMDB Coverage overview

Organizations often can't identify whether their CMDB data is complete despite using discovery tools because the discovery data and IPAM data aren't correlated. CMDB Coverage provides an automated solution that continuously measures CMDB discovery completeness by correlating IP addresses from IPAM systems with discovered configuration items (CIs).

The CMDB Coverage application includes the following features:

- Reconciliation and correlation of IPAM data with discovered configuration items (CIs).
- Identification of missing data and highlighting the gaps in IP address coverage to ensure compliance with enterprise standards.

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- Continuous coverage tracking.
- Discovery schedule gap detection, where the IPAM subnet data is compared to the scheduled discovery ranges (IPv4 and IPv6 addresses) to identify missing scheduled discovery ranges.

Supported versions

Supported ServiceNow versions:

- Zurich
- Australia

Request apps on the Store

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

CMDB Coverage users

CMDB Coverage user roles

User role	Description
sn_cmdb_admin	Users with the sn_cmdb_admin role can configure the application. These users can create, read, write, and delete records in the following tables: • CMDB Coverage Initialization Tracker [sn_cmdb_ip_cov_init_tracker] • Binary IP Address [sn_cmdb_ip_cov_binary_ip_address] • IP Coverage CI Table Configuration [sn_cmdb_ip_cov_ci_config] • IP Address Staging [sn_cmdb_ip_cov_ip_staging] • Discovery schedule gap [sn_cmdb_ip_cov_discovery_schedule_gap] • Discovery schedule gaps to allocated IP [sn_cmdb_ip_cov_m2m_discovery_schedule_gap] **Note:** The sn_cmdb_ip_cov_m2m_discovery_schedule_gap table is not populated by default. For information about how to populate data in this table, see Custom system property.
sn_cmdb_user	Users with the sn_cmdb_user role can read the data in the tables and view the dashboard.

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CMDB Coverage benefits

CMDB Coverage benefits

Benefit	Feature
Identify potential gaps between IPAM data and what is scheduled to be discovered in the configured discovery tools.	Find missing IPAM IP addresses in discovery
Understand the completeness of the CMDB discovery data.	Reconcile and correlate IPAM data with discovered CIs
Identify the number of free, reserved, and allocated IP addresses per subnet.	Analyze IP address usage per subnet

CMDB Coverage dashboard

The CMDB Coverage dashboard provides the following information:

- **Infrastructure coverage**: The percentage of allocated IP addresses that are associated with CIs in the CMDB. The total coverage count and coverage gap count are displayed.
- **IP-to-CI association**: Breakdown of how allocated IP addresses map to CMDB CIs. The distribution across single match, multiple matches, and no match categories are displayed.
- **Discovery schedule gap count**: The number of allocated IP addresses that exist in IPAM but are not covered by any active discovery schedule.
- **Network coverage**
  - **Total number of networks**: The number of operational managed networks that are configured in the CMDB.
  - **Total number of subnets**: The number of operational IP network subnets that are defined in the CMDB.
  - **Total number of IP addresses**: The number of allocated IP addresses that are imported from IPAM sources.
- **Discovery schedule gap**
  - **Missing IP addresses (Allocated IPs without discovery schedule)**: The number of allocated IP addresses from IPAM that are not covered by any active discovery schedule, indicating potential gaps in discovery coverage.
  - **Percentage of missing IP addresses**: The percentage of total allocated IP addresses that lack discovery schedule coverage.

What to explore next

To learn more about configuring and using CMDB Coverage, see:

- Configure CMDB Coverage
- Using CMDB Coverage dashboard
- CMDB Coverage reference

Configure CMDB Coverage

Configure the CMDB Coverage application to assess and improve the quality of the CMDB.

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Before you begin

Dependencies and requirements:

- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The SGC Central (sn_sgc_central) application.

  The admin user role is required to install the application.
- Optional: The Discovery (com.snc.discovery) plugin.

  This plugin must be activated to view the **Discovery schedule gap** widget in the CMDB Coverage dashboard. The admin user role is required for plugin activation.

Role required: sn_cmdb_admin

Procedure

1. Use one of the following methods to open the **Get started with CMDB Coverage** page:
   - Navigate to **Workspaces** > **Service Graph Workspace** > **Governance**, and then select **CMDB Coverage Dashboard** from the Manage group in Management tools.
   - Navigate to **Workspaces** > **CMDB Workspace** > **Quick links** > **CMDB Coverage Dashboard**.
2. For the Configure an IPAM connector activity, select one of the following options:
   - If you have an IPAM connector installed but not yet configured, select **Configure**, and then configure a connector using SGC Central.

     For information about configuring a connector using SGC Central, see Install a Service Graph Connector from ServiceNow Store in SGC Central and Install a Service Graph Connector with an available entitlement in SGC Central.
   - If you already have an IPAM connector configured or if IPAM data is populated in the CMDB from a different source, set the **Already configured or set up through another source** option to `true`.
3. For the Initialize CMDB Coverage activity, select **Begin initialization**.
   For more information about the initialization process, see CMDB Coverage initialization.

   Note:
   The time required for the initialization process to finish depends on the volume of your data. The percentage of completion is displayed in the real-time progress tracker.

   After the application is initialized, the CMDB Coverage dashboard is displayed. You can view the CMDB coverage details on this dashboard.

Using CMDB Coverage dashboard

Create discovery schedules, set up a new IPAM Service Graph Connector, and review your IPAM Service Graph Connector configuration from SGC Central to enable complete visibility.

- Create discovery schedules

  Create discovery schedules for discovering IP address ranges.
- Set up or review IPAM connectors

  Set up a new IPAM Service Graph Connector or review your IPAM Service Graph Connector configuration from SGC Central.

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- Review CMDB tables used for CMDB Coverage analysis

  Review the CMDB tables used for CMDB Coverage analysis and add additional tables, as required.

Create discovery schedules

Create discovery schedules for discovering IP address ranges.

Before you begin

Dependencies and requirements: The Discovery (com.snc.discovery) plugin must be activated to view the **Discovery schedule gap** widget in the CMDB Coverage dashboard. The admin user role is required for plugin activation.

Role required: sn_cmdb_admin

Procedure

1. Use one of the following methods to open the **CMDB Coverage** dashboard:
   - Navigate to **Workspaces** > **Service Graph Workspace** > **Governance**, and then select **CMDB Coverage Dashboard** from the Manage group in Management tools.
   - Navigate to **Workspaces** > **CMDB Workspace** > **Quick links** > **CMDB Coverage Dashboard**.
2. Select **Discovery schedule gap**.
3. Select **Create discovery schedule**.
4. On the Discovery Admin Workspace, create a discovery schedule as required.
   For more information, see Create an IP-based Discovery schedule in Discovery Admin Workspace.

Set up or review IPAM connectors

Set up a new IPAM Service Graph Connector or review your IPAM Service Graph Connector configuration from SGC Central.

Before you begin

Dependencies and requirements: Install the SGC Central (sn_sgc_central) application. The admin user role is required to install the application. For more information, see Install SGC Central.

Role required: sn_cmdb_admin

Procedure

1. Use one of the following methods to open the **CMDB Coverage** dashboard:
   - Navigate to **Workspaces** > **Service Graph Workspace** > **Governance**, and then select **CMDB Coverage Dashboard** from the Manage group in Management tools.
   - Navigate to **Workspaces** > **CMDB Workspace** > **Quick links** > **CMDB Coverage Dashboard**.
2. Select **Settings**.
3. Select **Configure IPAM SGC**, and then set up an IPAM Service Graph Connector or review your IPAM Service Graph Connector configuration.
   For more information, see SGC Central.

Review CMDB tables used for CMDB Coverage analysis

Review the CMDB tables that are used for CMDB Coverage analysis, and add additional tables to enable complete visibility.

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Before you begin

Role required: sn_cmdb_admin

Procedure

1. Use one of the following methods to open the **CMDB Coverage** dashboard:
   - Navigate to **Workspaces** > **Service Graph Workspace** > **Governance**, and then select **CMDB Coverage Dashboard** from the Manage group in Management tools.
   - Navigate to **Workspaces** > **CMDB Workspace** > **Quick links** > **CMDB Coverage Dashboard**.
2. Select **Settings**.
3. Select **Review CMDB tables**.
4. Review and update the CMDB tables listed in the IP coverage CI table configurations list.

CMDB Coverage reference

Reference topics provide additional information about the scheduled jobs and properties used by CMDB Coverage.

CMDB Coverage initialization

The initialization activity processes historical IP address data from your existing CMDB CIs and IPAM sources. Initialization establishes baseline coverage metrics before ongoing monitoring begins.

Initialization process

The initialization activity processes existing IP addresses from all configured CMDB CI classes (as defined in the sn_cmdb_ip_cov_ci_config table). All IPv4 addresses are converted to binary format for faster matching, and IPv6 addresses are processed as is. Subsequently, the allocated IP addresses (IPAM IP addresses) are matched with the discovered CIs to determine the CMDB coverage status. Finally, relationships are created between the IPAM IP addresses and the discovered CIs.

The time required for the initialization process to finish depends on the volume of your data. The percentage of completion is displayed in the real-time progress tracker.

CMDB Coverage scheduled jobs

CMDB Coverage uses scheduled jobs to identify stale and missing data.

To view the list of scheduled jobs, enter `sysauto_script.list` in the navigation filter.

PopulateBinaryTable

The *`PopulateBinaryTable`* scheduled job is a one-time initialization job that processes the historical records that existed before the CMDB Coverage was configured. All historical IP addresses (IPv4 addresses) are converted into binary format for fast matching. The records are added to the Binary IP Address [sn_cmdb_ip_cov_binary_ip_address] table. IPv6 addresses are processed as is.

InitializeAllocatedIPTable

The *`InitializeAllocatedIPTable`* scheduled job is another one-time initialization job that runs after the *`PopulateBinaryTable`* job. This scheduled job performs the following tasks and populates records in the CMDB Coverage Initialization Tracker [sn_cmdb_ip_cov_init_tracker] table:

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- Processes the historical records in the Allocated IP Address [cmdb_ci_allocated_ip_address] table.
- Updates the value of the `ci_match_status` attribute for the records in the Allocated IP Address [cmdb_ci_allocated_ip_address] table.
- Creates relationships between the discovered CIs and the records in the Allocated IP Address [cmdb_ci_allocated_ip_address] table. That is, corresponding records are created in the CMDB [cmdb_ci_rel] table.

The possible values of the `ci_match_status` attribute are:

- none: No CI matches the IP address, which indicates a discovery gap.
- single: Exactly one CI matches the IP address.
- multiple: Multiple CIs match the IP address.
- not_evaluated: The record isn't processed yet.

ProcessStagingTable

The *ProcessStagingTable* scheduled job processes the records that are created by the DB Listener after the CMDB Coverage application is configured.

You can configure the list of tables that the DB Listener should monitor in the IP Coverage CI Table Configuration [sn_cmdb_ip_cov_ci_config] table. The `Validate IP Coverage CI Config` business rule validates the records that are created in the IP Coverage CI Table Configuration [sn_cmdb_ip_cov_ci_config] table to verify that only the IP address field is updated.

The DB Listener performs the following tasks:

- Detects real-time changes in IP address information.
- Monitors the tables that are configured in the IP Coverage CI Table Configuration [sn_cmdb_ip_cov_ci_config] table.
- Identifies new and updated IP addresses and creates corresponding records in the IP Address Staging [sn_cmdb_ip_cov_ip_staging] table.
- Pushes changes to the Allocated IP Address [cmdb_ci_allocated_ip_address] table.

The Platform DB Listener doesn't rely on polling. Therefore, all updates to IP addresses are identified.

The *ProcessStagingTable* scheduled job identifies the new records that were added by the DB Listener to the IP Address Staging [sn_cmdb_ip_cov_ip_staging] table. Subsequently, the `ci_match_status` attribute in the Allocated IP Address [cmdb_ci_allocated_ip_address] table is updated for all new records.

SubnetUsageCount

This daily scheduled job tracks subnet usage. Based on the value of the `ci_match_status` attribute in the Allocated IP Address [cmdb_ci_allocated_ip_address] table, the *SubnetUsageCount* scheduled job counts the number of free IP addresses, allocated IP addresses, and reserved IP addresses for each subnet.

Find missing IPAM ips in discovery

IPAM-managed networks, subnets, and allocated IP addresses are managed separately from the configured discovery ranges and schedules of organizations. This often leads to stale and missing data (such as IP address ranges that are never scanned) in the CMDB.

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The *Find missing IPAM ips in discovery* scheduled job compares the IPAM data (networks, subnets, and allocated IP addresses) and the configured discovery ranges and schedules (IPv4 and IPv6 addresses) to identify gaps in IP address coverage, such as missing IPv4 address ranges and the number of IPAM IP addresses that don't have a discovery schedule. The data about gaps in IP address coverage is added to the Discovery schedule gap [sn_cmdb_ip_cov_discovery_schedule_gap] table, and is then available for operational review.

CMDB Coverage properties

CMDB Coverage properties control the behavior of the application.

Default system properties

These default system properties are available for the CMDB Coverage application.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

Default system properties for CMDB Coverage

Property	Description
db_listener_enabled	The DB Listener functionality is enabled when this property is set to `true`. The DB Listener creates records in the IP Address Staging [sn_cmdb_ip_cov_ip_staging] table that correspond to the new and updated records in the tables that are configured in the IP Coverage CI Table Configuration [sn_cmdb_ip_cov_ci_config] table. **Note:** Do not modify this property. The DB Listener functionality is deactivated when this property is set to `false`. • Type: true | false • Default value: `true` • Location: System Property [sys_properties] table
table_extension_enabled	Records from the child tables (table extensions) of the parent tables that are defined in the IP Coverage CI Table Configuration [sn_cmdb_ip_cov_ci_config] table are included in the analysis when this property is set to `true`. **Note:** Do not modify this property. Only records from explicitly configured tables are included in the analysis when this property is set to `false`. • Type: true | false • Default value: `true` • Location: System Property [sys_properties] table

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Custom system property

You can create the sn_cmdb_ip_cov.log_associated_missing_ip custom system property for the CMDB Coverage application. This property must be created in the CMDB Coverage application scope. The custom property that you create is listed in the System Properties [sys_properties] table. For more information about creating custom system properties, see Add a system property.

To populate data in the Discovery schedule gaps to allocated IP [sn_cmdb_ip_cov_m2m_discovery_schedule_gap] table, create the sn_cmdb_ip_cov.log_associated_missing_ip custom system property, and set the value to `true`.

- Type: true | false
- Default value: `false`

Domain separation and CMDB Coverage

Domain separation is unsupported for CMDB Coverage. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: No support

- The domain field may exist on data tables but there is no business logic to manage the data.
- This level is not considered domain-separated.

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

Related topics

Domain separation for service providers

CMDB success advisor

The ServiceNow® CMDB success advisor is a scoped application that drives business outcomes for targeted business products, including Data Foundations and Hardware Asset Management, by improving Configuration Management Database (CMDB) data quality. Use a specialized advisor to resolve data quality issues through guided remediation, and identify which data integrations are keeping your CMDB accurate and complete.

Get started

Explore	Configure
Learn about the benefits of CMDB success advisor.	Plan and configure your implementation.

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Use	Reference
Target business outcomes	Get details about installed components.

Troubleshoot and get help

- Ask questions and explore other resources for CMDB success advisor in the ServiceNow Community
- Asset and CI mapping guideline
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring CMDB success advisor

Learn about CMDB success advisor and review the benefits it can provide for different users in your organization.

CMDB success advisor overview

With the CMDB success advisor application, you can review CMDB Data Manager policies and Configuration Management Database (CMDB) settings to identify areas where improvements can be made in Data Foundations and the Hardware Asset Management (HAM) application. The advisor uses customized CMDB metrics to improve data quality for targeted configuration item (CI) classes, identifying and monitoring the CI classes most critical to your organizational processes to enable complete and accurate data in Data Foundations, and tracking hardware model categories for HAM.

CMDB success advisor users

Users

User	Description	Additional roles required
CMDB administrator	Users with the sn_cmdb_admin role can configure and improve CMDB data accuracy based on specific business use cases. With targeted CI tracking, practical data integration suggestions, and application-specific dashboards, the CMDB success advisor enables CMDB administrators to improve CMDB data accuracy and achieve key business outcomes. For Data Foundations, administrators can select and manage principal	**pa_viewer** Required to filter data by principal classes in Data Foundations advisor dashboard and model categories in HAM advisor dashboard. **pa_data_collector** Required to view the last updated data timestamp on an advisor dashboard.

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Users (continued)

User	Description	Additional roles required
	classes, monitor data quality across the CI classes most critical to incidents, changes, and problems, and use integration coverage analysis to ensure the right data sources are keeping the CMDB accurate and complete. For Hardware Asset Management, administrators can focus on critical hardware model categories to improve normalization rates, asset life cycle tracking, and data accuracy for business outcomes like HAM.	**cmdb_inst_admin** Required to manage Service Graph Connector connections in SGC Central through CMDB success advisor. **pd_user** Required to view Discovery and Service Mapping Patterns through CMDB success advisor with read-only access. **pd_admin** Required to modify Discovery patterns through CMDB success advisor with write access.

CMDB success advisor benefits

The following benefits are available to CMDB administrators across both Data Foundations and HAM.

Benefit	Feature	Users
Focused CMDB setup for specific business outcomes For Data Foundations, advisor dashboard scope is built from principal classes recommended based on incident, problem, and change (IPC) activity. If IPC data is unavailable, classes are ranked by how widely they are used across your CMDB. For new instances with no historical data, a set of default classes is suggested. For HAM, advisor dashboard scope is defined by hardware model categories.	Use-case-driven CMDB configuration. To learn more, see: Set up CMDB success advisor for Data Foundations and Set up CMDB success advisor for HAM	CMDB administrator
Improved visibility For Data Foundations, view CI data quality metrics by principal CI class, including missing attributes, stale records, duplicate CIs, and discovery source breakdown.	Dashboard with consolidated insights and metrics To learn more, see: Monitoring CMDB data quality using dashboard metrics in CMDB success advisor for Data Foundations and Monitoring CMDB data quality using	CMDB administrator

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Benefit	Feature	Users
For HAM, view hardware asset metrics by model category and integration source.	dashboard metrics in CMDB success advisor for HAM	
Continuous data quality improvement For Data Foundations, track KPIs for CI completeness, stale records, duplicates, and integration coverage across principal classes. For HAM, track KPIs for missing model ID, serial number, location, duplicates, and asset state.	KPI details access from the dashboard for metric monitoring, remediation tracking, and guided resolution steps To learn more, see: Monitoring CMDB data quality using dashboard metrics in CMDB success advisor for Data Foundations and Monitoring CMDB data quality using dashboard metrics in CMDB success advisor for HAM	CMDB administrator
Data quality improvement suggestions For Data Foundations, playbooks target principal class issues such as stale CIs and duplicate records. For HAM, guided playbooks address hardware issues such as missing serial numbers and asset/CI mismatches.	Remediation actions panel available for a chart in the dashboard To learn more, see: Improving CMDB data quality for Data Foundations and Improving CMDB data quality for HAM	CMDB administrator
Better alignment of CMDB rules and policies For Data Foundations, align CMDB Data Manager ownership policies and reconciliation rules for principal classes. For HAM, configure synchronization rules, asset creation rules, and status mappings.	Settings summary for gap analysis and configuration guidance To learn more, see: Analyze CMDB settings for Data Foundations and Analyze CMDB settings for HAM	CMDB administrator
Improved CMDB data coverage and accuracy For Data Foundations, evaluate integration sources with attribute-level coverage analysis across principal classes. For HAM, review SGC and Discovery pattern rankings for hardware model categories.	Data integrations summary for reviewing and evaluating integration sources To learn more, see: Analyzing data integrations for improving Data Foundations and Analyzing data integrations for improving HAM data coverage	CMDB administrator

Use cases

You can use CMDB success advisor for the following business outcomes:

- Data Foundations: Improve data quality across the principal classes your organization relies on for incidents, changes, and problems. Monitor attribute completeness, detect stale and duplicate records, and evaluate integration coverage to ensure the right data sources are populating your CMDB. For more information, see Using CMDB success advisor for Data Foundations.

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- HAM: Improve hardware data quality across model categories such as computers, servers, and printers. Identify and fix missing model IDs, serial numbers, and locations, eliminate duplicate CIs and align asset and CI states to support accurate life cycle tracking and financial reporting. For more information, see Using CMDB success advisor for HAM.

What to explore next

To learn more about configuring and using CMDB success advisor for supported business outcomes, see:

- Configuring CMDB success advisor
- Supported business outcomes
- CMDB success advisor reference

Configuring CMDB success advisor

Complete the configuration tasks to start using the CMDB success advisor.

Configuration overview

1. Install CMDB success advisor.

   Set up CMDB success advisor by installing the application.

2. Assign roles for CMDB success advisor users.

   Assign roles to control access to features, capabilities, and data in the CMDB success advisor application.

3. Optional: Configure record count visibility in the CMDB success advisor dashboard for managing large datasets.

   Improve the performance of the CMDB success advisor dashboards by hiding the record count on click-through from donut charts using a configurable system property.

4. Optional: Manage principal class marking during upgrade.

   Make sure that existing Hardware Asset Management (HAM) CI classes are included as principal classes in Data Foundations during upgrade, without requiring manual configuration.

Install CMDB success advisor

You can install the CMDB success advisor application (sn_cmdb_advisor) if you have the admin role. The application installs related ServiceNow applications and plugins if they are not already installed.

Before you begin

- Confirm that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Make sure that you have the required entitlements and that all dependent applications are installed on your instance.
- Review the CMDB success advisor application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.

Role required: admin

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About this task

The following items are installed with CMDB success advisor:

- Scheduled jobs
- Tables

For more information, see Components installed with CMDB success advisor.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the CMDB success advisor application (sn_cmdb_advisor) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   In the list next to the **Install** button, the versions that are available to you are displayed.
3. Select a version from the list and select **Install**.

   In the Review Installation Details dialog box, any dependencies installed with your application are listed.
4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data are the sample records that describe application features for common use cases. Load the demo data when you first install the application on a development or test instance.
6. Select **Install**.

Assign roles for CMDB success advisor users

Assign roles to control access to features, capabilities, and data in the CMDB success advisor application.

Before you begin

Set the application scope to CMDB success advisor using the application picker. For more information, see Application picker.

Role required: admin

About this task

Users with the following combination of roles can use the CMDB success advisor application.

Roles required

Role	Description	Applies to
sn_cmdb_admin	Required to access the CMDB success advisor. Users with the sn_cmdb_admin role can configure and improve CMDB data accuracy based on specific business use cases.	Data Foundations and HAM dashboards
pa_data_collector	Required to view the last updated data timestamp on the dashboard.	Data Foundations

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Roles required (continued)

Role	Description	Applies to
		and HAM dashboards
pa_viewer	Required to filter data by principal classes in Data Foundations advisor dashboard and model categories in HAM advisor dashboard.	Data Foundations and HAM dashboards
cmdb_inst_admin	Required to manage Service Graph Connector connections in SGC Central through CMDB success advisor. **Note:** Service Graph Connector data can be read without any additional role. The cmdb_inst_admin role is required for creating or modifying connector configurations through CMDB success advisor.	Data Foundations and HAM dashboards
pd_user	Required to view Discovery and Service Mapping Patterns through CMDB success advisor with read-only access.	Data Foundations and HAM dashboards
pd_admin	Required to manage Discovery patterns with create and write access.	Data Foundations and HAM dashboards

For more information, see Exploring CMDB success advisor.

Procedure

Assign roles to users and groups using the ServiceNow AI Platform user administration feature.

- To assign a role to a user, see Assign a role to a user.
- To assign a role to a group, see Assign a role to a group.

Configuring record count visibility in the CMDB success advisor dashboard to handle large datasets

Improve the performance of the CMDB success advisor dashboards for large datasets by hiding the record count on click-through from donut charts using a configurable system property.

Before you begin

Set the application scope to CMDB success advisor using the application picker. For more information, see Application picker.

Role required: admin

About this task

Selecting a segment in a donut chart on a CMDB success advisor dashboard displays a list page with records that match the criteria of the selected segment. By default, this list shows a record count in the header and a total count in the pagination area. In environments with large datasets, retrieving these counts can increase load time. To improve page responsiveness, add the *hide_list_record_count* system property and set its value to `true`. Enabling this property hides the record count in the list header and the total count in the pagination area,

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reducing the data load during navigation from donut charts without affecting the functionality of the charts or the list results.

Procedure

1. In the navigation filter, enter `sys_properties.list`.
2. Select **New**.
3. In the **Name** field, enter `hide_list_record_count`.
4. From the Type list, select **true | false**.
5. In the **Choices** field, enter `true`.
6. Select **Submit**.

Managing principal class marking during upgrade

Make sure that existing Hardware Asset Management (HAM) CI classes are included as principal classes in Data Foundations during upgrade, without requiring manual configuration.

Upgrading to a version of CMDB success advisor that introduces the Data Foundations principal class concept can result in CI classes being automatically marked as principal classes when existing HAM model category selections are present.

In CMDB success advisor, each HAM model category maps to one or more CI classes.

For example, if you selected the Computers model category, the cmdb_ci_computer class was included. Before the upgrade, these classes were used only for HAM data quality tracking.

After you upgrade to a version that includes Data Foundations, CMDB success advisor automatically marks those same CI classes as principal classes. This gives you a starting point for Data Foundations without requiring manual configuration.

Upgrade impact

The following table shows how principal classes from HAM model categories are applied across key features in Data Foundations after upgrade.

Principal class updates by feature

Feature	Impact after upgrade
Principal classes list	Your Data Foundations principal classes list is already populated with CI classes from your HAM model category selections.
CI picker on task records	On incidents, problems, and changes, the CI picker shows only CIs from your principal classes.
Data Foundations dashboard	Your Data Foundations advisor dashboard may already display data using the HAM derived principal classes as the initial scope.

Recommended actions

1. Go to CMDB success advisor landing page, and on the Data Foundations card, select **Edit principal classes** to review automatically marked classes.

   See Manage Data Foundations advisor scope in CMDB success advisor.

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2. Confirm that the marked classes align with your Data Foundations advisor scope. Remove any unwanted classes and add others as needed (up to 50 principal classes).
3. If CI picker filtering affects users, adjust behavior using the system properties for CMDB success advisor.

   See Principal class tracking in CMDB success advisor.

Note:

Automatic principal class marking happens only once during upgrade. Later changes to HAM model categories do not update the principal classes list automatically. Similarly, principal class changes made without using CMDB success advisor, for example through CI Class Manager, are not reflected in the Data Foundations advisor scope automatically.

Access CMDB success advisor

You can access CMDB success advisor within the CMDB Workspace for both setting up and managing application-specific dashboards. Depending on your progress, you can either begin the setup or access the dashboard to monitor and manage targeted configuration items (CIs) for an application.

Before you begin

Important:
CMDB success advisor (sn_cmdb_advisor) is a Next Experience application. It requires CMDB Workspace (sn_cmdb_ws) and SGC Central (sn_sgc_central) to be installed on your instance. If the application is not visible, contact your administrator to confirm these dependencies are installed and that you have the sn_cmdb_admin role.

Role required: sn_cmdb_admin

About this task

You can access the CMDB success advisor app from either CMDB Workspace or Service Graph Workspace.

Procedure

- From the CMDB Workspace:

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. Locate the CMDB success advisor tool.
   - In the Home view, select the CMDB success advisor card available within the Product highlights section.
   - In the Management view, select the CMDB success advisor link, available within the Optimize category in the Management tools section.
3. Select an action based on your progress.
   - On first access, select **Get started**, and then in the Get started with CMDB success advisor dialog box, select **Continue**.

     Tip:
     Select the **Don't show again** check box to skip the dialog box in the future.

   - On subsequent visits, select **View details**.

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- From the Service Graph Workspace:

1. Navigate to Service Graph Workspace.
   To learn more on how to set up Service Graph Workspace, see Set up Service Graph Workspace.

2. In the Data Governance view in Service Graph Workspace, select an action based on your progress.
   - On first access, select **Get started**, and then in the Get started with CMDB success advisor dialog box, select **Continue**.

     Tip:
     Select the **Don't show again** check box to skip the dialog box in the future.

   - On subsequent visits, select **View details**.

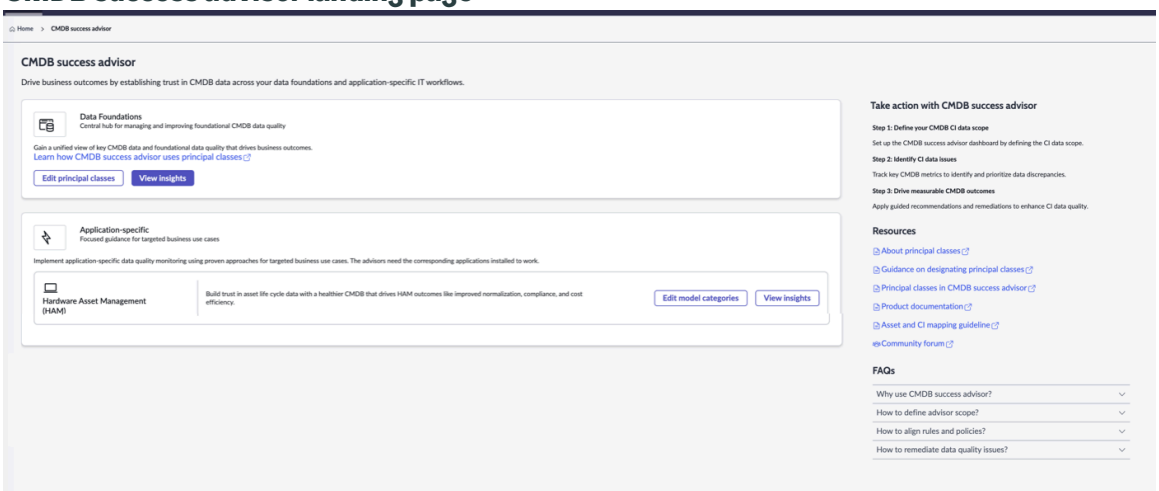
Result
The CMDB success advisor landing page opens, displaying product cards for Data Foundations and application-specific modules like Hardware Asset Management (HAM). Each card includes a brief description and action buttons to configure dashboards and review data quality insights and metrics.

Viewing the CMDB success advisor landing page

As a CMDB administrator, you can use the CMDB success advisor landing page to configure and manage data quality dashboards for Data Foundations and Hardware Asset Management (HAM).

The CMDB success advisor landing page opens when you select CMDB success advisor from the Product highlights section in the Home view of CMDB Workspace, the Management view in CMDB Workspace, or the Data Governance tab in Service Graph Workspace.

CMDB success advisor landing page



Role required

You must have the sn_cmdb_admin role to access the CMDB success advisor landing page.

Accessing and using the landing page

To access the CMDB success advisor landing page, use the following navigation paths.

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Entry point	Steps
Product highlights in CMDB Workspace	Navigate to **Workspaces** > **CMDB Workspace**. In the Home view, select the CMDB success advisor card in the Product highlights section.
Management view in CMDB Workspace	In the Management view, select the **CMDB success advisor** link in the Optimize view under Management tools.
Service Graph Workspace	Navigate to Service Graph Workspace. In the Data Governance view, select **Get started** (first visit) or **View details** (subsequent visits).

Tip:
On first access, select **Get started** in the Get started with CMDB success advisor dialog box, then select **Continue**. Select **Don't show again** to skip the dialog box on future visits.

Viewing data

From the landing page, you can:

- View and configure the scope for Data Foundations and application-specific advisors including HAM.
- Open a product dashboard to review data quality KPIs and trends.
- Follow guided steps to define scope, identify issues, and drive CMDB outcomes.
- Access resources and FAQs for additional guidance.

Advisor cards

The landing page organizes advisors into the following sections:

Data Foundations

Central hub for managing and improving foundational CMDB data quality. Gain a unified view of key CMDB data and foundational data quality that drives business outcomes.

Select **Select principal classes** to configure your Data Foundations advisor scope for the first time or **Edit principal classes** to update an existing scope. Select **View insights** to open the Data Foundations advisor dashboard. You can select up to 50 principal classes.

Use Data Foundations to keep your CI data accurate, complete, and reliable for processes such as incidents, problems, and changes. Select the CI classes that matter most to your organization. The selected classes are automatically marked as principal classes, which filters CI picker fields on task records to show only the most relevant items. You can select up to 50 principal classes.

Application-specific

Focused guidance for targeted business use cases. This section contains advisors for specific installed applications. The advisors need the corresponding application to be installed and entitled to work. Currently includes:

Hardware Asset Management (HAM)

Build trust in asset life cycle data with a healthier CMDB that drives HAM outcomes like improved normalization, compliance, and cost efficiency. Select **Select model categories** to configure your HAM advisor scope for the first time or **Edit model categories** to update

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an existing scope. Select **View insights** to open the HAM advisor dashboard. You can select up to 50 hardware model categories.

Right panel

The right panel of the landing page provides additional context and links to enable you to get started and learn more.

Take action with CMDB success advisor

A guided three-step process to help you define scope, identify data issues, and drive measurable CMDB outcomes.

Resources

Links to related documentation including guidance on principal classes, product documentation, asset and CI mapping guidelines, and the community forum.

FAQs

Expandable answers to common questions about using CMDB success advisor, defining scope, aligning rules and policies, and remediating data quality issues.

Advisor card states

Each advisor card shows action buttons that reflect its current state. Cards for application-specific advisors may also show a badge when the required app is not available.

State	Description	Action
Shows **Select principal classes** or **Select model categories**	The advisor is available but scope has not been configured yet.	Select **Select principal classes** or **Select model categories** to define the scope and set up the advisor dashboard.
Shows **Edit principal classes** or **Edit model categories** and **View insights**	The advisor is configured and the dashboard is available.	Select **Edit principal classes** or **Edit model categories** to update scope, or **View insights** to open the dashboard.
Needs installation	The app is entitled on your instance but has not been installed.	Select **Learn more** to install the app and gain insights with CMDB success advisor.
Needs entitlement	The app has not been entitled on your instance.	Select **Learn more** to request an entitlement and gain insights with CMDB success advisor.

Supported business outcomes

CMDB success advisor drives measurable CMDB improvements by aligning data quality efforts with specific business outcomes. Instead of tackling the entire CMDB at once, the advisor enables you to target the areas that matter most, beginning with the outcomes you want to achieve.

Each supported business outcome maps to a dedicated product with its own scope, dashboard, data quality monitoring, and guided remediation. CMDB success advisor supports the following business outcomes:

Data Foundations

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Use Data Foundations to keep your CI data accurate, complete, and reliable. By selecting the CI classes that matter most to your organization, you give your teams a focused, clear view of your IT infrastructure in the CMDB.

When you configure your Data Foundations scope in CMDB success advisor, the selected CI classes are automatically marked as principal classes. Doing so filters the CI fields on task records to show only the most relevant items, enabling you to reduce data entry errors and improve the accuracy of your incident, problem, and change records.

You can select up to 50 principal classes, which enables you to improve foundational data accuracy, align with Common Service Data Model (CSDM), strengthen incident and change CI links, and increase integration coverage for important CI classes.

To learn more, see Using CMDB success advisor for Data Foundations.

Hardware Asset Management (HAM)

Use HAM to keep your hardware data accurate and complete. This includes computers, servers, printers, and other physical devices. Focus on the hardware model categories that create the most business risk. By doing this, you can fix data issues that affect asset tracking and financial reports.

CMDB success advisor for HAM shows you hardware CIs that are missing model IDs, serial numbers, or locations, identifies duplicate records, and highlights asset and CI state mismatches. It then guides your team through targeted remediation to resolve each issue.

You can select up to 50 hardware model categories to improve hardware normalization rates, track asset life cycles accurately, strengthen financial and compliance reporting, and reduce duplicate and outdated hardware records.

To learn more, see Using CMDB success advisor for HAM.

Choosing your CMDB success advisor outcome

Use the following table to get the right CMDB success advisor guidance for your organization's goals. Each outcome activates a dedicated advisory experience with its own scope, KPI dashboard, issue detection, and guided remediation. You can start with one outcome and expand to the other at any time or run both simultaneously if your organization has overlapping goals.

Business goal	Recommended outcome
Improve integration coverage for your most critical CI classes	Data Foundations
Track and fix missing serial numbers, model IDs, and locations for hardware	HAM
Support asset life cycle management and financial reporting accuracy	HAM
Eliminate duplicate hardware records and asset and CI state mismatches	HAM
Improve both data quality and hardware asset accuracy	Both: Data Foundations and HAM can run simultaneously

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Using CMDB success advisor for Data Foundations

As a CMDB administrator, you can use the Data Foundations dashboard in CMDB success advisor to improve data quality for the most critical CI classes. Use Data Foundations to keep your CI data accurate, complete, and reliable across the CI classes your organization relies on for incidents, problems, and changes.

When you configure your Data Foundations scope, the selected CI classes are automatically marked as principal classes, filtering CI picker fields on task records to show only the most relevant CIs. You can select up to 50 principal classes.

Principal classes in CMDB success advisor

In CMDB success advisor, principal classes are the foundation of the Data Foundations product.

A principal CI class is a CI class that your organization has designated as important. When you set up your Data Foundations scope, the CI classes you select are automatically marked as principal on your ServiceNow instance.

Once a CI class is designated as principal, an automatic filter is applied to the **Configuration Item** field on task records.

Principal classes benefits

Selecting the right principal classes keeps your CMDB focused and healthy. The CMDB success advisor monitors and improves data quality for the classes that matter most to your business.

Principal class selection

CMDB success advisor analyzes your instance's history and ranks CI classes by relevance before you set up your advisor scope.

For guidance on choosing the right classes, see the Guidance on designating principal classes in the CMDB [KB2707240] article in the Now Support Knowledge Base.

You can manage most important CI classes with CMDB success advisor by:

- Selecting CI classes from the grouped, recommended list in the Data Foundations scope setup. Classes are marked as principal automatically when you save.
- Using intelligent recommendations based on the past 180 days of incident, problem, and change activity on your instance.
- Monitoring data quality continuously through the Data Foundations advisor dashboard.

Principal class tracking in CMDB success advisor

Use the following system properties to customize how CMDB success advisor recommends and manages principal classes. As a user with the admin role, you can adjust these properties to control the scope and quality of principal class recommendations in CMDB success advisor for Data Foundations.

System properties in CMDB success advisor for principal classes

Property	Purpose
sn_cmdb_advisor.principal_class_suggestion_period	Number of days of task history CMDB success advisor scans when

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System properties in CMDB success advisor for principal classes (continued)

Property	Purpose
	generating class recommendations. Default value: 180 days
sn_cmdb_advisor.principal_class_suggestion_limit	Maximum number of recommendations shown in the Recommended group. Default value: 20
sn_cmdb_advisor.cmdb_advisor_scope_limit	Maximum number of classes allowed in the Data Foundations scope. Default value: 50
sn_cmdb_advisor.other_principal_classes	Comma-separated list of custom CI classes to include in the Data Foundations scope selection that are not in the standard list.

Principal class synchronization

The Data Foundations advisor maintains its own record of which CI classes are in scope and does not automatically synchronize changes made outside CMDB success advisor. Changes to principal class designations made through CI Class Manager or directly on the instance are not reflected automatically in the Data Foundations advisor scope.

Consider the following behavior:

- When you mark a class as principal without using the CMDB success advisor after the Data Foundations advisor dashboard scope is configured, the class is marked as principal on the instance but is not automatically added to the Data Foundations advisor dashboard scope.
- When you remove the principal designation from a class outside the advisor, the class remains in the Data Foundations advisor dashboard scope until you remove it manually.

To keep the Data Foundations advisor dashboard scope accurate, make all principal class updates directly in CMDB success advisor by selecting **Edit principal classes** on the CMDB success advisor card. For more information, see Manage Data Foundations advisor scope in CMDB success advisor.

CI class recommendations

CMDB success advisor analyzes your instance's historical data to recommend which CI classes should be in your Data Foundations scope.

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Recommendations help prioritize classes that provide the most operational value. They are based on:

- Task activity: Frequency of each CI class appearing in incidents, problems, and changes (IPC) over a configurable period (default 180 days, set in the *sn_cmdb_advisor.principal_class_suggestion_period* system property).

  Note:
  If IPC data is unavailable, classes are ranked by how widely they are used across your CMDB. For new instances with no historical data, a set of default classes is suggested.

- CI population: Number of CI records in each class.
- Common Service Data Model (CSDM) alignment: Support for service mapping and dependency tracking.

Note:
You aren't required to accept all recommendations. Recommendations are guidance. Your organization's priorities should drive the final advisor scope selection.

Set up CMDB success advisor for Data Foundations

Use the CMDB success advisor application to configure and manage the CMDB success advisor for Data Foundations.

Plugins and dependencies

Review the CMDB success advisor application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.

Set up overview

1. Get started with Data Foundations advisor dashboard setup.

   Set up your Data Foundations specific advisor dashboard in CMDB success advisor.

2. Manage Data Foundations advisor scope in CMDB success advisor.

   After completing the initial setup, you can continue to improve your CMDB data quality by adjusting principal class selection for your current Data Foundations goals.

Get started with Data Foundations advisor dashboard setup

Set up your Data Foundations advisor dashboard by selecting principal classes to define the Data Foundations scope in CMDB success advisor.

Before you begin
Role required: sn_cmdb_admin

Note:
In addition to the sn_cmdb_admin role, the pa_data_collector role is required to view the last updated data timestamp on the dashboard and pa_viewer is required to filter data by principal classes.

About this task
The Data Foundations scope defines which principal classes CMDB success advisor monitors. When a CI class is included in the Data Foundations advisor dashboard scope, the class is automatically marked as a principal class, which means it appears in CI selection filters on incident, change, and problem forms.

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For guidance on choosing the right classes, see the Guidance on designating principal classes in the CMDB [KB2707240] article in the Now Support Knowledge Base.

Procedure

1. On the CMDB success advisor landing page, select **Select principal classes**.
   See Viewing the CMDB success advisor landing page.
2. On the Select principal classes dialog box, select a group to choose all its classes or expand a group to select individual classes, then move them from the **Available classes** column to the **Selected classes** column.
   Any CI classes added to an application-specific advisor dashboard such as for Hardware Asset Management (HAM) are automatically monitored as principal classes. You can select up to 50 classes.

   Tip:
   The **Recommended** group, shown at the top of the Group list, includes CI classes based on the recent incident, problem, and change (IPC) activity, ranked by task volume. You can start with these recommended principal classes to improve foundational CMDB data and maximize operational value. To learn more, see CI class recommendations.

3. **Optional:** To remove a CI class, select the X icon next to the class in the **Selected classes** column.
4. Select **Done** to build the CMDB success advisor for Data Foundations dashboard.

Result
The selected classes are marked as principal classes and data collection begins. The Data Foundations advisor dashboard is populated after data collection completes.

Manage Data Foundations advisor scope in CMDB success advisor

Manage the scope of your advisor for Data Foundations by editing principal classes in CMDB success advisor to support your targeted Data Foundations outcomes.

Before you begin
Role required: sn_cmdb_admin

About this task
Control which principal classes are included in your Data Foundations advisor dashboard in CMDB success advisor. You can add or remove entire CI class group or fine-tune the selection by including or excluding specific classes within a group.

For guidance on choosing the right classes, see the Guidance on designating principal classes in the CMDB [KB2707240] article in the Now Support Knowledge Base.

Note:
Principal classes that are currently in use by CMDB success advisor for HAM can't be edited here. To edit those classes in Data Foundations, you must first remove them from the HAM advisor. See Manage HAM advisor scope in CMDB success advisor.

Procedure

1. On the CMDB success advisor landing page, select **Edit principal classes** within the Data Foundations card.
   See Viewing the CMDB success advisor landing page.
2. In the Edit principal classes dialog box, add or remove CI classes to update your principal class selection.

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Principal class selection actions

Purpose	Action	Data coverage
Add a CI class group	Select the check box for the group to include all its CI classes.	Includes all CI classes associated with the selected group.
Expand CI class selection	Select **>** to expand a group, then select check boxes for specific CI classes.	Includes only the selected CI classes associated with a group.
Narrow down CI class selection	Select **>** to expand a group, then clear check boxes for specific CI classes.	Excludes only the CI classes cleared from a group.
Remove a CI class group	Clear the check box for the CI class group.	Excludes all CI classes associated with the removed group.
Remove a selected CI class	Select the X icon next to the category in the **Selected classes** column.	CI class is removed from scope.

3. Select **Save** to apply the changes.

Result

The CMDB success advisor for Data Foundations dashboard is updated to reflect the data based on the principal class selection.

Monitoring CMDB data quality using dashboard metrics in CMDB success advisor for Data Foundations

The CMDB success advisor for Data Foundations dashboard enables CMDB administrators to identify and address data quality issues specific to principal classes in the Configuration Management Database (CMDB).

Important:
When you select a segment or count on a chart from a CMDB success advisor dashboard, the KPI Details page opens. On the page, you can analyze how a specific metric trends over time. Additionally, the Remediation actions panel appears when remediation actions are available for that card. Use the panel to improve the quality of CMDB. To learn more, see KPI Details and Improving CMDB data quality for Data Foundations.

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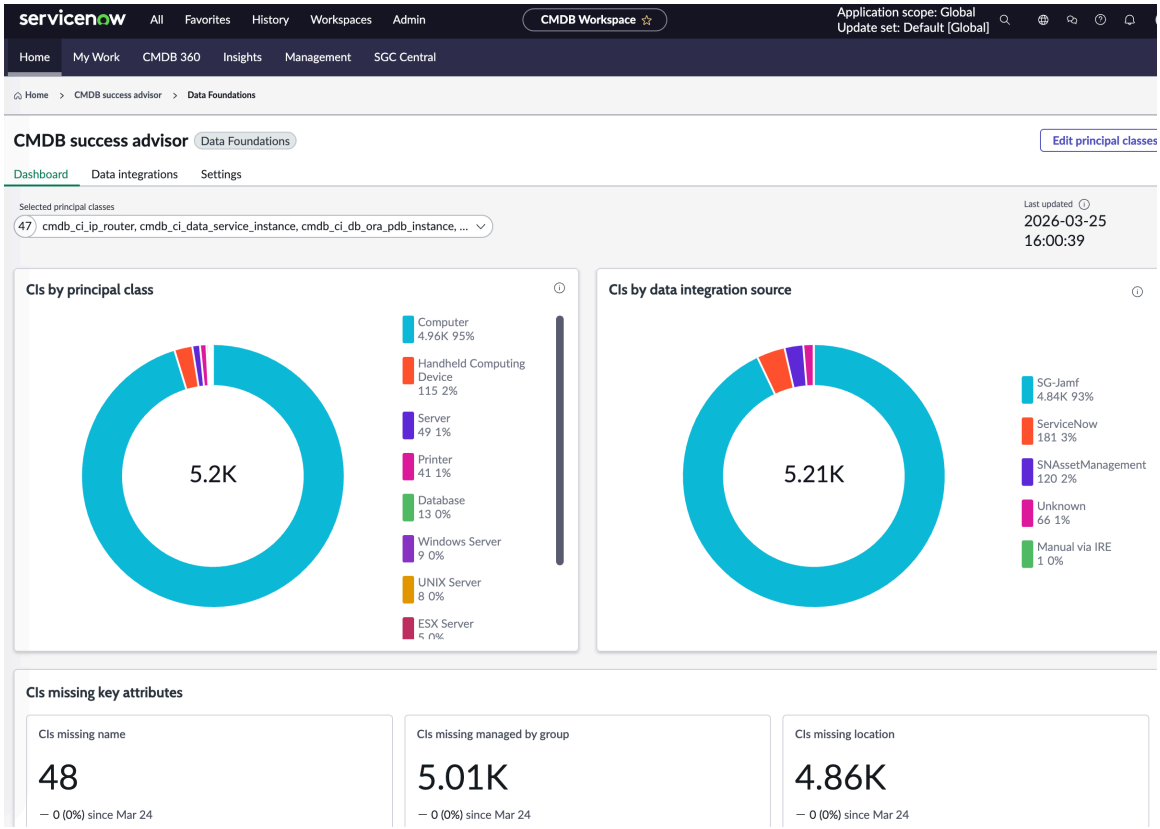

Access the dashboard

To open the dashboard, select **View insights** for Data Foundations on the CMDB success advisor landing page. See Access CMDB success advisor.

Note:
The CMDB success advisor for Data Foundations dashboard is available only after the setup process is complete. For more information, see Set up CMDB success advisor for Data Foundations.

Required roles

Roles required for CMDB success advisor for Data Foundations dashboard

Role	Description
sn_cmdb_admin	Required to access the Data Foundations dashboard.
pa_viewer	Required to filter data by principal classes.
pa_data_collector	Required to view the last updated data timestamp on the dashboard.

Use cases

For examples of how different people in your organization would use this dashboard, see these use cases.

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User	Dashboard use
CMDB administrator	• Monitor CI attribute completeness across principal classes • Identify classes at risk with low data quality scores • Detect stale and duplicate CI records affecting CMDB data accuracy • Evaluate integration coverage to ensure the right sources are populating the CMDB • Prioritize remediation efforts based on incident, change, and problem impact • Track progress toward CSDM alignment

Dashboard features

The dashboard provides clear, consolidated insights into principal CI class data quality and completeness. Use the dashboard to identify and resolve data quality issues within the CMDB through dedicated sections, filters, indicators, and visual reports. Gain valuable insights into CMDB performance related to Data Foundations. Targeted CMDB metrics focus remediation efforts. Regularly monitor these metrics and follow suggested remediation actions to systematically improve CMDB data quality over time.

Important:
The dashboard data is filtered based on the Selected principal classes and Date range filters. See Filters.

Feature description

Feature	Description
CIs by principal class	Displays the breakdown of operational CIs by principal CI class to highlight CI distribution in the CMDB.
CIs by data integration source	Displays the breakdown of operational CIs by data integration source to highlight their contribution to CMDB population.
CIs missing key attributes	Displays completeness metrics per principal CI class, identifying classes below the defined threshold.
CI data quality issues	Displays key metrics related to CIs that have not been updated or may have duplicate records, leading to outdated information and inconsistencies in the CMDB.

Filters

Enables narrowing the data shown in graphs and metrics based on principal class, date range, or stale CI threshold.

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Name	Type	Description
Selected principal classes	List	Filters CIs based on the selected principal classes. **Note:** Requires the `pa_viewer` role.
Date range	Date	Filters the dashboard data based on the selected date range.
Stale CI	List	Filters stale CIs based on the number of days since their last update. Available values: 7, 14, 30, 60, and 90 days.

CIs missing key attributes

Key metrics for the completeness of CI attributes across principal classes, identifying gaps that affect data quality.

Card	Description	Indicators
CIs missing name	Total number of CI records from principal classes missing a name, measured daily, where the CI does not have a name specified.	DF CIs missing name
CIs missing managed by group	Total number of CI records from principal classes missing a managed by group, measured daily, where the CI does not have a managed by group assigned.	DF CIs missing managed by group
CIs missing location	Total number of CI records from principal classes missing a location, measured daily, where the CI does not have a location assigned.	DF CIs missing location

CI data quality issues

Key metrics for CIs that have not been updated or may have duplicate records, leading to outdated information and inconsistencies in the CMDB.

Card	Description	Indicators
Stale CIs	Principal class CIs not updated within the expected maintenance window, causing data gaps and inaccuracies that affect incident and change impact analysis. Additionally filtered by the Stale CI filter.	DF CIs not updated in last 7 days DF CIs not updated in last 14 days DF CIs not updated in last 30 days DF CIs not updated in last 60 days

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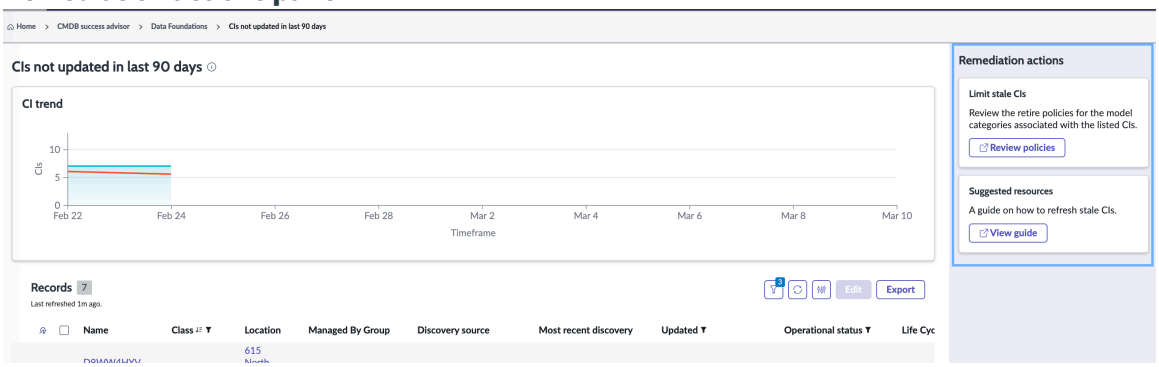
Card	Description	Indicators
		DF CIs not updated in last 90 days **Note:** The CIs not updated card data is additionally filtered based on the Stale CI filter. See Filters.
Duplicate CIs	Operational CIs identified as duplicates within principal classes, causing ambiguous CI selection in processes and data redundancy.	DF duplicate CIs

Improving CMDB data quality for Data Foundations

The Remediation actions panel available for a chart in the CMDB success advisor dashboard for Data Foundations suggests targeted actions to address Data Foundations data quality issues and improve the overall quality of your Configuration Management Database (CMDB).

Remediation actions panel



When remediation actions are available for a chart, the Remediation actions panel appears on the KPI Details page.

You can perform the actions suggested within the Remediation actions panel to address Data Foundations data quality issues in the CMDB. These actions help improve the accuracy, consistency, and usability of configuration items (CIs), promoting better alignment with Data Foundations.

The Remediation actions panel:

- Improves CMDB data quality through guided actions
- Suggests context-aware actions
- Supports quick, informed remediation steps
- Focuses attention on meaningful tasks
- Appears only when actionable insights are available

Accessing the Remediation actions panel

To open the Remediation actions panel, select a segment or count on a chart in the CMDB success advisor dashboard for Data Foundations. The KPI Details page opens. If the remediation actions are available for the selected data, the panel appears on the details page suggesting various remediation actions.

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Available remediation actions

The Remediation actions panel provides relevant suggestions and actions based on the information in the selected chart. For example, if the chart shows CIs that weren't updated recently, the panel suggests reviewing retirement policies.

The remediation actions are available for the improvement of the following issues:

CIs with invalid or unpopulated names

Identify and correct CIs in your principal classes that lack a valid name. Accurate names are required to correctly reference data to the right configuration item.

CIs missing location

Resolve CIs in your principal classes that have no location assigned. Location data supports incident routing, asset tracking, and compliance reporting across your organization.

CIs missing managed by group

Assign a managed by group to CIs in your principal classes that are missing ownership. Ownership data is critical for routing incidents, changes, and service requests to the correct team.

Stale CIs

Remove or update CIs in your principal classes that have not been updated or discovered for an extended period. Stale records reduce trust in the CMDB and can cause incorrect assignments.

Duplicate CIs

Remove or merge duplicate records within your principal classes. Duplicates can cause split incident history and routing errors in workflows.

Data Foundations specific remediation tips

- For stale CIs in principal classes: check whether a Discovery schedule is running against the affected network segment or cloud account. Stale data often means a Discovery job is failing or out of scope.
- For duplicate CIs: review the CMDB Identification and Reconciliation (IRE) rules for the affected CI class. Duplicates often signal that IRE rules need updating.
- For missing location or owner: consider using a CMDB enrichment rule to auto-populate these fields from related records. For example, derive location from IP subnet.

Analyzing data integrations for improving Data Foundations

Improve Data Foundations coverage by analyzing existing and suggested data integrations, including Discovery patterns and Service Graph Connectors.

Use the **Data integrations** tab in the CMDB success advisor for Data Foundations to assess the effectiveness of your current data integration sources in the Configuration Management Database (CMDB) and identify opportunities to improve coverage across your principal classes. The **Data integrations** tab provides a breakdown of active Discovery patterns and installed Service Graph Connectors, including how many key configuration item (CI) attributes each integration source is populating.

For a quick reference to improve Data Foundations coverage, see Data integration checklist for Data Foundations in CMDB success advisor.

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Access data integrations

Navigate to the CMDB success advisor landing page, and on the Data Foundations card, select **View insights**. Select the **Data integrations** tab to access integration-related details. For more information, see Access CMDB success advisor.

Note:
The CMDB success advisor for Data Foundations dashboard is available only after the setup process is complete. For more information, see Set up CMDB success advisor for Data Foundations.

Required roles

Roles required for accessing data integration sources in the CMDB success advisor for Data Foundations

Role	Description
sn_cmdb_admin	Required to access the CMDB success advisor.
cmdb_inst_admin	Required to manage Service Graph Connector connections in SGC Central.

Use cases

For examples of how different people in your organization would use this feature, see these use cases.

User	Feature use
CMDB administrator	• Identify an inactive Discovery pattern that can populate attribute data for your principal classes • Identify Service Graph Connectors that cover your principal classes with the highest attribute coverage • Detect integration sources that are installed but have no active connections • Evaluate which integrations populate ownership, relationship, and infrastructure attributes for CMDB data accuracy • Prioritize which integrations to improve to maximize data quality across principal classes

Data integration features

Feature description

Feature	Description
Integration overview	Displays the count of all Discovery patterns and Service Graph Connectors contributing CI data to your principal classes in the CMDB.

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Feature description (continued)

Feature	Description
Status indicators	Check whether Discovery patterns are active and Service Graph Connectors are installed with active connections. For more information, see Reviewing data integrations for Data Foundations.
Attribute coverage insights	Select the **Attribute coverage** link next to the integration to review which CI attributes it populates for your principal classes. For more information, see Evaluate Data Foundations data integration coverage.
Access integration details	Configure integrations to improve attribute coverage. For more information, see Evaluate Data Foundations data integration coverage.

Reviewing data integrations for Data Foundations

Review both existing and suggested Discovery patterns and Service Graph Connectors to improve your Data Foundations data coverage.

The **Data integrations** tab in CMDB success advisor for Data Foundations provides insight into current integration usage for Discovery patterns and Service Graph Connectors. To make sure your CMDB is being correctly populated with high-quality CI data for your principal classes, check the status of both integration types.

Integration types

The **Data integrations** tab displays two key data sources that support Data Foundations:

Discovery patterns

Discovery patterns identify IT infrastructure components through network-based discovery.

To evaluate Discovery pattern effectiveness for Data Foundations, review the fields as described in the following table.

Fields to monitor for Discovery pattern

Field	Description
Status	Indicates whether a Discovery pattern is currently active. Only active patterns contribute data to the CMDB.
Attribute coverage	Displays how many Data Foundations relevant attributes within a principal class are being populated by each pattern.
View pattern	Opens the Discovery pattern configuration, enabling you to inspect or refine the logic, identification rules, and targeted CI classes.

Low attribute coverage might occur if the Discovery pattern is limited in scope, not collecting detailed CI information, or if its identification rules are not aligned with the actual devices in your network. In such cases, required CI attributes may be missing from the resulting CI records.

Service Graph Connectors

Service Graph Connectors import CI data from third-party platforms.

To evaluate Service Graph Connectors effectiveness for Data Foundations, review the fields as described in the following table.

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Field	Description
Installed	Indicates whether the connector is deployed. A value of `Yes` confirms it is installed and available for use.
Attribute coverage	Displays how many Data Foundations relevant attributes within a principal class are being populated by each connector.
Active connections	Represents the number of connections actively importing data into the CMDB.
Inactive connections	Displays connections that are configured but not currently importing data and may need troubleshooting.

If a Service Graph Connector shows low attribute coverage or no active connections, it may indicate that the specific version being evaluated has limited attribute coverage. This can happen if the connector is installed but not fully mapped to populate key attributes or if the data source is unavailable or misconfigured. As a result, critical CI data, such as ownership, location, or relationship information, may not be imported into the CMDB, affecting data quality for your principal classes.

Evaluate Data Foundations data integration coverage

Identify supported principal classes and attributes from a Discovery pattern or Service Graph Connector to evaluate data coverage and upgrade requirements.

Before you begin

Role required: sn_cmdb_admin

Procedure

1. Navigate to the CMDB success advisor landing page.
2. On the Data Foundations card, select **View insights**.
3. Select the **Data integrations** tab.
4. Find the Discovery pattern or Service Graph Connector by selecting the respective cards.
5. Identify the status of your Discovery patterns and Service Graph Connectors to improve CMDB data coverage.
6. Select the **Attribute coverage** link for a data integration source.
7. In the Supported principal classes and attributes dialog box, review the attribute coverage details.
   The following details are available:
   - Integration suggested vs. installed version
   - Supported CI classes identified as principal classes
   - List of attributes and whether each is supported by the selected data integration source
8. **Optional:** When installed version is lower than the suggested version, select the **View available version** link to open the Application manager.

Note:
The **View available version** link is available only when applicable for a data integration source. Also, only users with the admin role can install or upgrade an application. See Application Manager.

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9. Determine which CI attributes are being populated by the integration and whether an upgrade is needed to improve the data coverage.
   Available options for improving the data coverage are:
   - For Discovery patterns, you can perform the following actions based on the applicable criteria:
     - If you have the pd_user, you can select **View pattern** for a Discovery pattern to view the pattern. For more information, see Patterns and horizontal discovery.
     - If you have the pd_admin role, you can select **View pattern** for a Discovery pattern to understand its contribution and modify the pattern to maximize the attribute coverage. For more information, see Patterns and horizontal discovery.
   - For Service Graph Connectors, if you have the cmdb_inst_admin role, you can perform the following actions based on the applicable criteria:
     - Select **Install connector** to add a connector from the ServiceNow Store.
     - Select **Create connection** to configure a Service Graph Connector from SGC Central. For more information, see Create a connection for a Service Graph Connector in SGC Central.
     - Select **View connections** to open and review details of existing installed connections importing hardware asset data within SGC Central. For more information, see Viewing connections for a Service Graph Connector in SGC Central.

Data integration checklist for Data Foundations in CMDB success advisor

Use the data integration checklist to verify that Discovery patterns and Service Graph Connectors are correctly configured and actively contributing to your Configuration Management Database (CMDB), promoting quality foundational data.

Discovery patterns checklist

Confirm each Discovery pattern is enabled and effectively populating attributes for your principal classes.

Discovery patterns configuration checks

Select	Check item (field)	Description	Action
☐	Pattern name	Name of the discovery pattern contributing CI data for Data Foundations.	Confirm that the pattern is relevant for your principal classes.
☐	Status	Current state of the pattern as active or inactive. Only active patterns contribute data.	Verify that the pattern is active with Status set to Active to confirm it's contributing data.
☐	Attribute coverage	Number of CI attributes populated by the pattern.	Check how many relevant CI attributes are populated for each principal class. **Note:** Low attribute coverage may suggest shallow discovery or misaligned pattern logic.

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Discovery patterns configuration checks (continued)

Select	Check item (field)	Description	Action
☐	Suggested version	Latest suggested version for optimal attribute coverage.	Plan and perform an upgrade to the suggested version or higher to improve coverage.
☐	Installed version	Version currently in use in your instance.	Compare with the suggested version and upgrade if necessary.
☐	View pattern	Link to inspect the pattern configuration.	Select the link to review or modify the pattern logic.

Service Graph Connectors checklist

Confirm Service Graph Connectors are installed and actively contributing hardware data.

Service Graph Connectors configuration checks

Select	Check item (field)	Description	Action
☐	Connector name	Name of the Service Graph Connector providing CI data for Data Foundations.	Confirm that the Service Graph Connector is required for your principal classes.
☐	Status	Current state of the Service Graph Connector as active or inactive.	Activate Service Graph Connectors that are needed for Data Foundations but currently inactive.
☐	Attribute coverage	Number of hardware attributes populated by the Service Graph Connector.	Check how many relevant CI attributes are being populated for each principal class. **Note:** Low coverage may indicate incomplete mappings or missing source data.
☐	Suggested version	Latest suggested version for optimal attribute coverage.	Plan and perform an upgrade to the suggested version or higher to improve coverage.
☐	Installed version	Version currently in use in your instance.	Compare with the suggested version and upgrade if necessary.
☐	Active connections	Number of active connections.	Confirm that at least one connection is actively importing data per principal class.
☐	Inactive connections	Number of inactive connections.	Review and troubleshoot any configured connections that aren't currently active.

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Optional checks for Discovery patterns and Service Graph Connectors

Optional data integration checks

Select	Check item	Description	Action
☐	No entitlements warning	Discovery patterns or Service Graph Connectors tile showing no entitlements, indicating missing access or licensing.	Verify licensing and entitlements with your administrator.
☐	Suggested integrations reviewed	Some Discovery patterns are listed as suggestions because they aren't installed or active, and some Discovery patterns are listed but are not actively used.	Evaluate business need and consider implementing high-value suggested integrations.

Final validation

Once all data integration checks are complete:

- Discovery patterns relevant to your principal classes are active.
- At least one Service Graph Connector is active for each principal CI class in your DF scope.
- Attribute coverage across integrations supports your Data Foundations outcome.
- Integrations are populating ownership, relationship, and key infrastructure attributes.
- CMDB records for principal classes are accurate and complete.

Analyze CMDB settings for Data Foundations

Monitor and optimize Configuration Management Database (CMDB) settings that support configuration item (CI) data quality, Common Service Data Model (CSDM) alignment, and Data Foundations outcomes.

Use the **Settings** tab in the CMDB success advisor for Data Foundations to review configuration indicators and identify opportunities to improve CMDB alignment with Data Foundations guidelines.

The CMDB success advisor for Data Foundations evaluates your current configuration across key areas such as:

- CMDB Data Manager ownership policies for principal classes
- Reconciliation rules ensuring the right integration source owns each attribute
- CI class manager configuration for principal class designation

Settings are categorized as `Ideal` or `Requires attention`, enabling you to prioritize actions and maintain a healthy CMDB for Data Foundations.

For a quick reference to validate CMDB settings for Data Foundations, see Settings checklist for Data Foundations in CMDB success advisor.

Access settings

Navigate to the CMDB success advisor landing page, and on the Data Foundations card, select **View insights**. Select the **Settings** tab to access settings-related details. For more information, see Access CMDB success advisor.

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Note:
The CMDB success advisor for Data Foundations dashboard is available only after the setup process is complete. For more information, see Set up CMDB success advisor for Data Foundations.

Required roles

You need the sn_cmdb_admin role to access the CMDB success advisor for Data Foundations.

To manage business rules, change the application scope from CMDB success advisor to Global in the application picker.

Use cases

For examples of how different people in your organization would use this feature, see these use cases.

User	Feature use
CMDB administrator	• Make sure Data Manager ownership policies are configured for all principal classes • Verify reconciliation rules prevent lower-quality sources from overwriting high-quality CI data • Identify CI classes with no Data Manager policy coverage and remediate gaps • Align CMDB settings with CSDM to support service mapping and dependency tracking

Settings features

The **Settings** tab in the CMDB success advisor for Data Foundations provides visibility into key configuration areas that promote accurate and complete CI data for your principal classes. These settings include business rules for CI creation, reconciliation rules that govern attribute ownership across integration sources, and Data Manager policies that support automated life cycle management and data integrity. To maintain CMDB data quality for Data Foundations, regularly review and validate these settings. For more information, see CMDB and Data Foundations settings assessed in the CMDB success advisor.

Evaluate CMDB settings for Data Foundations

Identify and evaluate settings including CMDB reconciliation rules, CI creation business rules, and CMDB Data Manager policies that support data quality and life cycle management for your principal classes.

Before you begin
Role required: sn_cmdb_admin

Procedure

1. Navigate to the CMDB success advisor landing page.
2. On the Data Foundations card, select **View insights**.
3. Select the **Settings** tab.

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4. Select a status tile to view settings by category.

5. Evaluate each setting that requires attention and use the available actions to open the related configuration pages and make updates.

   Tip:
   Select **Learn more** next to a setting to open a related help topic in a new browser tab or window with additional details about that setting.

6. To view any updated configuration status on the **Settings** tab, select the refresh icon .

Related topics

Administer CMDB Data Manager

CMDB and Data Foundations settings assessed in the CMDB success advisor

The Configuration Management Database (CMDB) and Data Foundations settings review provides a configuration-level assessment of the CMDB configuration item (CI) classes for your principal classes to support data quality, life cycle management, and integration accuracy.

Settings overview

Each setting is checked for alignment with suggested business rules, reconciliation guidelines, and Data Manager policy coverage.

CMDB settings for Data Foundations

Setting	Description
CI creation from assets using IRE	Enables the automatic creation of a CI from an asset record using the CMDB Identification and Reconciliation Engine (IRE) for CI classes identified by serial number and without dependent relationships. Requires the relevant business rule to be active for CI creation to occur during asset insertion.
Review reconciliation rules	Evaluates whether reconciliation rules correctly assign attribute ownership to the authoritative integration source for each principal CI class. Helps prevent lower-quality integration sources from overwriting high-quality CI attribute data, maintaining accuracy and consistency across the CMDB.
Review CMDB Data Manager policies	Assesses the configuration of CMDB Data Manager policies, including archive, attestation, certification, delete, and retire, for your principal classes. Each policy type manages a specific life cycle action: **Archive** Archives inactive CIs without deleting them. **Attestation** Validates CI data or runs automated checks. **Certification** Verifies CI data for accuracy and readiness. **Delete** Removes CIs based on defined criteria such as inactivity. **Retire**

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CMDB settings for Data Foundations (continued)

Setting	Description
	Marks CIs as retired when no longer in use.

Related topics

Administer CMDB Data Manager

Settings checklist for Data Foundations in CMDB success advisor

Use this checklist to review Configuration Management Database (CMDB) and Data Foundations settings in CMDB success advisor that directly affect Data Foundations data quality, configuration item (CI) to asset synchronization, and life cycle alignment.

CMDB and Data Foundations settings checklist

Confirm that each setting is configured to support accurate and complete CI data for your principal classes in the CMDB.

Settings configuration checks

Select	Check item (field)	Description	Action
☐	CI creation from assets using IRE	Enables the automatic creation of a CI from an asset record using the CMDB Identification and Reconciliation Engine (IRE) for CI classes identified by serial number and without dependent relationships.	Verify that the rule is active for all applicable principal classes.
☐	Review reconciliation rules	Evaluates whether reconciliation rules correctly assign attribute ownership to the authoritative integration source for each principal CI class, preventing lower-quality sources from overwriting high-quality data.	Update reconciliation rules to ensure the most authoritative source owns each CI attribute.
☐	Review CMDB Data Manager policies	Assesses the configuration of Data Manager policies, including archive, attestation, certification, delete, and retire, for your principal classes.	Enable and configure appropriate policies for all principal classes.

Final validation

Once all settings checks are complete:

- The business rule for CI creation from assets using IRE is `Active` for applicable principal classes.
- Reconciliation rules are configured to protect high-quality CI attribute data from being overwritten by lower-quality sources.
- Data Manager policies are configured for all principal classes.
- No `Requires attention` status is displayed for any setting in the **Settings** tab.

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Indicators used in the CMDB success advisor for Data Foundations dashboard

Indicators enable viewing of high-level metrics that highlight data quality, completeness, and integration coverage issues across principal classes and configuration items (CIs).

CMDB success advisor for Data Foundations dashboard indicators

DF CIs by principal class

Total number of CI records across principal classes, measured daily and grouped by CI class and data integration source.

DF CIs by discovery source

Total number of CI records from principal classes, measured daily and grouped by the discovery source populating each CI.

DF CIs missing name

Total number of CI records from principal classes missing a name, measured daily, where the CI does not have a name specified.

DF CIs missing location

Total number of CI records from principal classes missing a location, measured daily, where the CI does not have a location assigned.

DF CIs missing managed by group

Total number of CI records from principal classes missing a managed by group, measured daily, where the CI does not have a managed by group assigned.

DF duplicate CIs

Total number of CI records within principal classes identified as duplicates based on key matching attributes, measured daily.

DF CIs not updated in last 7 days

Total number of CI records from principal classes not updated in the last seven days, measured daily, where the update timestamp is older than seven days.

DF CIs not updated in last 14 days

Total number of CI records from principal classes not updated in the last 14 days, measured daily, where the update timestamp is older than 14 days.

DF CIs not updated in last 30 days

Total number of CI records from principal classes not updated in the last 30 days, measured daily, where the update timestamp is older than 30 days.

DF CIs not updated in last 60 days

Total number of CI records from principal classes not updated in the last 60 days, measured daily, where the update timestamp is older than 60 days.

DF CIs not updated in last 90 days

Total number of CI records from principal classes not updated in the last 90 days, measured daily, where the update timestamp is older than 90 days.

Using CMDB success advisor for HAM

As a CMDB administrator, you can use the Hardware Asset Management (HAM) dashboard in CMDB success advisor to keep hardware asset data accurate and aligned with data quality guidelines.

1. Set up CMDB success advisor for HAM.

   Set up the CMDB success advisor for HAM.

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2. Monitor CMDB data quality for HAM.

   Identify and address data quality issues specific to HAM in the CMDB.

3. Improve CMDB data quality for HAM.

   Use the Remediation actions panel available for a data card in the advisor dashboard for HAM to improve the overall quality of your CMDB.

4. Analyze data integrations for HAM.

   Improve HAM data coverage by analyzing existing and suggested data integrations, including Discovery patterns and Service Graph Connectors.

5. Analyze CMDB settings for HAM.

   Monitor and optimize CMDB settings that support CI-to-asset synchronization, life cycle alignment, and HAM data quality.

Related topics

Hardware Asset Management

Set up CMDB success advisor for HAM

Use the CMDB success advisor application to configure and manage the CMDB success advisor for Hardware Asset Management (HAM).

Plugins and dependencies

Review the CMDB success advisor application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.

Set up overview

1. Manage opt in HAM resource categories.

   Opt in to Hardware Asset Management (HAM) license resource categories to make the corresponding model categories available for selection in CMDB success advisor for HAM.

2. Get started with CMDB success advisor setup for HAM.

   Set up your HAM specific advisor dashboard by selecting model categories to define the HAM advisor scope.

3. Manage HAM advisor scope in CMDB success advisor.

   After completing the initial setup, you can continue to improve your CMDB data quality by adjusting model category selection for your current HAM goals.

Related topics

Hardware Asset Management

Managing opt-in and opt-out resource categories for HAM in CMDB success advisor

You can opt in to Hardware Asset Management (HAM) license resource categories to make the corresponding model categories available for selection in CMDB success advisor for HAM.

Before you can set up or update the HAM advisor scope in CMDB success advisor, at least one HAM license resource category must be opted in. Resource categories define the hardware

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types, such as Servers, Storage, or Mobile Device, covered by your HAM subscription. Only model categories belonging to opted-in resource categories appear in the CMDB success advisor for HAM.

The opted-in resource categories are set to `true` in the HAM Resource Category [sn_hamp_resource_category] table. For more information, see Opt-in or opt-out of HAM license resource categories.

Model category availability based on opt-in status

The opt-in status of resource categories determines which model categories are available in the HAM advisor.

The following table describes the HAM advisor behavior based on opt-in status.

Model category availability by opt-in status

Status	Advisor behavior
No resource categories opted in	The Select model categories dialog box displays a message indicating that no categories are currently available. You must opt in to at least one resource category before you can configure or update the HAM advisor scope.
Resource categories opted in	The corresponding model categories appear in the **Available resource and model categories** column of the Select model categories and Edit model categories dialog boxes and can be selected for the HAM advisor scope.
Resource category opted out after selection	Model categories from that resource category are no longer available in the advisor. If those categories were previously selected for the HAM advisor scope, they may become unavailable and the dashboard scope may be reduced.

Opt in resource categories

Select HAM resource categories to make their model categories available for configuration in CMDB success advisor.

Role required: sn_hamp.admin

To opt in resource categories, follow these steps:

1. On the CMDB success advisor landing page, select **Select model categories** within the HAM card.

   See Viewing the CMDB success advisor landing page.

2. If the dialog box displays **No model categories available**, select **Opt in categories** to open the HAM license resource categories management page.
3. Select the resource categories included in your HAM subscription and opt them in.
4. Return to CMDB success advisor and proceed with selecting model categories.

   For more information, see Get started with CMDB success advisor setup for HAM.

Opt out resource categories

When a resource category is opted out in HAM, its model categories remain in the CMDB success advisor until you manually remove them. A message is displayed in the advisor indicating that opted-out resource categories are part of the current scope.

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Role required: sn_hamp.admin

To remove opted out resource categories, follow these steps:

1. On the CMDB success advisor landing page, select **Edit model categories** within the HAM card.

   See Viewing the CMDB success advisor landing page.

2. In the **Available resource and model categories** column, locate the opted-out resource category and clear its check box.
3. Select **Save**.

Removing an opted-out resource category excludes all model categories associated with it from the HAM advisor scope and reduces the scope of your HAM advisor dashboard accordingly.

Get started with CMDB success advisor setup for HAM

Set up your Hardware Asset Management (HAM) specific advisor dashboard by selecting model categories to define the HAM advisor scope.

Before you begin

- Install Hardware Asset Management (sn_hamp) on your instance.
- Obtain entitlement for Hardware Asset Management (ham_hamp_license).
- Opt in HAM resource categories. See Managing opt-in and opt-out resource categories for HAM in CMDB success advisor

Role required: sn_cmdb_admin

Note:
In addition to the sn_cmdb_admin role, the pa_data_collector role is required to view the last updated data timestamp on the dashboard and pa_viewer is required to filter data by model categories.

About this task

Selecting model categories defines which hardware asset types CMDB success advisor monitors for HAM data quality. The selected categories determine the scope of the HAM advisor dashboard, including the KPIs, data integrations, and settings that are tracked.

Important:
To determine which model categories to select, review the count of operational assets under each category in the Hardware Asset Workspace, or consult with your IT Asset Management (ITAM) or HAM administrator for guidance. See Hardware Asset Workspace.

Procedure

1. On the CMDB success advisor landing page, select **Select model categories** within the HAM card.
   See Viewing the CMDB success advisor landing page.
2. On the Select model categories dialog box, select a resource category to choose all its model categories or expand a resource category to select individual categories, then move them from the **Available resource and model categories** column to the **Selected** column.

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Note:
If the Select model categories dialog box shows **No model categories available**, select **Opt in categories** to opt in at least one HAM license resource category, then return to this step.

Model category selection actions

Purpose	Action	Data coverage
Add an available resource category	Select the check box for the resource category to include all its model categories.	Includes all model categories associated with the selected resource category.
Expand model category selection	Select **>** to expand a resource category, then select check boxes for specific model categories.	Includes only the selected model categories associated with a resource category.
Narrow down model category selection	Select **>** to expand a resource category, then clear check boxes for specific model categories.	Excludes only the model categories cleared from a resource category.
Remove an opted-out or available resource category	Clear the check box for the resource category.	Excludes all model categories associated with the removed resource category.
Remove a selected model category	Select the X icon next to the category in the **Selected** column or clear the check box for the category	Model category is removed from scope.

Tip:
You can use the **Search** field to find specific categories. You can select up to 50 model categories.

3. Select **Done** to build the CMDB success advisor for HAM dashboard.

Result
The HAM data collection begins. The HAM advisor dashboard is populated after data collection completes.

Manage HAM advisor scope in CMDB success advisor

Manage the scope of your advisor for Hardware Asset Management (HAM) by editing model categories in CMDB success advisor to support your targeted HAM outcomes.

Before you begin
Role required: sn_cmdb_admin

About this task
Control which resource and model categories are included in your HAM advisor dashboard in CMDB success advisor. You can add or remove entire resource categories or fine-tune the selection by including or excluding specific model categories within a resource category. Resource categories may be opted in or out based on your hardware asset manager's preferences. This flexibility enables you to customize the dashboard to display only the most relevant HAM data.

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Procedure

1. On the CMDB success advisor landing page, select **Edit model categories** within the HAM card.
   See Viewing the CMDB success advisor landing page.
2. In the Edit model categories dialog box, add or remove categories to update your model category selection.

Model category selection actions

Purpose	Action	Data coverage
Add an opted-in resource category or an available resource category	Select the check box for the resource category to include all its model categories.	Includes all model categories associated with the selected resource category.
Expand model category selection	Select **>** to expand a resource category, then select check boxes for specific model categories.	Includes only the selected model categories associated with a resource category.
Narrow down model category selection	Select **>** to expand a resource category, then clear check boxes for specific model categories.	Excludes only the model categories cleared from a resource category.
Remove an opted-out or available resource category	Clear the check box for the resource category.	Excludes all model categories associated with the removed resource category.
Remove a selected model category	Select the X icon next to the category in the **Selected** column.	Model category is removed from scope.

3. **Optional:** To remove a model category, select the X icon next to the category in the **Selected** column.
4. Select **Save** to apply the changes.

Result

The HAM dashboard in CMDB success advisor is updated to reflect the data based on the model category selection.

Monitoring CMDB data quality using dashboard metrics in CMDB success advisor for HAM

The CMDB success advisor for HAM dashboard enables CMDB administrators to identify and address data quality issues specific to HAM in the Configuration Management Database (CMDB).

Important:
When you select a segment or count on a chart from a CMDB success advisor dashboard, the KPI Details page opens. On the page, you can analyze how a specific metric trends over time. Additionally, the Remediation actions panel appears when remediation actions are available for that card. Use the panel to improve the quality of CMDB. To learn more, see KPI Details and Improving CMDB data quality for HAM.

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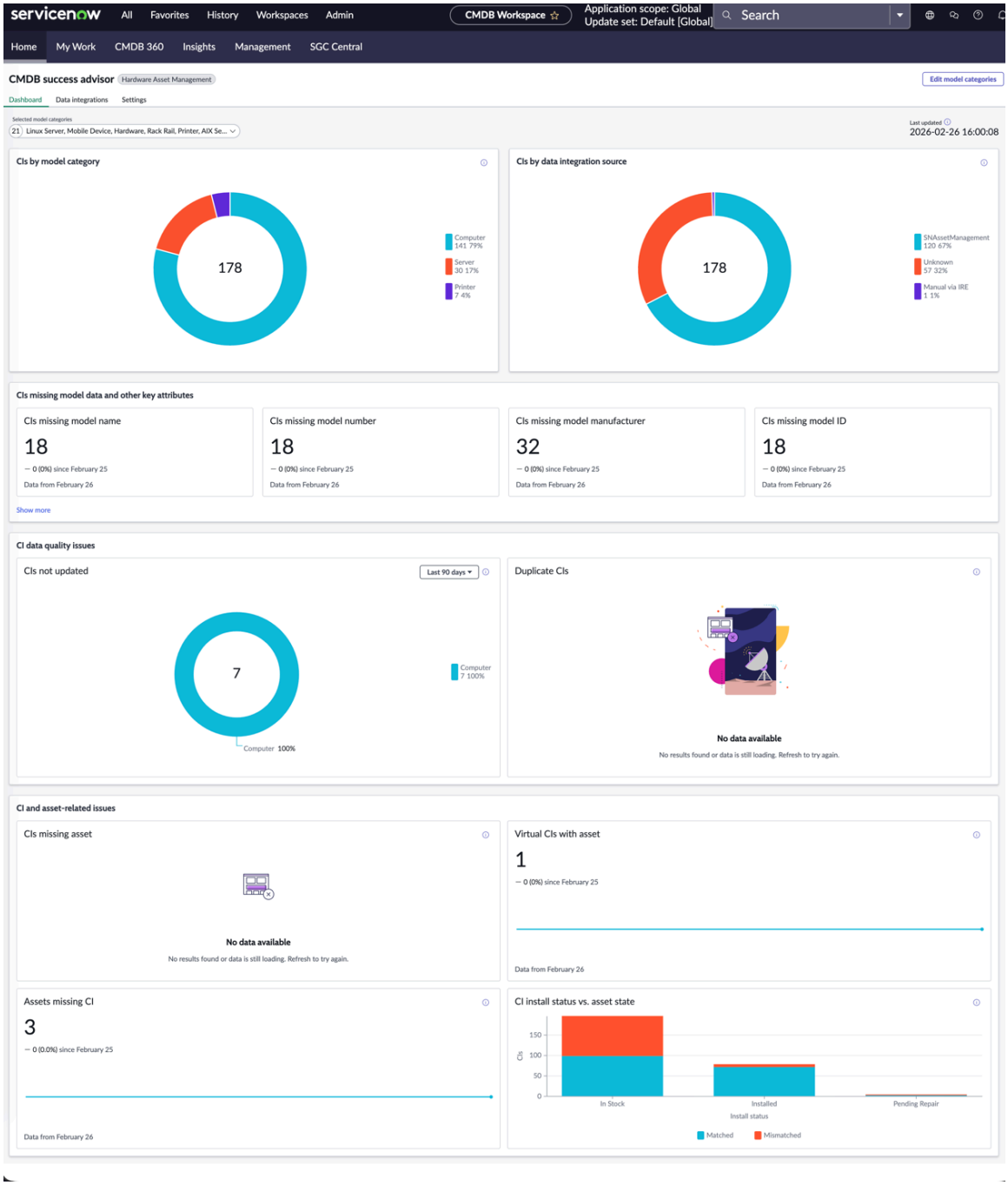

Access the dashboard

To open the dashboard, select **View insights** for HAM on the CMDB success advisor landing page. See Viewing the CMDB success advisor landing page.

Note:
The CMDB success advisor for HAM dashboard is available only after the setup process is complete. For more information, see Set up CMDB success advisor for HAM.

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Required roles

Roles required for CMDB success advisor for HAM dashboard

Role	Description
sn_cmdb_admin	Required to access the dashboard.
pa_viewer	Required to filter data by model categories.
pa_data_collector	Required to view the last updated data timestamp on the dashboard.

Use cases

For examples of how different people in your organization would use this dashboard, see these use cases.

User	Dashboard use
CMDB administrator	• Gain real-time visibility into hardware asset data quality and completeness • Identify missing or incorrect CI attributes quickly • Detect duplicate CIs and unlinked assets • Monitor asset life cycle status (installed, retired, inactive) • Prioritize and track data cleanup and remediation tasks • Verify that the CMDB stays accurate to support HAM

Dashboard features

The dashboard provides clear, consolidated insights into hardware asset data quality and asset status. Use the dashboard to identify and resolve data quality issues within the CMDB through dedicated sections, filters, indicators, and visual reports. Gain valuable insights into CMDB performance related to HAM.

Targeted CMDB metrics focus remediation efforts. Regularly monitor these metrics and follow suggested remediation actions to systematically improve CMDB data quality over time.

Important:
The dashboard data is filtered based on the Selected model categories and Date range filters. See Filters.

Feature description

Feature	Description
CIs by model category	Displays the breakdown of operational CIs by associated model category to highlight CI distribution in the CMDB.

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Feature description (continued)

Feature	Description
CIs by data integration source	Displays the breakdown of operational CIs by data integration source to highlight their contribution to CMDB population.
CIs missing model data and other key attributes	Displays key metrics related to CIs missing model details, ownership, and other key attributes, leading to incomplete records and operational inefficiencies.
CI data quality issues	Displays key metrics related to CIs that have not been updated or may have duplicate records, leading to outdated information and inconsistencies in the CMDB.
CI and asset-related issues	Displays key metrics related to mismatches and missing links between CIs and assets, leading to incomplete asset life cycle tracking and reporting issues.

Filters

Enables narrowing the data shown in graphs and metrics based on model category, date range, or stale CI threshold.

Name	Type	Description
Selected model categories	List	Filters CIs based on the selected model categories. **Note:** Requires the `pa_viewer` role.
Date range	Date	Filters the dashboard data based on the selected date range.
Stale CI	List	Filters stale CIs based on the number of days since their last update. Available values: `7`, `14`, `30`, `60`, and `90` days.

CIs missing model data and other key attributes

Displays key metrics related to CIs missing model details, ownership, and other key attributes, leading to incomplete records and operational inefficiencies.

CIs missing model data and other key attributes section

Card	Description	Indicators
CIs missing model name	Operational CIs not associated with a model ID or associated with a model ID missing a name.	CIs missing model name
CIs missing model number	Operational CIs not associated with a model ID or associated with a model ID missing a model number.	CIs missing model number

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CIs missing model data and other key attributes section (continued)

Card	Description	Indicators
CIs missing model manufacturer	Operational CIs not associated with a model ID or associated with a model ID missing a manufacturer.	CIs missing manufacturer
CIs missing model ID	Operational CIs not associated with a model ID.	CIs missing model ID
CIs missing assigned to	Operational CIs not assigned to a specific user, leading to unclear ownership and delayed action.	CIs missing assigned to
CIs missing location	Operational CIs not associated with a location, leading to gaps in asset tracking and service mapping.	CIs missing location
CIs missing owner	Operational CIs not associated with an owner, leading to unclear accountability and delayed issue resolution.	CIs missing owner
CIs missing managed by group	Operational CIs not managed by a specific ownership group, leading to inefficient support assignment and operational risk.	CIs missing managed by group
CIs missing serial number	Operational CIs missing a serial number, leading to issues with duplicate identification.	CIs missing serial number

Note:
Select **Show more** in the CIs missing model data and other key attributes section to view all the cards.

CI data quality issues

Displays key metrics related to CIs that haven't been updated or may have duplicate records, leading to outdated information and inconsistencies in the CMDB.

CI data quality issues section

Card	Description	Indicators
CIs not updated	Operational CIs not updated, causing data gaps and inaccuracies in the CMDB.	CIs not updated in last 7 days CIs not updated in last 14 days CIs not updated in last 30 days CIs not updated in last 60 days CIs not updated in last 90 days **Note:** The CIs not updated card data is additionally filtered based on the Stale CI filter. See Filters.
Duplicate CIs	Operational CIs identified as duplicates based on key matching attributes, causing data redundancy.	Hardware CIs group by

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CI and asset-related issues

Displays key metrics related to mismatches and missing links between CIs and assets, leading to incomplete asset life cycle tracking and reporting issues.

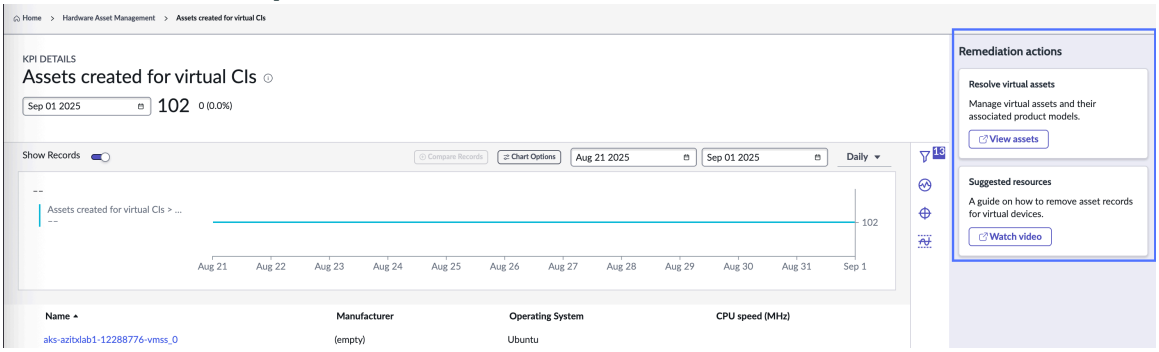
CI and asset-related issues section

Card	Description	Indicators
CIs missing asset	Operational CIs not associated with an asset record, leading to incomplete asset life cycle tracking.	CIs missing asset
Virtual CIs with asset	Virtual assets created for virtual CIs that are operational, leading to inaccurate consumption of HAM licenses.	Assets created for virtual CIs
Assets missing CI	Assets without a matching CI, caused by CIs not being discoverable on the network.	Assets missing CI
CI install status vs. asset state	All CIs where the install status matches or differs from the corresponding asset state.	CI install status vs. asset state matched CI install status vs. asset state mismatched

Improving CMDB data quality for HAM

The Remediation actions panel available for a chart in the CMDB success advisor dashboard for Hardware Asset Management (HAM) suggests targeted actions to improve the overall quality of your Configuration Management Database (CMDB).

Remediation actions panel



When remediation actions are available for a chart, the Remediation actions panel appears on the KPI Details page.

You can perform the actions suggested within the Remediation actions panel to address HAM data quality issues in the CMDB. These actions help improve the accuracy, consistency, and usability of configuration items (CIs), promoting better alignment with HAM.

The Remediation actions panel:

- Improves CMDB data quality through guided actions
- Suggests context-aware actions
- Supports quick, informed remediation steps

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- Focuses attention on meaningful tasks
- Appears only when actionable insights are available

Accessing the Remediation actions panel

To open the Remediation actions panel, select a segment or count on a chart in the CMDB success advisor dashboard for HAM. The KPI Details page opens. If the remediation actions are available for the selected data, the panel appears on the details page suggesting various remediation actions.

Available remediation actions

The Remediation actions panel provides relevant suggestions and actions based on the information in the selected chart. For example, if the chart shows CIs that weren't updated recently, the panel suggests reviewing retirement policies.

The remediation actions are available for the improvement of the following issues:

CIs with invalid or unpopulated names

Identify and correct CIs that lack meaningful or complete naming, which can impact discovery and asset alignment.

CIs with missing model entries

Resolve CIs missing any model-related data in the CMDB, including model ID, model name, model number, and manufacturer, all of which are essential for normalization and life cycle tracking.

Stale CIs

Remove or update CIs that weren't updated or discovered for an extended period, helping maintain an accurate representation of your environment.

Duplicate CIs

Remove or merge duplicate records to avoid data fragmentation and promote a single source of truth.

Virtual CIs with asset

Identify and remove hardware assets incorrectly created for virtual CIs, which can lead to inaccurate HAM license consumption and reporting.

CIs missing serial number

Identify and resolve CIs that have no assigned serial number, which can affect duplicate detection and hardware asset tracking.

CIs missing location

Identify and resolve CIs that have no assigned location, which can cause gaps in asset tracking and service mapping.

CI and asset state mismatch

Identify and resolve CIs where the installation status does not align with the corresponding asset state, which can lead to inaccurate asset life cycle reporting.

Analyzing data integrations for improving HAM data coverage

Improve HAM data coverage by analyzing existing and suggested data integrations, including Discovery patterns and Service Graph Connectors.

Use the **Data integrations** tab in the CMDB success advisor for HAM to assess the effectiveness of your current data integration sources in the Configuration Management Database (CMDB)

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and identify opportunities to improve HAM data coverage. The **Data integrations** tab provides a breakdown of active Discovery patterns and installed Service Graph Connectors, including how many key configuration item (CI) attributes each integration source is populating.

For a quick reference to improve HAM data coverage, see Data integration checklist for HAM in CMDB success advisor.

Access data integrations

Navigate to the CMDB success advisor , and on the HAM card, select **View insights**. Select the **Data integrations** tab. To access the dashboard, see Access CMDB success advisor.

Note:
The CMDB success advisor for HAM dashboard is available only after the setup process is complete. For more information, see Set up CMDB success advisor for HAM.

Required roles

Roles required for accessing data integration sources in the CMDB success advisor for HAM

Role	Description
sn_cmdb_admin	Required to access the CMDB success advisor.
cmdb_inst_admin	Required to manage Service Graph Connector connections in SGC Central.
pd_admin	Required to manage Discovery patterns with create and write access.
pd_user	Required to view Discovery patterns with read-only access.
pd_mid	Required to view Discovery and Service Mapping Patterns with read-only access.

Use cases

For examples of how different people in your organization would use this feature, see these use cases.

User	Feature use
CMDB administrator	• Identify an inactive Discovery pattern that can populate attribute data for hardware assets. • Identify a Service Graph Connector relevant to hardware assets that is installed but without any active connections. • Prioritize which hardware-related integrations to improve to maximize CMDB data quality for improving the completeness, accuracy, and reconciliation of hardware asset records.

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Data integration features

Feature description

Feature	Description
Integration overview	Displays the count of all Discovery patterns and Service Graph Connectors contributing hardware asset data to the CMDB.
Status indicators	Check whether Discovery patterns are active and Service Graph Connectors are installed with active connections. For more information, see Reviewing data integrations for HAM.
Attribute coverage insights	Select the **Attribute coverage** link next to the integration to review which hardware asset attributes are populated by a Discovery pattern or Service Graph Connector. For more information, see Evaluate HAM data integration coverage.
Access integration details	Configure integrations to improve attribute coverage. For more information, see Evaluate HAM data integration coverage.

Reviewing data integrations for HAM

Review both existing and suggested Discovery patterns and Service Graph Connectors to improve your HAM data coverage.

The **Data integrations** tab in CMDB success advisor for HAM provides insight into current integration usage for Discovery patterns and Service Graph Connectors. To make sure your CMDB is being correctly populated with high-quality HAM data, check the status of both integration types.

Integration types

The **Data integrations** tab displays two key data sources that support HAM:

Discovery patterns

Discovery patterns identify IT infrastructure components through network-based discovery.

To evaluate Discovery pattern effectiveness for HAM, review the fields as described in the following table.

Fields to monitor for Discovery pattern

Field	Description
Status	Indicates whether a Discovery pattern is currently active. Only active patterns contribute data to the CMDB.
Attribute coverage	Displays how many HAM relevant attributes within a model category are being populated by each pattern.
View pattern	Opens the Discovery pattern configuration, enabling you to inspect or refine the logic, identification rules, and targeted CI classes.

Low attribute coverage might occur if the Discovery pattern is limited in scope, not collecting detailed CI information, or if its identification rules are not aligned with the actual devices in your network. In such cases, required hardware attributes may be missing from the resulting CI records.

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Service Graph Connectors

Service Graph Connectors import asset and CI data from third-party platforms.

To evaluate Service Graph Connectors effectiveness, review the fields as described in the following table.

Field	Description
Installed	Indicates whether the connector is deployed. A value of `Yes` confirms it is installed and available for use.
Attribute coverage	Displays how many HAM relevant attributes within a model category are being populated by each connector.
Active connections	Represents the number of connections actively importing data into the CMDB.
Inactive connections	Displays connections that are configured but not currently importing data and may need troubleshooting.

If a Service Graph Connector shows low attribute coverage or no active connections, it may indicate that the specific version being evaluated has limited attribute coverage. This can happen if the connector is installed but not fully mapped to populate key attributes or if the data source is unavailable or misconfigured. As a result, critical hardware data, such as serial numbers, models, or manufacturers, may not be imported into the CMDB, affecting the completeness and reliability of asset records.

Evaluate HAM data integration coverage

Identify supported model categories and attributes from a Discovery pattern or Service Graph Connector to evaluate data coverage and upgrade requirements.

Before you begin

Role required: sn_cmdb_admin

Procedure

1. Navigate to the CMDB success advisor landing page.
2. On the HAM card, select **View insights**.
3. Select the **Data integrations** tab.
4. Find the Discovery pattern or Service Graph Connector by selecting the respective cards.
5. Identify the status of your Discovery patterns and Service Graph Connectors to improve CMDB data coverage.
6. Select the **Attribute coverage** link for a data integration source.
7. In the Supported model categories and attributes dialog box, review the attribute coverage details for model categories.
   The following details are available:
   - Integration suggested vs. installed version
   - Supported CI classes identified as model categories
   - List of attributes and whether each is supported by the selected data integration source
8. **Optional:** When installed version is lower than the suggested version, select the **View available version** link to open the Application manager.

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Note:
The **View available version** link is available only when applicable for a data integration source. Also, only users with the admin role can install or upgrade an application. See Application Manager.

9. Determine which hardware asset attributes are being populated by the integration and whether an upgrade is needed to improve the data coverage.
   Available options for improving the data coverage are:
   - For Discovery patterns, you can perform the following actions based on the applicable criteria:
     - If you have the pd_user, you can select **View pattern** for a Discovery pattern to view the pattern. For more information, see Patterns and horizontal discovery.
     - If you have the pd_admin role, you can select **View pattern** for a Discovery pattern to understand its contribution and modify the pattern to maximize the attribute coverage. For more information, see Patterns and horizontal discovery.
   - For Service Graph Connectors, if you have the cmdb_inst_admin role, you can perform the following actions based on the applicable criteria:
     - Select **Install connector** to add a connector from the ServiceNow Store.
     - Select **Create connection** to configure a Service Graph Connector from SGC Central. For more information, see Create a connection for a Service Graph Connector in SGC Central.
     - Select **View connections** to open and review details of existing installed connections importing hardware asset data within SGC Central. For more information, see Viewing connections for a Service Graph Connector in SGC Central.

Data integration checklist for HAM in CMDB success advisor

Use the data integration checklist to verify that Discovery patterns and Service Graph Connectors are correctly configured and actively contributing to your Configuration Management Database (CMDB), promoting high-quality hardware asset data.

Discovery patterns checklist

Confirm each Discovery pattern is enabled and effectively populating hardware-related attributes.

Discovery patterns configuration checks

Select	Check item (field)	Description	Action
☐	Pattern name	Name of the discovery pattern contributing Hardware Asset Management (HAM) data.	Confirm that the pattern is relevant for hardware asset discovery.
☐	Status	Current state of the pattern as active or inactive.	Verify that the pattern is active with Status set to Active to confirm it's contributing data.
☐	Attribute coverage	Number of hardware attributes populated by the pattern.	Check how many relevant CI attributes are being populated for each model category.

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Discovery patterns configuration checks (continued)

Select	Check item (field)	Description	Action
			Note: Low attribute coverage may suggest shallow discovery or misaligned pattern logic.
☐	Suggested version	Latest suggested version for optimal attribute coverage.	Plan and perform an upgrade to the suggested version or higher to improve coverage.
☐	Installed version	Version currently in use in your instance.	Compare with the suggested version and upgrade if necessary.
☐	View pattern	Link to inspect the pattern configuration.	Select the link to review or modify the pattern logic.

Service Graph Connectors checklist

Confirm Service Graph Connectors are installed and actively contributing hardware data.

Service Graph Connectors configuration checks

Select	Check item (field)	Description	Action
☐	Connector name	Name of the Service Graph Connector providing HAM data.	Confirm that the Service Graph Connector is required for your HAM processes.
☐	Status	Current state of the Service Graph Connector as active or inactive.	Activate Service Graph Connectors that are needed for HAM but currently inactive.
☐	Attribute coverage	Number of hardware attributes populated by the Service Graph Connector.	Check how many relevant CI attributes are being populated for each model category. **Note:** Low coverage may indicate incomplete mappings or missing source data.
☐	Suggested version	Latest suggested version for optimal attribute coverage.	Plan and perform an upgrade to the suggested version or higher to improve coverage.
☐	Installed version	Version currently in use in your instance.	Compare with the suggested version and upgrade if necessary.
☐	Active connections	Number of active connections.	Confirm that at least one connection is actively importing data into the CMDB.

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Service Graph Connectors configuration checks (continued)

Select	Check item (field)	Description	Action
☐	Inactive connections	Number of inactive connections.	Review and troubleshoot any configured connections that aren't currently active.

Optional checks for Discovery patterns and Service Graph Connectors

Optional data integration checks

Select	Check item	Description	Action
☐	No entitlements warning	Discovery patterns or Service Graph Connectors tile showing no entitlements, indicating missing access or licensing.	Verify licensing and entitlements with your administrator.
☐	Suggested integrations reviewed	Some Discovery patterns are listed as suggestions because they aren't installed or active, and some Discovery patterns are listed but are not actively used.	Evaluate business need and consider implementing high-value suggested integrations.

Final validation

Once all data integration checks are complete:

- Attribute coverage across integrations supports your HAM business outcome.
- CMDB records for hardware assets are accurate and complete.

Analyze CMDB settings for HAM

Monitor and optimize Configuration Management Database (CMDB) settings that support configuration item (CI) to hardware asset synchronization, life cycle alignment, and Hardware Asset Management (HAM) data quality.

Use the **Settings** tab in the CMDB success advisor for HAM to review configuration indicators and identify opportunities to improve CMDB alignment with HAM guidelines.

The CMDB success advisor for HAM evaluates your current configuration across key areas such as:

- Automatic asset and CI creation
- Field and model category mappings
- CI state and substate usage
- CMDB Data Manager policy coverage

Settings are categorized as `Ideal` or `Requires attention`, enabling you to prioritize actions and maintain a healthy CMDB for HAM.

For a quick reference to validate CMDB settings for HAM, see Settings checklist for HAM in CMDB success advisor.

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Access settings

Navigate to the CMDB success advisor landing page and for the HAM card, select **View insights**. Select the **Settings** tab to access settings-related details. For more information, see Access CMDB success advisor.

Note:
The CMDB success advisor for HAM dashboard is available only after the setup process is complete. For more information, see Set up CMDB success advisor for HAM.

Required roles

You need the sn_cmdb_admin role to access the CMDB success advisor for HAM.

To manage business rules, change the application scope from CMDB success advisor to Global in the application picker.

Use cases

For examples of how different people in your organization would use this feature, see these use cases.

User	Feature use
CMDB administrator	• Improve the accuracy of asset reconciliation by aligning CI and asset record creation. • Promote consistent asset life cycle management through status field alignment across asset and CI records. • Automate policy-based workflows for asset retirement, deletion, certification, or archival using policy-driven rules. • Standardize hardware model categories to improve normalization processes and reporting accuracy.

Settings features

The **Settings** tab in the CMDB success advisor for HAM provides visibility into key configuration areas that promote accurate synchronization between hardware assets and CIs. These settings include business rules, field mappings, model categories, and Data Manager policies that support automated life cycle management and data integrity. To maintain CMDB data accuracy and HAM integration, regularly review and validate these settings. For more information, see CMDB and HAM settings assessed in the CMDB success advisor.

Evaluate CMDB settings for HAM

Identify and evaluate settings including Hardware Asset Management (HAM) business rules, configuration item (CI) to asset field mappings, hardware model categories, and CMDB Data Manager policies that support synchronization and automation between hardware assets and CIs.

Before you begin
Role required: sn_cmdb_admin

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Procedure

1. Navigate to the CMDB success advisor landing page.
2. On the HAM card, select **View insights**.
3. Select the **Settings** tab.
4. Select a status tile to view settings by category.
5. Evaluate each setting that requires attention and use the available actions to open the related configuration pages and make updates.

> **Tip:**
> Select **Learn more** next to a setting to open a related help topic in a new browser tab or window with additional details about that setting.

6. To view any updated configuration status on the **Settings** tab, select the refresh icon .

Related topics

Administer CMDB Data Manager

Asset and CI management

Model categories

CMDB and HAM settings assessed in the CMDB success advisor

The Configuration Management Database (CMDB) and Hardware Asset Management (HAM) settings review provides a configuration-level assessment of the CMDB configuration item (CI) classes and HAM assets for maintaining data accuracy.

Settings overview

Each setting is checked for alignment with suggested business rules and mapping guidelines.

CMDB integration settings

Setting	Description
Create asset on CI insertion	Enables the automatic creation of an asset record when a CI is inserted into the CMDB. Requires the Create Asset on Insert business rule to be active for asset creation to occur during CI insertion.
Update asset fields on CI change	Enables automatic updates to asset records when a related CI is modified. Requires the Update Asset Fields on Change business rule to be active to synchronize CI changes with asset data.
Create CI on asset insertion	Enables the automatic creation of a configuration item when an asset record is added. Requires the Create CI on Insert business rule to be active to reflect asset data in the CMDB.
Update CI on asset update	Enables automatic updates to configuration item records when associated asset data is changed. Requires the Update CI Fields on Change business rule to be active to maintain data consistency.
Review custom model categories	Validates that custom model categories are properly mapped to predefined model categories. Verifies accurate classification, consistent reporting, and standardized data alignment.

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CMDB integration settings (continued)

Setting	Description
Review asset CI field mappings	Evaluates whether asset fields are correctly mapped to configuration item fields using standard mappings. Helps prevent data discrepancies caused by custom or incorrect mappings.
Review asset CI install status mappings	Checks that CI install status values are accurately mapped to the state and substate fields of the corresponding asset record. Verifies precise life cycle tracking and status reporting.
Review asset CI hardware status mappings	Verifies that CI hardware status values align with the state and substate fields of the corresponding asset record. Supports consistent representation of physical asset conditions.
Review Data Manager policies	Assesses the configuration of CMDB Data Manager policies, including archive, attestation, certification, delete, and retire, for the selected hardware CI classes. Each policy type manages a specific life cycle action: **Archive** Archives inactive CIs without deleting them. **Attestation** Validates CI data or runs automated checks. **Certification** Verifies CI data for accuracy and readiness. **Delete** Removes CIs based on defined criteria such as inactivity. **Retire** Marks CIs as retired when no longer in use.

Related topics

Administer CMDB Data Manager

Settings checklist for HAM in CMDB success advisor

Use this checklist to review Configuration Management Database (CMDB) and Hardware Asset Management (HAM) settings in CMDB success advisor that directly affect HAM data quality, configuration item (CI) to asset synchronization, and life cycle alignment.

CMDB and HAM settings checklist

Confirm that each setting is configured to support accurate and consistent hardware asset records in the CMDB.

Settings configuration checks

Select	Check item (field)	Description	Action
☐	Create asset on CI insertion	Enables the automatic creation of an asset record when a CI is inserted into the CMDB.	Verify that rule is active and set to

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Settings configuration checks (continued)

Select	Check item (field)	Description	Action
			create asset records on CI insertion.
☐	Update asset fields on CI change	Enables automatic updates to asset records when a related CI is modified.	Verify that rule is active and correctly updates asset fields on CI change.
☐	Create CI on asset insertion	Enables the automatic creation of a configuration item when an asset record is added.	Verify that rule is active and set to create CI records on asset insertion.
☐	Update CI on asset update	Enables automatic updates to configuration item records when associated asset data is changed.	Verify that rule is active and correctly updates CI fields on asset changes.
☐	Review custom model categories	Validates that custom model categories are properly mapped to predefined model categories	Map custom categories to predefined ones.
☐	Review asset CI field mappings	Evaluates whether asset fields are correctly mapped to configuration item fields using standard mappings.	Try using predefined mappings.
☐	Review asset CI install status mappings	Checks that CI install status values are accurately mapped to the state and substate fields of the corresponding asset record.	Try using predefined mappings.
☐	Review asset CI hardware status mappings	Verifies that CI hardware status values align with the state and substate fields of the corresponding asset record.	Try using predefined mappings.
☐	Review CMDB Data Manager policies	Assesses the configuration of Data Manager policies, including archive, attestation, certification, delete, and retire, for the selected hardware CI classes.	Enable and configure appropriate policies for the required CI classes.

Final validation

Once all settings checks are complete:

- All business rules for automatic asset and CI creation or updates are `Active`.
- Custom model categories are correctly mapped to predefined categories.
- Data Manager policies are configured for all required CI classes.
- No `Requires attention` status is displayed for any setting in the **Settings** tab.

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Indicators used in the CMDB success advisor for HAM dashboard

Indicators enable viewing of high-level metrics that highlight data quality, completeness, and synchronization issues across hardware assets and configuration items (CIs).

CMDB success advisor for HAM dashboard indicators

Assets created for virtual CIs

Total number of virtual CI assets in the Hardware [alm_hardware] table created daily, where the life cycle stage of CI is operational, the asset field is not empty, and the CI is marked as virtual.

Assets missing CI

Total number of hardware assets in the Hardware [alm_hardware] table missing a linked CI from the Hardware [cmdb_ci_hardware] class, measured daily, where the CI is operational, the asset is actively in use, and no CI is linked to the asset.

CI install status vs. asset state matched

All CI records from the Hardware [cmdb_ci_hardware] class where the installation status correctly aligns with the expected asset state, promoting accurate and reliable asset management.

CI install status vs. asset state mismatched

All CI records from the Hardware [cmdb_ci_hardware] class with an installation status that doesn't align with the expected asset state, resulting in erroneous asset management.

CIs missing asset

Total number of CI records from the Hardware [cmdb_ci_hardware] class missing a linked asset, measured daily, where the life cycle stage of CI is operational and no asset is associated with the CI.

CIs missing assigned to

Total number of CI records from the Hardware [cmdb_ci_hardware] class missing an assigned owner, measured daily, where the CI lacks an assigned owner.

CIs missing location

Total number of CI records from the Hardware [cmdb_ci_hardware] class missing a location, measured daily, where the CI doesn't have a location assigned.

CIs missing managed by group

Total number of CI records from the Hardware [cmdb_ci_hardware] class missing a managed by group, measured daily, where the CI doesn't have a managed by group assigned.

CIs missing manufacturer

Total number of CI records from the Hardware [cmdb_ci_hardware] class missing a manufacturer, measured daily, where the CI doesn't have a manufacturer specified.

CIs missing model ID

Total number of CI records from the Hardware [cmdb_ci_hardware] class missing a model ID, measured daily, where the CI doesn't have a model ID or model display name specified.

CIs missing model name

Total number of CI records from the Hardware [cmdb_ci_hardware] class missing a model name, measured daily, where the CI doesn't have a model name specified, with or without a model ID.

CIs missing model number

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Total number of CI records from the Hardware [cmdb_ci_hardware] class missing a model number, measured daily, where the CI is not associated with a model ID, or is associated with a model ID that is missing a model number.

CIs missing owner

Total number of CI records from the Hardware [cmdb_ci_hardware] class missing an owner, measured daily, where the CI doesn't have an owner assigned.

CIs missing serial number

Total number of CI records from the Hardware [cmdb_ci_hardware] class missing a serial number, measured daily, where the CI doesn't have a serial number assigned.

CIs not updated in last 7 days

Total number of CI records from the Hardware [cmdb_ci_hardware] class not updated in the last seven days, measured daily, where the update timestamp is older than seven days.

CIs not updated in last 14 days

Total number of CI records from the Hardware [cmdb_ci_hardware] class not updated in the last 14 days, measured daily, where the update timestamp is older than 14 days.

CIs not updated in last 30 days

Total number of CI records from the Hardware [cmdb_ci_hardware] class not updated in the last 30 days, measured daily, where the update timestamp is older than 30 days.

CIs not updated in last 60 days

Total number of CI records from the Hardware [cmdb_ci_hardware] class not updated in the last 60 days, measured daily, where the update timestamp is older than 60 days.

CIs not updated in last 90 days

Total number of CI records from the Hardware [cmdb_ci_hardware] class not updated in the last 90 days, measured daily, where the update timestamp is older than 90 days.

Hardware CIs group by

Total number of CI records from the Hardware [cmdb_ci_hardware] class, measured daily and grouped by model category and discovery source.

CMDB success advisor reference

Reference topics provide additional information about CMDB success advisor components, configuration reviews, and data integration checklists.

Components installed with CMDB success advisor

Several types of components are installed with activation of the CMDB success advisor plugin, including tables and scheduled jobs.

Scheduled jobs installed

Scheduled job	Description
CMDB success advisor data collection for HAM	Identifies Hardware Asset Management CI records and collects data for their corresponding indicators.

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Tables installed

Table	Description
CMDB Advisor CI attribute coverage [sn_cmdb_advisor_ci_attribute_coverage]	Details of configuration item (CI) attributes for a specific ingestion source, version, CI class, and selected attributes in CMDB success advisor using a Service Graph Connector or Discovery pattern.
CMDB Advisor Content Template [sn_cmdb_advisor_content_template]	Product-specific model categories used by CMDB success advisor to generate data quality insights.
CMDB Advisor settings [sn_cmdb_advisor_settings]	Details of CMDB success advisor settings, including product association, access roles, and remediation guidance.
CMDB Advisor suggested attribute [sn_cmdb_advisor_suggested_attribute]	Attribute suggestions for CMDB success advisor based on the selected product and CI class context.
CMDB Advisor suggested ingestion source [sn_cmdb_advisor_suggested_ingestion_source]	Ingestion source suggestions for CMDB success advisor based on the associated Service Graph Connectors, Discovery patterns, and product.
CMDB Advisor targeted product [sn_cmdb_advisor_targeted_product]	Targeted product definitions for CMDB success advisor, including icon, display name, and display order.

Key CMDB success advisor concepts

Familiarize yourself with the key terms and concepts to work with CMDB success advisor.

Configuration Management Database (CMDB)

The central database that stores information about IT assets (CIs) and their relationships.

Configuration item (CI)

Any IT component tracked in the CMDB, including hardware, software, applications, or network devices.

Scope

The set of principal classes in Data Foundations or model categories in HAM that CMDB success advisor monitors for your organization.

Principal class

A CI class, such as Server [cmdb_ci_server], designated as important for your organization within Data Foundations. When a class is principal, a filter is automatically applied to the CI fields in incidents, changes, and problems.

Model category

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A hardware classification used as the scope unit for HAM such as Computers, Servers, Printers.

Service Graph Connectors

A pre-built integration that imports data from an external system into the CMDB.

Discovery pattern

An automated ServiceNow Discovery rule that scans the network to find and populate CI attributes.

Key Performance Indicator (KPI)

A measurable metric showing CMDB health in a specific area including completeness, correctness, and compliance.

Remediation actions

Context-aware suggestions shown on the KPI details page for addressing a specific data quality issue. Actions appear only when actionable insights are available for the selected chart segment.

Data quality issue

A detected problem in CMDB data, such as a CI missing a serial number, a stale record, or a duplicate.

CMDB Data Manager

A ServiceNow feature that defines which integration source has authority (ownership) over each CI attribute.

CI Class Manager

Use the CI Class Manager to centrally view, create, or edit basic class definitions and class settings for identification, reconciliation, and CMDB Health.

> **Note:**
> CI Class Manager doesn't support working with non-CMDB tables. For more details, see IRE support for non-CMDB tables.

To access the CI Class Manager, navigate to **All** > **Configuration** > **CI Class Manager**.

Class basics

- Create a class
- View class basic information
- Class columns
- Add a suggested relationship
- Display all CIs for a class
- Dependency Views map icons for a class
- Delete CIs
- Update class list in the Principal Class filter

CMDB Health

- Create a compliance audit
- Create a certification template

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- CMDB Health orphan rule
- CMDB Health staleness rules
- Set a CI field to be recommended
- Set a CI attribute to be mandatory
- Health inclusion rules

IRE

- Identification:
  - CI identification rules
  - Identification inclusion rules
- Reconciliation:
  - CI reconciliation rules
  - Data refresh rules
- Dependencies:

  Dependent relationship rules (hosting and containment)

Service Mapping

- Entry point types for Service Mapping
- CI types for Service Mapping and Discovery

CMDB CI Lifecycle Management (legacy)

From the time of its creation to the time that it is no longer needed, a CMDB CI would typically transition through several operational states while undergoing various operations. CI LIfecycle Management provides the mechanism to define states and actions for a CI and lets you apply appropriate actions based on a CI's state to tailor the management of CI lifecycle to business needs.

The CMDB Data Manager is now a more comprehensive and integrated solution for managing CI life cycle operations such as deletion and archival, in bulk. For information about the CMDB Data Manager, see Working with CMDB Data Manager.

Terms associated with CI Lifecycle Management:

Operational states

A set of states that a CI can be at such as 'Operational' or 'Repair in Progress'. A CI can be associated with only a single operational state at any given time. The choices for operational states are based on the *operational_status* field in the [cmdb_ci] table. There are several operational states that are defined in the base system such as 'Retired' and 'Repair in Progress'. You can modify this list to reflect operational states that are relevant in your business.

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Note:
By default, Service Mapping is configured to ignore all host CIs for which the value of Operational status *[operational_status]* is not **1** (Operational) or the value of status *[install_status]* is **100** (absent). For additional information about this behavior, see Preparing customized ServiceNow deployments to work with Service Mapping [KB0647574] in the HI Knowledge Base.

CI Lifecycle Management allows multiple operators and automations to simultaneously set different operational states of a CI. Since a CI cannot be associated with multiple operational states, it is important to configure each operational state with a priority. These priorities are then used in such situation to determine which of the operational states is the cumulative operational state.

CI actions

A set of actions that can be applied to a CI during its lifetime. You can define CI actions that are relevant in your business.

Compatible CI Actions

CI Lifecycle Management allows a CI to have multiple active CI actions simultaneously, however they must be specifically defined as compatible. By default, there are no two actions for a CI that are compatible with each other. You can change this behavior by specifying pairs of actions that are compatible and thus allowed to be applied simultaneously to a CI. For example, you can specify that the 'Patching' and the 'Provisioning' CI actions are compatible making it possible to apply both simultaneously to a CI.

Not Allowed CI Actions

By default, any CI action can be applied to any CI. You can restrict this behavior by defining a rule that an action is not allowed for a CI when it is in a specific operational state. For example, you can define a Not Allowed CI Action in which it is not allowed to apply the 'Provisioning' action to a Linux Server that is in a 'Non-Operational' state.

Not Allowed Operational Transitions

By default, transitions are allowed from any operational state to another. You can restrict this behavior by defining a rule that for a specified CI, a transition from a certain operational state to another operational state is not allowed. For example, you can define that for a Linux Server it is not allowed to transition from 'Repair in progress' to 'Non-Operational'.

Requestor

A requestor can be a workflow or a non-workflow operator that is trying to set operational states and apply CI actions. Each requestor has an associated requestor ID that is a GUID and that can be an active workflow context or a non-workflow registered operator ID.

Lease time

A time period that each requestor (especially non-workflow operators) can provide, during which a specified CI action is allowed to be active for a specified CI.

CMDB CI Lifecycle Management provides a set of APIs to manage CI operational states and CI actions. And the UI where you define a set of rules to restrict certain operational state transitions and to restrict actions based on operational states. It also provides a mechanism to audit CI operational state and CI actions during the entire CI lifecycle.

Providers such as automation, workflows, or Change Management can use CI Lifecycle Management as a mechanism to manage CI operational states and apply CI actions. By

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default, the behavior of CI Lifecycle Management has no restrictions on some operations, and full restrictions on other operations. The CI Lifecycle Management UI lets you modify this default behavior by specifying Not Allowed CI Actions, Compatible CI Actions, and Not Allowed Operational Transitions that restricts some operations and enables for others.

With CI Lifecycle Management you can:

- Manage CI operational states and CI actions throughout the entire CI lifecycle.
- Manage CI operational state transitions.
- Restrict certain operational state transitions.
- Associate certain actions for certain CI types that are in specific operational state.
- Restrict IT Service Management applications based on CI operational state.
- Audit CI operational states and CI actions during the entire CI lifecycle.

Lifecycle management APIs

CI Lifecycle Management provides a set of APIs to manage CI operational state and CI actions during the entire CI lifecycle. All restrictions and allowances specified by rules in the UI are enforced when state management APIs run, and if an API attempts to perform a restricted operation, the operation is blocked and an error is logged.

Registering requestors

When using the lifecycle management APIs to apply CI actions, requestors are required to be registered and to obtain a requestor ID which is unique within the lifecycle management tables. To register and to obtain a requestor ID, non-workflow users should call the `registerOperator` API. Workflow users can use the active Workflow context as the requestor ID, and they do not need to explicitly call `registerOperator`.

After completing the CI lifecycle operations, the requestor should call the `unregisterOperator` API to unregister. All the state management records associated with that specific requestor ID are then marked as inactive or they are removed by the *CI Lifecycle Management – Restore Internal State Management Tables* scheduled job.

Integration with Incident Management and Problem Management

A base instance includes the pre-defined CI action *CreateTask* used for creating a task for a CI. New instances have a pre-defined Not Allowed CI Action, specifying that the 'CreateTask' action is not allowed for any CI with a **Retired** operational state. This restriction is integrated with Incident Management and with Problem Management to prevent the creation of incident or problem tasks for retired CIs. The 'CreateTask' CI action is used as a reference qualifier to the *Configuration Item* field of the Incident/Problem tables. In a new incident or problem, CIs in which *Operational Status* is 'Retired' — are filtered out from the *Configuration Item* list on the form. For more information about reference qualifiers, see Reference qualifiers .

Integration with Asset Management

In a base system, a CI's *Operational Status* field and the *Status*/*Hardware Status* (if its hardware) fields are kept synchronized if one of the two fields' values is **Retired**. When *Operational Status* of a CI is set to **Retired**, then the *Status*/*Hardware Status* field is automatically set to **Retired**. In the opposite direction, when the *Status*/*Hardware Status* field of a CI is set to **Retired**, *Operational Status* is automatically set to **Retired** too.

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- When an *Operational Status* field changes from **Retired** to another status, the CI's *Status*/*Hardware Status* field is set to **Installed**.

- When a CI's *Status*/*Hardware Status* field changes from **Retired** to another status, the *Operational Status* field is automatically set to **Non-Operational**.

  The change of state from 'Retired' to another state is seldom, and by default, the state is changed to 'Non-Operational'. However, this might not be the intended state for the record. Therefore, it important that administrators review and manage the state appropriately in this case.

Whenever CI's *Status*/*Hardware Status* changes, it is synchronized to the CI's corresponding *Asset State* field, and vice versa — keeping the CI's *Operational Status* and the CI's corresponding *Asset State* synchronized.

For more information about mapping *Asset State* and *Substate* fields to a CI's *Status*/*Hardware Status* (if its hardware) field, see Map asset state and CI hardware status. And for more information about retiring assets, see Retire assets.

Get started with CI Lifecycle Management

Follow these high level steps to get started and to track activities of the CI Lifecycle Management module of the CMDB application.

Before you begin
Role required: none

Procedure

1. Activate the base system CI Lifecycle Management - Restore Internal State Management Tables scheduled job that continuously checks and maintains data integrity of all internal CI Lifecycle Management tables.
2. Define CI actions.
3. Define compatible CI actions rules.
   Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **CMDB CI Actions** to display currently active/inactive CI actions in the CMDB.
4. Define not-allowed CI actions rules.
5. Define not-allowed operational state transitions rules.
6. Define new operational states by modifying the *operational_status* field in the [cmdb_ci] table in the system dictionary.
   Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **View Internal Operational States** to display available operational states set by each requestor.
7. Set priority for operational states.
8. Call APIs to apply CI actions.
   Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **CMDB CI Actions** to display which actions were submitted and thier active/inactive state in the CMDB.
9. Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **View CI State Registered Users** to display currently registered operators that were registered via the `registerOperator` API.
10. Review Renew Lease tasks and extend leases as needed: Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **Renew Lease Tasks**. These tasks are created automatically by the *CI Lifecycle Management - Restore Internal State Management Tables* scheduled job for CI action records in which the lease for a valid requester has

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expired. The Requestor should use the lifecycle management API *ExtendCIActionLease* to extend the lease. Otherwise, if the lease remains expired for a specified grace period, the *CI Lifecycle Management - Restore Internal State Management Tables* scheduled job marks the respective CI action record as 'inactive'.
The grace period for expired lease time is configurable by the system property *glide.cmdb.statemgmt.max_lease_expired_days*.

11. Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **State Management Logs** to display logs of CI Lifecycle Management operations.

Lifecycle management APIs

CI Lifecycle Management provides a set of state management APIs for manipulating CI operational states, and applying CI actions.

State management APIs adhere to restrictions and allowances specified by Not Allowed CI Actions, Compatible CI Actions, and Not Allowed Operational Transitions. If an API attempts to perform a restricted operation, the operation is blocked, an error is logged, and a task is automatically created if appropriate.

Lifecycle management APIs can set operational states and CI actions to CMDB groups by utilizing lifecycle management bulk APIs.

Registration APIs

- registerOperator() - Method to register operator with state management for non-workflow user.
- unregisterOperator(String requestorId) - Method to unregister operator for non-workflow users.
- isValidRequestor(String requestorId) - Method to determine if the specified requestor is a valid active workflow user or a registered user.
- isLeaseExpired(String requestorId, String ciSysId, String ciActionName) - Method to check if registered user lease expired.
- extendCIActionLease(String requestorId, String ciSysId, String ciActionName, String leaseTime) - Method to extend CI Action Lease time, for registered users. If previous lease already expired, extend lease from now.

Operational State APIs

- setBulkCIOperationalState(String requestorId, String sysIdList, String opsLabel, String opsStateListOld) - Method to set Operational State for an array of CIs.
- getOperationalState(String ciSysId) - Method to get CI Operational State.

CI Actions APIs

- addBulkCIAction(String requestorId, String sysIdList, String ciActionName, String ciActionListOld, String leaseTime) - Method to add CI Action for an array of CIs.
- removeBulkCIAction(String requestorId, String sysIdList, String ciActionName) - Method to remove a CI Action for a list of CIs.
- getCIActions(String ciSysId) - Method to get CI Actions.

Not Allowed Action Based on Operational State API

isNotAllowedAction (String ciType, String opsLabel, String actionName) - Method to check if a specific CI action is not allowed for specific Operational State on a CI Type.

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Not Allowed Operational State Transition API

isNotAllowedOpsTransition(String ciType, String opsLabel, String transitionOpsLabel) - Method to check if specific operational state transition is not allowed on a CI Type.

Compatible Action API

isCompatibleCIAction(String actionName, String otherActionName)- Method to check if two specific actions are compatible with each other.

Example: Using state management APIs

```
// 1. Register Operator with State Mgmt
var output =
 SNC.StateManagementScriptableApi.registerOperator();
var jsonUntil = new JSON();
var result = jsonUntil.decode(output);
var requestorId = result.requestorId;

// Get list of sys_ids to update
var sys_ids;

// 2. Set list of sys_ids's Operational State to 'Repair in
 Progress'
output =
 SNC.StateManagementScriptableApi.setBulkCIOperationalState(requ
estorId, sys_ids,'Repair in Progress');
gs.print(output);

// 3. Set list of sys_ids's CI Action State to 'Patching'
output =
 SNC.StateManagementScriptableApi.addBulkCIAction(requestorId,
 sys_ids, 'Patching');
gs.print(output);
```

Components installed by CI Lifecycle Management

Several types of components are installed by CI Lifecycle Management (included in the com.snc.cmdb plugin), including tables, scheduled jobs, and properties.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Scheduled jobs installed

Scheduled job	Description
CI Lifecycle Management - Restore Internal State Management Tables	Continuously checks and maintains the data integrity of all internal CI Lifecycle Management tables.
Update life cycle from legacy	Updates CIs *Life cycle stage* and *Life cycle status* fields when legacy status fields change.
Update legacy from CSDM”	Updates CIs legacy status fields when life cycle changes.

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Tables installed

Table	Description
CI State Registered Users [statemgmt_register_users]	All currently active registered users that were created via the *registerOperator* API. You cannot manually add new records to this table.
CI Actions [statemgmt_ci_actions]	A set of CI actions that can be applied to a CI during its lifetime.
CMDB CI Actions [statemgmt_cmdb_actions]	Active/inactive CI actions set by a specific requestor for a specific CI. You cannot manually add new records to this table.
Compatible CI Actions [statemgmt_compat_actions]	Set of rules that define pairs of CI actions that are compatible for a CI and can be applied simultaneously.
Not Allowed CI Actions [statemgmt_not_allow_actions]	Set of rules that define specific actions that are not allowed for a CI when its in a specific operational state.
Internal Operational States [statemgmt_ops_state]	Internal operational states set by a specific active requestor for a specific CI. You cannot manually add new records to this table.
Renew Lease Task [statemgmt_renew_lease_task]	Set of tasks that were automatically created to renew the lease of CI actions whose lease has expired. You cannot manually add new records to this table.
Operational State Priorities [statemgmt_ops_state_pri]	Priorities of operational states which determine precedence when multiple operational states are set for same CIs by different requestors.
Not Allowed Operational Transitions [statemgmt_not_allow_ops]	Set of rules that define specific operational state transitions that are not allowed.

Properties installed

Property	Description
glide.cmdb.statemgmt.max_lease_expired_days	Maximum number of days that lease expiration can be set with for CI Actions. • Type: integer • Default value: 15 • Location: System Property [sys_properties] table.
glide.cmdb.statemgmt.max_bulk_count	Maximum number of CIs that CI Lifecycle Management can process in a bulk update operation.

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Property	Description
	• Type: integer • Default value: 1000 • Location: System Property [sys_properties] table.

Activate the CI Lifecycle Management scheduled job

When starting to use the CI Lifecycle Management module, ensure to activate the *CI Lifecycle Management - Restore Internal State Management Tables* scheduled job which is disabled by default. This scheduled job continuously checks and maintains the data integrity of all internal CI Lifecycle Management tables.

Before you begin
Role required: none

About this task
When CI Lifecycle Management operations do not complete properly, for example due to a failure of the requestor or a requestor whose lease has expired, the integrity of tables related to CI Lifecycle Management might be compromised. The *CI Lifecycle Management - Restore Internal State Management Tables* scheduled job scans tables related to CI Lifecycle Management, and does the following:

- De-activates or removes all internal lifecycle management records with invalid requestors, and closes any corresponding Renew Lease Tasks if present.
- Detects records associated with a valid requestor whose lease has expired, and automatically creates a Renew Lease Task to notify the user and to provide details for extending the lease. If the requestor takes no action and the lease remains expired for a specified grace period (default 15 days), automatically de-activates the corresponding CI action record, and closes any corresponding Renew Lease Task if present.

Procedure

1. Navigate to **System Definition**, and click **Scheduled Jobs**.
2. Search for the *CI Lifecycle Management - Restore Internal State Management Tables* job.
3. In the respective **Active** column, double-click the value *false*, and select *true*.
4. Click the **Save** icon.

Define a CI action

Define a CI Lifecycle Management CI action that can be later applied to CIs.

Before you begin
Role required: none

About this task
You can view a list of all the actions that are currently applied to CIs by navigating to **Configuration** and clicking **CMDB CI Actions**.

Procedure

1. Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **CI Actions**.
2. On the CI Actions page, select **New**.

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3. Enter **Name** and **Description**.
4. Select **Submit**.

Define compatible CI actions

Allow a CMDB CI Lifecycle Management operation in which two specified CI actions can be applied simultaneously to a CI.

Before you begin
Role required: none

About this task
By default, it is not allowed to apply more than a single action to a CI. You can change that behavior by defining pairs of CI actions as compatible and therefore these actions can be applied simultaneously to a CI. For example you can specify that Provisioning and Patching are compatible CI actions, which lets you apply both to a CI at the same time.

Procedure
1. Navigate to **All** > **Configuration** > **Compatible CI Actions**.
2. On the **Compatible CI Actions** page click **New** and fill out the form.

Compatible CI Actions

Field	Description
Action	First action in the compatibility actions pair.
Compatible Action	Second action in the compatibility actions pair.

Result
An API can successfully apply the two specified actions simultaneously to a CI.

Define a not-allowed CI action

Define a restriction for CI Lifecycle Management in which a specified action is not allowed for a CI that is in a specified operational state.

Before you begin
Role required: none

About this task
By default, there are no restrictions in the CMDB CI Lifecycle Management on applying CI actions. You can restrict this behavior by not allowing a specified action to be applied to a CI when it is in a specified operational state. For example, you can define a restriction in which the provisioning action cannot be applied to a Linux Server that is in a non-operational state.

Procedure
1. Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **Not Allowed CI Actions**.
2. Click **New** on the **Not Allowed CI Actions** page, and fill out the form.

Field	Description
Not Allowed Action	The action that is being restricted.

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Field	Description
CI Type	The CI type for which the restriction applies to. To apply a rule to all CIs, select Configuration Item.
Operational State	The operational state that the CI must be at in order to apply the restriction.

3. Click **Submit**.

Result
If an API attempts to apply the specified action to the specified CIs, while it is in the specified operational state, the operation fails and an error is logged.

Set priority for an operational state

CI Lifecycle Management allows multiple operators or automations to simultaneously set different operational states for a CI. A CI can have only a single operational state, so in this case, the cumulative operational state of the CI is set to the one with the highest priority. It is recommended that you specify a priority for each operational state that you define so that a cumulative state can be correctly calculated.

Before you begin
Role required: none

About this task

Procedure

1. Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **Operational State Priority**.
2. On the **Operational State Priority** page, click the operational state for which you want to set or update priority.
3. Enter a **Priority** and click **Update**.
   Smaller numbers represent higher priority.

Define a non-allowed operational transition

Define a restriction for CI Lifecycle Management in which a specified CI cannot transition from one operational state to another.

Before you begin
Role required: none

About this task
By default, CI Lifecycle Management has no restrictions for transitioning CIs from one operational state to another. You can restrict this behavior by defining transitions that are not allowed for a specified CI. For example, you can define a restriction on transitioning a Linux server from non-operational state to repair in progress state.

Procedure

1. Navigate to **All** > **Configuration** > **CI Lifecycle Management** > **Not Allowed Operational Transitions**.
2. On the **Not Allowed Operational Transitions** page, click **New** and fill out the form.

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Field	Description
CI Type	The CI type for which the restriction applies.
Not Allowed Transition	The CI state into which transitioning is restricted.
Operational State	The operational state that the CI must be in for the restriction to apply.

Result
If an API attempts to transition a CI that is in the specified operational state to a state that is not allowed, the operation fails and an error is logged.

View CMDB benchmarks

CMDB calculates several CMDB Health benchmarks which then display in the Benchmarks dashboard. These benchmarks are based on various CMDB Health metrics, displaying monthly averages, trends, comparisons to industry averages of your ServiceNow peers, and global benchmarks.

Before you begin
Role required: none

The CMDB Health Dashboard jobs must be enabled and health data must be collected. Also, navigate to **Benchmarks** > **Setup** and ensure that the CMDB KPIs are enabled under **IT Operations Management**.

About this task
CMDB provides the following benchmarks:

- % of non-compliant CIs
- % of duplicate CIs
- % of stale CIs

For an instance, each of these benchmarks is the calculated monthly average for the corresponding CMDB Health metric. Calculating a monthly average requires that there is a metric result value for each day of the month. Therefore, each day on which the respective Health Dashboard job did not run, is assumed with the aggregated result from the run that is most recent to that day. The monthly average is then calculated based on the sum of all the daily aggregated results for the metric in that month, divided by the number of days of the month. For a CMDB Health Dashboard job that ran multiple times in a single day, only the results of the last run in that day are used for the monthly average calculation.

Note:
The frequency of CMDB Health Dashboard job executions depend on whether the job is enabled, its schedule and on manual runs.

Global averages are based on the sum of monthly averages of all peer instances, divided by the number of instances (aside from instances for which the monthly average is 0).

Procedure
1. Navigate to **Benchmarks** > **Dashboard**.
2. Click the icon and select **IT Operations Management**.

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3. Click **ALL** or **CMDB**.
4. Click on a CMDB benchmark to drill down to trend data, and other benchmark details.

Related topics

CMDB Health

Useful related lists in CI forms

By default, the forms that display manageable configuration items (CI) - computers, printers, network gear, uninterruptible power supplies (UPS), and power distribution units (PDU) - provide a number of related lists for the form.

The following related lists are common to all forms for manageable CIs.

- Network Adapters - Displays all the NICs installed on a CI.
- CI IPs - Displays all the IP addresses on this CI:
  - Computers (workstations, laptops using various macOS and Windows operating systems)
  - Windows servers
  - Linux servers
  - AIX servers
  - Solaris servers
  - Devices discovered through SNMP.
- DNS Names for CIs - Displays all the DNS names on a CI.

The IP version information appears in all IP address related lists and forms.

Note:
Since all paths here click into the **IP Address to DNS Names** list that associates an IP address with a DNS name, this part of the common flow was not added to the tree structure.

Discovery source

A table called Source [sys_object_source] stores information identifying the source of a discovery (by ServiceNow Discovery or another product), the ID of that source, and the date/time of the last scan. To view this information, configure a CI form and add the **Sources** related list.

This table is populated automatically when the Discovery plugin is enabled.

Platform Analytics Solution for Configuration Management (CMDB)

Platform Analytics Solutions contain preconfigured dashboards. These dashboards contain actionable data visualizations that help you improve your business processes and practices.

Platform Analytics data visualizations use Performance Analytics indicator data to show you data over time, helping you analyze your business processes and identify areas of improvement. With Platform Analytics Solutions, you can get value from Performance Analytics for your application with minimal setup. You can always create your own objects as well.

The Platform Analytics Solution for Configuration Management (CMDB) has been replaced by the CMDB Workspace. For more information, see CMDB Workspace store app.

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Related topics

Activate your Performance Analytics subscription

Now Assist for Configuration Management Database (CMDB)

Use ServiceNow® Now Assist for Configuration Management Database (CMDB) to improve the quality of CMDB data, search the CMDB quickly, find and remedy issues with Service Graph Connector import sets, view comprehensive summaries for CIs, manually create CIs, and accelerate the process of remediating duplicate CIs.

Get started

Explore

Learn about Now Assist for CMDB

Configure

Activate Now Assist for CMDB

sing skills in Now Assist for CMDB

Use Now Assist for CMDB skills to view a concise summary of key CI data, to help you to resolve deduplication tasks, and several other processes.

Using agentic workflows in Now Assist for CMDB

Apply AI agentic workflows to accelerate results.

Reference

Reference topics provide additional information about the property settings that you use to configure and administer Now Assist for CMDB.

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Important:

- Not all model providers are available for customers with in-country SKUs, and some Now Assist products/features are currently unavailable for in-country customers. For more information, see the KB1584492 article in the Now Support Knowledge Base. Be sure to check for model provider availability updates in future releases.
- Some Now Assist products/features are currently unavailable for customers in the FedRAMP, NSC DOD IL5, or Australia IRAP-Protected data centers, self-hosted customers, or in other restricted environments. For more information, see the KB0743854 article in the Now Support Knowledge Base . Be sure to check for availability updates in future releases.
- Some Now Assist products/features are currently available only for customers in some regions. Be sure to check for availability updates in future releases.
- Some AI products and skills are not available in Regulated Markets. For more information, see KB2593939: Regulated Markets AI Products/Skills Not Available. Be sure to check for availability updates in future releases.

Troubleshoot and get help

- Ask questions and explore other resources for in the ServiceNow Community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

AI limitations

This application uses artificial intelligence (AI) and machine learning, which are rapidly evolving fields of study that generate predictions based on patterns in data. As a result, this application may not always produce accurate, complete, or appropriate information. Furthermore, there is no guarantee that this application has been fully trained or tested for your use case. To mitigate these issues, it is your responsibility to test and evaluate your use of this application for accuracy, harm, and appropriateness for your use case, employ human oversight of output, and refrain from relying solely on AI-generated outputs for decision-making purposes. This is especially important if you choose to deploy this application in areas with consequential impacts such as healthcare, finance, legal, employment, security, or infrastructure. You agree to abide by ServiceNow's AI Acceptable Use Policy, which may be updated by ServiceNow.

Data processing

This application requires data to be transferred from ServiceNow customers' individual instances to a centralized ServiceNow environment, which may be located in a different data center region from the one where your instance is, and potentially to a third-party cloud provider, such as Microsoft Azure. This data is handled per ServiceNow's internal policies and procedures, including our policies available through our CORE Compliance Portal.

Data collection

ServiceNow collects and uses the inputs, outputs, and edits to outputs of this application to develop and improve ServiceNow technologies including ServiceNow models and AI products. In addition, this application will collect incident data (for Incident Assist and Knowledge Assist) and chat transcripts (for Chat Assist). Customers can opt out of future data collection at any time, as described in the Now Assist Opt-Out page.

For more information, see the Now Assist documentation.

Available LLMs

You can use Now LLM Service, Now LLM Long Term Stable models (LTS), Azure OpenAI, Google Gemini or Anthropic Claude on AWS as the AI model provider for all Now Assist skills and AI agents. Use the Configuration Controls in AI Control Tower to define which options are available, then set the skill-level preferences in the Now Assist Admin console. For more information, see Large language models on the ServiceNow AI Platform®.

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Exploring Now Assist for CMDB

With the Now Assist for Configuration Management Database (CMDB) application, you can use Agentic AI to search the CMDB, summarize discovery, ownership and related information for a CI, and fix failed SGC import sets. You can also follow step-by-step guidance to help you remediate duplicate CIs, improve CMDB data accuracy, completeness, and health .

Supporting information for Now Assist for CMDB

Now Assist for CMDB is supported starting with Xanadu patch 3.

Now Assist for CMDB supports the following LLM models:

- Gemini
- Claude

Now Assist for CMDB agentic workflows

Now Assist for CMDB provides the following abilities:

Create configuration item agentic workflow

Occasionally, you might create a CI manually. To help you, the Create configuration item agentic workflow accepts your natural language request and verifies that it understands which class the new CI should belong to. The workflow then checks Identification and Reconciliation engine (IRE) rules to determine the required attributes for the CI and requests that information. After you provide sufficient data, the workflow ensures that the proposed CI includes the attributes that you requested, complies with IRE rules, and is not a duplicate. The workflow then creates the CI.

The Create configuration item agentic workflow is particularly useful for adding CIs to tables accessed by Operational Technology because users might add physical CIs while unaware of the importance of managing CI data in the CMDB.

To learn more, see Create a CI using Now Assist.

Provide advice on CMDB governance agentic workflow

Data governance can be an overwhelming task. The Provide advice on CMDB governance agentic workflow supports data admins and owners by methodically working through the many-faceted process of improving CMDB data accuracy, completeness, and health. The objective is to promote that users can trust the data that they use for their work.

To learn more, see Getting advice from Now Assist on CMDB governance.

Search CMDB agentic workflow

The Search CMDB agentic workflow enables you to search for CIs by specifying any of several attributes of the CI of interest. The workflow accepts your natural language request, verifies your search goal, and then, depending on the information you provided, generates a keyword search, a single-table search with dot walks, or a multi-table search that involves relationship navigation. The workflow can infer CI relationship data to generate an appropriate query.

To learn more, see Use Now Assist to search the CMDB for CIs.

Duplicate CI remediator agentic workflow

The Duplicate CI remediator agentic workflow completes the full range of deduplication tasks. The workflow presents its reasoning for each step so CMDB

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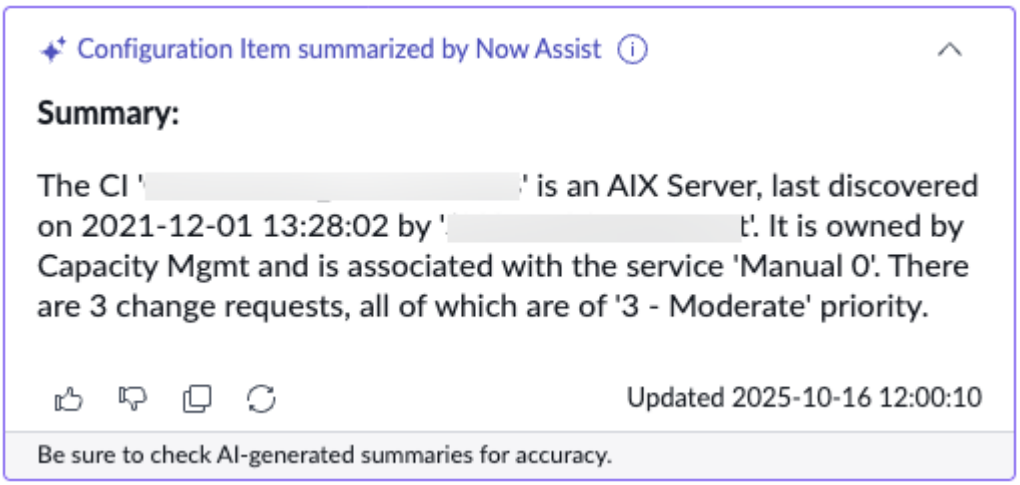
administrators can review the AI recommendations, modify the remediation actions if needed, and then perform the deduplication tasks.

Now Assist for CMDB skills

CI summarization skill

View a concise summary of key CI data. You can select the CI on a CI form, in a workspace page, or on any list view. The summary can include discovery data, ownership, and key related items such as open incidents, alerts, problems, upcoming change requests, and security vulnerabilities. Additionally, the summary lists the service instances that the CI is part of. Summary information is useful while working in applications such as Incident Management, Change Management, and Event Management.



To learn more, see View CI information with the Now Assist CI summarization skill.

Manage duplicate CIs skill

Duplicate CIs interfere with the integrity, reliability, and general health of CMDB. Resolve deduplication tasks with support from the Now Assist Manage duplicate CIs skill. CMDB administrators follow step-by-step guidance to perform remediation, and can preview remediation results before applying a template. The manage duplicate CIs skill accelerates the work that you normally perform manually.

In this example, the manage duplicate CIs skill presents a list of classes with duplicate CIs and suggests possible actions. You can select an option or enter the action text in your own words:

- Review deduplication tasks, create deduplication templates, assign tasks to templates, and run the templates.
- Preview the results of applying a deduplication template before you decide to apply it.
- Identify the root cause of duplications so that you can review the groups of deduplication tasks that share a common cause and possibly avoid the issue in the future.

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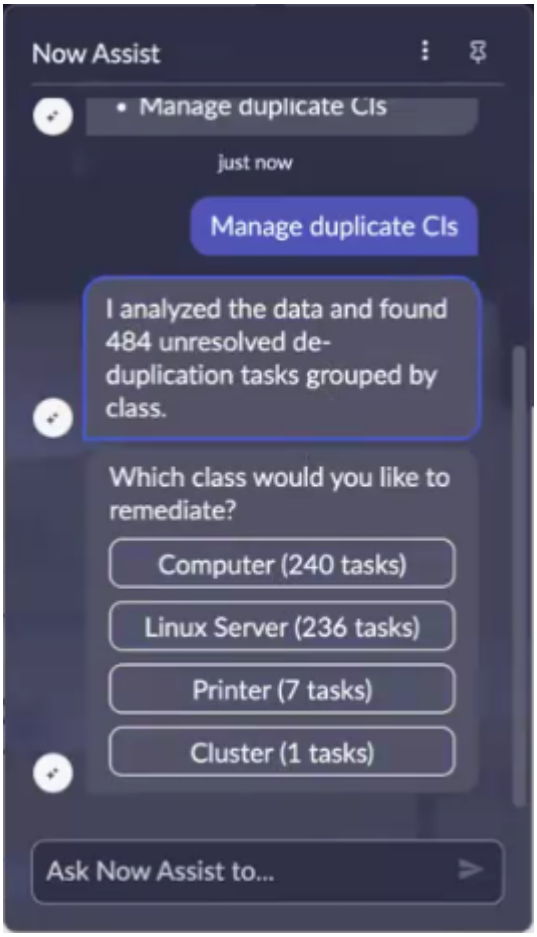

To learn more, see Let Now Assist help you to manage duplicate CIs.

Service Graph Connector diagnosis skill

Service Graph Connectors are integrations that facilitate data ingestion from third-party sources into the CMDB. Errors in Service Graph Connectors can disrupt the flow of configuration item (CI) data resulting in inconsistencies between the actual state of CIs and their CMDB records.

The Service Graph Connector diagnosis skill automates error diagnosis and recommendation generation, enabling CMDB installation administrators to identify and resolve the issues. This automation reduces manual effort and saves time in debugging Service Graph Connectors issues.

To learn more, see the following topics:

- Fix SGC import set issues with the Now Assist SGC diagnosis skill
- Getting started with Service Graph Connectors
- Learn how IRE detects duplicate CIs and creates deduplication tasks
- Learn how CMDB Health uses the duplicate metric to track duplicate CIs.
- Learn how to manage and remediate deduplication tasks by using deduplication templates in CMDB Workspace.

Supporting information for Now Assist for CMDB

Get a quick overview of the important information that is related to the Now Assist for CMDB application.

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Supported versions

Now Assist for CMDB is supported starting with Xanadu patch 3.

For more information, see Configuring Now Assist for CMDB.

Supported LLMs

You can use Now LLM Service, Now LLM Long Term Stable models (LTS), Azure OpenAI, Google Gemini or Anthropic Claude on AWS as the AI model provider for all Now Assist skills and AI agents. Use the Configuration Controls in AI Control Tower to define which options are available, then set the skill-level preferences in the Now Assist Admin console. For more information, see Large language models on the ServiceNow AI Platform®.

Supported languages

Now Assist for CMDB supports the following languages across all skills:

- German
- French
- Japanese
- Dutch
- French Canadian
- Spanish
- Brazilian Portuguese
- Italian

For more info, see Configure multilingual service for Now Assist applications

Configuring Now Assist for CMDB

Configure Now Assist for CMDB.

Roles

Role masking enables users to limit the roles and privileges of agentic workflows during tool execution. Agentic workflows and their AI agents that get installed with Now Assist applications are assigned pre-defined roles. If you select *`Users with specific roles`* for user access, you must configure the security controls to include these roles. Data access settings must also include these roles. For the instructions to change the security controls, see Define security controls for an agentic workflow.

Skill activation

Important:
Some Now Assist skills, agents, and agentic workflows are turned on by default. For more information, see Now Assist skills, agents, and agentic workflows on by default.

Skill reuse in a domain-separated environment

By default, all skills exist in the global domain. When you use Now Assist in a domain-separated environment, users are only able to access data in their domain. For example, if a user uses the summarization skill, Now Assist only uses material that exists in the user's domain when generating that summary. Additionally, there is no co-mingling of data for domain-separated

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instances when using generative AI skills. The data resides only on the instance, and the shared services used for generative AI do not persist any requests (prompts) and responses. For more information, see Domain separation in the Now Assist Admin console. (Note that global domain is not the same as global scope. For more information, see Exploring Next Experience pickers.)

Procedures

Follow these procedures to set up and configure Now Assist for Configuration Management Database (CMDB).

Configure Now Assist for CMDB

Configure the Now Assist for CMDB application so users can benefit from Agentic workflows, agents, and skills.

Before you begin

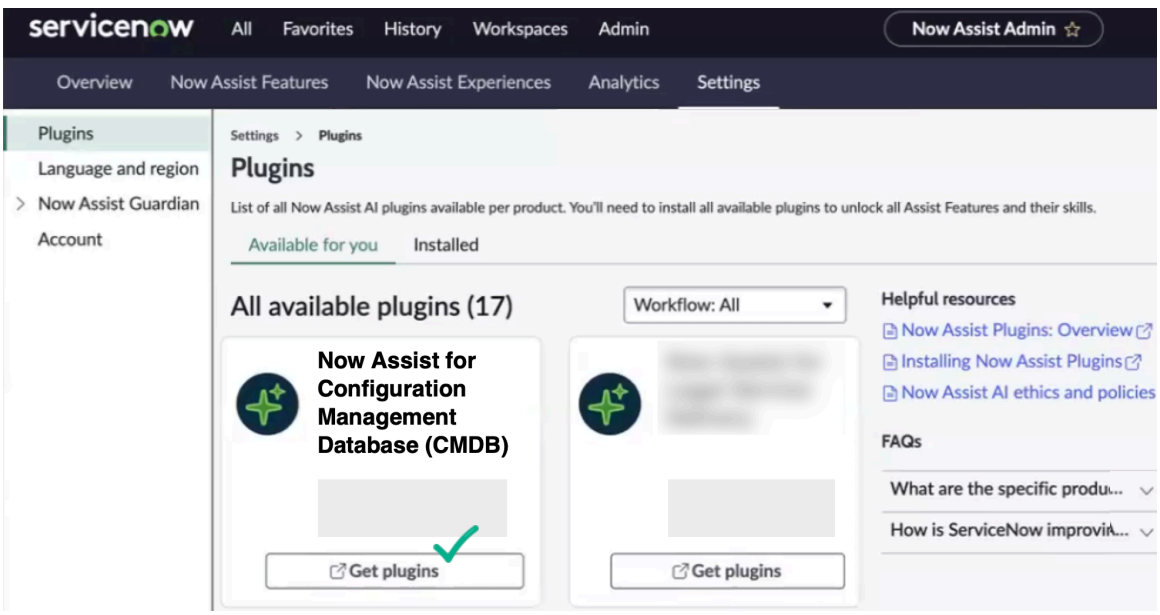
Role masking enables users to limit the roles and privileges of agentic workflows during tool execution. Agentic workflows and their AI agents that get installed with Now Assist applications are assigned pre-defined roles. If you select *`Users with specific roles`* for user access, you must configure the security controls to include these roles. Data access settings must also include these roles. For the instructions to change the security controls, see Define security controls for an agentic workflow.

Role required: sn_nowassist_admin.nsa_admin

Procedure

1. Navigate to **Admin** > **Now Assist Admin** and then select the **Settings** tab.
2. In the list, select **Plugins**.
   Plugins that have already been activated are listed on the **Installed** tab.
3. Uninstall Now Assist for Service Graph Connectors (SGC).
4. On the Now Assist for Configuration Management Database (CMDB) card, select **Get plugins** and then in the pop-up window, select **Install Plugin**.

   You install the Now Assist for CMDB (com.snc.cmdb.gen.ai) plugin.



You're redirected to the ServiceNow Store in a new browser tab so you can get the plugin.

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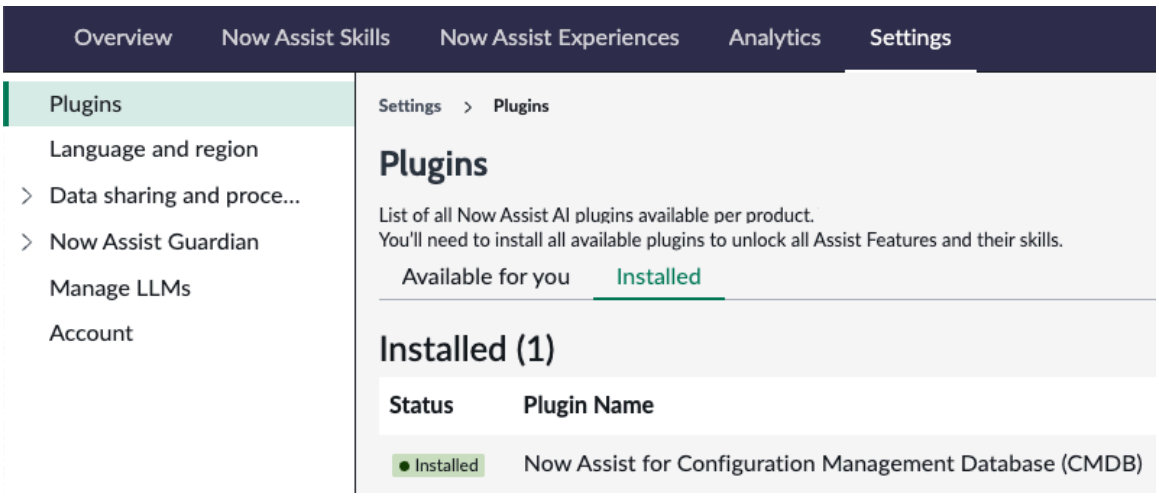
5. Install the Now Assist for CMDB plugin.

   For instructions on the installation process, see Install Now Assist plugins.

6. Confirm that Now Assist for CMDB is installed.

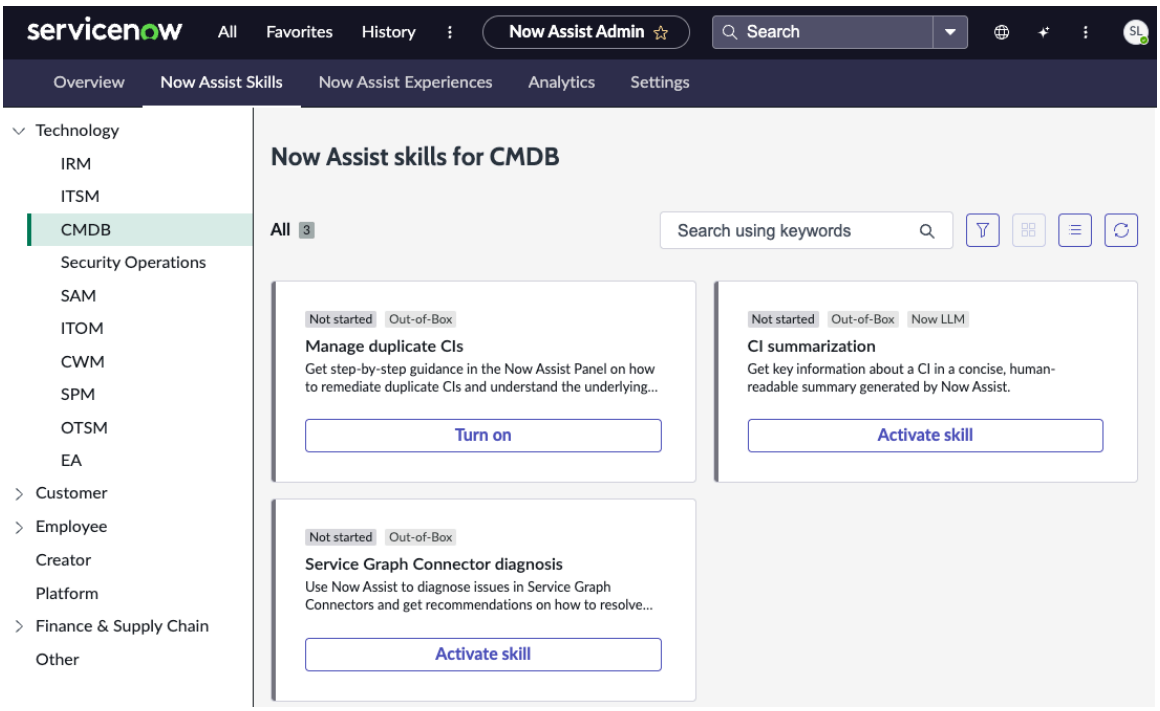
   a. On the **Now Assist Admin** console, select the **Settings** tab and then select **Plugins** in the list.

   b. On the **Installed** tab, verify that the **Status** value is **Installed**.



Now that you have installed the plugin, you set up the skills for Now Assist for CMDB.

7. On the **Now Assist Skills** tab, expand **Technology** and then select **CMDB**.



8. On the Now Assist skills for CMDB page, select **Turn on** for the Manage duplicate CIs skill. No configuration is required for the skill. On the pop-up, select **Back to skills** to set up the other skills.

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9. On the Now Assist skills for CMDB page, select **Activate skill** for the CI summarization skill.
   The skill requires configuration as described in Configure the CI summarization skill.
10. On the Now Assist skills for CMDB page, select **Activate skill** for the Service Graph Connector diagnosis skill.
    The skill requires configuration as described in Configure the Service Graph Connector diagnosis skill.
11. Configure property settings.
    See Property settings for Now Assist for CMDB.

What to do next

To start using Now Assist for CMDB skills, see Using agentic workflows in Now Assist for CMDB.

To deactivate a skill, select the menu icon for the skill and then select **Deactivate skill**.

Admins might be interested in Query Generation. Query Generation is an AI-powered service that translates user questions into an executable query. An executable query contains the data source, filter, aggregation, and visualization instructions that best answer the user's question. For more information, see Exploring Query Generation.

Related topics

CMDB Workspace store app

Configure the Search CMDB agentic workflow

Review and configure the settings of the Search CMDB agentic workflow.

Before you begin

Role masking enables users to limit the roles and privileges of agentic workflows during tool execution. Agentic workflows and their AI agents that get installed with Now Assist applications are assigned pre-defined roles. If you select *`Users with specific roles`* for user access, you must configure the security controls to include these roles. Data access settings must also include these roles. For the instructions to change the security controls, see Define security controls for an agentic workflow.

Role required: admin

Procedure

1. Activate the Query Generation skills as described in Query Generation skills.
2. Index the CI data.
   a. Navigate to **Query Generation** > **Indexed Sources**.
   b. Open the two records and select **Index all tables** or **Index table**.

Related topics

Use Now Assist to search the CMDB for CIs

Configure the CI form contextual help skill

Configure the CI form contextual help skill.

Before you begin

Role required: admin

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About this task

To enable Now Assist to provide a detailed description, you must activate the External Content Connectors plugin, install the 'ServiceNow Product Documentation' connector, and then crawl the product documentation.

Procedure

1. Navigate to **All** > **Application Manger** and then search for `external content connectors` on the **Available for you** or **Updates** tab.
2. Install the ServiceNow product documentation external content connector as described in ServiceNow® product documentation external content connector.
3. Configure the crawl settings as described in Configure crawl settings for the ServiceNow® product documentation external content connector.

   On the **Settings** tab, select **Extend Now Platform Capabilities** and then select **Save**.

   Note:
   You can select additional settings, but, to enable the skill, you must at least select **Extend Now Platform Capabilities**.

4. On the **Crawl schedules** tab, select **Crawl content** and then follow the instructions in Create a content crawl for an external content connector to configure the crawl process.

Configure the CI summarization skill

Review and configure the settings of the Now Assist for Configuration Management Database (CMDB) CI summarization skill to restrict the availability of the skill to certain users or conditions.

Before you begin

Role required: admin

About this task

The CI summarization skill might scan activated plugins, activated applications, and CMDB tables. The skill uses the Now LLM Service to generate summaries.

Requirements and dependencies for the skill

Detail type	Requirements and dependencies
Discovery	The CI summarization skill extracts details from the *`Discovery source`* and *`Most recent discovery`* CI attributes. If CMDB 360 is enabled, the summary can show additional discovery sources for the CI. For more information, see CMDB 360/ Multisource CMDB.
Alerts	Event Management must be activated for the CI summarization skill. For more information, see Event Management.
Security vulnerabilities	Security Operations must be activated for the CI summarization skill. For more information, see Security Operations.

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Requirements and dependencies for the skill (continued)

Detail type	Requirements and dependencies
CI ownership	The CI summarization skill determines the CI ownership based on the attribute that is specified in the *glide.cmdb.health.ci_ownership_field* system property. For more information, see CMDB Health system properties and CMDB Health.
Data on the CMDB Health Dashboard	The Correctness Score Calculation scheduled job improves the accuracy of the summary details on the CMDB Health Dashboard. For more information, see Enable and configure a CMDB Health Dashboard job.

By default, all skills exist in the global domain. When you use Now Assist in a domain-separated environment, users are only able to access data in their domain. For example, if a user uses the summarization skill, Now Assist only uses material that exists in the user's domain when generating that summary. Additionally, there is no co-mingling of data for domain-separated instances when using generative AI skills. The data resides only on the instance, and the shared services used for generative AI do not persist any requests (prompts) and responses. For more information, see Domain separation in the Now Assist Admin console. (Note that global domain is not the same as global scope. For more information, see Exploring Next Experience pickers.)

Procedure

1. **Optional:** Access the setting tabs for the CI summarization skill.
   a. Navigate to **All** > **Now Assist Admin**.
   b. On the **Now Assist Features** tab, expand **Technology** and then select **CMDB**.
   c. On the Now Assist Skills for CMDB page, review the skills and then select **View details**.
   d. On the **Active skills** card on the Configuration Management Database (CMDB) page, select the context menu for the CI summarization skill and then select **Edit**.
2. Review and configure the settings.

Setting tabs for the CI summarization skill

Tab	Action
General details	Review general information on the CI summarization skill.
Choose inputs	**Note:** In this release of the skill, all configuration settings on this section are read-only. Review the tables and fields that the Now LLM Service uses to gather details for the CI summary.

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Tab	Action
Define availability	Select **Customize skill availability** to restrict the availability of the skill to certain conditions or particular users or groups. Use the condition builder to specify the field conditions that must be met for the skill to be available and then select **Save and continue**.
Select display	**a.** Toggle the Display switch to expose the CI summarization skill on CI forms. When the **Display** toggle is in the off state, the CI summarization skill isn't available even when the skill itself is activated. **b.** Specify the user roles that can use the CI summarization skill by selecting the drop-down list icon and then selecting the user roles in the **User roles** field. **c.** Select **Save and continue**.
Review and activate	Review the summary of settings for the skill (each card displays a different category of settings). Select **Activate** or **Done**. **Important:** Confirm that the answer is **Yes** on the card titled **Will CI summarization display in product?**. Otherwise, the CI summarization function won't be available to users even if the skill itself is activated.

The **Summarize** button appears when a user with the appropriate role views a CI.

What to do next

Use the CI summarization skill.

Configure the manage duplicate CIs skill

Enable and configure scheduled jobs that support the manage duplicate CIs skill.

Before you begin

In this procedure, you enable scheduled jobs that support the manage duplicate CIs skill.

By default, all skills exist in the global domain. When you use Now Assist in a domain-separated environment, users are only able to access data in their domain. For example, if a user uses the summarization skill, Now Assist only uses material that exists in the user's domain when generating that summary. Additionally, there is no co-mingling of data for domain-separated instances when using generative AI skills. The data resides only on the instance, and the shared

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services used for generative AI do not persist any requests (prompts) and responses. For more information, see Domain separation in the Now Assist Admin console. (Note that global domain is not the same as global scope. For more information, see Exploring Next Experience pickers.)

Role required: admin

Procedure

1. Enable the De-duplication: Populate Duplicate Task Data scheduled job.
   For instructions, see Components installed for duplicate CI remediation.
2. Enable the PopulateDuplicate Task Group Daily scheduled job to provide analysis of the root cause of remediation tasks.
   For instructions, see Components installed with CMDB Workspace.
3. Enable the CMDB Health Dashboard - Correctness Score Calculation scheduled job.
   The job improves the accuracy of summary details on the CMDB Health Dashboard. For instructions, see Enable and configure a CMDB Health Dashboard job.

Related topics

Use Now Assist to search the CMDB for CIs

Configure the Service Graph Connector diagnosis skill

Review and configure the settings of the Service Graph Connector diagnosis skill.

Before you begin

By default, all skills exist in the global domain. When you use Now Assist in a domain-separated environment, users are only able to access data in their domain. For example, if a user uses the summarization skill, Now Assist only uses material that exists in the user's domain when generating that summary. Additionally, there is no co-mingling of data for domain-separated instances when using generative AI skills. The data resides only on the instance, and the shared services used for generative AI do not persist any requests (prompts) and responses. For more information, see Domain separation in the Now Assist Admin console. (Note that global domain is not the same as global scope. For more information, see Exploring Next Experience pickers.)

Role required: admin

Procedure

1. In the Select display section, review where the skill appears and then select **Save and continue**.
2. In the Review and activate section, review your selections and then select **Activate**.
3. On the Successfully activated pop-up, select **Return to Service Graph Connector**.

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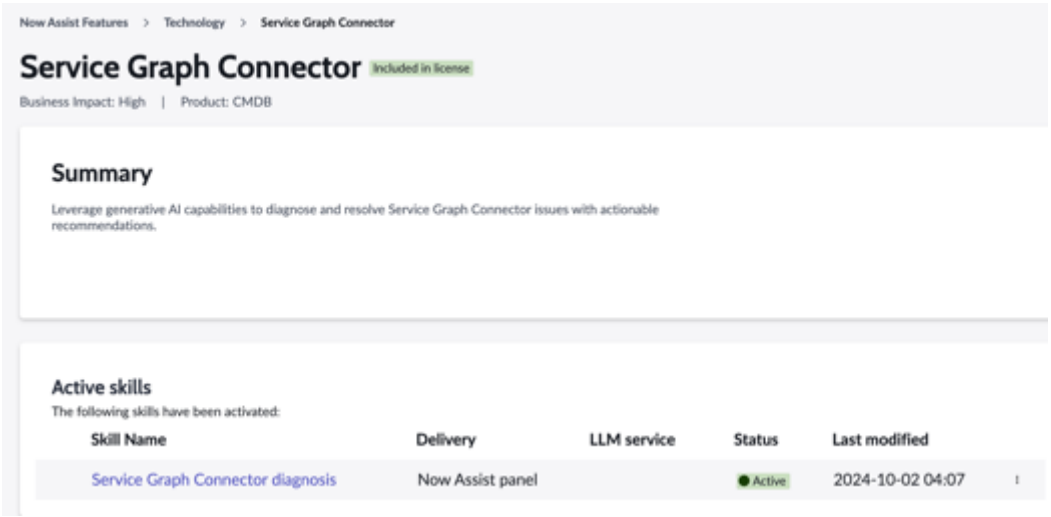
4. In the Active skills section of the Service Graph Connector page, see the **Status** column to verify that the skill is active.

Active skills section



Using AI skills in Now Assist for CMDB

Use Now Assist for CMDB skills to view a concise summary of key CI data, to help you to resolve deduplication tasks, and several other processes.

Skill reuse in a domain-separated environment

By default, all skills exist in the global domain. When you use Now Assist in a domain-separated environment, users are only able to access data in their domain. For example, if a user uses the summarization skill, Now Assist only uses material that exists in the user's domain when generating that summary. Additionally, there is no co-mingling of data for domain-separated instances when using generative AI skills. The data resides only on the instance, and the shared services used for generative AI do not persist any requests (prompts) and responses. For more information, see Domain separation in the Now Assist Admin console. (Note that global domain is not the same as global scope. For more information, see Exploring Next Experience pickers.)

Now Assist skills used by Now Assist for CMDB

Note:
To enable a subset of users to access Now Assist for CMDB skills, create a role or a group for the users. For more information, see Create a role or group to access Now Assist skills.

CI summarization skill

View a concise summary of key CI data. You can select the CI on a CI form, in a workspace page, or on any list view. The summary can include discovery data, ownership, and key related items such as open incidents, alerts, problems, upcoming change requests, and security vulnerabilities. Additionally, the summary lists the service instances that the CI is part of. For more information, see View CI information with the Now Assist CI summarization skill.

Manage duplicate CIs skill

Resolve deduplication tasks with support from the Now Assist Manage duplicate CIs skill. CMDB administrators follow step-by-step guidance to perform remediation, and can preview remediation results before applying a template. For more information, see Let Now Assist help you to manage duplicate CIs.

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Service Graph Connector diagnosis skill

To reduce debugging and resolution time and effort, the Service Graph Connector diagnosis skill generates summaries of errors and recommendations for resolving processing errors with SGC import sets. For more information, see Fix SGC import set issues with the Now Assist SGC diagnosis skill

View CI information with the Now Assist CI summarization skill

View a concise summary of key CI data. You can select the CI on a CI form, in a workspace page, or on any list view. The summary can include discovery data, ownership, and key related items such as open incidents, alerts, problems, upcoming change requests, and security vulnerabilities. Additionally, the summary lists the service instances that the CI is part of.

Before you begin

Role required: sn_cmdb_user

About this task

This procedure describes how you can manually access the skill in Core UI or in the CMDB Workspace. In addition, any agentic workflow can use the skill.

For more information, see Working in the Now Assist panel.

Important:
This Now Assist skill is turned on by default. The skill will be automatically available to appropriate role users for the application. For more information, see Now Assist skills, agents, and agentic workflows on by default.

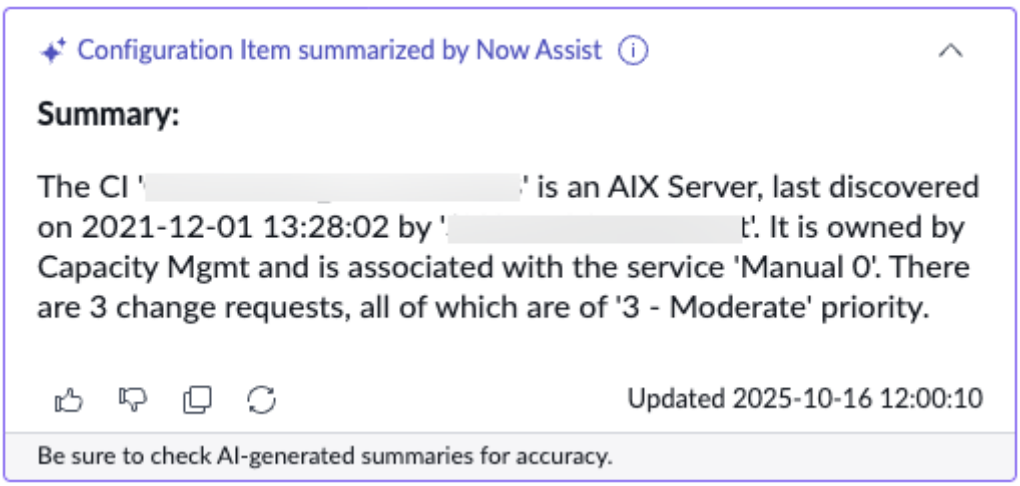
Procedure

1. Select a CI from the workspace or from any list view.

   For example, select **All** and enter `cmdb_ci.list` in the search filter. Select a CI to open its CI form.

2. Select **Summarize** in the Now Assist box.

   Now Assist generates and displays summary information for the CI, as in this example.



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3. **Optional:** Provide feedback, copy the summary text to the clipboard, or refresh the summary.

Related topics

Configure the CI summarization skill

View CI attribute descriptions on CI forms

Now Assist answers your questions on CI classes and attributes to help you work in CI forms, dashboards, home pages, and other views on the workspace.

Before you begin

To enable Now Assist to provide a detailed description, you must activate the External Content Connectors plugin, install the 'ServiceNow Product Documentation' connector, and then crawl the product documentation. For configuration instructions, see Configure the CI form contextual help skill.

Role required: cmdb_inst_admin

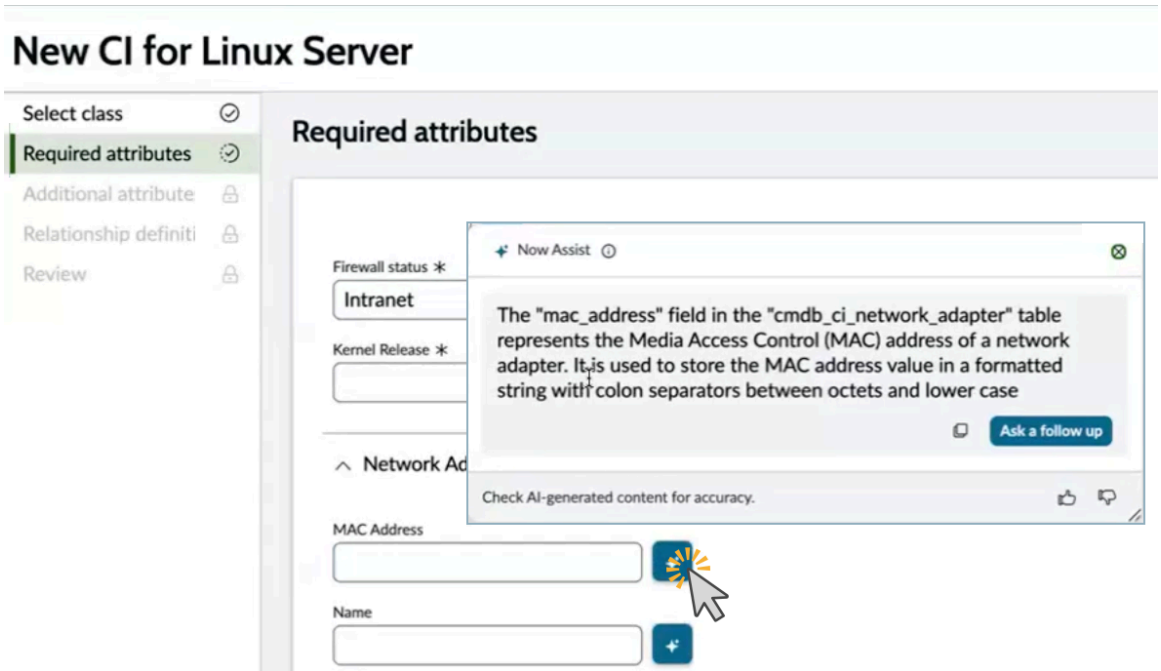
About this task

This procedure describes how to dig deeply into the details of CI information on any form while creating, viewing, or updating a CI record. In addition, you can view the information while working in the Explore CI view, as described in View CI details on the Explore CI view.

Procedure

1. On any CI form (while creating, viewing, or updating a CI record) select the Now Assist icon for a field.

   Now Assist displays the description of the attribute. In this example, while creating a CI record, the user views the description of the **MAC Address** attribute.



2. **Optional:** Select **Ask a follow-up** to learn more about the attribute.
   The Now Assist panel opens. Select one of the suggested questions or enter a different question about any field or section of the form. Now Assist responds to your follow-up question. For more information, see Working in the Now Assist panel.

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3. **Optional:** Provide feedback, copy the response text to the clipboard, or refresh the response.

Related topics

View CI details on the Explore CI view

Configure the CI form contextual help skill

View CI details on the Explore CI view

Now Assist answers your questions on CI classes and attributes to help you work in CI forms, dashboards, home pages, and other views on the workspace.

Before you begin

To enable Now Assist to provide a detailed description, you must activate the External Content Connectors plugin, install the 'ServiceNow Product Documentation' connector, and then crawl the product documentation. For configuration instructions, see Configure the CI form contextual help skill.

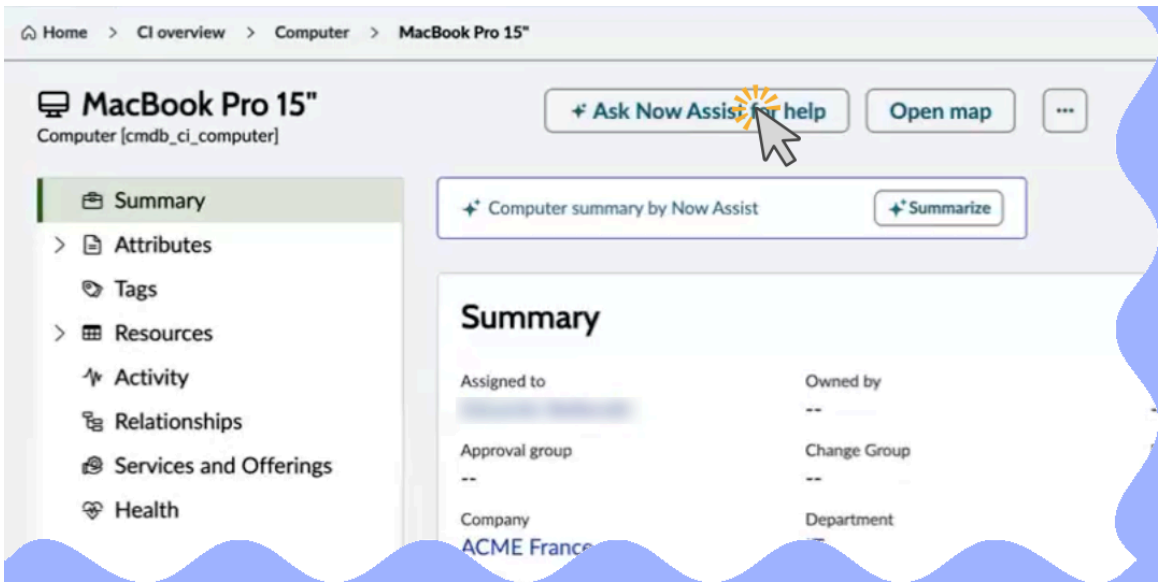
Role required: cmdb_inst_admin

About this task

In addition to using Now Assist on the Explore CI page, Now Assist provides detailed information on any CI form while you create, view, or update a CI record, as described in View CI attribute descriptions on CI forms.

Procedure

1. While viewing a CI on the Explore CI view, select **Ask Now Assist for help**.
   The Now Assist panel opens. Enter a question about any field or section on the view. For more information, see Working in the Now Assist panel.



2. **Optional:** Provide feedback, copy the response text to the clipboard, or refresh the response.

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Related topics

- View CI attribute descriptions on CI forms
- Configure the CI form contextual help skill
- Manage CI details in CI Form

Search the Service Graph database using natural language

Now Assist for CMDB uses the search result classifier skill to analyze your search criteria, identify and apply implicit filters, determine the optimum search method (keyword search or query generation), query Service Graph data, and then display the results. You then have the option to refine the search using natural language in the Now Assist panel.

Before you begin

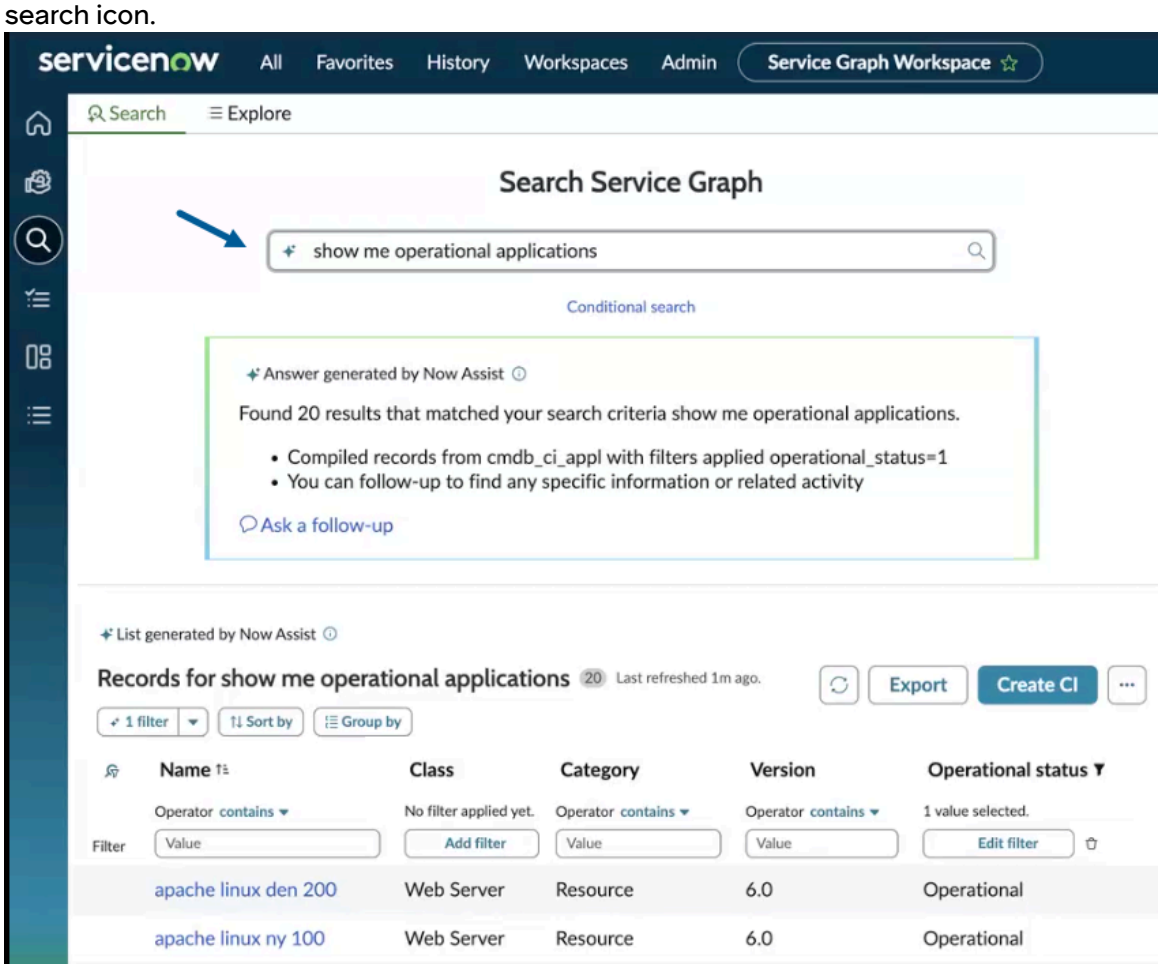
Starting with Now Assist for CMDB v3.0, the Now Assist for CMDB ServiceNow Store app must be installed. When the app is installed, several agents and skills are auto-activated. If you deactivate a skill, some features will not appear.

The Service Graph database on your instance includes CIs, services, and related data such as company and location data.

Role required: sn_cmdb_user and now_assist_panel_user

Procedure

1. On the Service Graph Workspace, select the search icon in the side panel.
2. On the **Search** tab, enter the search text in the text box and then press **Enter** or select the search icon.



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Two sections appear.

- The first section displays the count of matches with your search request, identifies the tables in which the matches were found, and specifies the filters that were applied to the search. Here, you can select the link to ask a follow-up question in the Now Assist panel.
- The second section displays the list of records that match the search criteria. Select a record name to view details.

3. **Optional:** If you select the link to ask a follow-up question, the Now Assist panel opens.

   (Optional) Now Assist guides you through the process of refining the search. For more information, see Working in the Now Assist panel.

4. **Optional:** Provide feedback, copy the response text to the clipboard, or refresh the response.

Related topics

Now Assist panel

Let Now Assist help you to manage duplicate CIs

Resolve deduplication tasks with support from the Now Assist Manage duplicate CIs skill. CMDB administrators follow step-by-step guidance to perform remediation, and can preview remediation results before applying a template.

Before you begin

Role required: cmdb_dedup_admin and now_assist_panel_user

About this task

When a Now Assist for SGC skill is enabled, the Now Assist icon appears in the SGC Central view of the CMDB Workspace. For more information, see Working in the Now Assist panel.

Important:
This Now Assist skill is turned on by default. The skill will be automatically available to appropriate role users for the application. For more information, see Now Assist skills, agents, and agentic workflows on by default.

Procedure

1. On the CMDB Workspace or in any form or list view, select the Now Assist icon and then select **Manage duplicate CIs** in the Now Assist panel (or enter similar text).
2. Follow the guidance on the Now Assist panel to remediate duplication.

   As you select options to remediate duplication, the skill adjusts the options and guides you through the process.

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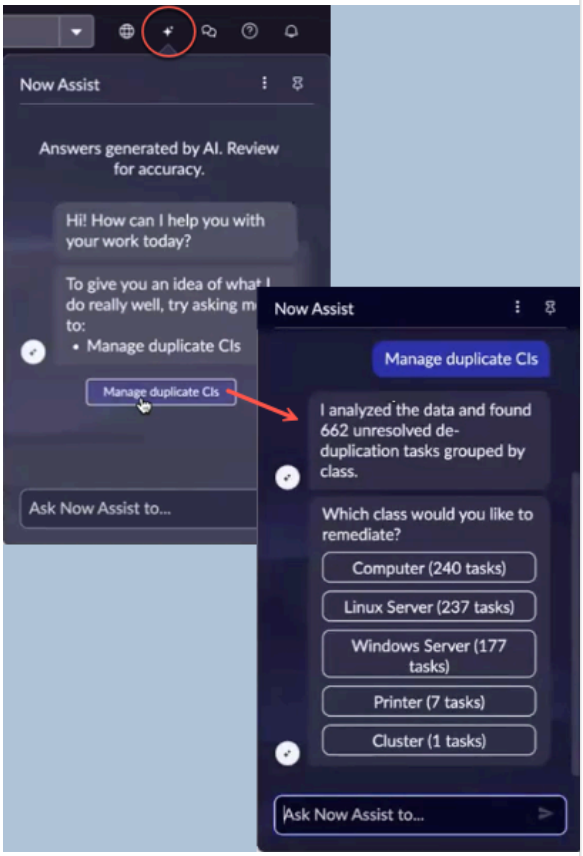
Working with the Manage duplicate CIs skill

Interactions with the skill	Description
	Review root causes for duplication: The analysis surveys IRE identification rules (including criterion attributes) and discovery sources and responds by grouping causes to suggest related groups of tasks. **Tip:** Use this information to help prevent further creation of duplicate CIs.

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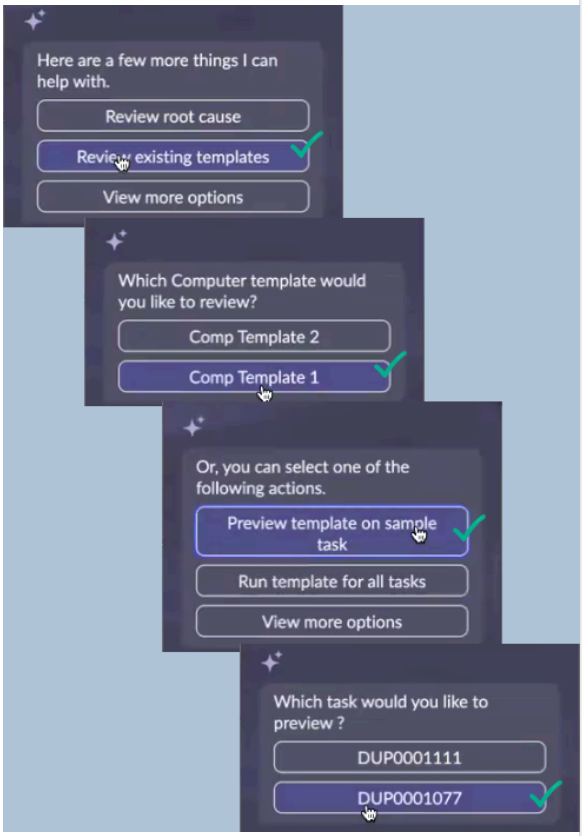
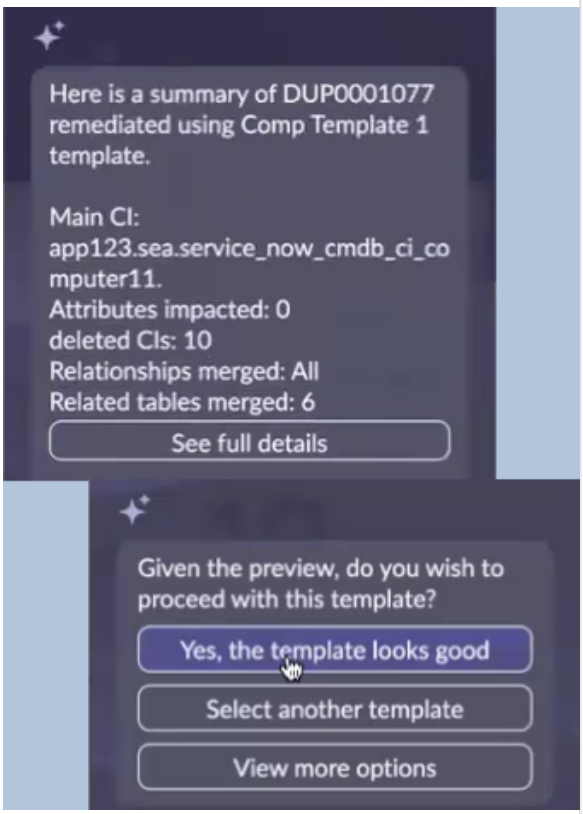
Interactions with the skill	Description
	Decide which deduplication template to apply: Select **Review existing templates** and then follow the suggestions to preview the results of applying the template.
	Without actually running the remediation process, Now Assist generates a preview of the results of applying a template. You can preview the results for any existing template. When you see the desired result in a preview, you can specify that template and proceed with the deduplication process.

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What to do next

- To learn more about using the Now Assist panel, see Working in the Now Assist panel.
- To start over, select **Reset conversation** in the More menu ( ).

> **Warning:**
> If you reset the conversation, all existing messages are deleted and an entirely new conversation starts. To learn more about using the Now Assist panel, see Working in the Now Assist panel.

- See how IRE detects duplicate CIs and generates deduplication tasks.
- See how to manage and remediate the deduplication tasks by using deduplication templates.

Related topics

Now Assist panel

Duplicate CIs remediation

Detecting duplicate CIs

View CMDB Health Dashboard

Fix SGC import set issues with the Now Assist SGC diagnosis skill

To reduce debugging and resolution time and effort, the Service Graph Connector diagnosis skill generates summaries of errors and recommendations for resolving processing errors with SGC import sets.

Before you begin

Enable the Service Graph Connector diagnosis skill as described in Configure the Service Graph Connector diagnosis skill.

Role required: cmdb_inst_admin and now_assist_panel_user

About this task

When a Now Assist for SGC skill is enabled, the Now Assist icon appears in the SGC Central view of the CMDB Workspace. For more information, see Working in the Now Assist panel and Diagnose a processing error in SGC Central.

> **Important:**
> This Now Assist skill is turned on by default. The skill will be automatically available to appropriate role users for the application. For more information, see Now Assist skills, agents, and agentic workflows on by default.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. Select the Now Assist icon to open the Now Assist panel and then select or enter **Diagnose a Service Graph Connector**.

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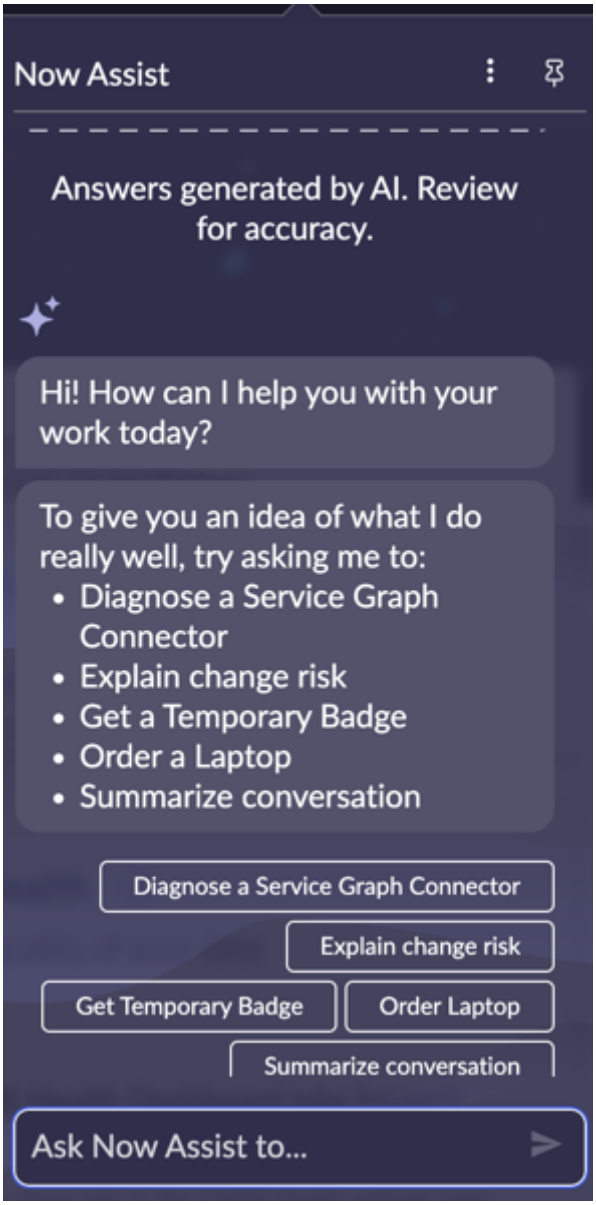

3. Begin the diagnostic process by entering the connector name, specific data source, or import-set number of a Service Graph Connector.

   Note:
   If Now Assist doesn't recognize the entered text, it displays a list of the Service Graph Connectors installed on your instance by their discovery source names, such as `SG-Infoblox`. You can then select a connector for further diagnosis.

4. **Optional:** Analyze other issues for the import set or other import set failures for the selected data source.

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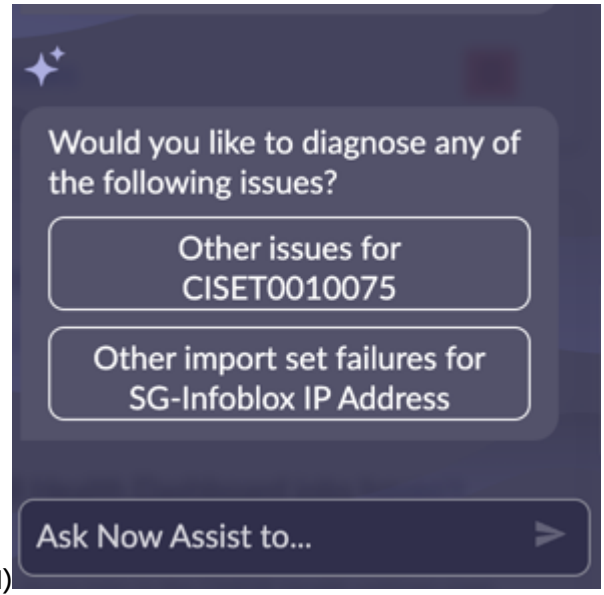
(Optional)



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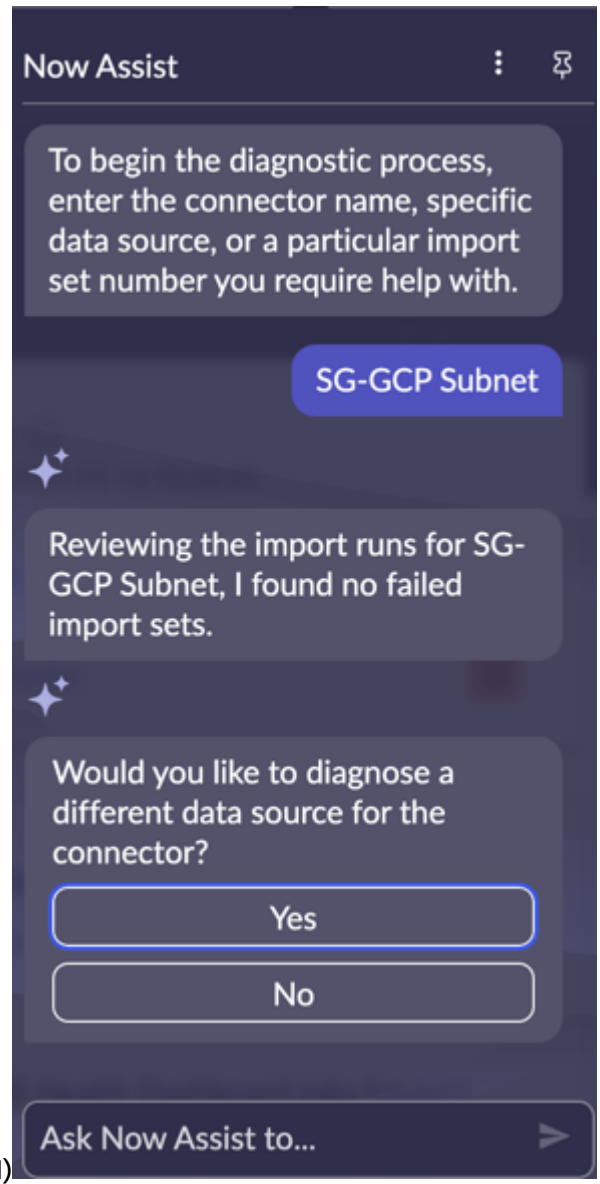
5. **Optional:** If no other import set issues are observed within a data source, analyze a different data source for the connector.

(Optional)



Result

Now Assist triggers the diagnosis process for the failed import sets. The Now Assist panel includes two key sections: Issue and Diagnosis recommendation, focused on the latest issue. The recommendation for an issue is based on a knowledge article matched using AI Search. A link to the knowledge article is provided in the Source section for additional guidance.

For issues related to Identification and Reconciliation engine (IRE), the panel provides a detailed summary of errors, including import errors, flow errors, partial payloads, and incomplete payloads.

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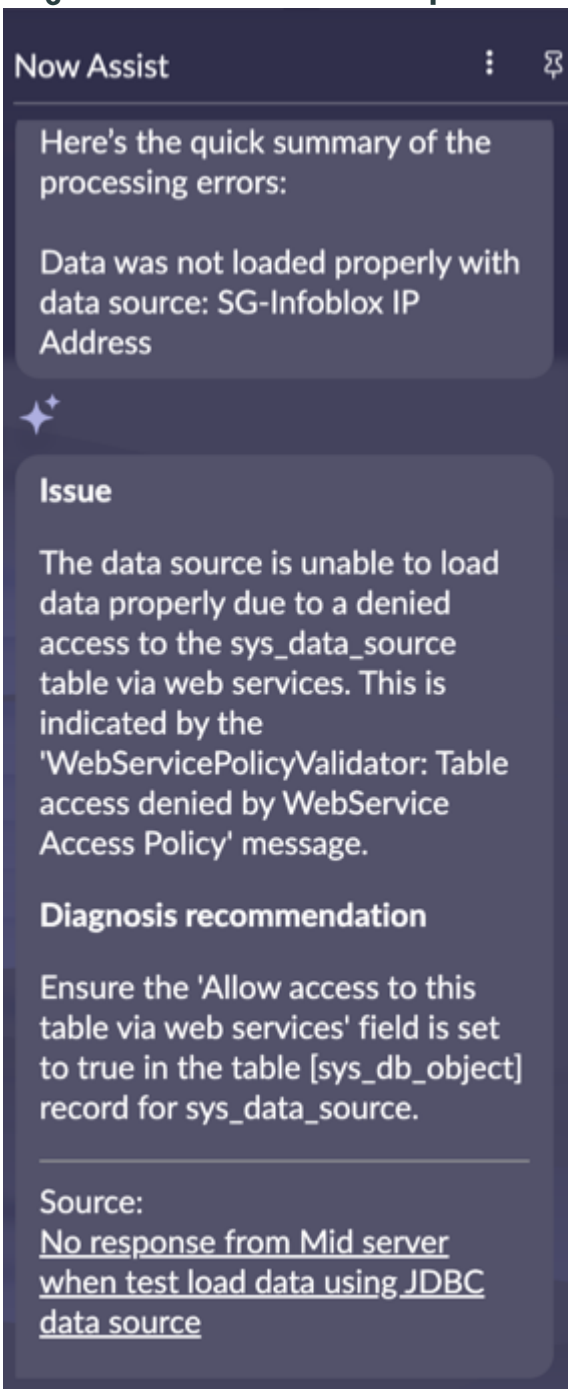
Diagnosis results for the failed import set with processing errors



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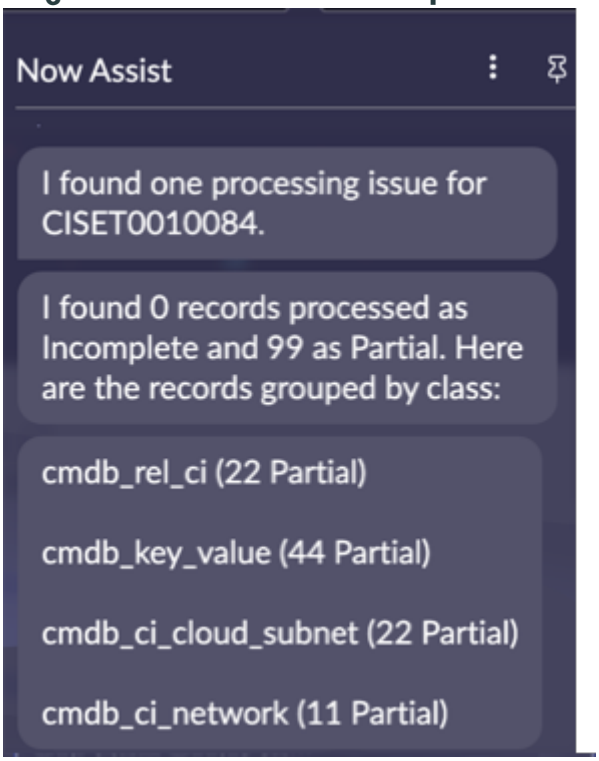
Diagnosis results for the failed import set with IRE issues



Tip:

To restart the conversation, select the reset icon ( ). If you reset the conversation, the existing messages are deleted, and a new conversation is started. You won't be able to access the previous messages after you reset the conversation. To learn more about how to use the Now Assist panel, see Now Assist panel.

What to do next

You can hover over the diagnosis recommendation and select an option to provide feedback or copy the summary text to the clipboard.

Optional actions

Action	Procedure
Provide feedback	If you think that the summary was helpful, select thumbs-up. If you think that the summary wasn't helpful, select thumbs-down. This feedback improves the Agentic AI model and can help to improve the future versions of this skill. The system gathers the feedback on each generated summary and stores it in the Agentic AI logs (sys_generative_ai_log_list.do).
Copy the summary	Select the copy to clipboard icon to use the content for another purpose, such as pasting into an email.

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Related topics

CMDB Workspace store app

Using agentic workflows in Now Assist for CMDB

Users with the sn_cmdb_user role can access several Now Assist for CMDB agentic workflows.

Agentic workflows

Available agentic workflows for Now Assist for CMDB

Agentic workflow name	Description	Available AI agents
Create configuration item	Occasionally, you might create a CI manually. To help you, the Create configuration item agentic workflow accepts your natural language request and verifies that it understands which class the new CI should belong to. The workflow then checks Identification and Reconciliation engine (IRE) rules to determine the required attributes for the CI and requests that information. After you provide sufficient data, the workflow ensures that the proposed CI includes the attributes that you requested, complies with IRE rules, and is not a duplicate. The workflow then creates the CI. For more information, see Create a CI using Now Assist	CMDB CI creator
Provide advice on CMDB governance	Data governance can be an overwhelming task. The Provide advice on CMDB governance agentic workflow supports data admins and owners by methodically working through the many-faceted process of improving CMDB data accuracy, completeness, and health. The objective is to promote that users can trust the data that they use for their work. For more information, see Getting advice from Now Assist on CMDB governance.	• CMDB data manager • CMDB data certification and attestation manager • CMDB data ownership manager • CMDB health metrics manager • CMDB life cycle manager • CMDB principal class manager
Search CMDB	The Search CMDB agentic workflow enables you to search for CIs by specifying any of several attributes of the	CMDB CI search

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Available agentic workflows for Now Assist for CMDB (continued)

Agentic workflow name	Description	Available AI agents
	CI of interest. The workflow accepts your natural language request, verifies your search goal, and then, depending on the information you provided, generates a keyword search, a single-table search with dot walks, or a multi-table search that involves relationship navigation. The workflow can infer CI relationship data to generate an appropriate query. For more information, see Use Now Assist to search the CMDB for CIs.	

AI agents used by Now Assist for CMDB

Looking for an AI agent?

- There might be AI agents installed with the Now Assist application that are not used in agentic workflows. To learn how to see all agents that are available on your instance, see Find AI agents.
- To find agents that might not be installed on your instance, visit the AI Agent Marketplace on the ServiceNow Store.

CMDB CI creator AI agent

The CI creator AI agent creates a new configuration item (CI) record in the CMDB.

CMDB data certification and attestation manager AI agent

The CMDB data certification and attestation manager AI agent retrieves the data certification and attestation policies for a CI class and for similar classes. It can also create a data certification and an attestation policy. For more information, see Data Certification.

CMDB data manager AI agent

The CMDB life cycle manager AI agent helps admins to promote that CMDB life-cycle policies are in place for principal classes or for specified classes. For more information, see Working with CMDB Data Manager.

CMDB data certification and attestation manager AI agent

The CMDB data certification and attestation manager AI agent retrieves and applies data certification and attestation policies to manage the data certification and attestation of CI classes.

CMDB data ownership manager AI agent

The CMDB data ownership manager AI agent helps you to assess the quality of CI ownership data for a CI class to determine ownership, validate ownership, and evaluate ownership quality. You can validate fields that reference sys_user or sys_user_group like **Assigned To**, **Managed by Group** (default), **Support Group**, and so on. The agent answers the following questions:

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- Is CI ownership specified? Is the **Managed by group** attribute value set for the CI? Does it indicate an active and correctly configured record? The value of the system property for ownership is a default field for the evaluation. For the **Managed by group** CI attribute, you can specify the percentage values that classify the result as `Poor`, `Average`, or `Healthy`. For more information, see Property settings for Now Assist for CMDB.
- If you provide a user referencing value: Does the **User Referencing** value indicate an active record? This evaluation identifies CIs that have inactive users and CIs with no **User** value.
- If you provide a user referencing value: Does the **Group Referencing** value indicate an active record? This evaluation identifies CIs that have inactive groups, empty groups (no users), and CIs with no **Group** value.

CMDB health metrics manager AI agent

The CMDB health metrics manager AI agent displays information on CMDB Health Dashboard jobs, health metrics status, and health scores. If the jobs are not configured, the workflow provides a link to the setup instructions. For more information, see CMDB Health.

CMDB life cycle manager AI agent

The CMDB life cycle manager AI agent performs actions related to life-cycle management of CI classes: retrieve the life-cycle management policy and retirement definition for a CI class and create a life-cycle policy.

CMDB principal class manager AI agent

The CMDB principal class manager AI agent determines whether you can set CI classes as principal, suggests principal classes, and can set or unset a class as principal. Setting a class as a principal class is a practical way to save time because you can configure ServiceNow AI Platform products to display only principal classes in list views. The workflow helps you to decide which CIs you're most likely to work with day-to-day and then provides a link to enable you to set the associated classes as principal classes. For more information, see Update class list in the Principal Class filter.

CMDB search AI agent

The CMDB search AI agent searches the CMDB for a particular CI using single table query search or keyword query search and then displays a link to search results.

CI summarizer AI agent

View a concise summary of key CI data. You can select the CI on a CI form, in a workspace page, or on any list view. The summary can include discovery data, ownership, and key related items such as open incidents, alerts, problems, upcoming change requests, and security vulnerabilities. Additionally, the summary lists the service instances that the CI is part of.

Note:

You can use Now LLM Service, Now LLM Long Term Stable models (LTS), Azure OpenAI, Google Gemini or Anthropic Claude on AWS as the AI model provider for all Now Assist skills and AI agents. Use the Configuration Controls in AI Control Tower to define which options are available, then set the skill-level preferences in the Now Assist Admin console. For more information, see Large language models on the ServiceNow AI Platform®.

Enable security implementation to execute AI agents and agentic workflows through Access Control Lists (ACLs) and user identities. ACLs provide the Run As capability to let agents

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and agentic workflows execute actions either as a dynamic user or as an AI user. For more information, see Implement access control in Now Assist AI agents

Running AI agents autonomously

Important:
By default, all agentic workflow and AI agent records are read only.

To run the AI agents autonomously, you must first duplicate the agentic workflow and then proceed with the following steps:

- Activate the agentic workflow.
- Activate all agents within the agentic workflow.
- Activate the trigger to invoke the agentic workflow automatically. If you prefer to invoke it manually, activating the trigger isn't necessary.

Create a CI using Now Assist

The Create configuration item agentic workflow accepts your natural language request to manually generate a valid CI in the class that you specify.

Before you begin

Role required:

- Now Assist for CMDB v2.4 and earlier: sn_cmdb_editor
- Starting with Now Assist for CMDB v2.5: sn_cmdb_admin
- Starting with Now Assist for CMDB v3.0: sn_cmdb_editor

About this task

Occasionally, you might create a CI manually. To help you, the Create configuration item agentic workflow accepts your natural language request and verifies that it understands which class the new CI should belong to. The workflow then checks Identification and Reconciliation engine (IRE) rules to determine the required attributes for the CI and requests that information. After you provide sufficient data, the workflow ensures that the proposed CI includes the attributes that you requested, complies with IRE rules, and is not a duplicate. The workflow then creates the CI.

The Create configuration item agentic workflow is particularly useful for adding CIs to tables accessed by Operational Technology because users might add physical CIs while unaware of the importance of managing CI data in the CMDB.

Note:
The workflow prevents creation of a CI whose class does not have an identification rule. For more information, see Identification rules.

To learn more about using the Now Assist panel, see Working in the Now Assist panel.

Procedure

1. Use either of the following methods to start the process.
   - While working in the CMDB Workspace, select **Create CI** in the Quick Links section.
   - While working in the CMDB Workspace, select the Now Assist icon and then enter `create a ci`.
2. Enter the class of CI to create and then continue by answering the Now Assist questions.

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Getting advice from Now Assist on CMDB governance

Data governance can be an overwhelming task. The Provide advice on CMDB governance agentic workflow supports data admins and owners by methodically working through the many-faceted process of improving CMDB data accuracy, completeness, and health. The objective is to promote that users can trust the data that they use for their work.

Access the workflow

See Get advice on CMDB governance from Now Assist for information on accessing the workflow.

Provide advice on CMDB governance agentic workflow

The Configuration Management Database (CMDB) is the central repository of your organization's IT assets, services, and their relationships. The Provide advice on CMDB governance agentic workflow helps to promote CMDB accuracy, completeness, and integrity to maximize the value and performance of your ServiceNow AI Platform products. The results are faster incident resolution, enhanced compliance, and a reduced risk of service disruption. The agentic workflow evaluates CIs updated in the last 90 days.

The Provide advice on CMDB governance agentic workflow supports admins and owners with information on data health and ongoing guidance for governance as data models and integrations grow. The workflow calls on AI agents.

AI agents

This section presents overviews of the actions of the AI agents that the agentic workflow uses.

Looking for an AI agent?

- There might be AI agents installed with the Now Assist application that are not used in agentic workflows. To learn how to see all agents that are available on your instance, see Find AI agents.
- To find agents that might not be installed on your instance, visit the AI Agent Marketplace on the ServiceNow Store.

CMDB principal class manager AI agent

The CMDB principal class manager AI agent determines whether you can set CI classes as principal, suggests principal classes, and can set or unset a class as principal. Setting a class as a principal class is a practical way to save time because you can configure ServiceNow AI Platform products to display only principal classes in list views. The workflow helps you to decide which CIs you're most likely to work with day-to-day and then provides a link to enable you to set the associated classes as principal classes. For more information, see Update class list in the Principal Class filter.

CMDB life cycle manager AI agent

The CMDB life cycle manager AI agent helps admins to promote that CMDB life-cycle policies are in place for principal classes or for specified classes. For more information, see Working with CMDB Data Manager.

CMDB data certification and attestation manager AI agent

The CMDB data certification and attestation manager AI agent retrieves the data certification and attestation policies for a CI class and for similar classes. It can also

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create a data certification and an attestation policy. For more information, see Data Certification.

CMDB health metrics manager AI agent

The CMDB health metrics manager AI agent displays information on CMDB Health Dashboard jobs, health metrics status, and health scores. If the jobs are not configured, the workflow provides a link to the setup instructions. For more information, see CMDB Health.

CMDB data ownership manager AI agent

The CMDB data ownership manager AI agent helps you to assess the quality of CI ownership data for a CI class to determine ownership, validate ownership, and evaluate ownership quality. You can validate fields that reference sys_user or sys_user_group like **Assigned To**, **Managed by Group** (default), **Support Group**, and so on. The agent answers the following questions:

- Is CI ownership specified? Is the **Managed by group** attribute value set for the CI? Does it indicate an active and correctly configured record? The value of the system property for ownership is a default field for the evaluation. For the **Managed by group** CI attribute, you can specify the percentage values that classify the result as `Poor`, `Average`, or `Healthy`. For more information, see Property settings for Now Assist for CMDB.
- If you provide a user referencing value: Does the **User Referencing** value indicate an active record? This evaluation identifies CIs that have inactive users and CIs with no **User** value.
- If you provide a user referencing value: Does the **Group Referencing** value indicate an active record? This evaluation identifies CIs that have inactive groups, empty groups (no users), and CIs with no **Group** value.

Get advice on CMDB governance from Now Assist

Work through the process of improving CMDB data accuracy, completeness, and health. The objective is to promote that users can trust the data that they use for their work.

Before you begin

Role required: sn_cmdb_admin and now_assist_panel_user

About this task

To learn more about using the Now Assist panel, see Working in the Now Assist panel.

Procedure

1. Use either of the following methods to start the process.
   - While working in the CMDB Workspace, select **Provide advice on CMDB governance** in the Quick Links section.
   - While working in the CMDB Workspace, select the Now Assist icon and then enter `Provide advice on CMDB governance` in the Now Assist panel.
2. Enter the class of CI to create and then continue by answering the Now Assist questions.

Related topics

Property settings for Now Assist for CMDB

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Use Now Assist to search the CMDB for CIs

The Search CMDB agentic workflow enables you to search for CIs by specifying any of several attributes of the CI of interest. The workflow accepts your natural language request, verifies your search goal, and then, depending on the information you provided, generates a keyword search, a single-table search with dot walks, or a multi-table search that involves relationship navigation. The workflow can infer CI relationship data to generate an appropriate query.

Before you begin

Important:
This agentic workflow is turned on by default. For more information, see Now Assist skills, agents, and agentic workflows on by default.

Verify that Query Generation skills are activated. For instructions, see Configuring Query Generation.

Note:
Because activation configures a large amount of data, wait one day after activation to use the Search CMDB agentic workflow.

Role required: sn_cmdb_user and now_assist_panel_user

About this task

The Search CMDB agentic workflow can perform the following types of search:

- Keyword searches for a specific CI. You can search using name, IP address, serial number, MAC address, or asset tag. For example, "search the CMDB for 192.168.1.1".
- CMDB searches that are single-table queries (including dot walk conditions for one level). For example,"What servers does Wile E. Coyote own?" or "Search the CMDB for operational windows servers that aren't assigned to anyone".
- Starting with Now Assist for CMDB v3.0, searches can include parent-child nodes spanning multiple tables and can traverse relationship graphs (searches that traverse the cmdb_rel_ci), for example, "Search for servers that depend on databases".

Note:
The *sn_cmdb_gen_ai.cmdb_rel_ci.search.enabled* system property is a Boolean that controls relational search (search queries that traverse the cmdb_rel_ci). The default value is true. Set the value to false to disable relational search.

Procedure

1. On the CMDB Workspace or in any form or list view, select the Now Assist icon.
2. Start a Now Assist query with "`Search the CMDB for `" and then enter the search criteria as described in the next step.
3. Enter the information that describes the searched-for CI.
   - Provide as much as you know about the CI. Ideally provide the class type followed by other search values and conditions. For example, name, IP address, serial number, MAC address, or asset tag.
   - If a query fails, you can check query generation events to determine the cause. Select **All** > **Query Generation** > **Event Queue** to view events. In some cases, a log will exist for the query. Select **All** > **Query Generation** > **Logs** to view the logs. For more information, see Query Generation logs.

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4. Refine the query if Now Assist returns a CI, but not the CI that you're interested in.
   For example, you might have specified an IP address that is duplicated in multiple tables. In such cases, provide details that narrow the search.

Result

If fewer than five search results are returned, they are summarized. If more results are returned, they appear in a linked list (limited to 100 records).

To learn more about using the Now Assist panel, see Working in the Now Assist panel.

Now Assist for CMDB reference

Reference topics provide additional information about the property settings that you use to configure and administer Now Assist for CMDB.

Property settings for Now Assist for CMDB

List of system properties for the agents used by Now Assist for CMDB agents.

Property settings

Note:
All properties are in the System Property [sys_properties] table. To open the sys_properties table, enter `sys_properties.list` in the navigation filter.

System properties for Now Assist for CMDB

Property	Description
sn_cmdb_gen_ai.principal_class_suggestion_period	The CMDB data governance manager agentic workflow collects and aggregates Change Management, Incident Management, and Problem Management data for the specified CI class. If the workflow collects too much data, the process might fail. This property limits the duration in days (integer starting at zero) for the query. For instances with little data, set the property to a high value like 36000 (10 years). For instances with a large store of data, experiment to determine a practical value. • Type: integer • Default value: 90 (Query all tasks that were updated in the last 90 days.)
sn_cmdb_gen_ai.suggested_principal_classes_limit	Specifies the maximum number of principal classes that are suggested to the user. Type: integer
sn_cmdb_gen_ai.health_ownership_evaluation_period	If the CMDB data governance manager agentic workflow collects too much health data, the process might fail. This property

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System properties for Now Assist for CMDB (continued)

Property	Description
	limits the duration in days (integer starting at zero) for the query. • Type: integer • Default value: 90 (Query all tasks that were updated in the last 90 days.)
sn_cmdb_gen_ai.ownership_evaluation_health_score_thresholds	The CMDB data governance agentic workflow determines the percentage of CIs in the specified class that have values for the **Managed by group** attribute. The process returns health scores of `Poor`, `Average`, or `Healthy`. The default setting of `40,60,80` returns a score of `Poor` for less than 40%, `Average` for 60%-79%, and `Healthy` for 80% and higher. Default: 40,60,80
sn_nowassist_sgc.ai_search_kb_score_threshold	Enter the relevancy score threshold for AI Search, used when retrieving knowledge articles with Now Assist for SGC. • Type: integer • Default value: 5
sn_nowassist_sgc.kb_filtering_strategy	Set the knowledge article filtering strategy for retrieving articles with Now Assist for SGC. • Type: list • Default value: `strict` Choices: **strict** Retrieves knowledge articles from the selected connector category only. **non-strict** Retrieves knowledge articles from other connector categories, in addition to the selected connector category.

CMDB reference

The topics in this section provide various reference details for CMDB.

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- Domain separation and Configuration Management Database (CMDB)
- CMDB APIs (CMDB SDK)
- Quick start tests for Configuration Management Database (CMDB)
- CMDB glossary

Domain separation and Configuration Management Database (CMDB)

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

Support level: Standard

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

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

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

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

- Domain separation in CMDB Health
- Domain separation and CMDB Query Builder
- Domain separation
- Domain separation
- CMDB APIs (CMDB SDK)

Related topics

Domain separation and Configuration Management Database (CMDB)

List of classes added by the CMDB CI Class Models app

Alphabetical list of classes that are added by the CMDB CI Class Models ServiceNow® Store app. The app adds class models (name, label, and a description of the type of information stored in the table) to the base-system CMDB. The app can also update the label (display name) of an existing base class.

Classes added by the CMDB CI Class Models app

For more information, see CMDB CI Class Models.

Table name	Label (Display name)	Table description
cmdb_ci_antenna	Antenna	An Antenna is a device that receives or transmits electromagnetic signals, typically

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Table name	Label (Display name)	Table description
		used to facilitate wireless communication by converting electrical currents into radio waves or vice versa.
cmdb_ci_antenna_control	Antenna Control	An Antenna Control is a device that manages the orientation and positioning of antennas in wireless systems. Controls the antenna's direction, tilt, and beamwidth to optimize signal coverage, enhance network performance, and ensure efficient communication
cmdb_ci_antenna_structure	Antenna Structure	Physical structure that supports the antennas in a radio network.¬† Raises them to a suitable height for optimal signal coverage and minimizing interference with nearby structures.
cmdb_ci_anypoint_api_gateway	Anypoint API Gateway	An API Gateway service provided by MuleSoft for hosting and managing APIs.
cmdb_ci_api	API	A representation of the primary API object that has many API components.
cmdb_ci_api_backend	API Backend	The backend component of an API definition that handles API requests and provides a response.
cmdb_ci_api_component	API Component	A reusable resource representing a specific aspect of an API.
cmdb_ci_api_consumer_subscription	API Consumer Subscription	To access one or more API product bundles, a developer can register for an API consumer subscription on a developer portal. The subscription registers with one or more bundles and provides a key for access to the APIs in the bundles.
cmdb_ci_api_frontend	API Frontend	The frontend component of an API definition representing the entry point of an API request.
cmdb_ci_api_gateway	API Gateway	A service that manages APIs to facilitate the interactions between applications, data, and clients.
cmdb_ci_api_product_bundle	API Product Bundle	API Product Bundles are a construct within API gateways and developer portals to represent a collection of one or more APIs for consumption by developers and applications. Some platforms use the term for an API product alone.
cmdb_ci_apigee_api_gateway	Apigee API Gateway	An API Gateway service provided by Google Cloud platform for hosting and managing APIs.
cmdb_ci_appl_ai_application	AI Model Application	AI software applications that can run on various platforms such as Linux, Windows, Docker containers, or Kubernetes (K8) clusters. These platforms support diverse AI workloads, including machine learning

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Table name	Label (Display name)	Table description
		models, data analytics, and intelligent services or AI enabled applications.
cmdb_ci_appl_ibm_cics_program	IBM CICS Program	IBM CICS Program is a family of mixed-language application that provide transaction management and connectivity for applications on IBM mainframe systems under z/OS and z/VSE.
cmdb_ci_appl_ibm_cics_region	IBM CICS Region	CICS Region is a named collection of resources that are controlled by CICS as a unit
cmdb_ci_appl_ibm_cics_transaction	IBM CICS Transaction	A CICS transaction consists of an item of processing that can be run by one or more application programs
cmdb_ci_appl_ibm_cicsplex	IBM CICSplex	A CICSplex is any grouping of CICS systems to manage and manipulate as a single entity
cmdb_ci_appl_ibm_mq_channel	IBM MQ Channel	In IBM MQ, a channel is a unidirectional communication link that allows two queue managers to connect over a network and transmit messages between each other.
cmdb_ci_appl_ibm_wmq	IBM MQ Manager	IBM Websphere MQ software.
cmdb_ci_appl_ibm_wmq_queue	IBM MQ Queue	Inner module of IBM WebSphere MQ software.
cmdb_ci_appl_ims_program	IMS Program	A program that runs within IMS. An IMS Program name is specified for each IMS Transaction that is defined.
cmdb_ci_appl_ims_region	IMS Subsystem Region	The IMS region provides the central point of control for an IMS subsystem. The IMS region provides the interface to z/OS for the operation of the IMS subsystem.
cmdb_ci_appl_ims_transaction	IMS Transaction	An IBM IMS transaction is a message that is sent to an application program. When defining a transaction to IMS, several characteristics can be identified such as: transaction codes, output limits, scheduling rules, and exceptions to those rules.
cmdb_ci_appl_mq_queue_alias	IBM MQ Queue Alias	An alias queue is an IBM MQ object that you can use to access another queue or a topic
cmdb_ci_appl_mq_queue_local	IBM MQ Queue Local	A local queue is a definition of both a queue and the set of messages that are associated with the queue. The queue manager that hosts the queue receives messages in its local queues.
cmdb_ci_appl_mq_queue_model	IBM MQ Queue Model	A model queue is a template for queues that you want the queue manager to create dynamically as required.
cmdb_ci_appl_mq_queue_remote	IBM MQ Queue Remote	Remote queue definitions are definitions on the local queue manager of queues that belong to another queue manager. To send a message to a queue on a remote queue

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Table name	Label (Display name)	Table description
		manager, the sender queue manager must have a remote definition of the target queue.
cmdb_ci_aws_api_gateway	AWS API Gateway	An API Gateway service provided by Amazon Web Services (AWS) for hosting and managing APIs.
cmdb_ci_azure_api_mgmt	Azure API Management	An API Management service provided by Microsoft Azure for hosting and managing APIs.
cmdb_ci_base_station_controller	Base Station Controller	A Base Station Controller (BSC) is a central unit in cellular network. It manages multiple base stations to handle call routing, resource allocation, and mobility management for efficient communication and seamless handover between stations.
cmdb_ci_baseband_unit	Baseband Unit	A Baseband Unit (BBU) is a wireless communication processing unit that converts digital data to analog signals for transmission, performing modulation, coding, and decoding for efficient data transfer and reliable communication in the network.
cmdb_ci_battery_distribution_fuse_bay	Battery Distribution Fuse Bay	A Battery Distribution Fuse Bay is a compartment that distributes power from batteries to circuits. Equipped with fuses or breakers for overcurrent and short-circuit protection, ensuring safe and controlled power distribution in electrical systems.
cmdb_ci_battery_distribution_fuse_panel	Battery Distribution Fuse Panel	A battery distribution fuse panel distributes power within an equipment holder (rack/ cabinet) and connects to a Battery Distribution Bay.
cmdb_ci_boomi_api_gateway	Boomi API Gateway	An API Gateway service provided by Boomi for hosting and managing APIs.
cmdb_ci_bosh_component	BOSH Component	Base class for storing all BOSH Components.
cmdb_ci_bosh_deployment	BOSH Deployment	This class stores discovered BOSH Deployments. The collection of instructions and actions to provision a new system.
cmdb_ci_cable	Cable	A tangible physical media that encompasses one or more strands (optical or electrical). Cables are procured as asset and laid between sites to consume it.
cmdb_ci_call_content_delivery_unit	Call Content Delivery Unit	A Call Content Delivery Unit is a system or unit that is involved in the delivery or optimization of content related to voice communications or calls.
cmdb_ci_call_server	Call Server	A Call Server is a centralized communication system that manages telephony calls, handling call routing, setup, termination, and processing. It provides call control

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Table name	Label (Display name)	Table description
		and features for efficient and reliable communication within a network.
cmdb_ci_certificate	Unique Certificate	A public key certificate in a X.509 standard format.
cmdb_ci_channel_bank	Channel Bank	A Channel Bank device converts multiple analog voice or data channels into digital format for transmission over a digital network. It enables efficient utilization of bandwidth and supports voice and data communication in a compact and scalable solution.
cmdb_ci_cloud_system_management_agent	Cloud System Management Agent	A cloud system management agent is a software component installed on a cloud-managed server to facilitate remote management, automation, and monitoring.The agents act as intermediaries between the cloud provider and the managed system, enabling seamless communication.
cmdb_ci_comm_hardware	Communication Hardware	Communication device information.
cmdb_ci_communication_distribution_panel	Communication Distribution Panel	A Communication Distribution Panel is a central hub that organizes and distributes communication connections, like phone lines and data cables within a building. This simplifies management and enhances communication infrastructure.
cmdb_ci_connection_medium	Connection Medium	Any connection medium used to connect two end points where A/Z termination can be site, equipment, or interface.
cmdb_ci_connection_service_instance	Connection Service Instance	A Connection Service Instance represents a network connection between two endpoints, crucial for end-to-end service delivery. It differs from Network Service Instances by representing the provisioned interconnection.
cmdb_ci_container_cabinet	Cabinet	A Cabinet is a physical enclosure that houses and secures network equipment. It provides organization, cooling, and connectivity for efficient telecom infrastructure operation.
cmdb_ci_container_multi_rack	Multi Rack	A Multi-rack is a modular rack system for housing and organizing network equipment. It offers flexibility, scalability, and efficient cable management. It enhances space utilization and facilitates easy equipment installation and maintenance.
cmdb_ci_container_rack	Equipment Rack	A Rack is a structured framework for housing network equipment. It provides organization, security, and efficient cable management. It optimizes space utilization and simplifies equipment installation and maintenance.

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cmdb_ci_container_shelf	Container Shelf	A Shelf is a mountable platform for holding network equipment. It provides space-saving storage, organization, and easy access. It facilitates cable management and supports efficient equipment installation and maintenance.
cmdb_ci_container_slot	Slot	In the context of technology and hardware, a slot refers to modular space for inserting network modules. It enables flexible configuration and expansion of telecom equipment. It also streamlines installation and maintenance processes.
cmdb_ci_container_subslot	Subslot	A Subslot is a subdivision within a slot for additional module insertion. It allows further expansion and customization of telecom equipment and enhances flexibility and scalability in network configuration.
cmdb_ci_converged_infra	Converged Infrastructure	Devices that serve both a computing and networking function.
cmdb_ci_data_service_instance	Data Service Instance	A Data Service Instance extends a Service Instance and represents a logical instance of a data service that can persist structured and unstructured data, process data (pipeline) or retrieve data (data, search, query, etc.).
cmdb_ci_db_db2_sharing_group	DB2 Sharing Group	A collection of one or more DB2 subsystems that share DB2 data
cmdb_ci_db_db2_stored_procedure	DB2 Stored Procedure	A DB2 stored procedure is a compiled program that can run SQL statements and is stored on a local or remote DB2 Universal Database Server.
cmdb_ci_db_ims_area	IMS Area	Data sets, called areas, with each area containing the entire data structure.
cmdb_ci_db_ims_database	IMS Database	An IMS Database running within an IMS Subsystem (database instance).
cmdb_ci_db_ims_plex	IMS Plex	An IMSplex is made up of IMS and z/OS components that work together.
cmdb_ci_db_ims_subsystem	IMS Subsystem	A control program that can be either online or batch and runs in a z/OS address space. It is a part of IBM's Information Management System (IMS). IMS systems help with the organization, storage, and retrieval of data.
cmdb_ci_deployed_marketplace_product	Deployed Marketplace Product	Cloud deployed marketplace product is a preconfigured cloud service or application, that simplifies deployment and streamlining access to third-party solutions in cloud environments.
cmdb_ci_deployment_component	Deployment Component	Base class for storing all Deployment Components.

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cmdb_ci_digital_cross_connect_patch_panel	Digital Cross Connect Patch Panel	A Digital Cross Connect Patch Panel facilitates the routing and management of digital signals in telecom networks, allowing flexible connections between network elements, enhancing signal flow, and simplifying network maintenance and troubleshooting.
cmdb_ci_digital_cross_connect_system	Digital Cross Connect System	A Digital Cross Connect System is telecommunications device that routes and manages digital signals in networks, optimizing connectivity for efficient data transmission. Enhances performance with quick provisioning and flexible connection rearrangement.
cmdb_ci_digital_distribution_panel	Digital Distribution Panel	A Digital Distribution Panel is a centralized point for distributing digital signals. It enables organized routing, testing, and maintenance of digital connections. Facilitates efficient and reliable distribution of digital signals within the network
cmdb_ci_display	Display Device	Connected Device that displays images.
cmdb_ci_distributed_antenna_system_controller	Distributed Antenna System Controller	A Distributed Antenna System (DAS) Controller is a centralized equipment that manages distributed antenna systems. It controls signal distribution, monitors performance, and optimizes coverage for improved wireless connectivity in large buildings or venues.
cmdb_ci_distributed_antenna_system_remote	Distributed Antenna System Remote	Distributed Antenna System (DAS) Remote is a device that extends cellular coverage. It receives, amplifies, and distributes signals from a central DAS hub, eliminating dead zones and improving wireless connectivity in large buildings or outdoor areas.
cmdb_ci_dns_domain_info	DNS Domain Info	Domain Name allows you to trace the ownership and tenure of domain name details from tools like whois and DNS lookup tools.
cmdb_ci_dns_resource_record	DNS Resource Records	DNS record detail from Domain Name Server (DNS) for a WWW Domain
cmdb_ci_dns_zone_a_record	DNS Zone A Records	DNS Zone A records hold only IPv4 addresses.
cmdb_ci_dns_zone_aaaa_record	DNS Zone AAAA Records	DNS Zone AAAA records hold only IPv6 addresses
cmdb_ci_dns_zone_alias_record	DNS Zone Alias	An ALIAS record that points a domain name to a hostname instead of an IP address.
cmdb_ci_dns_zone_cname_record	DNS Zone CNAME	A canonical name (CNAME) record points from an alias domain to a canonical domain
cmdb_ci_drone	Drone	Unmanned Connected Device with mobility.
cmdb_ci_dslam	DSLAM	A Digital Subscriber Line Access Multiplexer (DSLAM) centralizes DSL connections and optimizes bandwidth. It enables reliable and

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		high-speed internet access for multiple users. It enhances network performance and user experience.
cmdb_ci_echo_cancellation_system	Echo Cancellation System	An Echo Cancellation System is a device that minimizes echo in audio communication by removing reflected signals. Ensures clear and high-quality sound transmission, enhancing the overall audio experience.
cmdb_ci_edge_appl	Edge Application	Thick client software purpose built and deployed typically at a place closer to where data is being generated, leveraging local computing resources to execute tasks closer to the data source enabling processing at greater speeds and volumes, minimizing latency and enhancing responsiveness leading to greater action-led results in real time. An edge application is one component in larger system and it will send the resulting small amount of data to the server counterpart. Typically, a large number of edge applications are deployed and overall load on the server side component is reduced as majority processing is done at Edge application and minor results are sent to server side to either surface it to customer or to perform aggregations and take actions. Examples of edge applications include purpose-built software deployed smart grids to send alarms, action oriented small set of data to server side system, purpose-built software at a retail store for performing retail analytics at the store and sending minimal results such as events, purpose-built thick client application built for industrial IoT applications where the application is in close proximity to the data being generated and performing the computations to send the resulting small dataset to the server side component to source to customers or to perform aggregations.
cmdb_ci_edge_device	Edge Device	Edge device on either the provider's edge or at customer branch locations.
cmdb_ci_edge_rack	Edge Rack	Infrastructure on the provider or customer edge.
cmdb_ci_enode_b	EnodeB	An EnodeB, short for Evolved Node B, is an LTE base station. It connects user devices to the LTE core network, providing wireless access, managing radio resources, and enabling high-speed data transmission for cellular communication.
cmdb_ci_fabric_interconnect	Fabric Interconnect	A Fabric Interconnect is a networking component that connects servers, storage

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Table name	Label (Display name)	Table description
		devices, and network resources, enabling high-speed communication, centralized management, and efficient data transfer within a data center environment.
cmdb_ci_facility_service_instance	Facility Service Instance	A Facility Service Instance extends a Service Instance, representing a logical instance of a service tied to the operations of a facility, such as an office building, residential building, manufacturing plant, or operations control center.
cmdb_ci_fan_module	Fan Shelf	A Fan Shelf is a rack-mounted unit with built-in fans for equipment cooling. It ensures optimal temperature management, prevents overheating, and enhances the reliability and performance of network devices.
cmdb_ci_fiber_cross_connect_panel	Fiber Cross Connect Panel	A Fiber Cross Connect Panel is a device used in organizing and managing fiber connections. It enables easy interconnection, testing, and maintenance of fiber-optic cables. It ensures efficient routing for a reliable and scalable network infrastructure.
cmdb_ci_fiber_distribution_panel	Fiber Distribution Panel	A Fiber Panel is a component used in fiber optic networks that provides termination and connection points for fiber optic cables, allowing for efficient routing and management of optical signals, enhancing the performance and reliability of the network.
cmdb_ci_fiber_serving_terminal	Fiber Serving Terminal	A Fiber Serving Terminal (FST) connects fiber optic cables from the service provider to subscribers, enabling high-speed data transmission and delivery of services like internet and phone, enhancing connectivity and network performance for end-users.
cmdb_ci_filler_component	Filler Component	A flat metal or plastic cover for empty spots/slots in a rack or device. It helps separate cold and hot air zones, prevents dust from entering the chassis, and ensures proper airflow through the chassis or rack.
cmdb_ci_fortinet_firewall_interface	Fortinet Firewall Interface	Fortinet firewall interface connects network segments, allowing traffic flow while applying assigned security policies and configurations.
cmdb_ci_fortinet_firewall_policy	Fortinet Firewall Policy	Fortinet firewall policy defines the security rules that control traffic flow between network interfaces, specifying conditions like source/destination and services. It ensures granular traffic management and enforces security across network segments.
cmdb_ci_fortinet_vdom	Fortinet Virtual Domain	VDOM in a firewall represents a virtual instance within a physical firewall that enables independent security policies, routing, and

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Table name	Label (Display name)	Table description
		configurations for different network segments. Each VDOM functions like a separate firewall, isolating traffic and rules.
cmdb_ci_function_ai	AI Function	AI SaaS applications deployed on public cloud platforms that offer scalable, on-demand services for machine learning, data processing, and AI-driven tasks, providing flexible solutions without the need for on-premises infrastructure management.
cmdb_ci_gnode_b	GnodeB	A GnodeB, or Next-Generation NodeB is a 5G base station. It connects user devices to the 5G core network, supporting ultra-fast data transfer, low latency, and massive device connectivity, revolutionizing mobile communication capabilities.
cmdb_ci_gpu	Graphics Processing Unit	The GPU helps handle graphics-related work like graphics, videos, and AI ML workloads. The GPU could be externally connected or internally installed in a computer. Typically characterized by number of cores and GPU memory.
cmdb_ci_handheld_computing	Handheld Computing Device	Hand held device running an operating system. Includes smart phones and tablets.
cmdb_ci_hc_device	Healthcare device	Base class for various clinical equipments.
cmdb_ci_heat_baffle	Heat Baffle	Represents hardware used to help direct rising hot air away from equipment.
cmdb_ci_hmc_server	IBM HMC Server	IBM console that manages frames and assigns lpars to pools.
cmdb_ci_hmi	Human Machine Interface [DEPRECATED]	DEPRECATED — OT assets moved to cmdb_ci_ot to support broader use cases. Instead use cmdb_ci_ot_hmi
cmdb_ci_ibm_api_connect	IBM API Connect	An API Gateway service provided by IBM for hosting and managing APIs.
cmdb_ci_ibm_frame	IBM Frame	IBM physical machine with considerable resources that can be virtualized.
cmdb_ci_ibm_i_server	IBM i Server	A fully integrated operating system for IBM Power servers
cmdb_ci_ibm_vios_server	IBM viOS Server	A Virtual I/O Server that facilitates the sharing of physical I/O resources between client logical partitions within the server
cmdb_ci_ibm_ztpf_server	IBM zTPF Server	The z/Transaction Processing Facility operating system is a special-purpose system that is used by companies with very high transaction volume
cmdb_ci_ibm_zvm_server	IBM zVM Server	IBM z/VM is an operating system with security-rich and scalable hypervisor and virtualization technology designed to run guest servers

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cmdb_ci_ibm_zvse_server	IBM zVSE Server	The z/VSE operating system provides a smaller, less complex base for batch processing and transaction processing
cmdb_ci_imaging	Imaging Device	Connected device that captures images.
cmdb_ci_incomplete_ip	Incomplete IP Identified Device	Devices that can be identified only by IP Address.
cmdb_ci_interface_card	Network Interface Card	This class stores interface cards installed in slots in edge devices enabling a clear relationship between the edge device and cards installed within that network chassis.
cmdb_ci_iot	IoT Device	Parent table that contains Internet of Things device types.
cmdb_ci_ipdslam	IP DSLAM	An Internet Protocol Digital Subscriber Line Access Multiplexer(IP DSLAM) centralizes IP-based DSL connections, optimizing bandwidth. It enables high-speed and reliable internet access for multiple users. Enhances network performance and user experience
cmdb_ci_keyboard_video_mouse_switch	Keyboard Video Mouse Switch	A Keyboard Video Mouse Switch (KVM Switch) is a device for controlling multiple computers using a single set of keyboard, video, and mouse. It simplifies management and improves efficiency in multi-system environments.
cmdb_ci_kong_gateway	Kong Gateway	An API Gateway service provided by Kong for hosting APIs.
cmdb_ci_kong_lb	Kong Load Balancer	A built-in load balancer in the Kong Gateway for distributing API requests across multiple Kong targets.
cmdb_ci_kong_target	Kong Target	An individual backend server that identifies an instance of a backend service configured in a Kong Gateway.
cmdb_ci_kubernetes_node_pool	Kubernetes Node Pool	A Node Pool class that belongs to a Kubernetes cluster in cloud environment.
cmdb_ci_logical_composite	Logical Composite	Logical device that is composed of multiple distinct entities that are aggregated to provide a function. The Logical Composite is not a physical device separate from its constituent entities. The entities that the logical composite is composed of are themselves typically realized as separate CIs with relationships to the Logical Composite CI.
cmdb_ci_lpar_instance	IBM LPAR Instance	IBM logical partition representing the virtual aspect of the OS.
cmdb_ci_lpar_resource	LPAR Resource	Resources of an LPAR instance.
cmdb_ci_mainframe	IBM Mainframe	High performance computers with large amounts of memory and processors that

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		process billions of simple calculations and transactions in real time.
cmdb_ci_mainframe_lpar	IBM Mainframe LPAR	A Logical Partition (LPAR) is a subset of an IBM Mainframe computer.
cmdb_ci_mainframe_sysplex	Mainframe Sysplex	A collection of z/OS systems that cooperate using certain hardware and software products to process work
cmdb_ci_managed_api	Managed API	An API object dependent on an API Gateway and identified through the Gateway.
cmdb_ci_manufacturing	Manufacturing Device [DEPRECATED]	DEPRECATED class — OT assets moved to cmdb_ci_ot to support broader use cases. Instead, use cmdb_ci_ot as the base class or other generic child classes as appropriate.
cmdb_ci_med_clinical_device	Clinical Device	Devices used in a clinical setting for overall management, medical staff, and patient aid.
cmdb_ci_med_dental	Dental Equipment	Dental equipment and supplies as defined by UNSPSC family code 42150000.
cmdb_ci_med_device	Medical device	Class of Medical devices that are used for patient treatment.
cmdb_ci_med_diagnostic_imaging	Diagnostic Imaging	Specialized equipment used in medicine to visualize the internal structures of the body.
cmdb_ci_med_lab_equipment	Lab Equipment	Specialized tools, apparatus, and instruments used in scientific research, experiments, and analysis.
cmdb_ci_med_patient_implant	Patient Implant	Medical devices or tissues that are surgically placed inside a patient's body.
cmdb_ci_med_patient_monitoring	Patient Monitoring	Monitors and tracks various physiological parameters of a patient. Monitors heart rate, blood pressure, oxygen levels, respiratory rate, and so on.
cmdb_ci_med_surgical_instrument	Surgical Instrument	Devices used during surgical interventions. Life support tools and tools to assist surgeons in precise and controlled maneuvers.
cmdb_ci_med_therapeutic_device	Therapeutic Device	Specialized tools designed to aid in the treatment, rehabilitation, or management of health conditions. Can range from orthopedic supports to cardiac implants and neurostimulation devices.
cmdb_ci_media_converter	Media Converter	A Media Converter is a device that converts signals between different network media types (e.g., fiber to copper), enabling seamless connectivity and extending network reach. It facilitates smooth communication in diverse network environments.
cmdb_ci_media_gateway	Media Gateway	A Media Gateway is a device that connects different communication networks, converting signals between different protocols or media

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Table name	Label (Display name)	Table description
		types. It enables seamless interoperability and facilitates smooth communication across diverse networks.
cmdb_ci_medical	Medical Device [DEPRECATED]	DEPRECATED class — Instead, use cmdb_ci_med_device
cmdb_ci_microwave_radio_equipment	Microwave Radio Equipment	A wireless technology for high-speed data transmission over long distances using microwave frequencies. It is reliable, efficient, and widely used in telecom and backhaul networks for point-to-point connectivity.
cmdb_ci_mixed_node_b	Mixed NodeB	Telecommunications equipment that supports multiple radio access technologies, typically combining both 2G and 3G technologies in a single base station.
cmdb_ci_mobile_switching_center	Mobile Switching Center	A Mobile Switching Center (MSC) is a core component in a cellular network, connecting mobile devices to the rest of the network. It handles call routing, switching, and mobility management, facilitating seamless communication.
cmdb_ci_mobility_management_entity	Mobility Management Entity	A Mobility Management Entity (MME) manages mobility-related functions in a wireless network. It handles tasks such as user authentication, tracking, and handover between cells. Enables seamless mobility and efficient utilization of network resources.
cmdb_ci_monitoring_unit	Monitoring Unit Shelf	A Monitoring Unit Shelf is a rack-mountable platform for centralized monitoring of network devices. It streamlines monitoring, troubleshooting, and maintenance tasks and also enhances network performance and reliability
cmdb_ci_mssql_ag	MSSQL Availability Group	An availability group is a container for a set of databases that failover together to support high availability and disaster recovery.
cmdb_ci_mssql_ag_replica	MSSQL Availability Group Replica	An availability group replica is an SQL Server instance that hosts a local copy of each database in an availability group. There are two types of replicas: one primary replica and up to eight secondary replicas.
cmdb_ci_mssql_ag_listener	MSSQL Availability Group Listener	An availability group listener is a virtual network name that provides a single connection point for clients to access databases in an availability group, routing connections to the primary or a readable secondary replica for HADR.
cmdb_ci_multi_service_network_router	Multi-Service Network Router	A versatile networking router device that supports various networking services, such as voice, video, and data, providing efficient

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Table name	Label (Display name)	Table description
		and reliable communication across multiple networks and protocols.
cmdb_ci_multi_service_switch	Multi Service Switch	A network device that aggregates and routes multiple types of traffic (voice, data, video) in a network. Provides efficient and flexible connectivity, ensuring seamless communication and optimized resource utilization.
cmdb_ci_multimedia	Multimedia Device	A connected device that assists in the generation or delivery of media content.
cmdb_ci_multiplexer	Multiplexer	A Multiplexer (MUX) is a device that combines signals into one transmission to optimize bandwidth. It simultaneously transmits multiple data streams for efficient communication in various applications. It also enhances network performance.
cmdb_ci_network_circuit	Network Circuit	A discrete path between two or more points that enables telecommunication connectivity services.
cmdb_ci_network_controller	Network Controller	Network controllers are responsible for orchestrating network functions.
cmdb_ci_network_interface_device	Network Interface Device	A Network Interface Device (NID) connects customer equipment to the service provider's network. It serves as a demarcation point, ensuring reliable and secure connectivity for end-users. It provides physical and logical interface for communication services.
cmdb_ci_network_interface_unit	Network Interface Unit	A Network Interface Unit (NIU) connects customer devices to the network. Acts as a demarcation point, enabling reliable and secure connectivity. It provides interface and protocols for seamless communication between customer equipment and the network.
cmdb_ci_network_link	Network Link	Physical network links in the provider's network and up to the customer edge. (for example, fiber, coax, an so on)
cmdb_ci_network_monitoring	Network Monitoring	A Network Monitoring Unit is a dedicated device or software that continuously monitors network traffic, collects data, and provides real-time insights and alerts for effective network management, troubleshooting, and security analysis.
cmdb_ci_network_node	Network Node	General class to capture network infrastructure when a specific CI class doesn't exist.
cmdb_ci_network_port	Network Port	Network ports that are contained in interface cards or independently in access class network chassis.

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cmdb_ci_network_service_instance	Network Service Instance	A specific deployed, provisioned and/or configured instance of a set of network services that in turn are based on Network Functions.
cmdb_ci_network_tap	Network Tap	A passive device that captures and copies network traffic for monitoring and analysis. Provides visibility without interrupting flow, aiding performance monitoring, security analysis, and troubleshooting.
cmdb_ci_network_testing_unit	Network Testing Unit	A device for assessing network performance, reliability, and security. Conducts tests like bandwidth measurement, latency analysis, and vulnerability scanning, ensuring optimal functioning and identifying potential issues.
cmdb_ci_network_timing	Network Timing	A Network Timing device, also known as network time server, synchronizes clocks across a network, ensuring accurate data transmission, synchronization, and performance optimization for network devices and systems.
cmdb_ci_network_topology	Network Topology	Network topology describes the physical and logical structure of a network.
cmdb_ci_ni_logical_path	Logical connection	Intangible entity between two active interfaces. These are formed through multiple network links (like physical connections / microwave links) or other logical connections or combination of all
cmdb_ci_ni_physical_link	Physical connection	A Network Link, Configured Connection between two end points realized via Connection Medium (for example a cable, a wireless connection, a strand, and so on).
cmdb_ci_nids	Network Intrusion Detection System	The NIDS class builds the relationships between passive network monitoring appliances and the devices on the network that it discovers.
cmdb_ci_nutanix_cluster	Nutanix Cluster	Cluster made up of the physical nodes running Nutanix software.
cmdb_ci_nutanix_controller_vm	Nutanix Controller VM	Nutanix controller virtual machine that is present in each node and that provides the storage clustering and management capabilities.
cmdb_ci_nutanix_host	Nutanix Host	Physical host on which all the virtual machines run.
cmdb_ci_nutanix_storage_container	Nutanix Storage Container	Subset of Nutanix storage pool used to apply policies such as reserved capacity, replication factor, and storage optimization options.

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Table name	Label (Display name)	Table description
cmdb_ci_nutanix_storage_pool	Nutanix Storage Pool	Grouping of physical disks in a Nutanix cluster that is typically used to create physical separation between virtual machines.
cmdb_ci_nutanix_vm_instance	Nutanix Virtual Machine Instance	A virtual machine that runs on Nutanix infrastructure.
cmdb_ci_oe	Operational Equipment	This class is for industrial and manufacturing equipment, machines and tools that are directly involved in the production process of goods and services. These CIs are sometimes controlled by Operational Technology (OT) CIs.
cmdb_ci_operational_process_service_instance	Operational Process Service Instance	An Operational Process Service Instance extends a Service Instance, representing a logical instance of an operational process involving interconnected devices and equipment. The process may be autonomous but typically includes front-line employees.
cmdb_ci_optical_carrier_transport_node	Optical Carrier Transport Node	An Optical Carrier Transport Node transmits and switches high-capacity optical signals in transport networks. It facilitates efficient and reliable transport of data, voice, and video traffic. Enhances network performance and scalability
cmdb_ci_optical_fiber_cable	Optical Fiber Cable	Entity representing a connection medium that is made by a set of Optical Fiber. This class shall capture all cables made of Optical Fiber strands.
cmdb_ci_optical_fiber_strand	Optical Fiber Strand	Entity representing a connection medium that is made of a single fibre strand. This class shall capture all strands made of optical fiber.
cmdb_ci_optical_line_amplifier	Optical Line Amplifier	An Optical Line Amplifier is a device that amplifies optical signals in fiber-optic systems for long-distance transmission. It enhances signal strength without electrical conversion, ensuring efficient and reliable data transfer.
cmdb_ci_optical_line_terminal	OLT	An Optical Line Terminal (OLT) is an endpoint device in passive optical networks. It aggregates and distributes data, voice, and video signals. It also provides high-speed fiber connectivity to multiple subscribers.
cmdb_ci_optical_network_terminal	ONT	An Optical Network Terminal (ONT) is a device used in fiber optic networks to convert optical signals into electrical signals, enabling the delivery of high-speed internet, phone, and television services to end-users.
cmdb_ci_optical_network_unit	ONU	An Optical Network Unit (ONU) is a customer-end device in fiber optic networks. Converts optical signals to electrical signals, providing connectivity for devices to access high-speed

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Table name	Label (Display name)	Table description
		internet, voice, and video services in homes or businesses.
cmdb_ci_optical_splitter	Optical Splitter	An Optical Splitter also known as beam splitter divides incoming optical signals into multiple outputs. It enables signal distribution to multiple devices or network branches. It facilitates efficient sharing of optical bandwidth in fiber-optic networks.
cmdb_ci_ot	Operational Technology (OT)	Base class for OT technology used for industrial control, for instance in manufacturing.
cmdb_ci_ot_cnc	CNC	Computer Numerical Control — automated control of machining tools (such as drills, lathes, mills) and 3D printers
cmdb_ci_ot_control	OT Control System	Base class for industrial control systems (ICS), usually at Purdue Model Level 1 or 2.
cmdb_ci_ot_control_module	OT Control Module	Module connected to an OT Control System like a PLC or DCS.
cmdb_ci_ot_dcs	DCS	Distributed Control System — control achieved by intelligence that is distributed about the process to be controlled, rather than by a centrally located single unit
cmdb_ci_ot_dpu	DPU	Distributed Processing Units — ICS on a dedicated network with each DPU handling thousands of points of I/O
cmdb_ci_ot_ews	EWS	Engineering Workstation — computing platform for configuration, maintenance, and diagnostics of ICS applications and other control system equipment.
cmdb_ci_ot_field_device	OT Field Device	OT Input and Output Devices at Purdue Model Level 0
cmdb_ci_ot_historian	Historian	Data Historian — a centralized database supporting data analysis for industrial processes
cmdb_ci_ot_hmi	HMI	Human-Machine Interface — hardware or software through which an operator interacts with a controller
cmdb_ci_ot_ied	IED	Intelligent Electronic Device — receive or send data/control from or to an external source — for Power Grids
cmdb_ci_ot_industrial_3d_printer	Industrial 3D Printer	Device used in additive manufacturing for the construction of a three-dimensional object from a CAD model or a digital 3D model
cmdb_ci_ot_industrial_actuator	Industrial Actuator	Component of a machine that is responsible for moving and controlling a mechanism, like opening a valve.

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Table name	Label (Display name)	Table description
cmdb_ci_ot_industrial_drive	Industrial Drive	Equipment used to control the speed of machinery — may be mechanical electromechanical, hydraulic, or electronic.
cmdb_ci_ot_industrial_robot	Industrial Robot	Robotic system used for manufacturing.
cmdb_ci_ot_industrial_sensor	Industrial Sensor	Sensor that monitors the health of equipment.
cmdb_ci_ot_opc_client	OPC Client	Software module that enables applications to acquire data from an OPC Server or conduct supervisory control using an OPC Server.
cmdb_ci_ot_opc_server	OPC Server	Software module that enables applications to provide their data to the outside world using OPC.
cmdb_ci_ot_plc	PLC	Programmable Logic Controller — used to control OT devices
cmdb_ci_ot_qics	Quality Inspection Control System	Control systems that assist specifically in quality and inspection functions.
cmdb_ci_ot_rtu	RTU	Remote Terminal Unit — special purpose data acquisition and control unit designed to support DCS and SCADA remote stations
cmdb_ci_ot_scada_client	SCADA Client	Supervisory Control and Data Acquisition — client that allows an operator to manage a SCADA server
cmdb_ci_ot_scada_server	SCADA Server	Supervisory Control and Data Acquisition — system capable of gathering and processing data and applying operational controls over long distance
cmdb_ci_ot_supervisory	OT Supervisory System	Base class for supervisory systems, usually at Purdue Model Level 2 or 3
cmdb_ci_ot_system_service	OT System Service	Category of technology and systems that are used to manage, control, and monitor physical processes, machinery, and industrial operations.
cmdb_ci_payment	Payment Device	Connected Device that allows for purchasing goods or services.
cmdb_ci_plc	Programmable Logic Controller [DEPRECATED]	DEPRECATED class — OT assets moved to cmdb_ci_ot to support broader use cases. Instead, use cmdb_ci_ot_plc
cmdb_ci_power_over_ethernet_device	Power Over Ethernet Device	A Power Over Ethernet (PoE) device allows the transmission of power and data over a single Ethernet cable, simplifying installation and reducing the need for separate power sources.
cmdb_ci_primary_flexibility_point	Primary Flexibility Point	A Primary Flexibility Point (PFP) is a central location in a network where multiple cables or conduits converge, allowing for flexible redistribution and reconfiguration of network connections, optimizing network management and scalability.

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Table name	Label (Display name)	Table description
cmdb_ci_private_branch_exchange	Private Branch Exchange	A Private Branch Exchange (PBX) is a telephone system that enables internal communication within an organization, allowing users to make calls, share extensions, and manage incoming/outgoing calls without relying on individual phone lines.
cmdb_ci_processing_unit	Processing Unit	Base class for various processing units in a computing system. It encapsulates core attributes and functionalities common to all units, serving as a foundation for specialized subclasses like GPUs, CPUs, and other processors.
cmdb_ci_processor_pool	IBM HMC Processor pool	IBM shared pool used to allocate processors to a group of LPARs.
cmdb_ci_protocol_converter	Protocol Converter	Device used to convert standard or proprietary protocol of one device to the protocol suitable for the other device or tools to achieve the interoperability.
cmdb_ci_provider_device	Provider Device	The point of connectivity connecting the SD WAN Edge Port and the service providers core network.
cmdb_ci_radio_access_network	Radio Access Network	A part of a mobile system connecting user devices to the core network. It comprises base stations, antennas, enabling wireless communication, and access to mobile services.
cmdb_ci_radio_control_hardware	Radio Control Hardware	Device that helps in managing radio communication systems. It includes transceivers, antennas, amplifiers, and switches, ensuring efficient and reliable wireless connectivity.
cmdb_ci_radio_network_controller	Radio Network Controller (RNC)	The RNC is a functional element of the UMTS RNS (Radio Network System) which controls a number of NodeBs. Responsibilities of the RNC include radio resource management and control, air interface security, mobility procedures, and system synchronization.
cmdb_ci_radio_transmission_hardware	Radio Transmission Hardware	An equipment for wireless signal transmission that facilitates wireless communication over various frequencies and ranges. It includes transmitters, receivers, antennas, amplifiers, and related components.
cmdb_ci_remote_radio_unit	Remote Radio Unit	A Remote Radio Unit also known as Remote Radio Head (RRH) is a device placed at the antenna site, connects to baseband unit via fiber. Converts baseband signals to radio signals for wireless transmission, enhancing network flexibility and performance.

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Table name	Label (Display name)	Table description
cmdb_ci_repeater	Repeater	A Repeater is a device that amplifies and retransmits wireless signals to extend coverage range. It receives weak signals, boosts them, and rebroadcasts, enhancing signal strength and improving communication reliability in areas with limited reception.
cmdb_ci_residential_gateway	Residential Gateway	A Residential Gateway is a device that combines modem, router, and firewall functionalities in a single device, enabling internet access, local network connectivity, and security for home users.
cmdb_ci_rj45_patch_panel	RJ45 Patch Panel	A RJ45 Patch Panel is a hardware component that organizes and manages Ethernet connections, serving as a central hub for terminating and patching network cables, simplifying network configuration, maintenance, and troubleshooting.
cmdb_ci_sap_sid		
cmdb_ci_sbc	Single Board Computing	Single Board Computing device such as a Raspberry Pi.
cmdb_ci_sdwan_controller	SDWAN Controller	Device that provides physical or virtual device management for all SD-WAN Edges.
cmdb_ci_sdwan_edge	SDWAN Edge	Network functions (physical or virtual) that are located between the Underlay Connectivity Service and SD-WAN Service.
cmdb_ci_sdwan_port	SDWAN Port	The socket on a network device that connects to an external network.
cmdb_ci_security	Security Device	Connected Device that serves a Security function such as a badge reader.
cmdb_ci_service_aggregation_router	Service Aggregation Router	A Service Aggregation Router is a network device that centralizes network services in one device, simplifying management by aggregating traffic from multiple sources, improving efficiency and reducing complexity.
cmdb_ci_service_control_point	Service Control Point (SCP)	SCPs in the Signaling System 7 (SS7) network are responsible for routing calls and managing special features.
cmdb_ci_service_switching_point	Service Switching Point (SSP)	Switch in a telecommunications network that sends a query to a central database called a service control point (SCP) via the SS7 network to determine how a TDM call can be routed. SSPs can be part of a voice switch or a separate computer connected to it.
cmdb_ci_serving_area_interface	Serving Area Interface	A Serving Area Interface (SAI) is the connection point between a service provider's network and customer premises, enabling the delivery of services like internet,

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Table name	Label (Display name)	Table description
		telephony, and television, ensuring efficient communication and connectivity.
cmdb_ci_serving_gprs_support_node	Serving GPRS Support Node	Serving General Packet Radio Service (GPRS) Support Node (SGSN). S4 is the interface between the SGSN and Serving Gateway (SGW).
cmdb_ci_session_border_controller	Session Border Controller (SBC)	Protects and regulates IP communication. Deployed at the network borders between IP networks like a service provider and its customers. Regulates real-time communications include VoIP, IP video, and text chat. Examples: Oracle 6350, Oracle 4250
cmdb_ci_signal_transfer_point	Signal Transfer Point	A Signal Transfer Point (STP) is a telecommunications network element that routes signaling messages in telecommunication networks, facilitating smooth communication between service providers and enabling seamless connectivity for different services.
cmdb_ci_sim_card	SIM Card	SIM Cards used in mobility devices including phones, tablets, and mobility gateways.
cmdb_ci_small_cell_radio_gateway	Small Cell Radio Gateway	A device that connects small cell base stations to the core network. It manages signal transmission, integrating and enhancing wireless communication in densely populated areas or indoor environments.
cmdb_ci_small_cell_radio_node	Small Cell Radio Node	A compact wireless communication device that enhances network capacity and coverage by providing localized cellular connectivity in areas with high user density or weak signal strength
cmdb_ci_splice_closure	Splice Closure	A device that seals and protects a communications splice, such as a fiber optic splice. For example joining two fiber strands into a single, continuous, physical fiber optic strand.
cmdb_ci_strand	Strand	A tangible entity that defines the capacity of a cable. One or more strands are used to form a physical connection. Strands can be spliced to create longer or extended physical connections. Strands shall be connected to an interface or left open.
cmdb_ci_telco_control_component	Control Component	Device in a computer hardware component that creates an interface between a computer main system motherboard and other telecom components. Some will be integrated directly into the motherboard, while others may be added on as expansion devices.

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Table name	Label (Display name)	Table description
cmdb_ci_topology	Topology	Generic class to represent the arrangement of a set of CIs (equipment or connections).
cmdb_ci_transmission_control_unit	Transmission Control Unit (TCU)	In a 2G radio network the transmission control unit (TCU) encodes and decodes speech as well as handling data rate adaptation. The TCU handles translation between 13 kbits/s and 64 kbits/s.
cmdb_ci_transport	Transport Type	Types of transportation that contain interconnected technology.
cmdb_ci_tyk_api_gateway	Tyk API Gateway	An API Gateway service provided by Tyk for hosting and managing APIs.
cmdb_ci_unclassified_hardware	Unclassified Hardware	Hardware Devices that lack enough information to classify properly.
cmdb_ci_universal_customer_premises_equipment	Universal Customer Premises Equipment (uCPE)	General purpose network devices located at the customer edge. Platform that enables virtual functions. Contrast with purpose-built CPE devices provided by the same hardware vendor. Examples: Juniper NFX250-S2, Silicom Connectivity Solutions 80500-015
cmdb_ci_unmatched_api_endpoint	Unmatched API Endpoint	An API endpoint that doesn't have sufficient information for populating the API and API Component classes.
cmdb_ci_v35_patch_panel	V.35 Patch Panel	A V.35 Patch Panel is a centralized termination point for V.35 connections. Organizes, tests, and maintains V.35 interfaces. Enables efficient connectivity and management of V.35 networks, ensuring reliable data transmission and streamlined operations.
cmdb_ci_vms_appl	Video Management System	A Video Management System (VMS) is a software-based platform designed to manage and control video surveillance cameras, recording devices, and other security components. It is commonly used in large-scale surveillance and security monitoring.
cmdb_ci_voice_activity_detection_equipment	Voice Activity Detection Equipment	A Voice Activity Detection Equipment detects presence or absence of human speech in audio signals. It enables efficient utilization of resources and enhances audio processing by activating or deactivating specific functions based on voice activity.
cmdb_ci_voice_gateway	Voice Gateway	A Voice Gateway is a device that connects traditional phone systems to IP networks, enabling voice communication. It converts analog voice signals to digital data, integrating voice services with IP-based systems.
cmdb_ci_voice_switch	Voice Switch	Represents a large-scale computer system that is used to switch Time Division Multiplexer (TDM)-based, circuit-switched telephone calls. An example is a Class-5 telephone switch in

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Table name	Label (Display name)	Table description
		the public switched telephone network (PSTN) that serves calling features.
cmdb_ci_voicemail_equipment	Voicemail Equipment	A Voicemail Equipment refers to hardware that stores and retrieves voice messages in telecom networks, allowing users to receive and save messages when unavailable, enhancing communication efficiency and preventing missed messages.
cmdb_ci_wdm	WDM	A Wavelength Division Multiplexing (WDM) transmits multiple signals of different wavelengths on a single fiber. It increases data capacity and optimizes bandwidth. It enables efficient and high-speed communication in optical networks.
cmdb_ci_wearable	Wearable Technology	Connected Device that is worn by a person. For example, a smart watch.
cmdb_ci_web_acl	Web ACL	The WebACL class represents ACLs for CloudFront, API Gateway REST APIs, Application Load Balancers, AppSync GraphQL APIs, Cognito user pools, App Runner services, AWS Verified Access, and Azure Front Door Application Gateway.
cmdb_ci_webseal_backend_server	Webseal Backend Server	Discovered IBM WebSEAL Backend Servers. Represent servers used by WebSEAL for serving the web content.
cmdb_ci_webseal_junction	Webseal Junction	Discovered IBM WebSEAL Junctions. A WebSEAL Junction is an HTTP or HTTPS connection between a front-end WebSEAL server and a back-end Web application server.
cmdb_ci_webseal_reverse_proxy	Webseal Reverse Proxy	Discovered IBM WebSEAL Reverse Proxies. Generally WebSEAL acts as a reverse web proxy by receiving HTTP/HTTPS requests from a web browser and delivering content from its own web server or from junctioned back-end web application servers.
cmdb_ci_wireless_sector	Wireless Sector	A unit of cellular coverage area.

CMDB APIs (CMDB SDK)

Use CMDB APIs to create, update, and read operations on the CMDB. Domain separation is supported in CMDB APIs.

CMDB APIs (CMDB SDK)

Use the following CMDB APIs to create, update, and read operations on the CMDB:

- CMDBGroupAPI - Scoped
- CMDBTransformUtil - Global
- CMDBUtil - Global

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- IdentificationEngineScriptableApi
- IdentificationEngine - Scoped

Domain separation in CMDB APIs

Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

CMDB APIs are used for accessing the CMDB from a script. CMDB stores the CI and relation information; CMDB is domain separated.

CMDB APIs support the following operations:

- Create a new CI:

  This operation goes through the Identification and Reconciliation Engine which supports domain separation when creating a CI. The domain of the caller is used for this operation.

- Update an existing CI:

  This operation goes through the Identification and Reconciliation Engine which supports domain separation when creating a CI. The domain of the caller is used for this operation.

- Create/Delete relations:

  The cmdb_rel_ci table is not domain separated.

- Query CMDB CI/Query CMDB table:

  Results are filtered by the domain(s) visible to the caller.

- Query CMDB metadata table:

  Metadata information is not domain separated.

Setting up domain separation for CMDB APIs

If domain separation is enabled for CMDB, then it is also available for CMDB APIs.

Data separation

Data is stored and domain separated in CMDB. There is no additional work needed from the CMDB API perspective.

Configuring a domain-separated environment

The configuration is done at the CMDB level.

If a domain column is present for base system application tables

See the Domain separation in CMDB Health topic.

Tenant domains and application data

There is no application-specific data to manage with CMDB.

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Related topics

Domain separation and Configuration Management Database (CMDB)

Quick start tests for Configuration Management Database (CMDB)

Validate that Configuration Management Database (CMDB) still works after you make any configuration change such as apply an upgrade or develop an application. Copy and customize these quick start tests to pass when using your instance-specific data.

Configuration Management Database (CMDB) quick start tests require activating the Configuration Management (CMDB) plugin (com.snc.cmdb) and the CMDB - ATF Tests plugin (com.snc.cmdb.atf).

CMDB BSM: Dependency Views test suite

Test suite to check functionality of Dependency Views APIs.

Test	Description	Release version
CMDB BSM: Dependency Views	Test functionality of Dependency Views APIs. These APIs retrieve Dependency Views map and associated map items such as context menu items, for a given CI sys_id and using itil user role.	New York

CMDB HEALTH: CMDB Health Dashboard test suite

Test suite to check whether CMDB CMDB Health Dashboard is functional at a basic level.

Test	Description	Release version
CMDB HEALTH: Health Job Status	Checks whether any CMDB Health dashboard jobs, which were started 30 or more days ago, are still in progress.	New York
CMDB HEALTH: CMDB Health Completeness/ Recommended	Checks whether the recommended metric (included in the CMDB Health completeness KPI) is fully functional. This test validates: • Creation of a health inclusion rule for the recommend metric. • Creation of a recommended field that satisfies the health inclusion rule. • Validate that the health inclusion rule is correctly	New York

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CMDB HEALTH: CMDB Health Dashboard test suite

Test suite to check whether CMDB CMDB Health Dashboard is functional at a basic level.

(continued)

Test	Description	Release version
	applied to a test record with missing data in the recommended field.	

CMDB IRE: Identification Reconciliation Engine test suite

Test suite to check Identification and Reconciliation Engine (IRE) functionality.

Test	Description	Release version
CMDB IRE: IRE Validation	Validate CI identifiers and reconciliation definitions and check indexes for CI identifiers.	Madrid
CMDB IRE: Reconciliation Rule	Check operations on a reconciliation rule, in CI Class Manager, using itil and itil_admin roles. Operations include create, edit, and delete a reconciliation rule. Also, check for active and not active setting, and derived rules.	Paris
CMDB IRE: Identification Rule	Check operations on an identification rule, in CI Class Manager, using itil and itil_admin roles. Operations include create, edit, and delete an identification rule. Also, check for active and not active setting, and derived rules.	Paris

CMDB QB: Query Builder test suite

Test suite to verify CMDB Query Builder functions such as create query, read query, and execute query using two related user roles - cmdb_query_builder and cmdb_query_builder_read.

Test	Description	Release version
CMDB QB: Query Builder - cmdb_query_builder Role	Verify that cmdb_query_builder user role	New York

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CMDB QB: Query Builder test suite

Test suite to verify CMDB Query Builder functions such as create query, read query, and execute query using two related user roles - cmdb_query_builder and cmdb_query_builder_read.

(continued)

Test	Description	Release version
	can save queries, and access and run all saved queries, in CMDB Query Builder.	
CMDB QB: Query Builder - cmdb_query_builder_read Role	Verify that cmdb_query_builder_read user role can access and run all saved queries, and cannot save any query, in CMDB Query Builder.	New York

CMDB REL: Relationship Editor and Formatter test suite

Test suite to verify functionality of Relationship Editor and Relationship Formatter.

Test	Description	Release version
CMDB REL EDITOR:Relationship Editor	Check addition of relations to a CI and deletion of relations from a CI using itil user role.	New York
CMDB REL FORMATTER:Relationship Formatter	Check accuracy of CI information, relationship types, relationships, associated records such as change tickets, and settings such as CMDB views (relationship filters), displayed for a specific CI in relationship formatter using itil user role.	New York

CMDB SDK: SDK REST API test suite

Test suite to verify functionality of CMDB SDK Rest APIs.

Test	Description	Release version
CMDB SDK: Query CMDB Metadata	Test querying CMDB metadata.	New York
CMDB SDK: Create a relation for a CI using REST APIs	Test creation of a relationship for a CI in the CMDB using the CMDB REST APIs.	New York
CMDB SDK: Delete a relation for a CI using REST APIs	Test deletion of a relationship for a CI using CMDB REST APIs.	New York

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CMDB SDK: SDK REST API test suite

Test suite to verify functionality of CMDB SDK Rest APIs.

(continued)

Test	Description	Release version
CMDB SDK: Create a CI using REST API	Test creation of a CI using CMDB REST APIs.	New York
CMDB SDK: Query CMDB using REST APIs	Test querying the CMDB using CMDB REST APIs.	New York
CMDB SDK: Update a CI using REST APIs	Test updating of a CI using CMDB REST APIs.	New York
CMDB SDK: Query for a CI using REST APIs	Test querying a CI using CMDB REST APIs.	New York

Related topics

Quick start tests

CMDB glossary

Texts associated with CMDB, such as UI text and core CMDB documentation, use many terms that are important to understand in the context of CMDB.

CMDB hierarchy

The CMDB hierarchy is a structured, tree-like, data store where all data related to CMDB is stored, used, and managed. The following terms are best explained in the context of the CMDB hierarchy:

Class/Table

Stores data about a specific IT physical, logical, or conceptual item, such as a computer, in your organization. The CMDB hierarchy contains many classes where each class stores a set of similar IT infrastructure items that share similar attributes. Each class in the CMDB hierarchy has a set number of attributes that are common for the IT items stored in that class, such as CPU of a computer. A class consists of rows, where each row represents a single IT item referred to as a Configuration Item (CI). Initially, a class has no rows until actual IT items are stored in the class using one of the methods of populating the CMDB. The number of rows (CIs) in a class dynamically changes, reflecting on the number of IT items of that type in your organization. A class can be specified as independent or dependent, which determines the dependency of the class CIs on one another within the CMDB hierarchy.

Attribute/Column

A class table is defined by a set number of columns, each designed for storing a specific attribute of IT items using a specific data type such as string or integer. A column in a class table contains the attribute values of actual IT items.

Configuration Item (CI)

A basic unit of data, stored as a row in a class, and that represents an actual IT infrastructure item in your organization, such as a computer. The number of rows in a class is the number of CIs of that class. All CIs of a specific class, have the same collection of columns, where each column holds the actual value of the respective attribute for the IT item. For example, the computer class has an operating system attribute, therefore a Computer CI has an operating system attribute, which can

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have the value of Windows 10.0 for a specific computer in your organization. Any CI that is being added to a class has all of the class attributes where you can then enter the actual values of the CI.

CI class/CI type

The actual table name in the instance database that a CI belongs to. CI type is a friendly name for a CI's class, such as computer, router, or printer.

Relationship

Type of connection between a CI and either another CI, a user, or a group. Relationship types are defined twice, once from the perspective of the child CI and once from the parent CI's perspective. For example, a parent CI that powers a child CI uses the relationship type Powers::Is Powered By.

Parent class/Child class

Each class in the CMDB hierarchy is created as a child of another class (parent class), creating a parent-child relationship between classes. A child class automatically derives all the columns specified at the parent class, as well as some other feature-specific definitions. In addition to the derived attributes, you can add to the child class unique attributes which don't exist at the parent class.

The CMDB hierarchy is the entire collection of pre-defined and user-defined classes that serve as a detailed map of all IT items in your organization, including their attributes and the relationships between them. Throughout the CMDB hierarchy, classes derive attributes from each other and are connected by relationships to form a web of classes in a tree-like structure. The class at the top of the CMDB hierarchy is the Configuration Item [cmdb_ci] class, which holds the basic attributes that are common to all classes in the CMDB hierarchy. Hundreds of classes are fully defined in the base system and are ready to be populated with CIs that represent actual IT items in your environment.

Key terms

The following terms are key in CMDB:

Configuration Management Database (CMDB)

ServiceNow® application that stores the logical configuration of your organization's infrastructure and gives you full visibility into your IT environment to support needed services. This application lets you monitor your network and support stability and best performance.

Dependent CI

CIs that depend on a relationship to another CI and can't exist on their own in the absence of the dependent relationship. A class can be independent or dependent, which determines the dependency or independence of the class CIs.

Independent CI

CIs, such as Server CIs, which exist on their own and aren't dependent on any other CIs.

Principal Class

Class who's CIs are included in various CI list views. A Principal Class designation is used to restrict the list of CIs in list views across CMDB features, to only specific classes that you need.

For more information, see Update class list in the Principal Class filter.

Related table

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A table that isn't part of the CMDB hierarchy but which still qualifies as CMDB data, such as the Serial Number [cmdb_serial_number] table. A related table doesn't derive from the Configuration Item [cmdb_ci] table, but has at least one column that references a CMDB CI. Information about related tables is stored in the Related Entries [cmdb_related_entry] table.

Duplicate CI

One or more CIs in which key attributes have identical values and can occur, for example, when multiple discovery sources attempt to import the same CI. Duplicate CIs in the CMDB interfere with its integrity and efficiency and therefore, as a general guideline, should be avoided.

For more information, see Detecting duplicate CIs and Duplicate CIs remediation.

Orphan CI

In the context of CMDB Health, an orphan CI is a CI that matches CMDB Health orphan rules. Orphan CIs are typically CIs that are missing key attribute values, or key relationships and therefore, as a general guideline, must be remediated or removed.

In the context of Data Manager, an orphan dependent CI belongs to a dependent class, and is missing the dependent relationship.

Some scenarios that involve related tables, can result in orphan CIs in related tables. A CI in a related table can, for example, become orphan if the referenced CI in the CMDB is deleted.

For more information about orphan CIs in the context of CMDB Health, see CMDB Health KPIs and metrics.

For more information about orphan dependent CIs, see Dependent CIs management.

Related list

Information about additional components contained by a CI, such as disk drives on a server and the rules that control the behavior of a network router.

A related list can show, for example, active incidents, problems, changes, and outages against the CI. For example, a router can have several Related Lists affected by these filter conditions, including routing rules, disk drives, interfaces, and network adapters. Only those components found during the last Discovery appear in these Related Lists.

CMDB group

Collection of CIs that lets you apply actions collectively to all the CIs that are members in the group. There are several methods for populating a CMDB group with CI members. Depending on the group type, you can populate a CMDB group by manually adding individual CIs, selecting saved CMDB queries, or building encoded queries in the CMDB group itself. CI members in a CMDB group of type 'health' can be monitored by CMDB Health, and a CMDB group of type 'CMDB Workspace' appears in CMDB Workspace views.

For more information, see CMDB groups.

Features, tools, store apps

The following terms are for essential features and tools that CMDB provides, some of which are implemented as store apps:

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CMDB Identification and Reconciliation (IRE)

Feature that provides a centralized framework for identifying and reconciling data from different data sources as the data is being imported into the CMDB. Using IRE helps maintain the integrity of the CMDB and some non-CMDB tables when multiple data sources are used to create and update CI records. IRE identification processes extensively use CIs dependency classification.

For more information, see CMDB Identification and Reconciliation (IRE).

CMDB Health

Feature that lets you monitor the health of the CMDB by using health indicators such as duplicate CIs, required CI fields, and audits, and that provides a framework for applying standardized CI remediation. CMDB Health evaluates and aggregates those health indicators into health scores at the class, health group, and service levels, which are then shown on dashboards.

For more information, see CMDB Health.

CMDB Query Builder

Tool that lets you build complex infrastructure and service queries that span multiple CMDB classes, non-CMDB tables, and that involve many CIs that are connected by different relationships. Query elements are represented by UI building blocks that you connect and structure on a canvas to query the CMDB and Service Mapping.

For more information, see CMDB Query Builder.

CMDB Data Manager

An essential comprehensive and integrated solution where you can create, publish, and manage policies that reflect organizational needs for data management. CMDB Data Manager supports bulk management of CI life cycle operations such as deletion, archival, and attestation. The CMDB Data Manager lets you automate and govern those CI life cycle operations to help maintain the CMDB in a healthy and reliable operational state.

For more information, see Working with CMDB Data Manager.

CI Class Manager

Tool where you can centrally view, create, and edit basic class definitions. You can also view, create, or edit class settings that are used in core CMDB functions such as identification, reconciliation, and essential features such as CMDB Health.

For more information, see CI Class Manager.

CMDB Workspace

A central, comprehensive, and modernized solution that provides access to a wide range of applications, features, and key CMDB dashboards and tools to support tasks in your organization. CMDB Workspace lets you manage, search, explore, and examine the health state and recent activities in CMDB. CMDB Workspace views and dashboards show high-priority tasks that require your immediate attention, which were generated by various CMDB features such as CMDB Health.

For more information, see CMDB Workspace store app.

Service Graph Connectors

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Collection of pre-defined integrations that ingest data into the CMDB from third-party sources such as Tanium, Jamf, and Microsoft SCCM. Service Graph Connectors help maintain the quality and consistency of third-party data in your CMDB by verifying that the imported data is mapped correctly into your CMDB as specified by the Common Service Data Model (CSDM). Service Graph Connectors are delivered as store apps.

For more information, see Service Graph Connectors.

CMDB CI Class Models

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

For more information, see CMDB CI Class Models.

CSDM and the CMDB Data Foundations Dashboards

Store app containing a set of dashboards, complementing each other that together provide insights into key foundational metrics of your CMDB and Common Service Data Model (CSDM). In addition, these dashboards provide recommendations to verify that the CMDB and CSDM are properly configured for optimal usage and to mitigate any potential risks.

For more information, see Monitor health in CSDM and CMDB Data Foundations Dashboards.

Common Service Data Model

The CSDM is the data model that admins should follow when they set up ServiceNow products and applications. The standards for defining configuration items (CIs) and relationships between CIs in the CMDB helps to promote that your data resides in the appropriate CMDB tables. The result is maximum value from ServiceNow AI Platform applications.

About the CSDM

The CSDM data model reflects your service life cycle. The CSDM is the data model standard for all products that use the Configuration Management Database (CMDB).

- ServiceNow AI Platform products, apps, and features are “CSDM-compliant”. That is, they all share identical access to the underlying CSDM data model. This shared model significantly increases the power of your applications.
- The CSDM guidelines ensure unified data access for ServiceNow AI Platform products.
- The CSDM gives you clear direct prescriptive guidelines for service modeling within the CMDB.
- CSDM terms and definitions ensure consistent and accurate service reporting.
- The CSDM data model supports multiple configuration strategies and includes guidelines for using base-system tables and relationships.
- You can use the CMDB query builder to create reports showing CMDB configuration items (CIs) and their relationships.

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Expert guidance to assess and improve your CSDM implementation — the CSDM Assessment

The CSDM Assessment provides Impact Customers with leading practices and prescriptive guidance on the CSDM and how it supports processes on the ServiceNow AI Platform. To help your organization plan for and implement CSDM, the assessment includes interactions with ServiceNow CSDM experts and personalized content. See Common Service Data Model (CSDM) Assessment Accelerators.

CSDM documentation

Explore

See how the CSDM framework ensures that CIs have the proper relationships with each other and that your data resides in the appropriate CMDB tables. The guidelines help you to get maximum value from your ServiceNow AI Platform applications.

Configure the framework

Following the CSDM framework ensures that you meet your primary goal of consistent accuracy in reporting and analytics so you can effectively manage your digital environment.

Implement the framework

Following the CSDM framework ensures that you meet your primary goal of consistent accuracy in reporting and analytics so you can effectively manage your digital environment.

Manage the framework

The CSDM is the data model that admins should follow when they set up ServiceNow products and applications. The standards for defining configuration items (CIs) and relationships between CIs in the CMDB helps to promote that your data resides in the appropriate CMDB tables. The result is maximum value from ServiceNow AI Platform applications.

Reference

Reference topics provide detailed descriptions of tables,

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properties, forms, and roles that are used in the CSDM framework.	

Key principles that guided the design and development of the CSDM framework

The framework is intended to help you avoid errors in implementation and to ensure that your ServiceNow AI Platform products generate accurate, complete, and consistent reports. The following principles guided the development of the CSDM framework.

Use simplified concepts

Represent concepts in a simple, direct manner to eliminate duplicates and confusion over data sources.

Design for reporting and analytics

A prime objective of CSDM is to support consistent analysis.

Prescribe the data relationships

Tell users in a clear direct way which relationships and references to use to link CSDM tables.

Share the data model across products

The CSDM identifies a data model that is shared across products to simplify concepts and collaboration. Collaborating with other product teams achieves the best shared design.

Use clear definitions

Use agreed-upon CSDM definitions wherever a table, reference, or attribute is used.

Share base-system tables

zBoot must provide shared base-system CSDM tables by default.

Consistent data integrations

To ensure data integrity, use prescribed technologies when integrating external data sources

Speed adoption

For each new release, provide automation and guidance for CSDM that accelerates upgrading and minimizes issues.

Enable data governance and process

The presence of data within the model provides little value without governance and effective process to manage the truth and validity of the data.

Provide practical user documentation

(The content that you're viewing now) Each product team that references CSDM objects should provide documented guidance on use and/or value of the objects. Links to product guidance appear in Applying CSDM guidelines to your product — product views.

Helpful resources

Some ServiceNow resources that can provide you with helpful information are:

Other CSDM resources

See What is a CSDM? and CSDM in a nutshell.

Support

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Video

Watch Playlist of all CSDM videos.

Exploring the CSDM model

The CSDM is the data model that admins should follow when they set up ServiceNow products and applications. The standards for defining configuration items (CIs) and relationships between CIs in the CMDB helps to promote that your data resides in the appropriate CMDB tables. The result is maximum value from ServiceNow AI Platform applications.

Definitions of CSDM terms

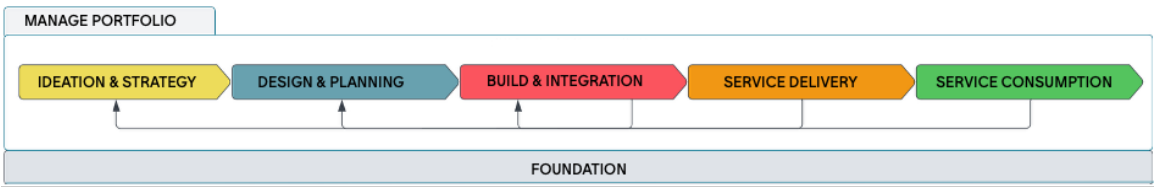
See CSDM terms.

Goal of CSDM

Following the CSDM data model helps you to accurately and completely capture the data objects that help you to run your business.

CSDM provides guidance on where to put data in the platform. Because there are multiple ways of identifying and using data, the CSDM guidelines help you to determine the best data structures for supporting your organization's services.

How tables in CSDM data domains support the service life cycle



1. When you first start working on an instance, your admins install and populate the CMDB data structures. The data is required to enable your platform features and capabilities. This kind of data is kept in tables that are considered foundational to all products on your instance. We therefore refer to this set of tables as forming the Foundation domain — it supports all of the other data domains.
2. You start with an idea — an idea that implements your business model. The idea or concept is saved in data that you work on in the tables of the *Ideation & Strategy* domain.
3. If your research determines that the idea has merit, you can decide to commit to it and move forward into designing and planning the idea. You might design the products to implement the idea internally or buy something to integrate into your organization's offerings. The supporting data lives in tables in the *Design & Planning* domain.
4. After the design is complete and acceptable, you can hand it off to the teams that will build or integrate the idea. Designers and developers build the software that implements the idea. The supporting data lives in tables in the *Build & Integration* domain. Information learned in this stage of the product life cycle is fed back into data in the domains that were involved earlier in the digital product's life cycle.
5. You can now release the idea. It's delivered from the infrastructure and management of the *Service Delivery* domain to the catalog of business offerings in the *Service*

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Consumption domain so that your customers can consume it. Customers can be internal or external. Again, information learned in these stages is fed back.

The Manage Portfolio domain is a layer on top of the CSDM conceptual model that interacts with the other CSDM domains. The typical user, a service owner, might be responsible for services in more than one domain.

Roles that create, maintain, and use the data

Note:
The Application Owner, Portfolio Manager (multiple), and Service Owner (multiple) might be the same persons.

Enterprise Architect and Application Owner

- Identify, enter, and maintain data in Business Application records
- Align enterprise applications to capabilities and business strategy
- Manage technology portfolio life cycle

Portfolio Manager and Service Owner

- Own the Service or digital product
- Create Services and service offerings
- Set the SLAs
- Is informed of outages
- Request catalog items to be created for the offerings

Service Desk, Incident Manager, and Change Manager

- Use the CIs and related service-related data to support and maintain services and CIs
- Support Service Operations
- Review and approve changes
- Maintain support processes

App Service Admin and Technical SMEs

- Support, manage, and operate the underpinning technology that services rely on
- Subject matter technical experts that create change requests with data from CMDB

CMDB Manager and CI Analysts

- Maintain the accuracy and integrity of the CMDB
- Work with various SMEs to certify that the data is accurate and aligned to the data model
- Create new CIs and own the SACM processes

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Benefits of the CSDM guidelines

Benefit	Value and associated features
Rationalization — Determine how well an enterprise application is performing	Identify insights from operational activities related to services (visualize aggregated information across all your services and supporting operations). Application Portfolio Management (APM) and IT Business Management (ITBM)
Outage reduction — Identify affected business services quickly	Prioritize critical events based on service-related information. IT Service Management (ITSM) and Event Management
Reporting — Consistent and reliable information about your services and digital products	Understand services, their makeups, and their accountabilities. IT Service Management (ITSM)
Alignment — Align business processes to reduce risk and assure compliance	Understand Service Health (availability, CSAT, Performance, Vulnerabilities, IPC stats) Governance, Risk, and Compliance (GRC)

Importance of CSDM to the ServiceNow AI Platform

Value across the enterprise — impact analysis, risk analysis, and business continuity

Product family	Benefits of a mature CMDB that follows the CSDM guidelines	Key metrics
ITSM	• Change management • True service-level reporting • Remove semantic disparity	• Reduced tickets • Reduced MTTR
ITOM	• Visibility across environments • System health and availability • Map issues to business processes for prioritization	• Avoided service outages • Reduced MTTR
ITAM	• Accurate license positions • Visibility across operational and financial data	• Reduced software license fines • Reduced failed audits

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Value across the enterprise — impact analysis, risk analysis, and business continuity (continued)

Product family	Benefits of a mature CMDB that follows the CSDM guidelines	Key metrics
Strategic Portfolio Management (SPM)	• Map resources to business processes • Services based on business context • Planning scope and impact of investment / divestment	Reduced business risk and outages from outdated technologies
SecOps	• Prioritization of vulnerabilities based on business criticality • Faster incident isolation and response • End-to-end risk visibility	Reduced time to remediate priority 1 vulnerabilities
DevOps	• Automated DevOps change management • Link between configuration changes and impacted CIs	Automated change
CSM	• Visibility across customer environment • Accurate response to incidents	Customer satisfaction
IRM (GRC)	• Ensures quality data used for audit • Healthy, trusted data is critical for audit scoping and activities	• Accurately identify audited entities • Reduced audit effort and time

CSDM Community

Join the ServiceNow CSDM Community to grow your CSDM expertise.

CSDM videos in the ServiceNow Community

Playlist of all CSDM videos

CSDM data domains

The CSDM is the data model that admins should follow when they set up ServiceNow products and applications. The standards for defining configuration items (CIs) and relationships between CIs in the CMDB helps to promote that your data resides in the appropriate CMDB tables. The result is maximum value from ServiceNow AI Platform applications.

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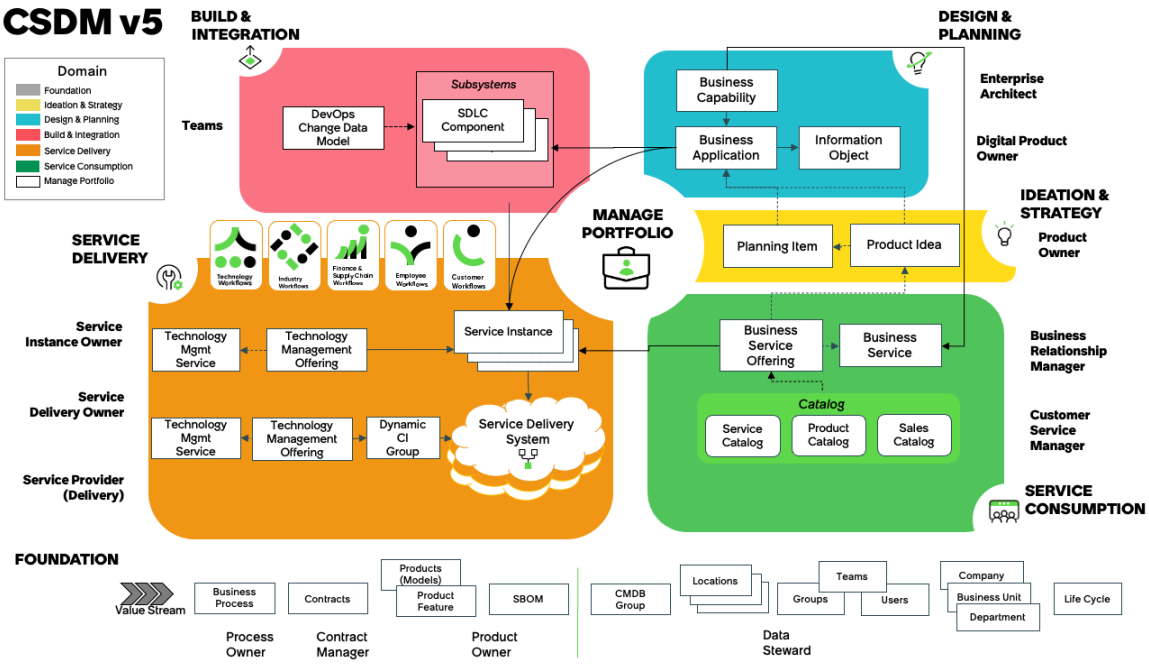
CSDM domains

As described in Exploring the CSDM model, each domain is associated with one or more products, services, or service types, each of which you can extend as needed. Every box in the diagram (except Catalog Item) represents tables that hold CIs in the CMDB. Each connecting line represents a relationship between CI classes. Roles and user types appear next to their area of responsibility.



Foundation domain

Tables in the Foundation domain contain base data that is referenced from or to objects in the other CSDM domains. Before you can use ServiceNow products, you must populate foundational data. For more information, see Foundation domain in the CSDM model

Ideation & Strategy domain

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The Ideation & Strategy domain represents the ideas, concepts, and considerations for both the creation of new or additional services as well as improvements and enhancements to existing services. These capabilities are part of Strategic Portfolio Management (SPM). For more information, see Ideation & Strategy domain in the CSDM model.

Design & Planning domain

Enterprise architects and digital product owners work on the design and planning of digital products that your organization can either buy or build. For more information, see Design & Planning domain in the CSDM model.

Build & Integration domain

Development teams use the tables in the Build & Integration domain during the build effort (systems development life cycle — Agile development) of digital products. The tables represent the logical development details of the enterprise applications (digital products) to be deployed and used by your organization. These are not operational CIs. For more information, see Build & Integration domain in the CSDM model.

Service Delivery domain

The Service Delivery domain represents the overall end-to-end service delivery system that includes the infrastructure, technologies, integration patterns (infrastructure, systems, data, processes, dependency models), service delivery networks, and operational models. Together, these items deliver the CSDM-conforming services to internal and external users and organizations. For more information, see Service Delivery domain in the CSDM model.

Service Consumption domain

Internal or external consumers can request business services through the request catalogs in the Service Consumption domain. The business service offerings in the request catalogs are the deployed digital products in the Service Delivery domain. Business relationship managers and customer service managers might sell or even consume elements of the Service Delivery domain. For more information, see Service Consumption domain in the CSDM model.

Manage Portfolio domain

The Manage Portfolio domain is a layer on top of the CSDM conceptual model that interacts with the other CSDM domains. The typical user, a service owner, might be responsible for services in more than one domain. For more information, see Manage Portfolio domain in the CSDM model.

Services and service types

A service enables you to achieve the outcomes that you want with minimal risks and without ownership of specific costs and risks. (This definition is consistent with the base definition of “service” in ITIL v3 and IT4IT.) Services typically have three components: the interaction, the offering, and the service system.

The ServiceNow AI Platform includes the following base-system service types that you can extend to align with the service types in your organization.

Technology management service [cmdb_ci_service_technical] table (formerly Technical service)

Technology management services are the systems associated with the admins of CIs in the Service Delivery domain. Service instance owners, Technology management service owners, and Technology service owners. Technology management services are typically lower-level leaf nodes of one or more business services or business service instances in a structured hierarchy.

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- Technology management services are operational CIs.
- A technology management service must be a one-level service and not a hierarchy of technology management services.
- Technology management services are used for impact in Incident Management, Problem Management, and Change Management. Also used for approvals for Change Management.
- Technology management services must be provider-focused and include the technology provided for the business to consume or sell.

For more information, see Manage Portfolio domain in the CSDM model.

Service Instances — Service Instance (called application service before CSDM v5) [cmdb_ci_service_auto] table

A service instance is a logical representation of a deployed application stack. Because service instances are logical in nature, they should use the Logical life-cycle value pairs. Service instances follow the same life-cycle guidance as any other logical CI.

- A service instance is an operational CI and a unique instance of an application.
- Used in Incident Management, Problem Management, and Change Management.
- Can be created for each region and each environment (Development, QA, and Production).
- Can be created via manual mapping, service mapping with entry point, and dynamic query.

For more information about leaf nodes and structured hierarchies, see Design & Planning domain in the CSDM model.

You can monitor service instances (called application service before CSDM v5) on the Application Services dashboard. For more information, see Use Application Services dashboard to monitor health.

Business services (cmdb_ci_service_business)

A business service is a service type that is published to business users. A business service typically implements one or more business capabilities.

Usually, business users order business services. Business users can select the desired offering and service commitment levels via the Service Catalog. For example, procurement, shipping, and finance.

- A business service is an operational CI.
- A business service must be a one-level service and not a hierarchy of business services.
- A business service can be used for impact in Incident Management, Problem Management, and Change Management and for approvals for Change.
- A business service must be focused on the consumer or seller.

For more information, see Service Consumption domain in the CSDM model.

CSDM videos in the ServiceNow Community

Playlist of all CSDM videos

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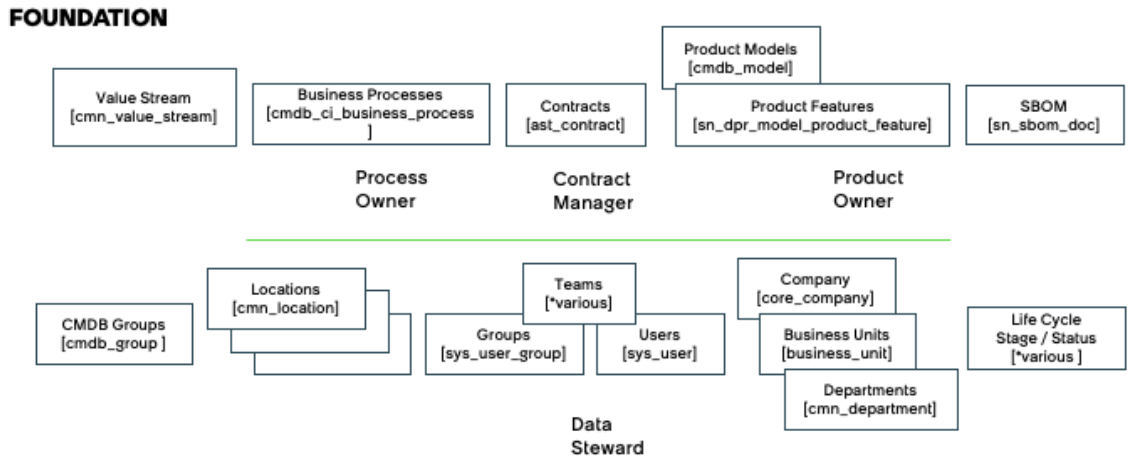
Foundation domain in the CSDM model

Tables in the Foundation domain contain base data that is referenced from or to objects in the other CSDM domains. Before you can use ServiceNow products, you must populate foundational data.

The tables in the Foundation domain aren't used in CMDB relationships. Instead, the tables contain critical referential data. Typical users of the domain are process owners, data stewards, product owners, and contract managers.



Note:
For an introductory walk-through of the tables and attributes that you should populate for any domain, see the videos listed in CSDM resources.

Foundation domain tables used during the service life cycle

Individual Foundation domain tables are accessed as needed during each phase of the service life cycle. Each topic that describes the life-cycle phase of a domain identifies the foundation tables that are active during that phase. See the following diagrams:

- Tables used during the Ideation & Strategy phase of the service life cycle
- Tables used during the Design & Planning phase of the service life cycle
- Tables used during the Build & Integration phase of the service life cycle
- Tables used during the Service Delivery phase of the service life cycle
- Tables used during the Service Consumption phase of the service life cycle

Data managed by the chief strategist: Value stream

Value stream: A value stream is the set of actions that take place to add value to a customer from the initial request through realization of value by the customer. The value stream begins with the initial concept, moves through various stages of development and on through delivery and support. A value stream begins and ends with a customer. The value stream is aligned with your organization's business processes.

Data managed by the process owner: Business processes

A business process has a well-defined start and finish. Examples of business processes in the banking industry are the customer onboarding process and the credit check process. Each business process can have levels of criticality and impact. Business processes are stored in the cmdb_ci_business_process table.

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In a parent-child relationship, business processes can be identified by using the parent attribute as a reference to a parent business process.

The business process is a manually-maintained CI that can identify declared and determined criticality as well as impact to confidentiality, integrity, and availability. Business processes can be reviewed monthly, quarterly, semi-annually, or annually. In addition, the next review date can be recorded. For further information, see Business process management and Create a business process.

Data managed by the contract manager: Contracts

A contract is a binding agreement between two parties. In the ServiceNow AI Platform, contracts contain detailed information such as the contract number, start and end dates, active status, terms and conditions statements, documents, renewal information, and financial terms.

- A contract is not a CI. Contracts use contract model types from the Product Models module. Contracts are stored in the [ast_contract] table.
- Use the Contract Management application to manage and track contracts. See Contract Management application.
- In the Service Level Management application, contracts group together SLAs that relate to a single vendor or customer, as well as the CIs, locations, groups, users, and child contracts that are related to the contract. For more information, see Define a service contract.
- Service contracts used by Vendor Management Workspace can support tangible/physical CIs as part of an SLA.
- In the Customer Service Management product, service contracts define the type of support that customers receive. A contract can include an account and contact or a consumer and the specific assets that are covered. A contract can also include multiple service entitlements and SLAs. See Define a service contract in Customer Service Management.

For more information, see Definitions of life-cycle values for document and contract entities.

Data managed by the product owner

Products and product models

Products might be bundled to create a collection or group of products, for example a FlashBlade server (hardware model), or a 24/7 support service (service model). Additionally, you can identify the products reaching end-of-life as defined by third-party providers or internal product owners. You can also bundle other products as components to represent the set of products that your organization develops, sells, or uses.

A product model is a specific version or configuration of a product used to manage and track applications on the ServiceNow AI Platform. The Product Model tables are not CIs. CIs reference Product Models using the **Model ID** attribute (available on all CMDB tables). For example, a Service Offering CI may reference a Service Offering Model, while a Windows Server may reference a Hardware Model.

Product models identify the product owner, team, product status, compatibility with other products, reference to product catalog, and reference objects in the various stages of a product's life cycle.

Product Models are recorded in the [cmdb_model] table through the following extended tables, known as product model classes.

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- Application Model [cmdb_application_product_model] (version-agnostic)
- Software Model [cmdb_software_product_model] (version-specific)
- Contract Model [cmdb_contract_product_model]
- Facility Model [cmdb_facility_product_model]
- Hardware Model [cmdb_hardware_product_model] (tangible/physical devices)
- Consumable Model [cmdb_consumable_product_model]
- Service Model [cmdb_service_product_model]

Application, service, and software class instance CIs aren't created through Discovery, so their **Model ID [model_id]** values might not refer to product model records. To help you to migrate to a product-centric management paradigm, each instance of a logical CI should be associated with a product model. For recommendations, see Auto-generate product models for logical CIs.

Product features

In digital product release, a feature (what you're developing toward) exists in a particular version of software or service.

Software bills of material (SBOMs)

An SBOM is the overall collection of components of a piece of software.

Cyclone DX is supported.

Data managed by the data steward

CMDB groups

A CMDB group is a collection of CIs (but is not, itself, a CI). A group is based on the results of saved Query Builder queries, encoded queries, or manual entries. You can apply an action to all members of a group at one time.

- You can work with a CMDB group across the ServiceNow AI Platform.
- For the CSDM, the Dynamic CI Group references a CMDB group to provide a list of CIs based on a common criteria.
- CMDB groups are stored in the Group [cmdb_group] table.
- The CMDB group can potentially replace the spreadsheets that you might be using to group your CIs.

For more information, see CMDB groups.

Locations

Data that comes from multiple sources and federated integrations is difficult to maintain. The following attributes have been added to the location [cmn_location] table to simplify management:

- **Source**: The origin of the location record.
- **Location type**: The position of the location record in the hierarchy of locations. You can use the following options to create a hierarchy of location data to suit your requirements: Region, County, State/Province, City, Site, Building/Structure, Floor, and Room.
- **Managed by group**: The group that governs or manages this location record.

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- **Validation** (duplicate and primary): Flag duplicate records and manually filter locations that are not be displayed.
- **Life cycle stage** and **Life cycle stage status**.

Life-cycle values

life-cycle value pairs track the life cycles for products, assets, contracts, CIs, locations, and other objects. Using the standard CSDM life-cycle values consistently helps you to effectively track objects through their transitions over time. Reporting can therefore accurately reflect the actual states of CIs: usage, availability, end of support, and so on.

When you enable the CSDM framework, you can start using the *`Life Cycle Stage`* and *`Life Cycle Stage Status`* values to track an asset's life cycle. To use the fields, follow the procedure described in Activate the CSDM plugin. The following processes can use the life-cycle value pairs:

- Life cycle of product entities
- Life cycle of tangible/physical CIs
- Life cycle of intangible/logical entities
- Life cycle of document and contract entities
- Life cycle of location entities

See the ServiceNow Community video: CSDM V4 product and life cycle discussion

Common data managed by the data steward

Common data is stored in the following tables:

- Company: [core_company]
- Business unit: [business_unit]
- Department: [cmn_department]
- Location: [cmn_location]
- Groups [sys_user_group] and users [sys_user]. When the full definition of a CI requires that you identify the contact groups that are associated with the CI, you can add that data in the **Teams** related list for the CI.

Common data elements are not configuration items. Common data is shared and used throughout the ServiceNow AI Platform. Common data includes organizational structure (Company, Business Unit, Department), locations, groups, and users. Many ServiceNow AI Platform products depend on common data to provide business value.

Planning your common data is essential to the effective implementation of ServiceNow AI Platform products and features. Consider the following issues:

- Do you have a trusted source for the data?
- Do you have multiple data sources?
- How often does the data change?
- Do you have the depth of data that the CIs require?
- Who maintains the data?

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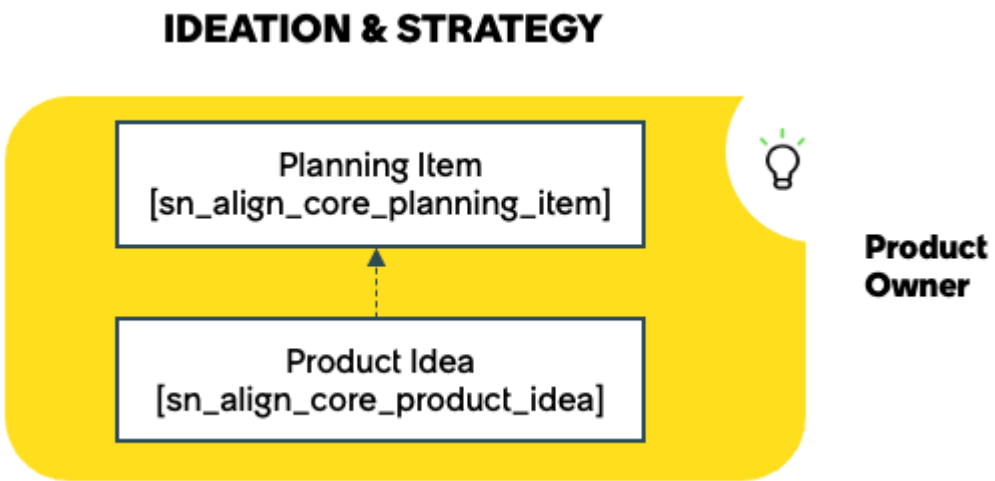
Ideation & Strategy domain in the CSDM model

The Ideation & Strategy domain represents the ideas, concepts, and considerations for both the creation of new or additional services as well as improvements and enhancements to existing services. These capabilities are part of Strategic Portfolio Management (SPM).

Tables used in the Ideation & Strategy domain

The Ideation & Strategy domain supports the efforts of product owners during the initial stages of working out the ideas for digital products.

- Planning Item [sn_align_core_planning_item] table: A planning item is a type of work item that planning organizations use to visualize planning data. The planning data supports enterprise-level planning, project-level planning, and portfolio planning.
- Product Idea [sn_align_core_product_idea] table: An idea for a complete product, feature, enhancement change proposal, or suggestion that can be curated and promoted into demand, project, epic, or story.



Note:
CIs in the Ideation & Strategy domain aren't operational, so you can't select them for Incident Management, Problem Management, or Change Management.

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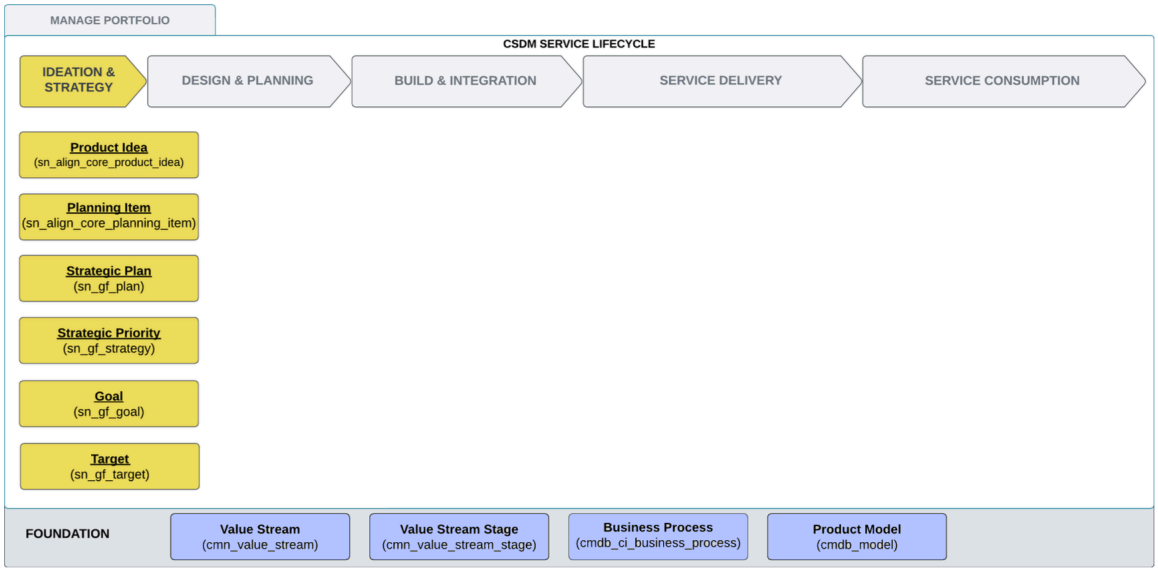
Tables used during the Ideation & Strategy phase of the service life cycle



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Design & Planning domain in the CSDM model

Enterprise architects and digital product owners work on the design and planning of digital products that your organization can either buy or build.

Tables in the Design & Planning domain

CIs in the Design & Planning domain aren't operational, so you can't select them for Incident Management, Problem Management, or Change Management.

The Design & Planning domain includes the tables used by Application Portfolio Management (APM). You use APM to rationalize and manage your business applications, but you're not required to use APM to benefit from the data in these tables. The Design & Planning domain includes the following tables:

- Business Capability [cmdb_ci_business_capability] table. Business Capability: A business capability is a high-level capability required by the organization to execute its business model. A business capability provides design guidance for implementing applications.
- Business Application [cmdb_ci_business_app] table. A business application is a purchased or internally-developed application that supports a business capability. A Business Application, ultimately, relates to an Application Service table and not any other type of Service Instance. For more information, see CI relationships in the CSDM.
- Information Object [cmdb_ci_information_object] table. An information object describes the type of data that is being interchanged between the business application and the database that serves it.

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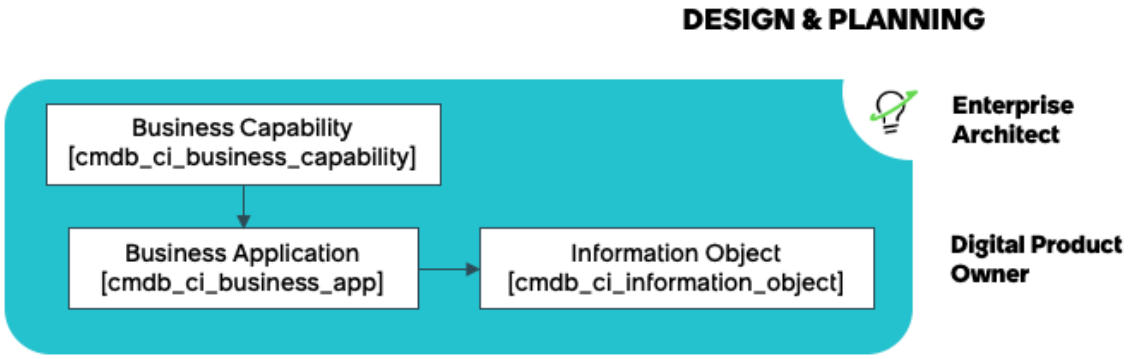
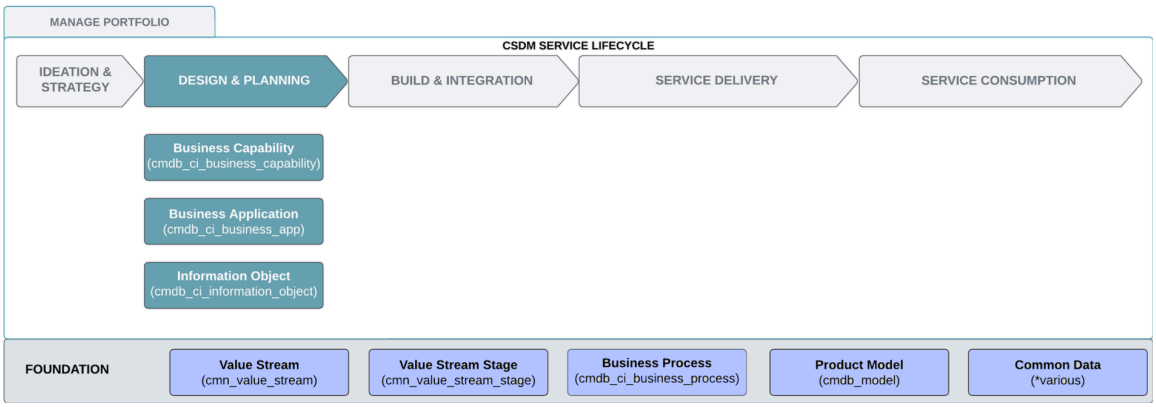


Note:
CIs in the Design & Planning domain aren't operational, so you can't select them for Incident Management, Problem Management, or Change Management.

Tables used during the Design & Planning phase of the service life cycle



Relationships between CIs that support decision making

An accurate service model that includes the following relationships can serve as the foundation for strategically aligned architectural decisions. The relationships enable you to determine the risks involved in using particular business capabilities. In addition, they enable you to assess services based on their relationships to business capabilities and business applications.

- Business capability *`Provided By::Provides`* Business application
- Business capability *`Provided By::Provides`* Business service (Service Consumption domain)
- Business application *`Uses::Used By`* Information object
- Business application (reference attribute) Business application
- Business application *`Contains::Contained By`* Agile development component (optional) (Build & Integration domain)
- Business application *`Consumes::Consumed By`* Service instance (Service Delivery domain)

Relationship between a business capability and its supporting business applications

This relationship supports visualization and reporting.

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- A business capability has the *Provided By::Provides* relationship with its supporting business applications

- A business capability is a high-level capability that supports a business model or fulfills a mission for your organization.

  A business capability typically describes a specific task that achieves one or more business outcomes. Business capabilities are often listed as verbs (for example, Manage HR, Manage financial data, or Provide IT support services). You can use business capabilities to rationalize and prioritize the cost of business applications and business services.

- A business application represents the software and infrastructure that provides a business function (for example, the titles catalog). Business applications are not strictly required, but they are strongly recommended because they increase productivity and perform other business functions such as accounts payables, accounts receivables, and general ledger. You can use APM to add any business application for which you must track costs, usage, business value, functionality, and risks.

Relationship between a business application and the service instances

A business application has *Consumes::Consumed By* relationships with service instances.

The relationship connects the record of the business application that is used in planning and design with where and how it's realized operationally, represented by service instances. The relationship accounts for each use of a business application in the development, test, and production environments (dev, test, and prod service instances). Often there are multiple production deployments. For example, a large retailer uses a business application that runs a cash register in each of its 1,000 stores. There are therefore 1,000 production instances of the service instance — one per store — for that one business application. See the "CSDM in a nutshell" video for additional discussion of the relationship.

Business capabilities represented in a hierarchy

You can represent business capabilities in a hierarchy of a parent business capability and one or more lower-level (child) capabilities. Child capabilities (leaf nodes) are represented by numeric values: 1.0 for the parent and 2.0 through 6.0 for the leaf nodes. If you add, update, or delete a capability at a leaf node, be sure to update the levels of all the capabilities for the leaf nodes in that hierarchy, as applicable. If a business capability hierarchy requires more than six levels, divide the structure into multiple business capabilities.

Use the Business Capability form to create, modify, and extend business capabilities.

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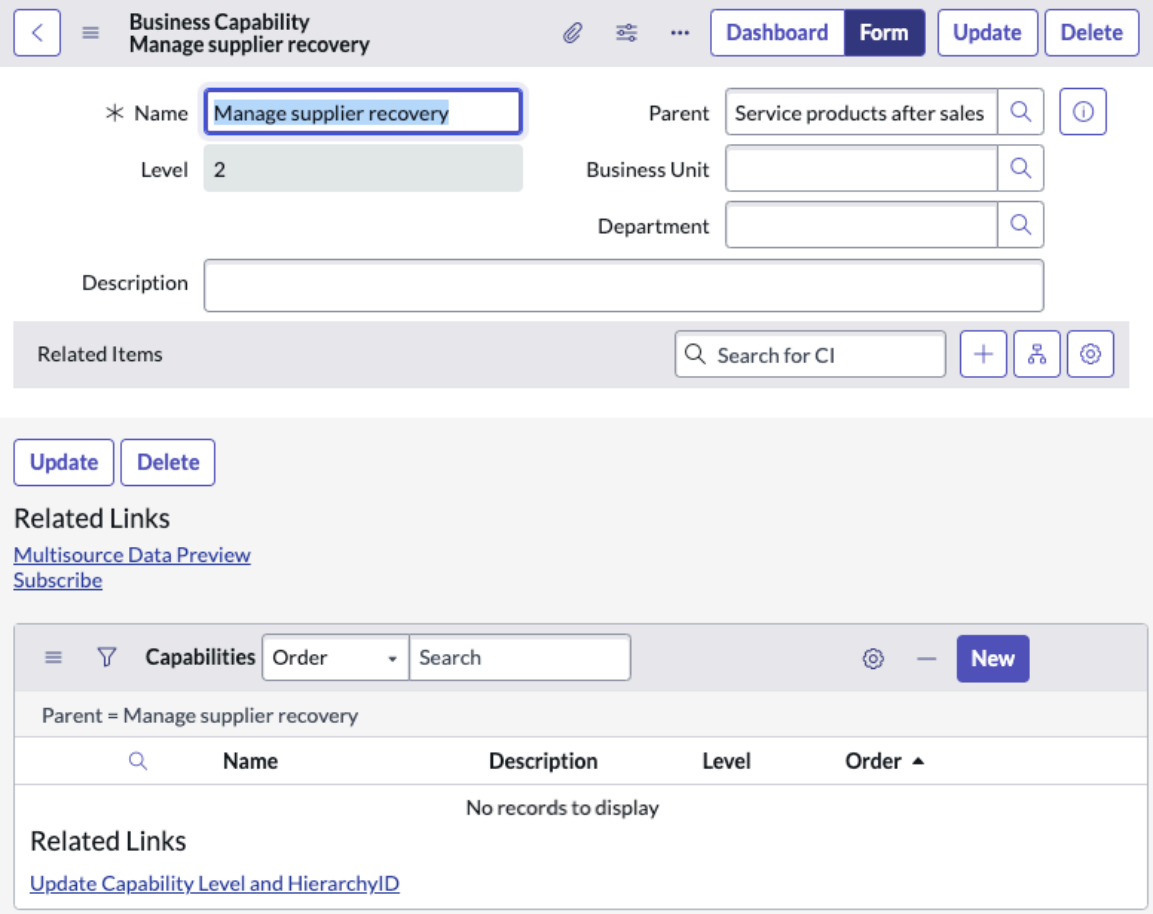

To update capabilities, select the **Update Capability Level and HierarchyID** related link. Follow these guidelines when you update capabilities to verify that the capability map reflects the change:

- If the parent capability is updated in the hierarchy, the levels of all its leaf node capabilities are recalculated.
- The total number of leaf node levels in a hierarchy can't exceed six.
- When adding a capability, the hierarchy level is automatically assigned based on the parent capability level.
- You can delete only leaf node-level capabilities or capabilities without leaf node levels.
- Don't create circular relationships. For instance, when creating a parent capability, a leaf node capability can't be its parent.

Adding a Business application

A business application is a manually managed CI class that has a Consumes :: Consumed By relationship with a service instance. You must therefore manually create required relationships to CIs (for example, with instances of the service instances in use). Creating relationships also enables you to relate business applications to infrastructure CIs such as databases and web servers. If needed, you can integrate or connect two or more business applications to establish their relationship.

A business application can span the following entities:

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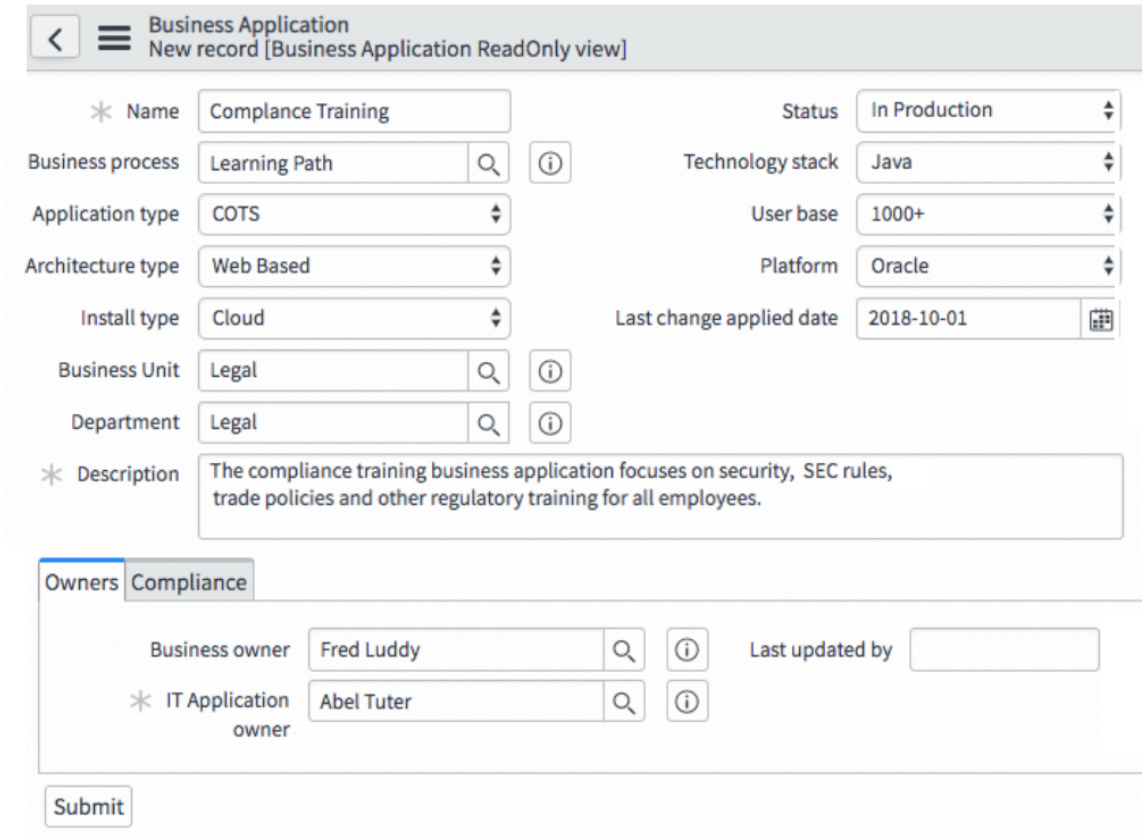
- Environments (for example, Development, Test, or Production).
- Geographies (for example, the Americas or the Asia Pacific Japan [APJ])
- Regions (for example, Europe, the Middle East, and Africa [EMEA]).

Use either of the following methods to add a business application:

- Import the list of applications from a spreadsheet or third-party tool. To import data, define a data source and a transform map and then run or schedule an import.
- Use the Business Application form.



Information object

- An information object is a CI that displays and describes the information (or type of data) that the application receives from the database. Information objects are part of the information portfolio and are referenced by the business application. An information object has a *Used By::Uses* with a business application.
- Information objects are mapped to the information object [cmdb_ci_information_object] table.
- You can use the information object table to identify the types of data that a business application uses, including highly sensitive data such as:
  - Personally Identifiable Information (PII)
  - Payment Card Industry Data Security Standard (PCI DSS) data
  - Health Insurance Portability and Accountability Act (HIPAA) data

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Related topics

CI relationships in the CMDB

Build & Integration domain in the CSDM model

Development teams use the tables in the Build & Integration domain during the build effort (systems development life cycle — Agile development) of digital products. The tables represent the logical development details of the enterprise applications (digital products) to be deployed and used by your organization. These are not operational CIs.

Tables and relationships in the Build & Integration domain

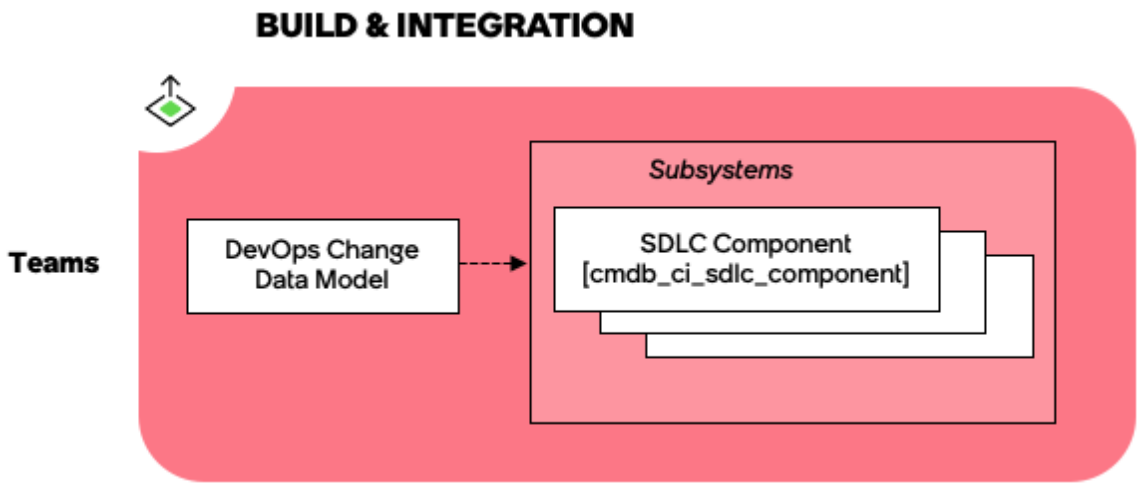
An Agile development component is a CI that represents a unique development effort of code. It represents parts of a larger business application or digital product broken down into its individually developed components. In other words, the Agile development component is a software element of a larger application or technology. Agile development component CI records in the Agile development Component [cmdb_ci_sdlc_component] table enable the DevOps product to provide enhanced capabilities for visualizing and managing your application development pipeline.

Records in the table are not operational and are not direct targets of the ITSM Incident Management, Problem Management, or Change Management processes. You therefore are not required to configure SDLC component records. The SDLC Component table is available through the CMDB schema version 1.33.

The DevOps Change Data Model is built on a powerful data model that connects your DevOps tool chain to the work and data already in the platform. The model provides the ability to accelerate changes while ensuring effective and transparent risk management.

The Build & Integration domain includes the following tables and relationships:

- Business application (Service Consumption domain) *`Contains::Contained By`* SDLC component
- SDLC component has a *`Contains::Contained By`* relationship with the Service instance table in the Service Delivery domain.



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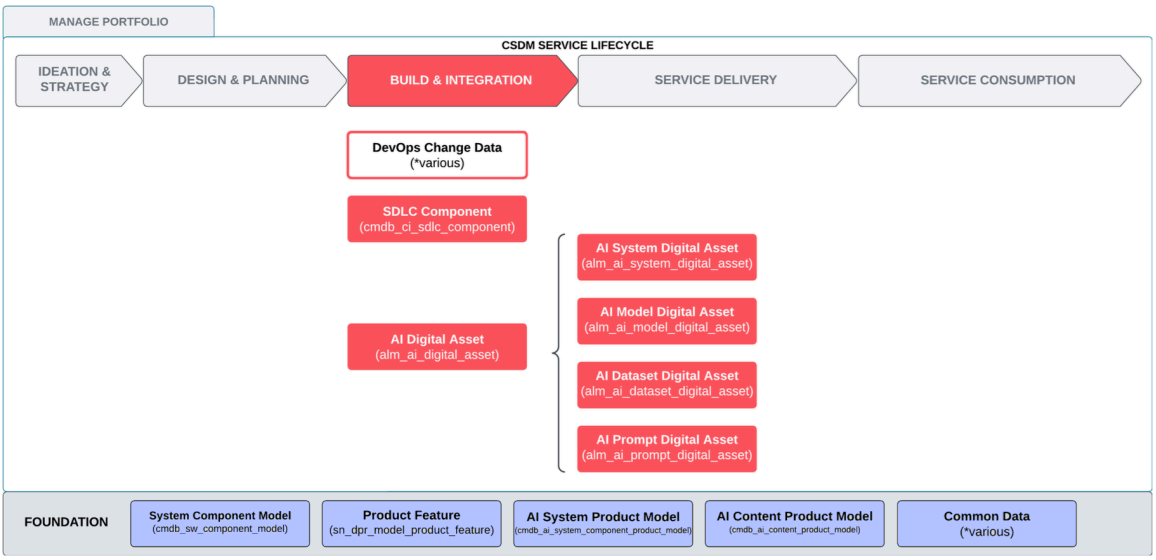
Tables used during the Build & Integration phase of the service life cycle

The AI System Digital Asset represents the Software/ Application components for AI and Gen AI services. For the purposes of build, integration, and AI governance, the AI System Digital Asset (ServiceNow asset, third-party asset, or custom asset) represents the deployable software source, binaries, and components that feed into the Build & Integration pipelines. An asset can be deployed or not currently deployed.



Types of SDLC component

- Application: A service instance is a deployed instance of the SDLC application component. Examples include micro services and APIs. The build team typically builds service instances on behalf of the Service Owner (as described in Manage Portfolio domain in the CSDM model).

  See Use Application Services dashboard to monitor health.

- Infrastructure: Any infrastructure CI that represents a snapshot of its configuration details is a deployed instance of the SDLC infrastructure component. Examples include database and security configurations.

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Service Delivery domain in the CSDM model

The Service Delivery domain represents the overall end-to-end service delivery system that includes the infrastructure, technologies, integration patterns (infrastructure, systems, data, processes, dependency models), service delivery networks, and operational models. Together, these items deliver the CSDM-conforming services to internal and external users and organizations.

Tables in the Service Delivery domain

Users of tables in the Service Delivery domain provide and manage the operational environments and infrastructure that support your organization's business applications (as developed in the Build & Integration domain). Typical users are service instance owners (for application and platform) and service delivery owners or service providers (for infrastructure and delivery).

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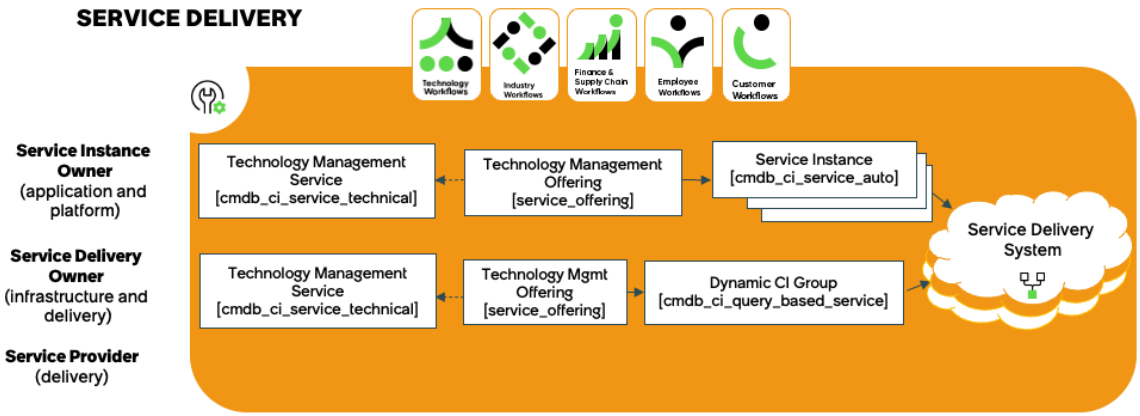
The tables in the Service Delivery domain represent the technology that your business sells or consumes in the provider view. Service Mapping and Discovery populate the tables. The tables in the domain also enable you to manage CIs and their relationships. The domain includes the following tables:

- Technology management service (formerly Technical service) [cmdb_ci_service_technical] table. The **Service Classification** is Technical Service.
- Technology management offering (formerly Technical service offering) [service_offering] table. The **Service Classification** is Technical Service.
- Request catalog. Technology consumers can request technology management offerings through a request catalog. Catalogs are described in detail in Service Catalog.
- Dynamic CI group [cmdb_ci_query_based_service] table. **Service Classification** is Technical Service. Technology management services in Event Management use the cmdb_ci_query_based_service table.
- Service instance (called application service before CSDM v5) [cmdb_ci_service_auto] tables. The **Service Classification** is Application Service.
  - For manually-created and Service Mapping: Mapped Application Service [cmdb_ci_service_discovered] table (included in the base system).
  - When query-based: [cmdb_ci_query_based_service].
  - When tag-based: [cmdb_ci_service_by_tags].

The CIs in this domain are deployed instances of digital products and their related and discoverable components (such as installed applications, servers, and network components) plus documentation of the services that provide and support the deployed instances. The domain also represents the portfolio of technology management services in use. For more information on life cycles, see Definitions of life-cycle values for tangible/physical CIs.

The services are operational, which means that you can select them for ITSM Incident Management, Problem Management, or Change Management.



Relationships between Service Delivery tables

- SDLC component *Contains::Contained by* Service instance (optional to use this item).
- Business application *Consumes::Consumed* by Service instance.
- Service instance (a logical representation of a deployed system or application stack)*Depends on::Used by*/*Sends Data To::* Service instance.
- Service instance *Depends on::Used by* Application.
- Application *Runs on::Runs* Infrastructure CIs.

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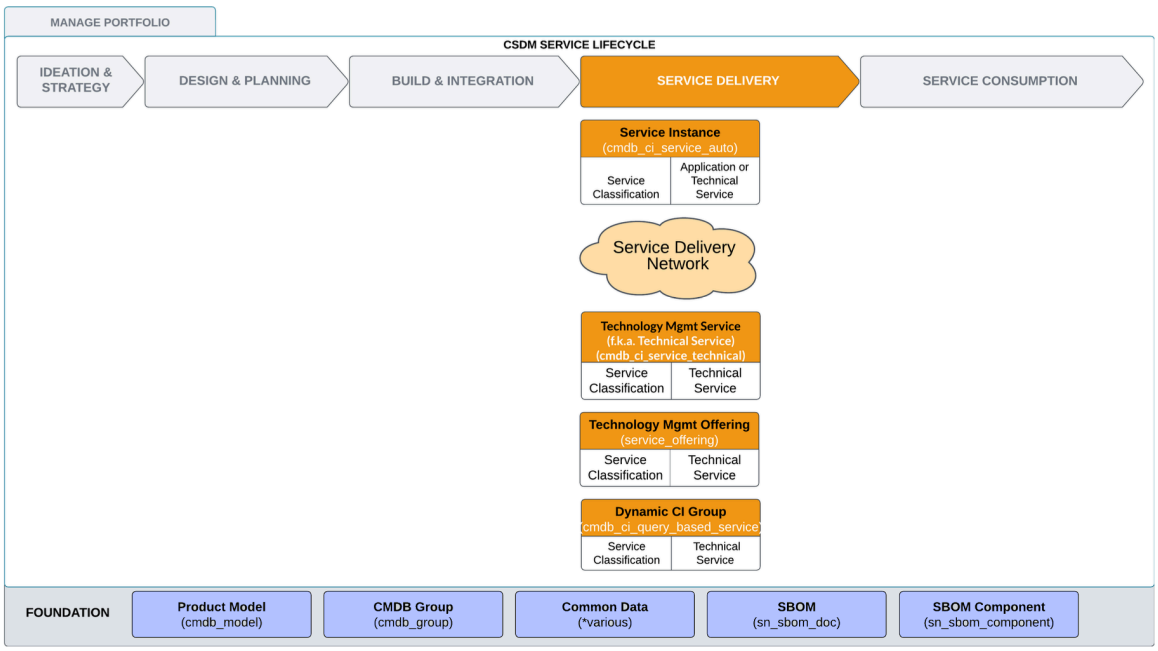
- Technology management service uses a reference attribute to specify the relationship with Infrastructure Technology management offering. Published to service owners and typically underpins one or more business services. A Technology management service may have an operational view made up of one or more Technology management offerings.
- Technology management offering *Contains::Contained by* Service instance. Stratification of the Technical Service into options, including localization/geography, environment, pricing, availability, capability, support group (INCIDENT), technical approval group (CHANGE) and packaging options.
- Technology management offering *Contains::Contained by* Dynamic CI Group.
- Dynamic CI Group (a dynamic grouping of CIs, based on results of CMDB Groups queries) uses a related list to specify the relationship with Infrastructure CIs.
- Business Service Offering *Depends on::Used by* Service instance.

Note:
Business services and technology management services connect to the spm_service_portfolio through the spm_taxonomy_node. See Service Portfolio Management taxonomy.

Tables used during the Service Delivery phase of the service life cycle



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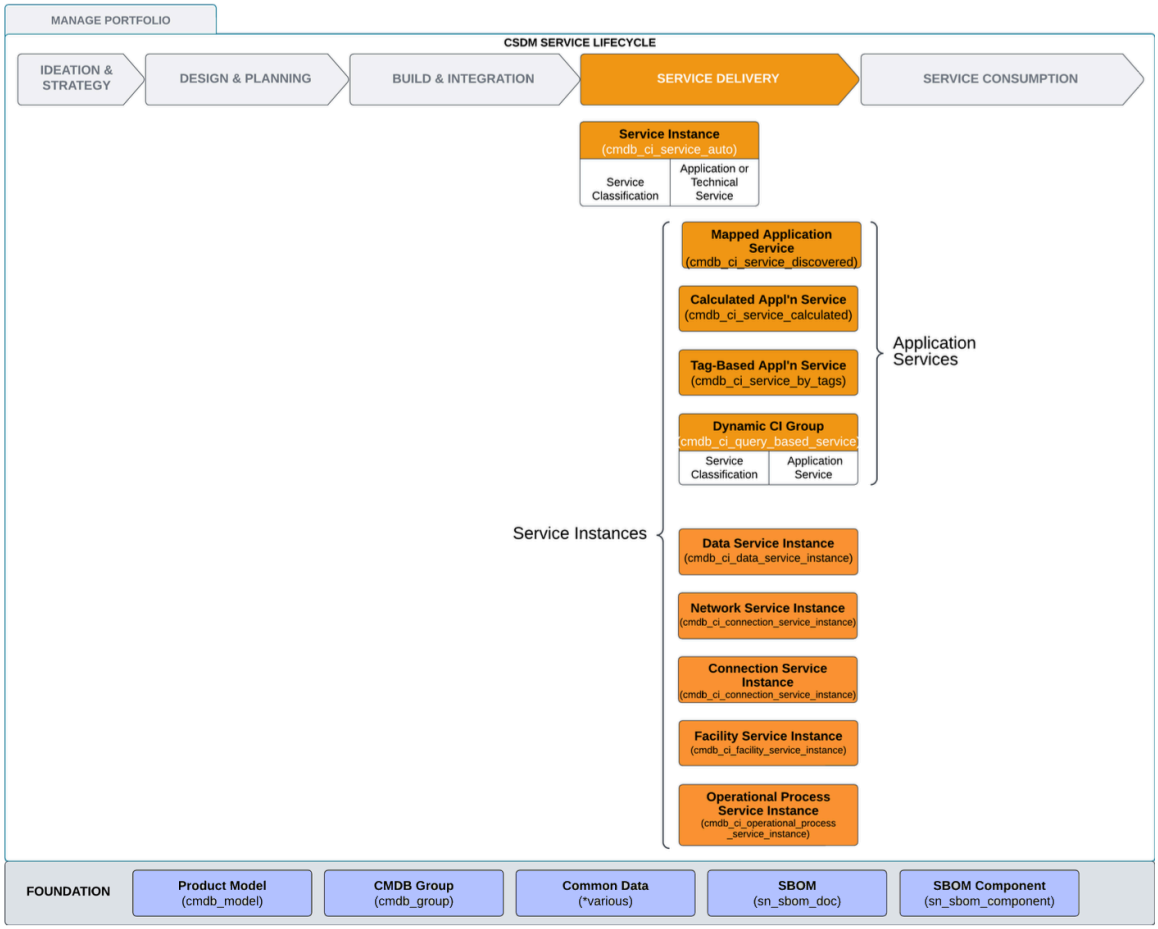
Tables used during the Service Delivery phase of the service life cycle



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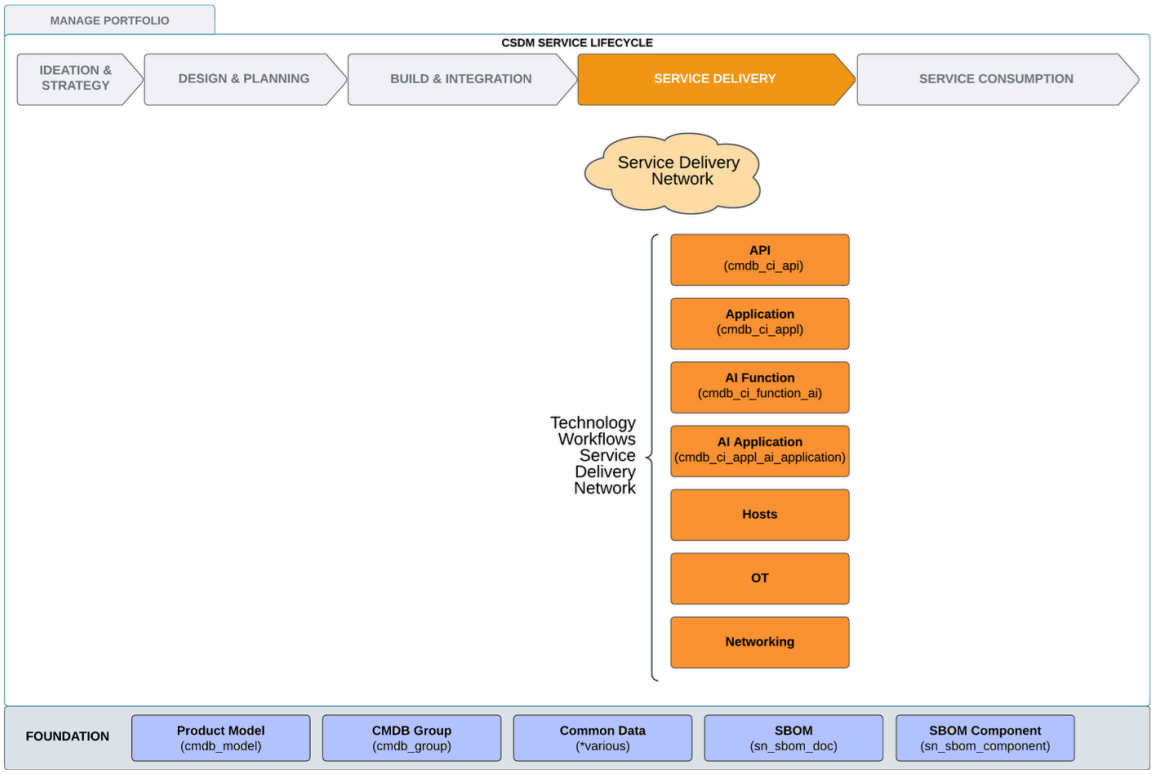
AI component tables used during the Service Delivery phase of the service life cycle



API: The API data model is made available within the CMDB to assist in managing your API data. As part of API Insights, you can centralize your management of APIs including, but not limited to, viewing API details, comparing APIs, identify and resolve data gaps, and manage service relationships. API Function: from a virtual perspective. API Application: From an on-premises perspective.

AI Function: AI SaaS applications deployed on public cloud platforms that offer scalable, on-demand services for machine learning, data processing, and AI-driven tasks. The applications provide flexible solutions without the need for on-premises infrastructure management.

AI Application: AI software applications that can run on various platforms such as Linux, Windows, Docker containers, or Kubernetes (K8) clusters. The platforms support diverse AI workloads, including machine learning models, data analytics, and intelligent services or AI-enabled applications.

Technology management services

Technology management services are associated with service owners and are typically layered under one or more business services or service instances. A technology management service may have one or more technology management offerings.

Users of technology management services can view and manage the technologies that you provide to the business. Event Management enables you to monitor service performance. You can also use Event Management to identify health issues for related infrastructure CIs and service instances.

Technology management services can be managed as part of the Service Portfolio in the Service Consumption domain (that is, a Service Portfolio hierarchy can be referenced from a technology management service). This allows for a more complete hierarchy and management of both technology management services and business services within the Service Portfolio

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Management workspace and related workspaces. You can make better decisions when you know how spend on technology management services can improve performance and reliability of your business services.

Note:
Business services and technology management services connect to the spm_service_portfolio through the spm_taxonomy_node. See Service Portfolio Management taxonomy.

Technology management offerings

Technology consumers can request technology management offerings (TMO) through the request catalog. Catalogs are described in Service Catalog. The consumer can typically select the following features and options:

- Level of performance
- Location or geography
- Environment
- Pricing
- Availability
- Capability
- Support group (for incident)
- Technical approval group (for change)
- Packaging options (commitments)

Tip:
Use dynamic CI groups to significantly improve management. For more information, see Synchronize user groups for a technology management offering.

Technology management offerings typically have the following components:

One or more service commitments

A service commitment defines the service delivery obligations agreed to between the consumer and the provider. Service commitments uniquely define the level of service in terms of availability, criticality, scope, pricing, and other factors. For example, an organization may offer two levels of support for a service instance:

- Support for a production-level offering: Provides a high level of availability and criticality for production instances. Includes a 24/7, 5-minute response time guarantee (24 hours per day seven days per week).
- Support for a non-production-level offering: Limited availability and criticality for non-production instances. Includes a 60-minute response time guarantee between 8:00 a.m. and 5:00 p.m., Monday through Friday.

A service offering subscription that records which users have access to an offering

A technology management offering references the **Service Categorization** attribute in service tables to denote whether a technology management offering or offering is related to a business service or to a technology management service. Technology management offerings that are mapped to the [service_offering] table are classified as “technology management service" and are derived from the service. The technology management offering is based on how the parent serves a specific

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technical need. Every technology management service should have at least one technology management offering.

> **Important:**
> Each CI associated through a Dynamic CI Group can be related to only one technology management service or technology management offering. Conflicts can result when one service includes multiple offerings with different SLAs, OLAs, Support Groups, and commitments.

Dynamic CI groups

A dynamic CI group is comprised of CIs that result from a CMDB Groups query. For example, you can create a dynamic CI group based on location: "all web servers in Detroit" or "all Oracle databases in Mumbai".

> **Note:**
> Dynamic CI groups contain only CIs and can't contain other CI groups.

Dynamic CI groups are mapped to the [cmdb_ci_query_based_service] table and are classified as either service instance or technology management service, as applicable. You might want to use dynamic CI groups in the following situations:

Query-based service instance

You don’t have Service Mapping enabled yet, but you have 12 servers and three database instances in MyAppServiceProd. You can replace your spreadsheets with a dynamic CI group as a service instance.

See Use the Dynamic CI Group method to populate application services.

Managed group of Infrastructure CIs

The web servers in Detroit are managed by the DetroitRockCity technology management offering. Instead of manually creating relationships from technology management offerings to Infrastructure CIs, use a dynamic CI group. A single relationship from your technology management offering CI (DetroitRockCity) to your dynamic CI Group (web servers in Detroit) gives you the visibility you need.

A way to manage patches for your CIs

In Change Management, you can select the dynamic CI group for the CIs that you must update and use a business rule to auto-populate the **Affected CI** field.

Service instances (called application services before CSDM v5)

Service instance a relabel of [cmdb_ci_service_auto], which previously was called application service.

Application services still exist. They were there as extended tables depending on how you managed that application service.

For manual creation or service mapping, you go into the mapped application service.

For tag-based, it would live in the tag-based application service table. The tables still exist and they are still application services and you're still gonna go to the application service wizard to create application services.

New types of service instances are extensions of [cmdb_ci_service_auto]:

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- Data service instance [cmdb_ci_data_service_instance]
- Network service instance [cmdb_ci_network_service_instance]
- Operational Process service instance [cmdb_ci_operational_process_service_instance]
- Connection service instance [cmdb_ci_connection_service_instance]
- Facility service instance [cmdb_ci_facility_service_instance]

The Service Instance (called application service before CSDM v5) [cmdb_ci_service_auto] table supports service instances. A service instance is a set of interconnected applications and hosts that are configured to offer a service. A service instance is a logical representation of a deployed system or an application stack. Using service instances, you can view maps and change history for services. For example, the Event Management application can monitor service performance and identify health issues for service instances.

Service instances can be internal, like an organization's email system or customer-facing, like an organization's website. For example, creating financial reports through a web-based application requires a computer, web server, application server, databases, middleware, and network infrastructure. The applications and hosts are configured to offer the service of financial reporting. A service instance represents an instance of such a business application or system in the development, test, or production environment.

Service instances are the entry points for the Service Mapping feature. Service instances underpin a business or technology management service and are mapped to the CMDB Service Instance (called application service before CSDM v5) [cmdb_ci_service_auto] table for common reporting.

Service instances are key relationship entities for IT Service Management (ITSM), IT Operations Management (ITOM), Strategic Portfolio Management (SPM), and Customer Service Management (CSM).

Service instances include relationships between business applications, business services, technology management services, applications, and infrastructure CIs. You can expose a service instance by using the related business or technology management offering. For more information, see Use Application Services dashboard to monitor health.

Types of service instance in the Service Instance data model:

- Data service instance
- Network service instance
- Operational Process service instance
- Connection service instance
- Facility service instance

The table that a service instance maps to depends on the method used to create it:

Methods mapped to tables

Method used to create the service instance	Mapped to table
Top Down Discovery (Service Mapping)	cmdb_ci_service_discovered
Dynamic CI Group (Query-based)	cmdb_ci_query_based_service
Tags	cmdb_ci_service_tags

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Methods mapped to tables (continued)

Method used to create the service instance	Mapped to table
Manual entry, using the Create a Service Instance form (formerly, the Create an Application Service form)	cmdb_ci_service_discovered

- For more information about service instances and the methods you can use to create them, see Application services and Create an application service.
- You can specify required attributes for service instances. For more information, see Modify the attributes and relationships required for application services.
- You can set a relationship between a service instance and the components of other CSDM domains. See Service Mapping.

Applications

An application is any program or module that defines behavior and performs a specific function. Applications are typically discoverable instances and provide a specific set of functions for one or more services.

- The application table and extended tables contain uniquely discovered instances of code in use on the host.
- Applications are considered infrastructure CIs.
- The instance is limited to the applications on a single host. This limitation ensures that applications are uniquely identified during discovery.
- There's a one-to-many (and not a one-to-one) relationship between the application and the service instance. A single installed application, such as a database instance, may support multiple service instances depending on the configuration and the use of the applications.

Note:
The application table [cmdb_ci_appl] isn't an inventory or portfolio of your applications. Don't make the mistake of storing managed application details in the application table. Those details (inventory or application portfolio objects) belong in the business application table (as documented in Design & Planning domain in the CSDM model).

Infrastructure CIs

Infrastructure CIs are managed physical and logical components. A CI can be a single module, such as a server, database, or a router or a complete system such as a web server, database, or infrastructure.

The underlying infrastructure components or CIs can be complicated. The complexity increases as data structures are layered on top of physical CIs. For that reason, you should work with a business relationship manager or enterprise architect to define your business capabilities and business applications.

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Related topics

Synchronize user groups for a technology management offering

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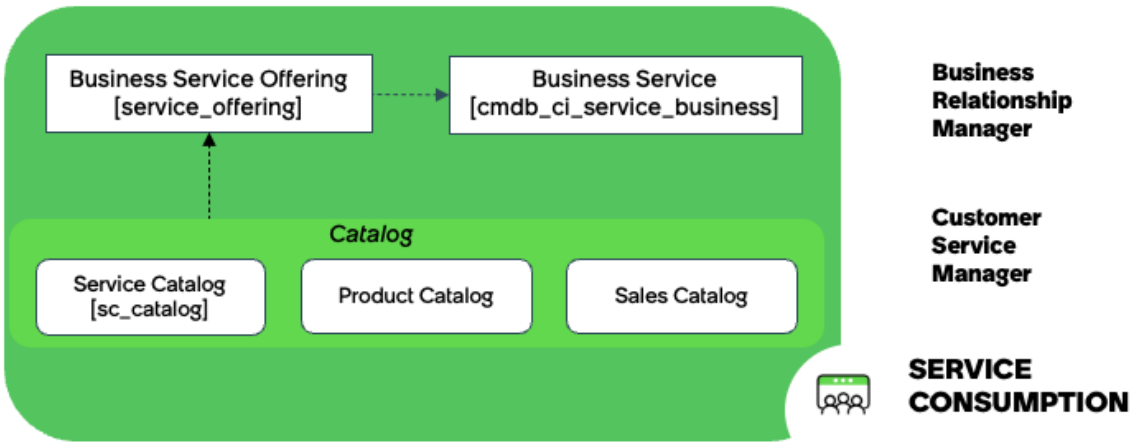
Service Consumption domain in the CSDM model

Internal or external consumers can request business services through the request catalogs in the Service Consumption domain. The business service offerings in the request catalogs are the deployed digital products in the Service Delivery domain. Business relationship managers and customer service managers might sell or even consume elements of the Service Delivery domain.

Tables in the Service Consumption domain

Tables in the Service Consumption domain are used by Service Portfolio Management and Customer Service Management (CSM). You can select the tables in the Service Consumption domain to use with Incident Management and Change Management.



The Service Consumption domain includes the following tables:

- The Business Service [cmdb_ci_service_business] table (**Service Classification** is Business Service) extends the core Service [cmdb_ci_service] table. For example, a service might be "Manage HR".

  Note:
  Before the Business Service table was added, all Business Services existed in the Service table. In the future, all Business Services might migrate from core cmdb_ci_service to cmdb_ci_service_business. Until then, both tables operate identically.

- The Business Service offering [service_offering] table holds the offerings that consumers can select in the catalog. Taken together, the business service offerings make up the business service. In the HR example, offerings might be "Manage Onboarding" and "Manage Interviews". Each offering has a *Depends on::Used by* relationship with a service instance in the Service Delivery domain.
- Service Catalog [sc_catalog] table. The Service Catalog tables hold the business service offerings that consumers can select.

- Business capability *Provided By::Provides* Business service
- Service portfolio (reference attribute) Business service
- Business service (reference attribute) Business service offering
- Business service offering *Depends on::Used by* Service instance

You're not required to use Service Portfolio Management or CSM to use the referenced tables, but those products enable you to manage workflows and report service-related data.

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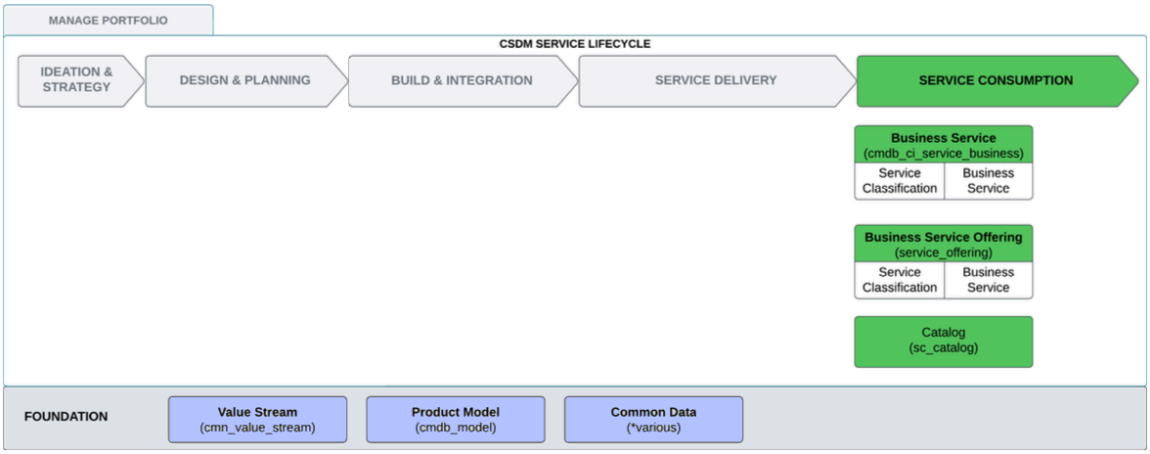
Tables used during the Service Consumption phase of the service life cycle



Business service offerings

Business service offerings (**Service Classification** is Business Service) are the starting point for configuring Service Portfolio Management. Business service offerings inherit from Business Services. Business service offerings consist of one or more service commitments that define the level of service in terms of availability, scope, pricing, and other factors. For example, an organization might offer two levels of desktop support:

- A silver offering of upgrades and virus protection.
- A gold offering with the silver commitments plus a response time guarantee of 30 minutes between the hours of 8:00 a.m. and 5:00 p.m., Monday through Friday.

Note:
Business services and technology management services connect to the spm_service_portfolio through the spm_taxonomy_node. See Service Portfolio Management taxonomy.

Business service offerings have the following characteristics:

- Business service offerings tailor the service by capability, availability, pricing, and packaging options. You can use the service offering to set different levels of performance and features for a particular service.
- Business service offering commitments define the agreed-on service delivery obligations.
- Business service offering subscriptions record which users have access to an offering.
- Business service offerings are the CMDB records that identify the specific business area and the entity where the service is delivered. Some business services and service offerings depend on the service instance.
- Business service offerings are derived from the service and are refined depending on how the parent serves a particular business need.

Note:
You should configure at least one business service offering for each operational business service or technology management service.

You can view your business service offerings in the Digital Portfolio Management (DPM).

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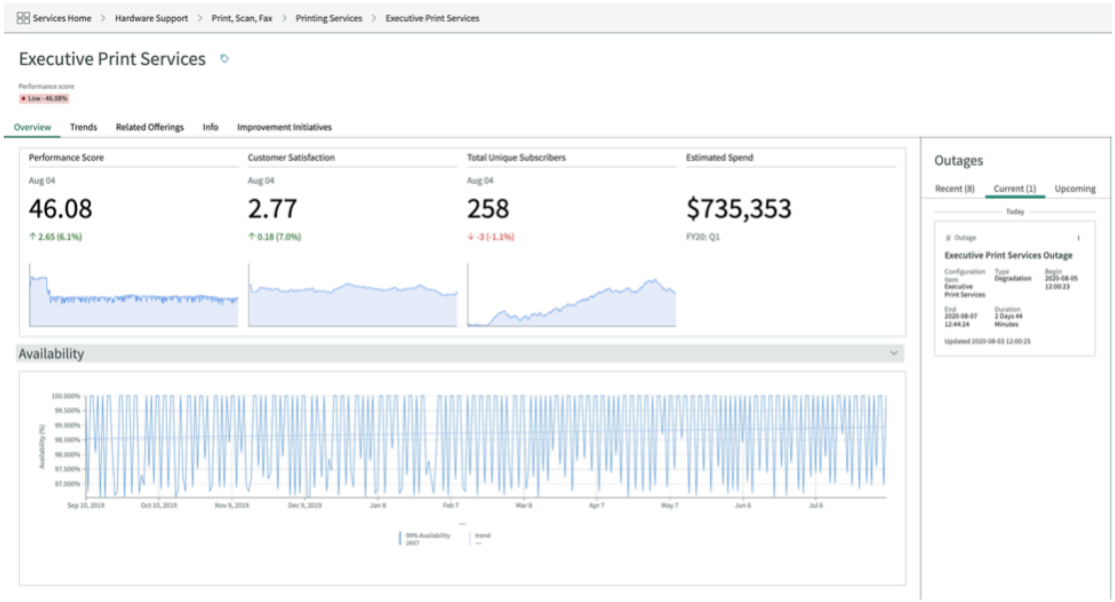

Business service offerings typically have different service-level agreements (SLAs) depending on their commitments. Without a business service offering, SLAs remain at a process level only. For example, the SLA stays at a P1 incident or a minor change, and doesn't refer to the affected business service offering.

You can represent business services and business service offerings as catalog items in the service catalog to make them available for consumers.

Business services

A business service is associated with business users and is typically layered beneath one or more business capabilities. A business service can contain one or more business service offerings.

Business consumers can use the request catalog to order business services, business service offerings, and service commitment levels. Catalogs are described in detail in Service Catalog. Business services are mapped to the cmdb_ci_service_business table and are classified as “business services.”

Service portfolios

A service portfolio is a hierarchical collection of business services, products, projects, or applications. A portfolio can represent a strategic business objective and enables you to manage all included items as a group (for example, life cycles). Items are organized into the following categories:

- Objective (business intent)
- Capability
- Organization (for example, enterprise resource planning [ERP] or financial management)
- Geography (location)

Catalogs

A request catalog enables consumers to order and manage business and technical products, services, service commitment options, and offerings (for example, the Human Resources [HR] service catalog). Catalogs contain catalog items and are the starting point for consumers to access available services. Catalogs are described in Service Catalog.

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Catalog Item

A catalog item is an item or a service that a consumer can request from the catalog. A service can contain multiple catalog items (for example, the employee onboarding catalog). Catalog items are listed on the service portal and are available to the users that need them (either through subscription or job responsibility). Each catalog item is linked to one business service offering.

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Manage Portfolio domain in the CSDM model

The Manage Portfolio domain is a layer on top of the CSDM conceptual model that interacts with the other CSDM domains. The typical user, a service owner, might be responsible for services in more than one domain.

For example, in the Service Consumption domain, the service owner for Human Resources (HR) might be financially responsible for the business application that provides HR services. The service owner might also manage the HR application instances (known as service instances or systems) and might also be accountable for the impact the application has on the business.

Because of these additional responsibilities, CSDM enables service owners to oversee business applications and their deployed instances. This visibility enables service owners to perform their duties and meet their responsibilities.

CSDM videos in the ServiceNow Community

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Configuring CSDM

Activate and configure CSDM capabilities.

Configuration overview

Activate the CSDM plugin

Activate the CSDM plugin so you can begin implementing the CSDM data model.

Before you begin

Important:
Before you activate the CSDM plugin, you must map your existing life-cycle data to standard CSDM attributes. The mapping enables you to track assets effectively through their life cycle transitions with the CMDB Data Manager. For instructions, see Migrate to CSDM life cycle standards.

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- Role required: itil and itil_admin

Procedure

Activate the *com.snc.cmdb.csdm.activation* plugin as described in Activate a plugin.

Configure the CSDM Data Foundations dashboard

Use the CSDM Data Foundations dashboard to monitor and evaluate key foundational metrics of the CSDM framework.

Before you begin

For an introduction to the dashboard, see CSDM Data Foundations dashboard.

- Before you use the dashboard for the first time, populate the CSDM metrics: Navigate to **All** > **System Scheduler** > **Scheduled Jobs** and run the *CSDM Get Well Metric Collection* job.
- The CSDM Data Foundations dashboard adds the following scheduled jobs that must be running:
  - *CSDM Get Well Metric Collection*: Calculates and stores details for compliant CIs associated with metrics. Data appears on the dashboard only after the first run of this scheduled job. metrics' scores are stored in the CSDM Data Foundations Metric Scores [sn_getwell_csdm_score] table. The job runs daily by default.
  - *CSDM Data Foundations PA Metric Collection*: Calculates the total count of non-compliant CIs that are associated with each metric. It also provides trending data over time for the non-compliant CIs associated with metrics.
  - *CMDB Get Well CIs Processed Via IRE Metric Batch Collection*: Invoked once a day (by default) by the *CMDB Get Well Metric Collection* job. Repeatedly executes a 10-minute run/one-minute pause cycle to process as many batch files as possible.
- Role required: app_service_admin, app_service_user, asset, cmdb_read, itil_admin, portfolio_admin, service_viewer, or technology_service_owner

Procedure

1. Navigate to **All** > **CSDM** > **Configuration** > **CSDM Data Foundations Dashboard**.
2. Select a tab.

   The reports on each tab display the data metrics that are appropriate for the maturity of your organization's CSDM implementation stage (foundation, crawl, walk, run, and fly).

3. Review the reports.

   Note the percentages and color-coding in the **Result** column for each metric.

   - If the percentage is 100%, the CSDM framework has the information it needs. No action is needed.
   - Otherwise, required information is missing and additional actions are required. Continue with step 5.

   Note the metrics on the **Foundation** tab:

   Named Product Models with Product Owners

   Shows cmdb_model records that meet the following conditions:

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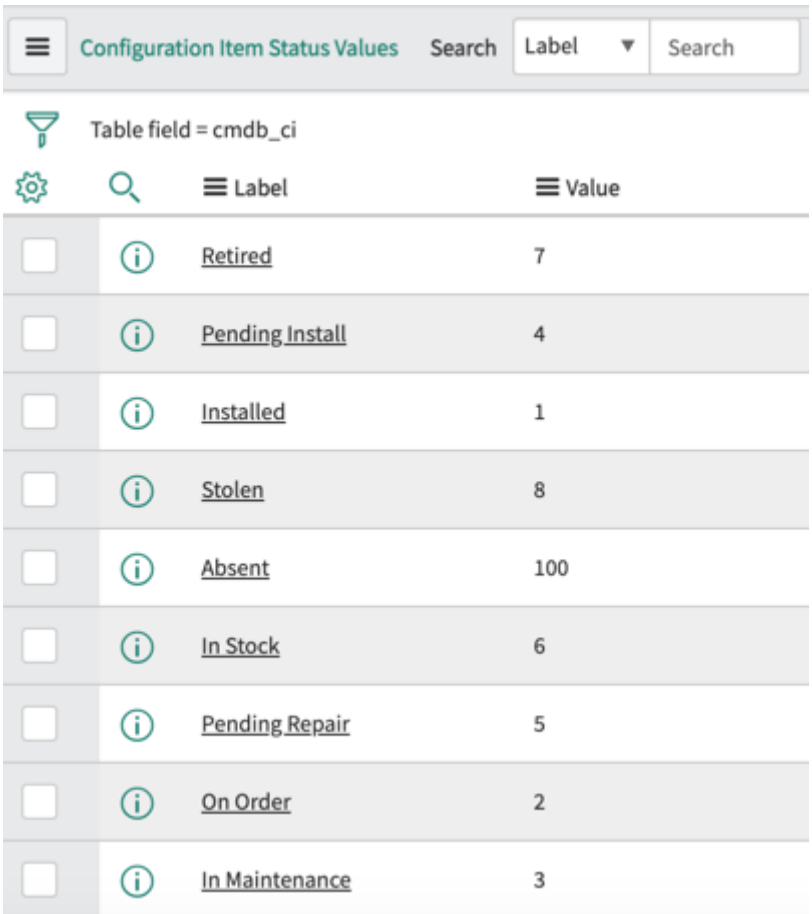
- **Status** = **In production**
- **Name** and **Owner** is not empty

Configuration Item Status Values

Shows the percentage of CIs with default status values.

- 80%: At least 1 to 5 CIs have custom status values.
- 60%: 6 to 10 CIs have custom status values.
- 40%: 11 to 15 CIs have custom status values.
- 20%: 16 or more CIs have custom status values.

To view the default base-system status values, enter *sn_getwell_oob_status_table_field.list* in the navigator **Filter** text box. The Configuration Item Status Values form displays the list of elements and associated tables. Select a table name to see the list of default labels and values.



Business Units with Companies

Shows business unit records where the **Company** field is not empty.

Locations with Parents.

Shows cmdb_ci records that meet the following conditions:

- **Status** = installed
- **Operational status** = operational
- **Location** and **Location.parent** is not empty

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4. Select the tiles associated with the foundational metrics to access Performance Analytics widgets.

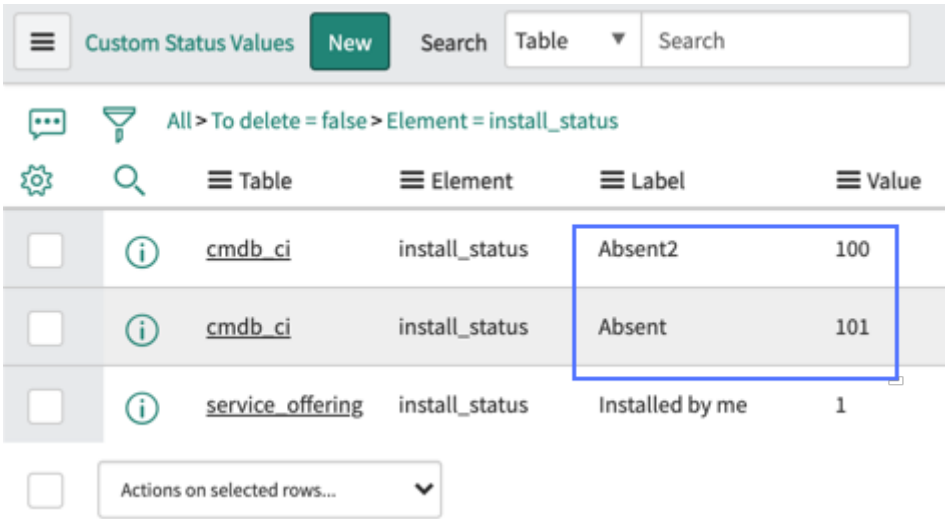
   Performance Analytics widgets are provided by the *CSDM PA Metric Collection* scheduled job. These widgets provide trending data over time for the non-compliant CIs associated with the metric.

   - Verify that the real-time option is selected (

) and then select **Show Records** to view the list of CIs.
   - Select the **Breakdowns** context menu to view available breakdowns.

5. Scroll to the list of CIs in the **Custom Status Values** related list.

   The charts show the number of custom values that have been defined for each element. Select a chart to view custom values that have been defined for the element. This example shows custom label-value combinations for the install_status element.



6. Select a CI to drill down to the form view.

   The form view provides the required information. If you don't see the form, you might not have sufficient access privileges. Contact your ServiceNow administrator.

7. When you're finished using the form, select **Update** or **Delete** to return to the list view.
8. Navigate to return to the CSDM Data Foundations dashboard.

Result

The key foundational metric results are available for you to review and analyze.

Migrate and sync existing data to the CSDM framework

You complete several tasks to migrate your existing application data to the required tables in the CMDB.

Before you begin

Role required: admin

About this task

Keep the following points in mind:

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- Some CSDM tables have been introduced recently so you might not be familiar with them. See the documentation for your product to learn about unfamiliar tables.
- You can continue to use customized or non-conforming CMDB tables. If you do so, however, you might not get the full benefit of your products.
- Be sure to use the migration tools that are described in Assistance with the CSDM life-cycle sync process.

Manage the attributes that you're using. Rationalize your custom attributes. Use the following guidelines to decide whether to keep all customizations:

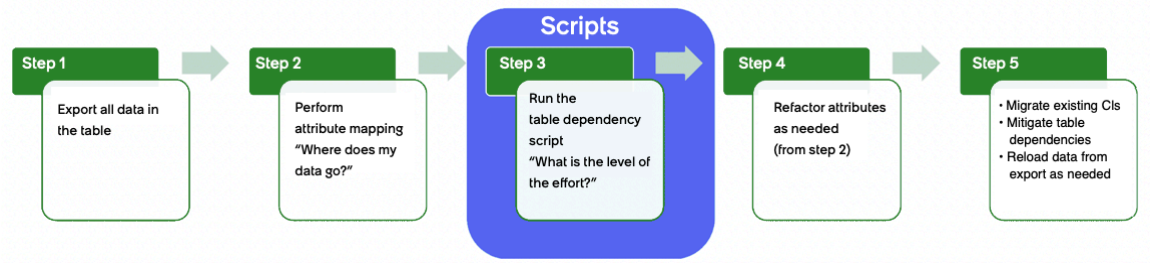
- Preferred: The custom attribute doesn't have a related base-system attribute but you must use it.
- Keep: The custom attribute doesn't have a related base-system attribute but it's required for a unique use case.
- Refactor: The custom attribute does have a base-system attribute or a capability that can be migrated.
- Do Not Need: The customization is no longer needed. Delete the attributes that you don’t use or use only rarely. Consider deleting attributes if there’s a better way to address a use case.

Consider related dependencies. Moving configuration items (CIs) to a new table doesn't automatically move related dependencies. To identify related dependencies, use the scripts described in Migrating into CSDM identifying table dependencies (available on the ServiceNow Community).

Important:
The script only identifies the dependencies — it doesn't move your data or their dependencies. You refactor data and dependencies as part of the migration.

After running the scripts and evaluating the data, you will have a better idea of the effort required to migrate your data. Decide whether you need all referenced reports, rules, and scripts. Then decide what you want to migrate and make a migration plan.

Migration workflow



Procedure

1. Back up your data.
   Export your data (with all attributes) to Excel and keep the file in a secure location. Have a contingency plan in case issues arise.
2. Map the attributes.
   Identify the table where the data should go. Make sure that destination table has the required base-system attributes. Rationalize your custom attributes. Decide which customizations you will keep.
3. Move CIs from existing classes to CMDB classes.

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Note:
Don't forget about non-conforming tables and their dependencies. You could have hundreds of reports, business rules, scripts, table references, and more that need the data in your non-conforming tables.

Moving CIs to a new table does not automatically move reports, business rules, and so on. As described in the following steps, the fix script identifies dependencies that you must refactor. You can download the fix script from the ServiceNow Community.

4. Refactor the attributes.
   Solidify the data model and get the data ready for migration.

   Make sure you have completed the attribute mapping-related tasks described in earlier steps. Follow the guidelines and refactor your data as needed.

5. Migrate the data.

   Note:
   Make sure that you have a valid and recent backup. Make another backup if necessary. During migration, you lose all customized or base-system attributes that are not in the same table hierarchy.

   Keep these points in mind as you proceed:

   - Migrate your CIs to the new class to move the CI and all its related objects, incidents, and changes to the new table.
   - Start with a few CIs and increase the number when you feel comfortable.

6. Remediate your table dependencies:
   a. Modify reports to use the new table.
   b. Migrate business rules and scripts as needed.
   c. Update table references as needed.
7. Reload data into the new attributes using the backup that you made earlier.
8. Validate all data and dependencies.

Result
You have successfully migrated your application to the CSDM framework, and your data is in the required CMDB locations.

Assistance with the CSDM life-cycle sync process

Several features help you to promote accuracy and completeness for the process of synchronizing legacy data with life-cycle data in the CSDM framework.

Before you perform the life-cycle sync process

Legacy status values that are auto-updated

Several legacy statuses are automatically mapped to the *Life Cycle Stage* and *Life Cycle Stage Status* fields. For more information, see Legacy status values that are auto-updated.

Data migration script

Use the fix script from the ServiceNow Community to identify table dependencies. See Migrating into CSDM identifying table dependencies.

CMDB Data Foundations dashboard

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Navigate to **All** > **Configuration** and then select **CMDB Data Foundations Dashboard**.

- CMDB dashboard: Each tab provides key metrics that evaluate configuration and customizations in the CMDB.
- The metrics provide visible results of evaluation. Color codes and weighted priority help with planning.
- Each metric includes a link to a remediation playbook with background and plays for remediation.

See Monitor health in CSDM and CMDB Data Foundations Dashboards.

CSDM Data Foundations dashboard

Navigate to **All** > **Configuration** and then select **CSDM Data Foundations Dashboard**.

The CSDM dashboard focuses on key data elements to support you in implementing the CSDM framework. The reports on each tab display the data metrics that are appropriate for the maturity of your organization's CSDM implementation stage (foundation, crawl, walk, run, and fly). See CSDM Data Foundations dashboard. In particular, the **Crawl** tab presents a report titled **CIs with Mismatched Operational Status and Life Cycle Stage** that shows a summary of life-cycle value mismatches among CMDB, asset, and IBI and enables you to view mismatch details. See 'Crawl' stage reports on the CSDM Data Foundations dashboard.

View the contents of life-cycle tables

To view how life-cycle value pairs are mapped in the mapping tables, select **All**, and then enter `life_cycle_stage.list` in the search text box.

Migrating nonconforming CIs into the correct CSDM tables

If you already have CSDM data but not in the recommended tables, you can run a script to identify dependencies that you may have created on the nonconforming tables. The results of the script identify referenced dependencies such as reports, UI scripts, business rules, and other references for a specified table (editable in the script). See this post on the Now Community site

The life-cycle sync process presents the discrepancy report

When you start the sync process, the discrepancy report Enabling life-cycle sync from legacy-to-asset helps you to isolate and remediate mapping issues or missing data issues before proceeding with migration and synchronizing. The report identifies issues and presents links that take you to the mappings that must be resolved before you can sync the data.

Related topics

Enabling life-cycle sync from legacy-to-asset

Legacy status values that are auto-updated

Several legacy statuses are automatically mapped to the *`Life Cycle Stage`* and *`Life Cycle Stage Status`* fields.

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Values that can be auto-updated

When you follow the procedure described in Activate the CSDM plugin, the following legacy statuses are automatically mapped to the *Life Cycle Stage* and *Life Cycle Stage Status* fields:

Important:
Legacy field values are not deleted after you map them to *Life Cycle Stage* and *Life Cycle Stage Status* values.

- Product Model Status
- Asset State
- Asset Substate
- Contract Status
- CI Install Status
- CI Operational Status
- CI Hardware Status (tangible/physical CIs)
- CI Hardware Substatus (tangible/physical CIs)

Note:
Mappings are inherited from parent tables to child tables.

Implementing the CSDM framework in stages

Following the CSDM framework ensures that you meet your primary goal of consistent accuracy in reporting and analytics so you can effectively manage your digital environment.

The CSDM data framework

The CSDM is the data model that admins should follow when they set up ServiceNow products and applications. The standards for defining configuration items (CIs) and relationships between CIs in the CMDB helps to promote that your data resides in the appropriate CMDB tables. The result is maximum value from ServiceNow AI Platform applications.

Activating CSDM

Activate the CSDM plugin

Activate the CSDM plugin so you can begin implementing the CSDM data model.

Enabling life-cycle sync from legacy-to-asset

You can align life-cycle values for each product instance on the asset, CI, and IBI tables. A one-time process moves legacy status values for asset and CI across the platform to standard CSDM life-cycle value pairs (*life cycle stage* and *life cycle stage status*). Business rules then run regularly to set identical IBI, asset, and CI life-cycle data for each product instance.

Migrate and sync existing data to the CSDM framework

You complete several tasks to migrate your existing application data to the required tables in the CMDB.

Implementing the CSDM framework

It's best to use a staged approach when you implement the CSDM framework. Each implementation stage involves particular information types and provides specific benefits.

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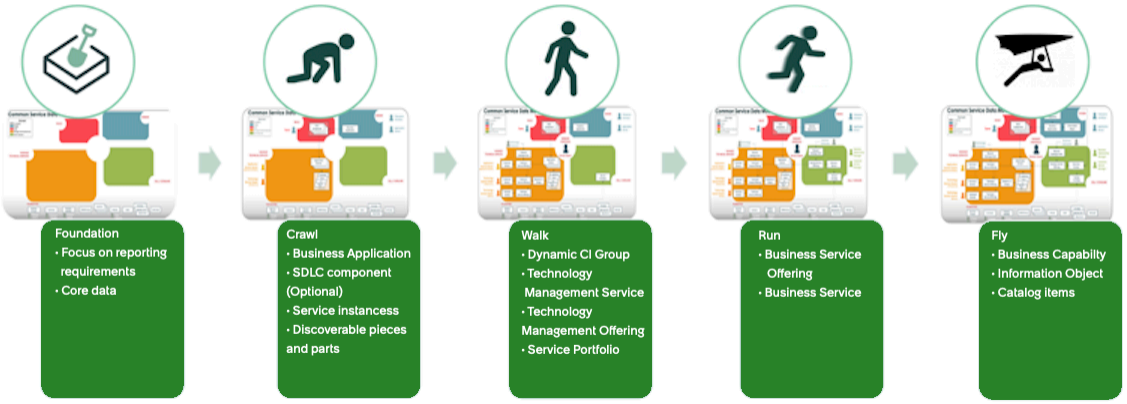
Because each stage builds on the preceding stage, we use an analogy to the way a person develops: foundation, crawl, walk, run, and, eventually, fly.



Note:
Business applications reference information objects in the information portfolio. You might implement the Information Object [cmdb_ci_information_object] table earlier than the Fly stage. Your business requirements determine the right stage for implementing the table.

CSDM implementation stage — Foundation

In the Foundation stage of implementing the CSDM framework, you prepare the referential data that enables accurate reporting to support good business decisions. Use the base-system tables when you begin implementing the CSDM to derive the highest value from your ServiceNow products and the ServiceNow AI Platform.

CSDM implementation stage — Crawl

In the Crawl stage, you work on base-system CMDB tables that are associated with IT Service Management (ITSM).

CSDM implementation stage — Walk

In the Walk stage, you identify and populate the network infrastructure CIs and applications that your organization's technical teams support.

CSDM implementation stage — Run

In the Run stage, you set up the relationship between a technology and the business that sells and consumes the technology.

CSDM implementation stage — Fly

When you reach the Fly stage, you have accomplished all or most of the process of implementing the CSDM framework. The fly stage completes the process.

Key guidelines for you to follow

- When linking CSDM tables, use only the relationships that are designed in the model.
- Collaborate on the shared data model with other product teams. Also, when you extend CSDM and related functionality, be sure to follow the provided guidance. Following the guidance and collaborating with other product teams helps you achieve the best design.
- Use agreed-on CSDM definitions whenever you use a table, reference, or attribute.
- Use the provided CSDM base tables.
- Use the recommended technologies when you integrate external data sources. The specified process ensures data integrity and integration consistency.
- Follow the provided guidance for setting up and using ServiceNow AI Platform products.

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Improve your CSDM implementation

The CSDM Assessment provides Impact Customers with leading practices and prescriptive guidance on the CSDM and how it supports processes on the ServiceNow AI Platform. To help your organization plan for and implement CSDM, the assessment includes interactions with ServiceNow CSDM experts and personalized content. See Common Service Data Model (CSDM) Assessment Accelerators.

Enabling life-cycle sync from legacy-to-asset

You can align life-cycle values for each product instance on the asset, CI, and IBI tables. A one-time process moves legacy status values for asset and CI across the platform to standard CSDM life-cycle value pairs (*`life cycle stage`* and *`life cycle stage status`*). Business rules then run regularly to set identical IBI, asset, and CI life-cycle data for each product instance.

This topic provides an overview of the entire align-and-sync process.

- Detailed instructions for running the align-and-sync process appears in Migrate legacy asset and CI settings to CSDM life-cycle values.
- A detailed reference to all sync options appears in How life-cycle values for Asset, CI, and IBI are synced.

Tip:
Terms used in this document are defined in CSDM life-cycle terms.

Why enable CSDM life-cycle sync between CI and asset entities

When the one-time data sync operation finishes, CSDM life-cycle values for each product instance as represented in the asset and CI tables will be identical. Business rules then sync life-cycle value pairs among the asset, CI, and IBI tables. The business rules then run on regular schedules to align life-cycle values for the asset, CI, and IBI tables.

See How life-cycle values for Asset, CI, and IBI are synced.

The following products, for example, benefit from the standardized values:

- To handle alerts appropriately, the Event Management and Operational Intelligence features must know whether a CI is in the *`maintenance`* life cycle stage status.
- To report cost data effectively, the Cloud Cost Management feature needs to know the CSDM life-cycle values of a CI.
- To generate consistent tasks and workflows, the Audit Management and Compliance features use standard CSDM life-cycle values.

How the mapping between legacy status values and CSDM CSDM life-cycle values is specified

A life-cycle value pair is the combination life cycle stage and life cycle stage status values for a CI, asset, or IBI over the life cycle of a product instance. The base system includes the life-cycle mapping [life_cycle_mapping] table that holds mapping rules. The default rules specify how to align common legacy status values to a CSDM life-cycle value pair. You can update and add rules as needed. (The table is described more fully in Life cycle mapping table.)

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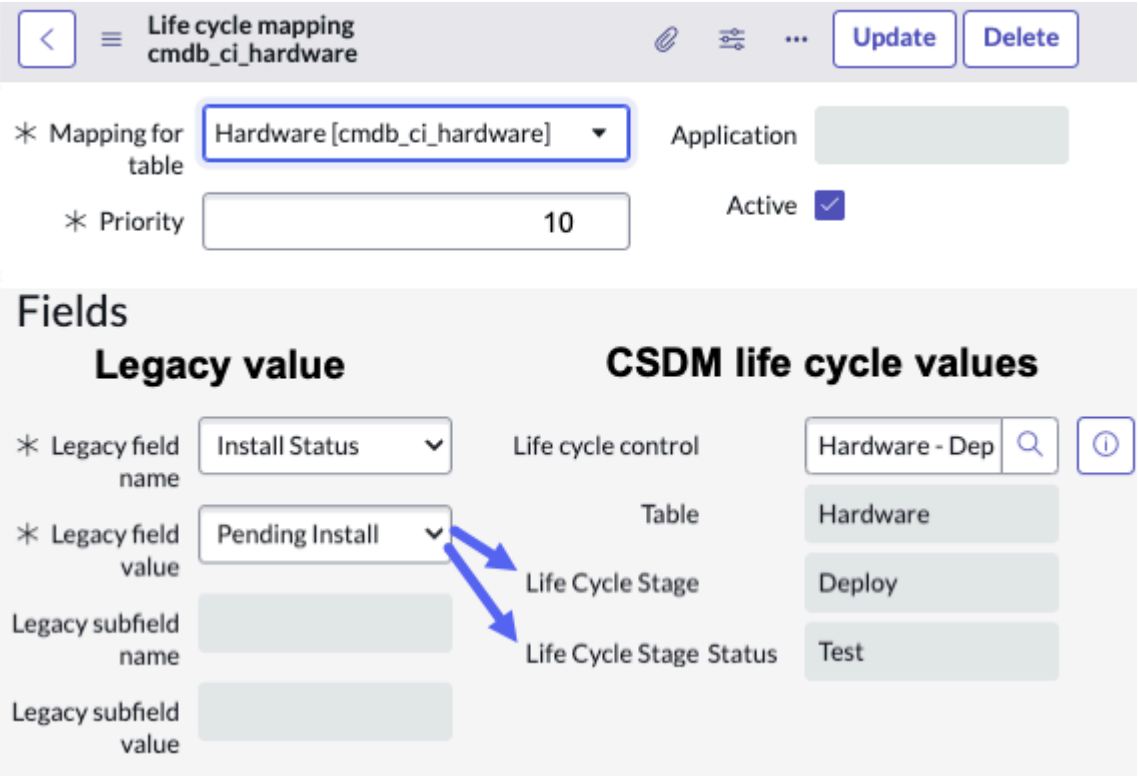

Note:
If you're activating the CSDM (csdm.lifecycle.migration.activated) plugin for the first time, and you have custom states and substates for assets or CIs, then you will create and configure mapping between the custom legacy values and the CSDM life-cycle values.

Alignment/sync process

To start the align and sync process, you select **Enable life cycle sync** on the Life cycle mapping table list page. That action sets the *csdm.lifecycle.sync.between.ci.and.asset.activated* system property to `true` and starts the following activities:

Phase 1: Run the discrepancy check and correct all mappings

The system runs the discrepancy check

The discrepancy check script checks all mapping rules:

- Verify CSDM life-cycle mapping rules for asset tables.
- Verify CSDM life-cycle mapping rules for CMDB CI tables.
- Verify legacy asset-to-CI mapping rules that appear in the alm_hardware_state_mapping and alm_asset_ci_state_mapping tables.

Note:
For each CI that is not associated with an asset (non-asset CI), use CSDM mapping tables to derive the life-cycle value pair for the CI from the legacy status.

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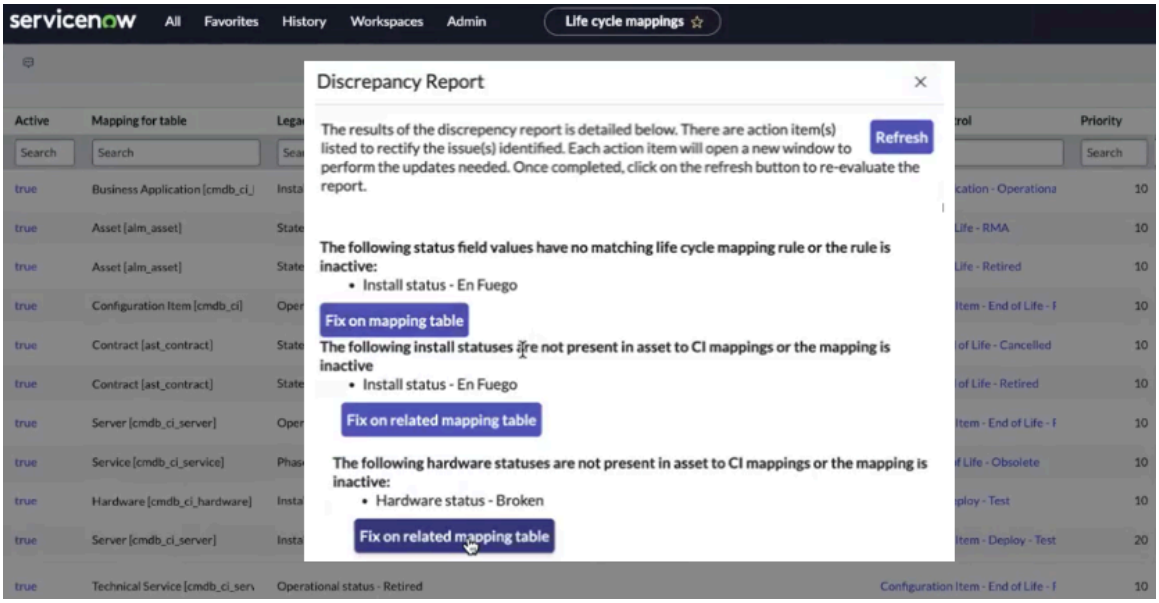

The script generates a discrepancy report. The report displays the list of missing or inactive mappings that you must repair before you can perform bulk alignment of life-cycle values.

- Legacy status values that aren't yet mapped to life-cycle value pairs.
- Legacy status values that aren't included in a mapping rule or that are included in an inactive rule.
- Custom legacy status values. For each custom value, the system adds a record to the life_cycle_mapping table. Those mapping records, however, are inactive because some required field values are not yet set. You will edit and activate those records so all custom legacy status values will be aligned.
- After the one-time alignment, legacy status values between CI and asset will be auto-synced. The report therefore identifies hardware statuses or install statuses that are not present or that are included in an inactive mapping rule between asset and CI.

Manual process: If there are mapping errors, add or update mappings

Add missing mapping rules and ensure that current rules are correct and active. The buttons open mapping tables where you can update mapping rules. Instructions for updating individual rules appear in Map legacy status values to CSDM life-cycle values.

Run the discrepancy check again

Run the discrepancy check and fix errors until all errors are fixed.

Phase 2: Automated bulk alignment: Align all legacy CMDB CI and asset data to CSDM life-cycle value pairs

When all mapping errors are fixed, a scheduled job in the batch process performs one-time-only bulk alignment to *`life cycle stage`* and *`life cycle stage status`* life-cycle value pairs.

During bulk alignment, the process uses the mapping rules to derive the CSDM life-cycle value pair from legacy status values for both asset and CMDB CI records. During the process, the **Activate** button is disabled and you're blocked from updating mapping rules.

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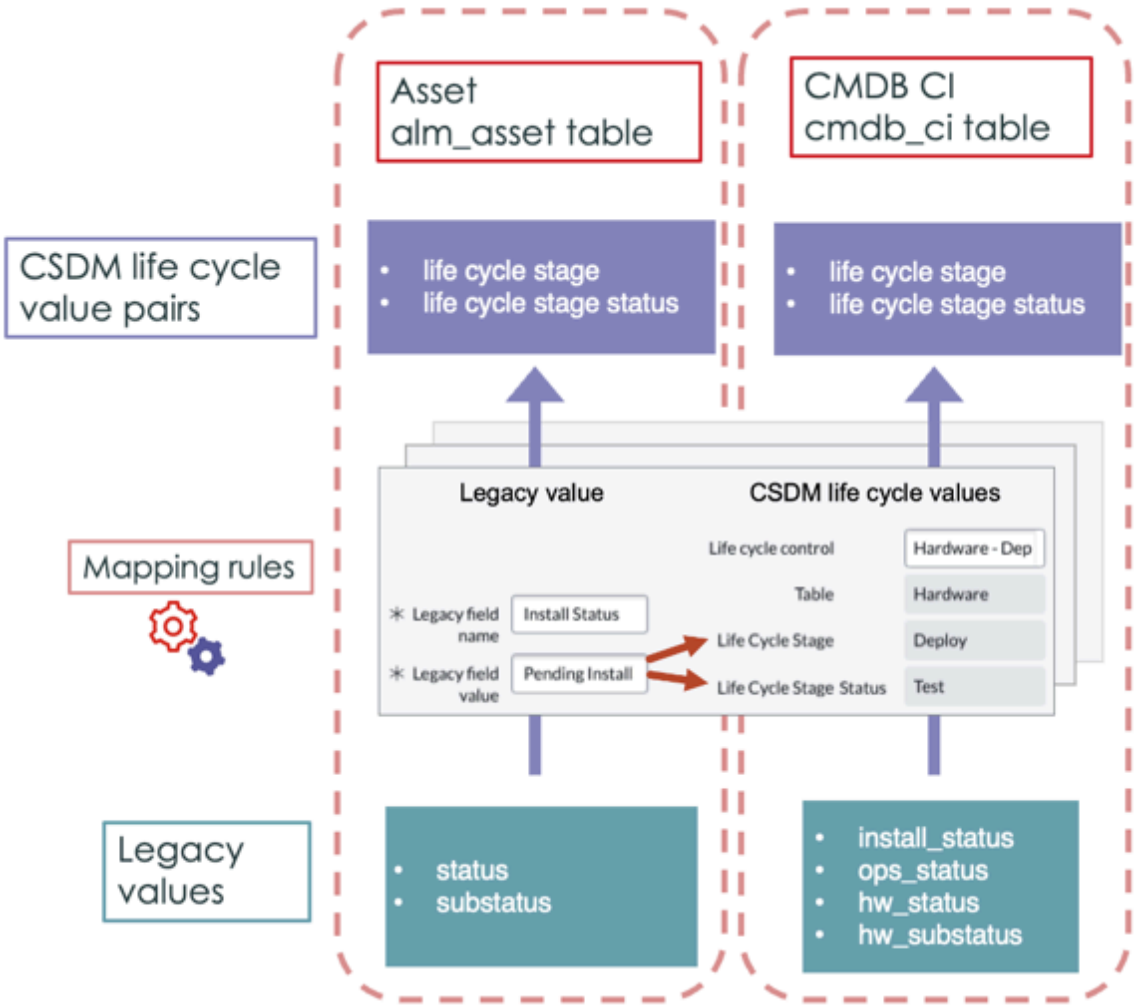
Note:
IBI records do not change. Active sync between legacy and life-cycle values for IBI records is already in place.



Step 1: For all assets that do not have life-cycle value pairs, generate the values

Use the CSDM life-cycle mapping rules for asset tables to derive the life-cycle value pairs from the legacy status values.

Step 2: One-time sync: For each CI whose CSDM life-cycle values do not match the asset values, update the CI with the asset values

This one-time sync will not be repeated because in one of the following phases, bi-directional sync is implemented between CI life-cycle value pairs and asset life-cycle value pairs.

Step 3: One-time sync: If a CI is not associated with an asset, use CSDM mapping tables to derive the CI's life-cycle values from the legacy status.

This one-time sync will not be repeated because bi-directional sync continues between CI legacy values and asset legacy values. Future CI values will derive from the new bi-directional sync between asset and CI life-cycle value pairs.

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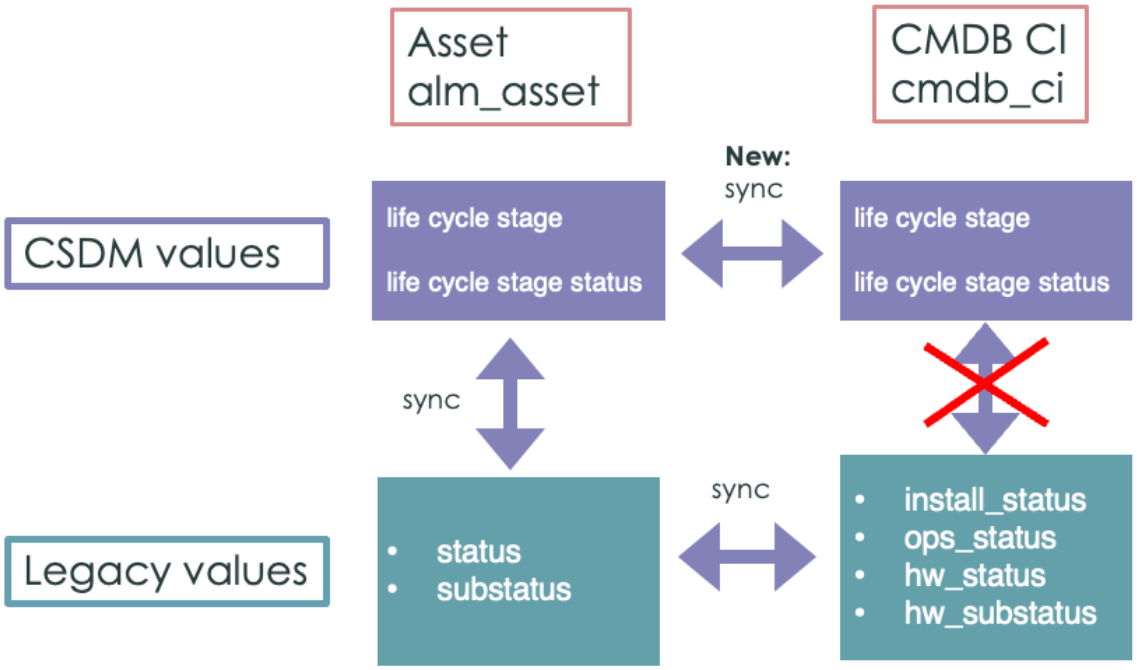
Phase 3: Automated update to sync operations



New: Activate sync of life-cycle data between asset and CMDB CI

CSDM life-cycle value pairs are bi-directionally synced between asset and CI.

New: Deactivate Bi-directional sync between CMDB CI legacy values and CSDM life-cycle values

As a result, changes to CI legacy values will not update CSDM life-cycle value pairs (the values will diverge over time). Instead, CSDM life-cycle value pairs are updated by the bi-directionally sync with asset life-cycle value pairs. A report on the CSDM dashboard lists CIs whose life-cycle values diverge from legacy values.

No change: Sync between asset legacy values and CI legacy values

The existing bi-directional sync between asset legacy values and CI legacy values continues.

(No change if sync is currently active): Activate sync between asset legacy and asset life-cycle values.

Bi-directional sync between asset legacy values and life-cycle value pairs continues.

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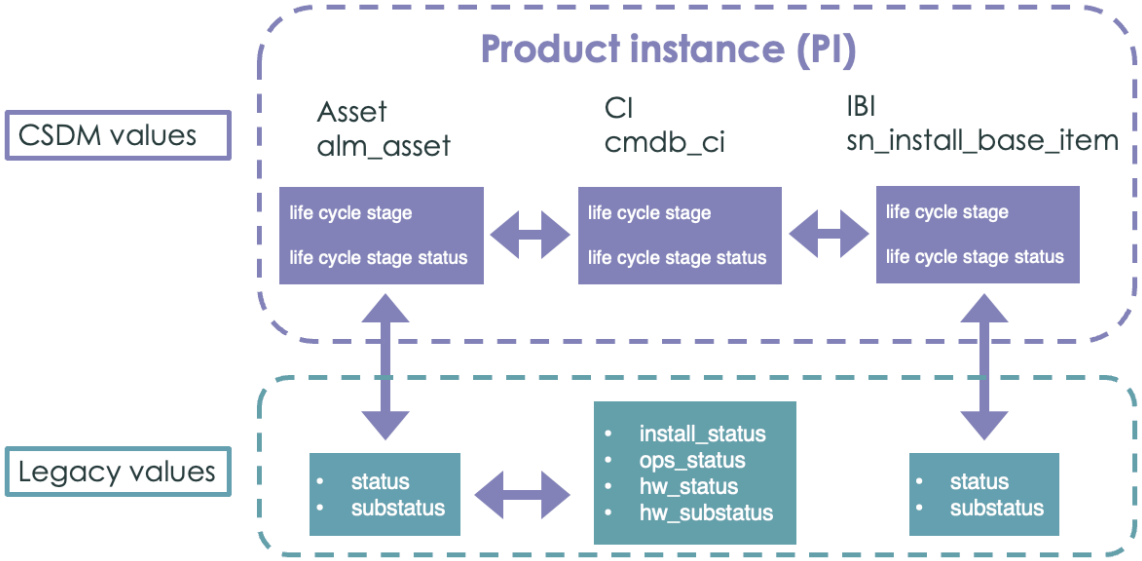
Phase 4: Ongoing automated sync operations



Immediately after sync operations are completed, business rules run to align life-cycle value pairs in the asset, CI, and IBI tables for each product instance. Business rules then run on a regular schedule to incorporate changes to legacy status values as updates to life-cycle value pairs and to maintain alignment among Asset, CI, and IBI.

Activate life-cycle alignment and sync

Instructions Migrate legacy asset and CI settings to CSDM life-cycle values

Map legacy status values to CSDM life-cycle values

Use the Life Cycle Mapping module to specify how existing legacy status values should be converted to CSDM life-cycle value pairs (*`life cycle stage`* and *`life cycle stage status`*). You map both asset and CI legacy status values to life-cycle value pairs.

Before you begin
Role required: itil_admin or asset_admin

About this task
Several legacy statuses are automatically mapped to the *`Life Cycle Stage`* and *`Life Cycle Stage Status`* fields. For more information, see Legacy status values that are auto-updated.

Because the base system includes many default mappings, you might not have to create many custom mappings. To view the list of default mappings, navigate to **All** > **CSDM** > **Life Cycle Mapping**.

Tip:
Terms used in this document are defined in CSDM life-cycle terms.

In the following example, your existing data uses a status attribute named **Install Status** for hardware CIs. You configure the Life cycle mapping form to map the existing **Pending Install** value of the **Install Status** attribute to the **Deploy/Test** life-cycle value pair in the CMDB.

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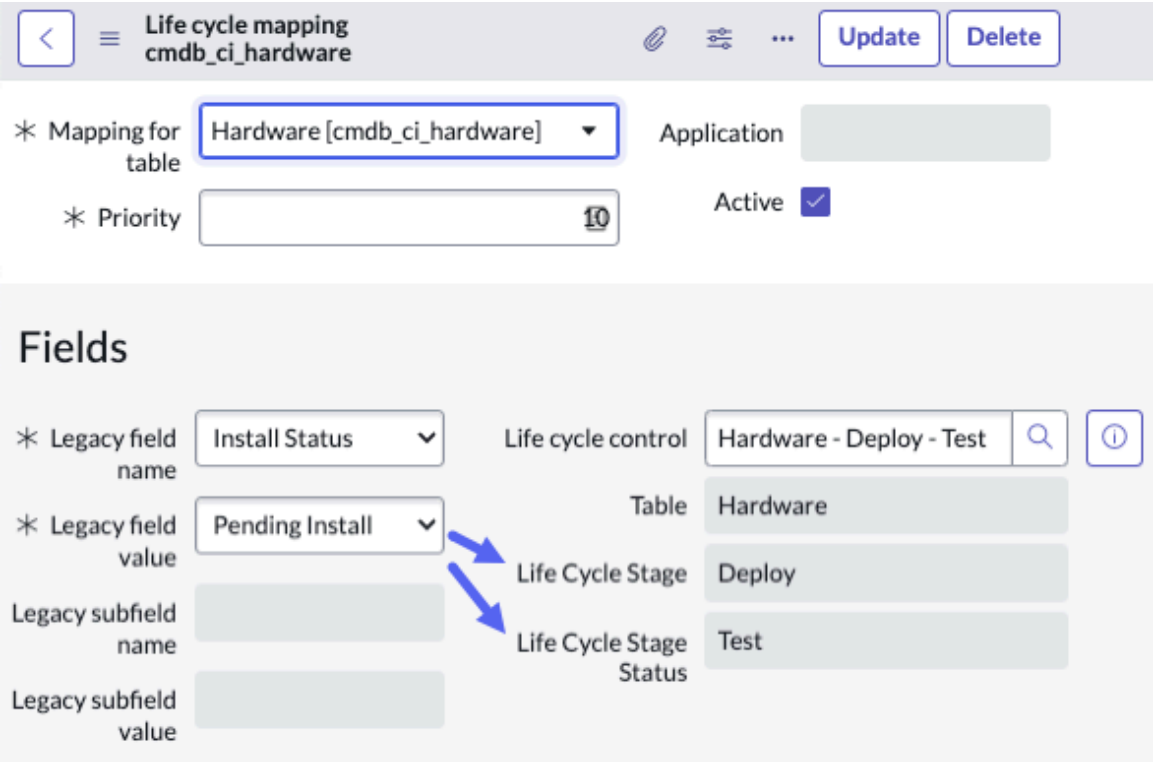

Procedure

1. Navigate to **All** > **CSDM** > **Life Cycle Mapping**.
2. On the Life cycle mappings list view, select **New** and then fill in the Life cycle mapping form as described in Life cycle mapping form.
3. Select **Submit**.
4. Repeat the process and, when you have mapped all legacy status values, migrate them to the CMDB.
   For instructions, see Migrate legacy asset and CI settings to CSDM life-cycle values.

Migrate legacy asset and CI settings to CSDM life-cycle values

Activate life-cycle sync to migrate your legacy asset and CI status settings to the CSDM standard life-cycle value pairs. After the one-time migration process, business rules maintain sync among IBI, asset, and CI life-cycle values.

Before you begin

Tip:
Terms used in this document are defined in CSDM life-cycle terms.

Before you enable life-cycle sync, navigate to **CSDM** > **Life Cycle Mapping**. Review the prepopulated mappings in the **Life Cycle Mappings** list view:

- Adjust and add any mappings as needed for your environment.
- Review mappings for any custom status values. Those mappings are incomplete and you must provide the desired standard life cycle control to map to.
- Ensure that all mappings are configured with a life cycle control.
- Ensure that all mappings are activated.

Activation can proceed only if the following conditions apply:

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- All mapping records are set to active and are configured with a life cycle control
- All mapping records for custom legacy values are fully configured.

Role required: itil_admin or asset_admin

Procedure

1. Navigate to **CSDM** > **Life Cycle Mapping**.
2. On the **Life Cycle Mappings** list view, select **Enable life cycle sync** on the Life cycle mapping table list page.
   That action sets the *csdm.lifecycle.sync.between.ci.and.asset.activated* system property to `true` and runs a script that validates mappings. The script generates a discrepancy report. The report displays the list of missing or inactive mappings that you must repair before you can perform bulk alignment of life-cycle values.
3. Select an item on the report to access the mappings that need attention, correct the mappings, and then select **Refresh** to run the report again.

Result

One-time sync is done. All cmdb_ci and asset records should have *life cycle stage* and *life cycle stage status* values, either coming directly from what the asset had (if you have an asset/CI combo), or from the life cycle mapping table directly for non-asset CIs.

Business rules now perform ongoing alignment of life-cycle data as described in Enabling life-cycle sync from legacy-to-asset.

What to do next

After the data has migrated successfully, you can start managing data following the CSDM model:

1. Activate the CSDM Activation (com.snc.cmdb.csdm.activation) plugin.
2. Use the CMDB Data Manager to centrally govern the life cycle of CIs in bulk and in a standard and consistent way.

Matching the usage of dynamic CI groups to service type

The type of service determines how you use dynamic CI groups.

Dynamic CI groups

- A dynamic CI group is a user-defined collection of CIs that is used as a group CI in the CI field of the record for Incident Management, Problem Management, and Change Management.
- You set up dynamic CI groups based on common attributes or criteria.
- A dynamic CI group cannot contain other groups.

Dynamic CI groups for technology management services (formerly Technical services)

You can group up to 10,000 similar items that are associated with a technology management service and its associated technology management offering. In this usage, a dynamic CI group functions as a collection of CIs that are managed individually. Because the CIs aren't necessarily related to each other, service associations are not needed. Impact analysis (through Incident Management, Problem Management, or Change Management) is also not meaningful or expected for unrelated CIs. Here are some examples:

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- Servers with a particular operating system
- Network gear based on location
- Application servers based on a running process
- CIs that make up a service instance
- CIs that share a particular support group

The *Service Classification* attribute identifies the service as a technology management service. The ownership sync process assigns CI ownership through the technology management service, as described in Synchronizing group assignment attributes.

Dynamic CI groups for service instances

For a service instance (called application service before CSDM v5), impact analysis outcomes are expected because when any individual CI is impacted, the entire dynamic CI group is affected. All related business services or technology management services are also affected. Because of this interdependence, you must establish service associations and impact analysis is important.

The *Service Classification* attribute identifies the service as a service instance.

See Use the Dynamic CI Group method to populate application services.

Synchronizing group assignment attributes

To empower a particular user group to manage a collection of CIs or CI classes, set group assignment attributes through the Technology management offering or the CI Class Manager. The operation synchronizes the group attribute data across all CIs that belong to the specified CI class or groups of CIs.

Methods for synchronizing group assignment attributes

Note:
The *Managed by Group* setting identifies the group that manages a CI class (ensuring that it is complete and correct). It might or might not be the same group as repairs an individual CI.

- Synchronize user groups for a technology management offering: Directly set the **Support group**, **Change group**, or **Managed by group** attributes in a technology management offering. The settings are applied to all CIs that are associated with the technology management offering.
- Set the group for a CI or an entire class of CIs: Set the **Managed by group** attribute for a specific class in the CI Class Manager. All CIs within the class will have their **Managed by group** field populated based on the value specified in the CI Class Manager. With this method, the **Managed by group** setting is applied only to the CIs that aren't associated with a technology management offering. For CIs that are managed by a technology management offering, the **Managed by group** field is first synchronized with its dynamic CI group. The field is then synchronized with the CIs in the dynamic CI group, overwriting the entry from the CI Class Manager. For instructions, see Synchronize user groups for a technology management offering.
- Use Support Group and Change Group: By using dynamic CI groups, data synchronization enables you to manage data that cannot be discovered. The values in the **Support Group** and **Change Group** (previously labeled **Assignment Group**) fields in the cmdb_ci table are synchronized with their related dynamic CI groups and with all the CIs that are contained as part of that dynamic CI group object.

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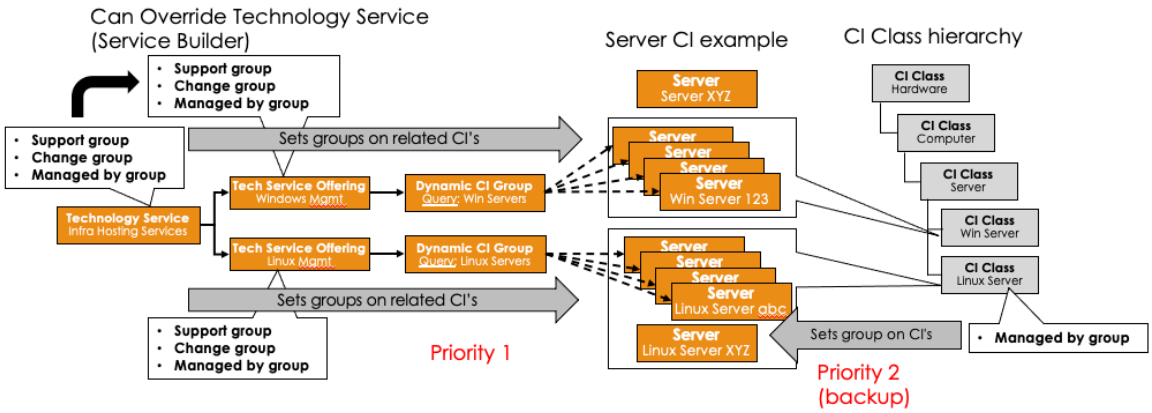
Team data synchronization



Related topics

CI Class Manager

Synchronize user groups for a technology management offering

Set the group for a CI or an entire class of CIs

Synchronize group assignment attributes on entire CI classes and individual CIs using the CI Class Manager.

Before you begin

Role required: itil and itil_admin

About this task

Note:

The *Managed by Group* setting identifies the group that manages a CI class (ensuring that it is complete and correct). It might or might not be the same group as repairs an individual CI.

You can streamline approval of CMDB Data Manager policies by populating the *Manage by Group* attribute of CIs that you plan to target in policies. Use the CI Class Manager to populate the attribute for an entire class in a single synchronization operation. If the *Managed by Group* attribute isn't populated for a CI, then the approval process is directed to the administrator.

Set the **Managed by group** attribute for a specific class in the CI Class Manager. All CIs within the class will have their **Managed by group** field populated based on the value specified in the CI Class Manager. With this method, the **Managed by group** setting is applied only to the CIs that aren’t associated with a technology management offering. For CIs that are managed by a technology management offering, the **Managed by group** field is first synchronized with its dynamic CI group. The field is then synchronized with the CIs in the dynamic CI group, overwriting the entry from the CI Class Manager.

Procedure

1. Navigate to **All** > **Configuration** > **CI Class Manager**.
2. Select **Hierarchy** to expand the CI Classes list, select a class to display details for, and then select **Basic Info**.
3. Specify the value in the **Managed by Group** attribute and select **Save**.

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4. To verify the change, select **CI List**.
   The change should be applied to the **Managed by Group** attribute of all CIs of the class unless they are associated with a technology management offering. The change is applied only to the CIs in the class and not to the sub classes under a CI.

Example:

In this example, you define a user group that can manage all CIs belonging to the **Linux Server** class:

1. Navigate to the CI Class Manager and select the **Linux Server** class in the list.
2. Select **Basic Info** and, in the **Managed By Group** attribute, select **sys_user_group** and then select **Save**.
3. To verify that the attribute was updated, select **CI List** and navigate to the Linux Server class. You will see that the **Managed By Group** attribute has been updated to **sys_user_group**.

Related topics

Synchronizing group assignment attributes

Synchronize user groups for a technology management offering

Synchronize user groups for a technology management offering

Synchronize group assignment attributes on entire CI classes and individual CIs by creating a dynamic CI group for use by a technology management offering.

Before you begin

Role required: itil and itil_admin

About this task

Directly set the **Support group**, **Change group**, or **Managed by group** attributes in a technology management offering. The settings are applied to all CIs that are associated with the technology management offering.

In addition to the method described in this procedure, you can use the CI Class Manager to set any CI property value. If the **Support group**, **Change group**, or **Managed by group** value is set in the technology management offering, the value specified by the technology management offering takes precedence.

Note:
The *Managed by Group* setting identifies the group that manages a CI class (ensuring that it is complete and correct). It might or might not be the same group as repairs an individual CI.

Procedure

1. Navigate to **All** > **Configuration** > **CMDB Groups** and create a CMDB group.
   See CMDB groups for details.
2. Navigate to **All** > **Configuration** > **Dynamic CI Groups**.
3. Create a dynamic CI group and associate it with the CMDB group that you created.

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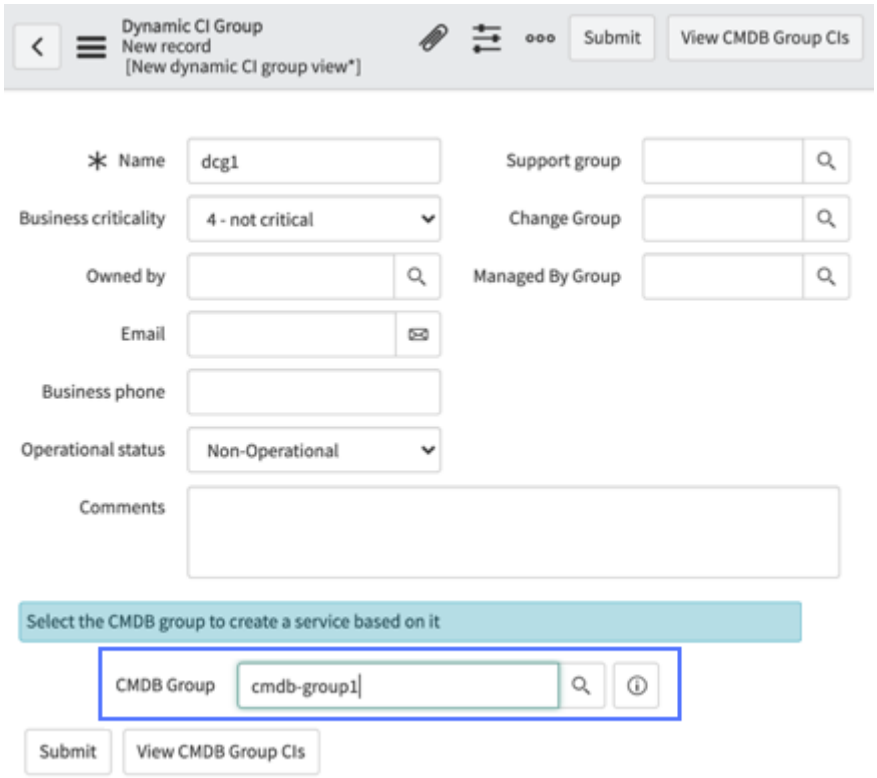
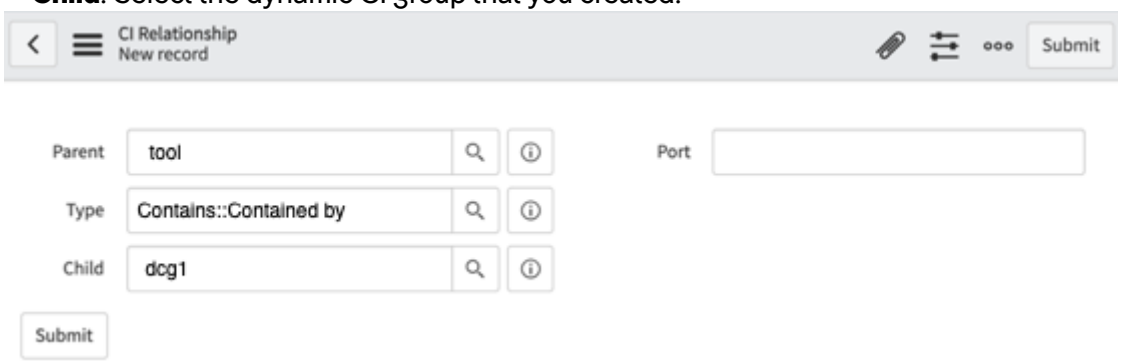


See Service Delivery domain in the CSDM model for more information on dynamic CI groups.

4. Navigate to **All** > **CSDM** > **Technical Service Offering** and create a technology management offering.
   See Service Delivery domain in the CSDM model for more information on technology management offerings.
5. Navigate to the **CI Relationships** table, select **New**, and then enter the following values:
   - **Parent**: Select the technology management offering that you created.
   - **Child**: Select the dynamic CI group that you created.



6. Select **Submit**.
   You have created a relationship between the technology management offering and the dynamic CI group.
7. Navigate to **All** > **CSDM** > **Technical Service Offering** and open the technology management offering that you created.
8. Enter values in the following fields:

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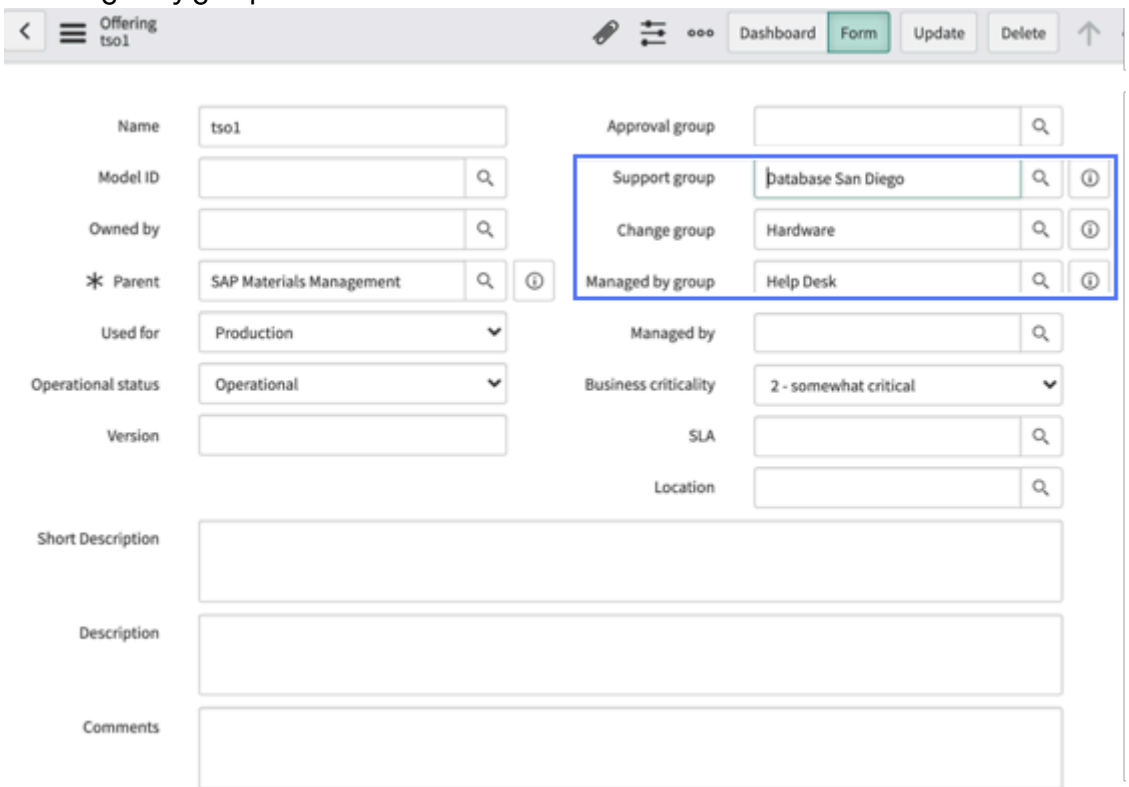
- Support group
- Change group
- Managed by group



9. Select and hold (or right-click) the header and select **Save**.
   A message confirms that data synchronization has been enabled for the fields.
10. The values that you specified are applied to the related dynamic CI group and all associated CIs.

> **Note:**
> If a new CI is added to the class, the data will be synchronized only after the scheduled CSDM Data Sync job is completed. To synchronize the data immediately, navigate to **Scheduled Jobs** > **CSDM Data Sync** and select **Execute**.

CSDM implementation stage — Foundation

In the Foundation stage of implementing the CSDM framework, you prepare the referential data that enables accurate reporting to support good business decisions. Use the base-system tables when you begin implementing the CSDM to derive the highest value from your ServiceNow products and the ServiceNow AI Platform.

Benefits of preparing the data in the Foundation stage

The basis of any good data model is the foundational data that is referenced throughout the model.

- The base-system tables in the CMDB act as the foundation for many ServiceNow AI Platform products.
- The tables help your organization align with reporting requirements early to expedite the value you get from ServiceNow AI Platform products. You can reduce or eliminate costly rework tasks needed to align with reporting requirements.

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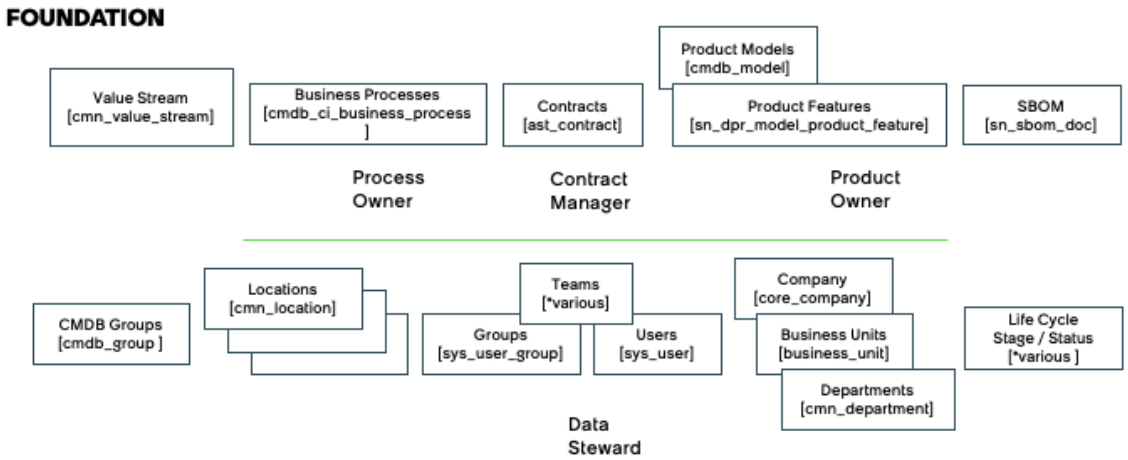
Tables that you work on during the Foundation stage



Business Process [cmdb_ci_business_process] table

A business process has a well-defined start and finish. Examples of business processes in the banking industry are the customer onboarding process and the credit check process. Each business process can have levels of criticality and impact. Business processes are stored in the cmdb_ci_business_process table.

Contract [ast_contract] table

The Contract table identifies binding agreements between two parties. When you populate services provided by vendors into the CMDB, consider the role that contracts play when evaluating service level agreements (SLAs).

Product model [model_id] table

The Product model [model_id] table identifies the unique types of products your organization develops or consumes. When you group assets and CIs by product model, you unify and relate CIs that are part of the same digital product and portfolios of products. Grouping assets and CIs by product model can help you plan projects, monitor costs, and rationalize your data. Discovery can populate tangible/physical product models after they're operational, but other types of product models require planning from product owners.

Use the *CSDM Product Model Assignment* job to auto-generate a product model record (application model, service model, or software model) for each logical CI that is not yet associated with a product model. Product models are ideal for associating CIs that are parts of a single digital product. See Auto-generate product models for logical CIs.

CMDB Group [cmdb_ci_query_based_service] table

The CMDB Group table identifies a collection of CIs based on the results of saved Query Builder queries, encoded queries, or manual entries.

CMDB groups are critical elements of dynamic CI groups and the strategic management of CIs. Decide early how you want to report CI information and how you want to monitor CIs. These decisions affect how you create CMDB groups. For Change Management and Incident Management processes, there are two distinct impact analysis behaviors for dynamic CI groups. See Matching the usage of dynamic CI groups to service type.

Software bills of material (SBOM)

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An SBOM is the overall collection of components of a piece of software. Cyclone DX is supported.

Location [cmn_location] table

The Location table uniquely identifies geographic locations. You can create a hierarchy of location data using the *Parent* attribute. The hierarchy might include entries that match your reporting requirements. For example, you could populate the location table as follows

Your organization's location attributes

To include more detail in reports, you could extend the Location table to include floors, rooms, and even datacenters. With hierarchy capabilities, trusted source data, and your requirements in hand, you can create locations that support your future reporting needs.

Group [sys_user_group] table

The Group table identifies sets of users that share a common purpose. Groups may perform tasks such as approving change requests, resolving incidents, receiving email notifications, or performing work order tasks. Groups also use the referential data in the CMDB to identify how CIs are managed (for example, the Managed by Group) and supported (for example, the Support Group). Any business rules, assignment rules, system roles, or attributes that refer to a group automatically apply to all group members.

Note:
The *Managed by Group* setting identifies the group that manages a CI class (ensuring that it is complete and correct). It might or might not be the same group as repairs an individual CI.

User [sys_user] table

The User table identifies the persons and applications that have access to your ServiceNow instance. You can organize users into groups that are associated with the Company, Business Unit, and Department tables.

Organizational structure

Organization structure tables identify internal business structures and external customers, manufacturers, and vendors.

Company [core_company] table

The Company table is populated with the legal entities of companies. Entities can be either internal (your organization) or external. You can use the Parent attribute to build a hierarchy. Consider the legal entities that you need for reporting when the CMDB is populated.

- Internal entries should focus on a hierarchy of legal entities rather than a hierarchy of business units within a legal entity.
- External entries are identified by a True or False flag. The Customer flag identifies your external customers.

  The Manufacturer flag identifies companies that create products that you consume. An internal organization might be a manufacturer.

- The Vendor flag identifies organizations that provide products that you purchase. An internal organization might be a vendor.

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Business Unit [business_unit] table

The hierarchy of your business is populated in the Business Unit table with a reference to the parent company. A business unit is a part of your organization that is responsible for specific operations, such as finance, human resources (HR), or IT. A hierarchy within a business unit is common. For large multinational organizations, you might have business units that identify independent regional operations and the specific operations within the region.

Department [cmn_department] table

The Department table includes a finer level of detail about a business unit. The Department table gives you another way to categorize users, groups, assets, and CIs.

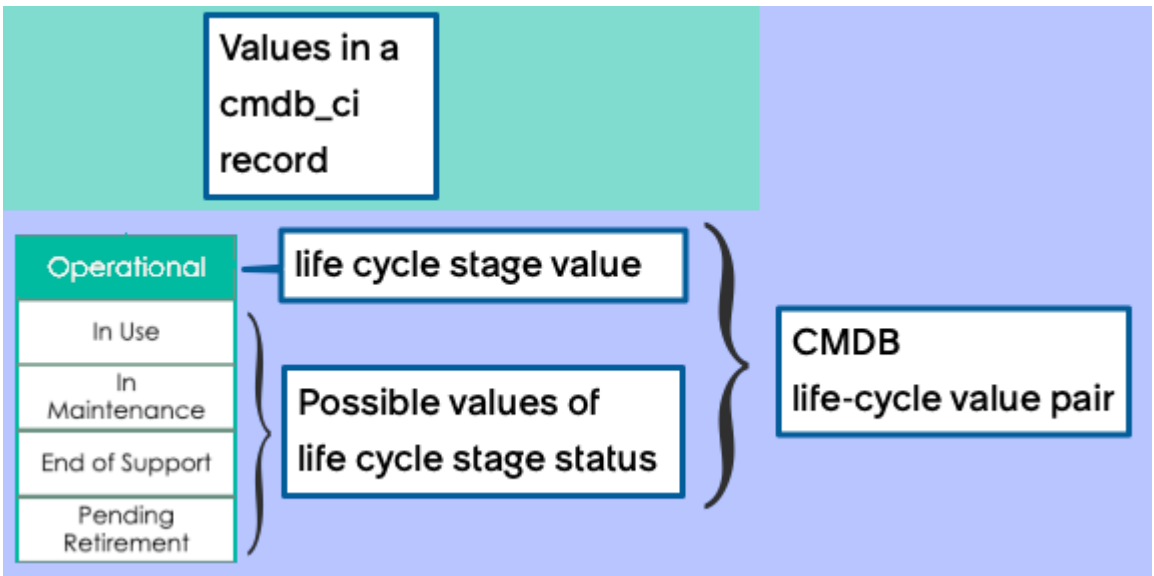
Life cycle tables

CSDM life-cycle value pairs track the life cycles for products, assets, contracts, CIs, locations, and other objects. Using the standard values consistently helps you to track objects through their transitions over time. Reporting can therefore accurately reflect the actual states of CIs: usage, availability, end of support, and so on.

The standard CSDM life-cycle value pair covers all phases of a product instance life cycle.

- A *`life cycle stage`* is one of the broad phases that a CI moves through, for example from inception or procurement to operation and then perhaps to end of life.
- *`life cycle stage status`* is the particular status of a CI within its current life cycle stage.

For example, a tangible/physical CI in the **Operational** stage might change stage status over time from **In Use** to **In Maintenance** to **End of Support**. A different tangible/physical CI might go from **In Use** to **End of Support** without ever having been in **In Maintenance** status.



Note:
The [life_cycle_control] table uses the type of CI (tangible/physical, document and contract, location and so on) to determine which *`life cycle stage status`* values are available for each *`life cycle stage`*.

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To take full advantage of the CSDM life-cycle standards, you can map legacy status data to the life-cycle value pairs. See Enabling life-cycle sync from legacy-to-asset.

The following assets can use life-cycle value pairs:

- Life cycle of product entities
- Life cycle of tangible/physical CIs
- Life cycle of intangible/logical entities
- Life cycle of document and contract entities
- Life cycle of location entities

Watch the ServiceNow Community video: CSDM V4 product and life cycle discussion

CSDM implementation stage — Crawl

In the Crawl stage, you work on base-system CMDB tables that are associated with IT Service Management (ITSM).

Benefits of the operations that you perform in the Crawl stage

- The operations provide the minimum CMDB support requirements for Incident Management and Change Management.
- Setting up APM is faster because your business application data is in the right place in the CMDB.
- The operations build the foundation for using DevOps because your SDLC component data is populated and ready to relate to your applications.
- Service Mapping is ready to use for mapping entry points because your service instance data is populated.
- The operations build the foundation for using TPM risk details, a capability of APM.

  The operations prepare you to manage and monitor the life cycles and versions of the underlying technologies of the business applications in your enterprise.

  The data enables you to identify outdated or at-risk software using APM, Service Mapping and Software Asset Management (SAM) Professional.

Tables that you work on during the Crawl stage

Important:
Future products and product enhancements depend on the data that you prepare in each of the tables.

During this stage, you work on the following base-system CMDB tables:

- Business Application [cmdb_ci_business_app] table
- Mapped Application Service [cmdb_ci_service_discovered] table.
- Application [cmdb_ci_appl] table (discoverable)
- Server/host (discoverable)

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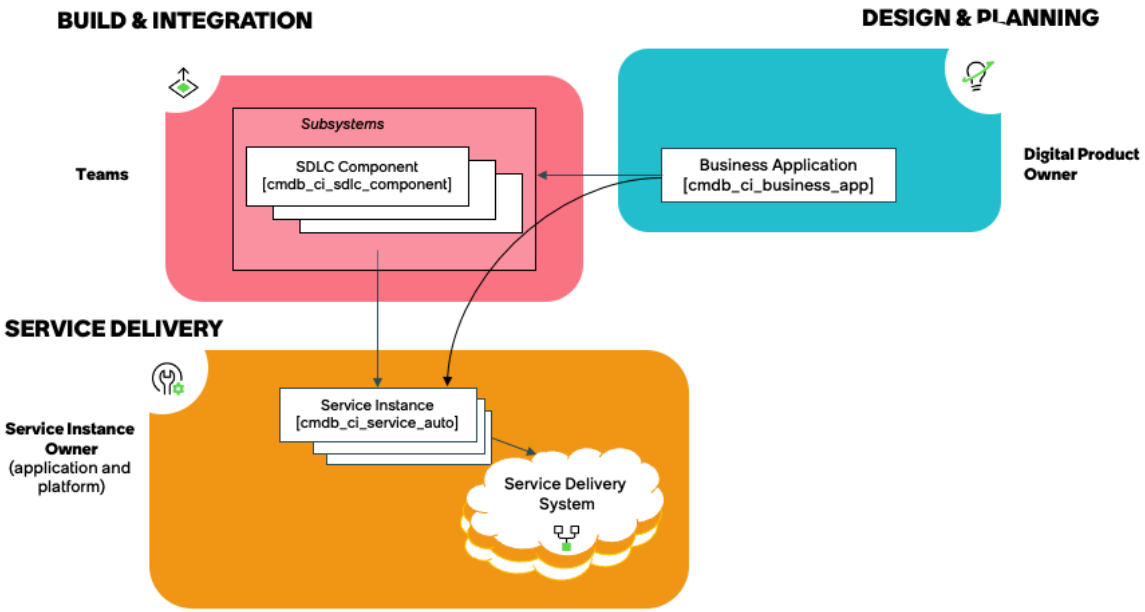
Note:
Some of the classes that you implement in this stage are logical CIs. Logical CIs aren't created through Discovery, so their **Model ID** values might not refer to product model (application model, service model, or software model) records. To help you to migrate to a product-centric management paradigm, each instance of a logical CI should be associated with a product model. See Auto-generate product models for logical CIs.



Start by focusing on applications and the application-related data in these areas and tables:

Business Application [cmdb_ci_business_app] table

A business application is a base-system CMDB table that stores your inventory, application portfolio, and their metadata.

Note:
Because this table holds conceptual data, not operational CIs, it is not used by ITSM Incident Management, Problem Management, or Change Management processes.

SDLC Component [cmdb_ci_sdlc_component] table

An Agile development component is a CI that represents a unique development effort of code. It represents parts of a larger business application or digital product broken down into its individually developed components. In other words, the Agile development component is a software element of a larger application or technology. Agile development component CI records in the Agile development Component [cmdb_ci_sdlc_component] table enable the DevOps product to provide enhanced capabilities for visualizing and managing your application development pipeline.

This table represents the software part or element of a larger whole for applications and infrastructure. Related material may serve as representative of developmental details. It can be used if you need to identify the stratification of a business application or digital product.

Note:
Because this table holds logical data, not operational CIs, it is not used by ITSM Incident Management, Problem Management, or Change Management processes.

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Service Instance (called application service before CSDM v5) [cmdb_ci_service_auto] table

The service instance is typically the system that a caller identifies when they report an issue with an application.

A mapped service instance is a base-system CMDB table that identifies the related business application in use. The service instance ties all the elements of the CSDM together where applications are present.

You might have several service instances representing each deployment based on the environment (development, QA, production) and location or geography (North America, Asia Pacific).

Because service instances are logical in nature, they should use the Logical life-cycle value pairs. Service instances follow the same life-cycle guidance as any other logical CI.

See Use Application Services dashboard to monitor health.

Application [cmdb_ci_appl] table

An application is a base-system CMDB table that represents the discoverable instance of an application: code related to a process in use on a host. This table isn't an inventory of your applications. Because of the high level of complexity involved, don't try to manually populate the application table. Discovery creates and maintains this table.

> **Important:**
> The application table [cmdb_ci_appl] isn't an inventory or portfolio of your applications. Don't make the mistake of storing managed application details in the application table. Those details (inventory or application portfolio objects) belong in the business application table (as documented in Design & Planning domain in the CSDM model).

The application might be identified as the root cause of an incident. However, if you're not using Event Management, the application might not be the initial cause.

If you're using Discovery, applications are automatically related to their host, which provides an impact hierarchy from server-to-host applications.

CSDM implementation stage — Walk

In the Walk stage, you identify and populate the network infrastructure CIs and applications that your organization's technical teams support.

Benefits of the operations that you perform in the Walk stage

Managing discovered infrastructure CIs

The operations facilitate managing the discovered infrastructure CIs. You might manually managing the metadata on these CIs, such as support group and technical approval group. By identifying the technology management offering that manages the CIs, you can perform the following operations:

- Configure the instance to populate and synchronize this metadata onto the related child objects.
- Eliminate the manual effort of maintaining the metadata on thousands of CIs.

View supported CIs

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The operations establish a view of the CIs that your organization's technical teams support.

You can see the specific support assignments, which you can change as needed based on your support structure, operational-level agreements (OLAs), and commitments.

Also, this view enables you to formalize for your process for supporting applications and technology owners.

Prepare for Service Portfolio Management

The operations build the foundation for using Service Portfolio Management (Service Portfolio Management).

You can start using Service Portfolio Management more quickly because your service data are in the right place.

Use the request catalog

The operations enable you to order technology service offerings through the request catalog. You can also automate ordering some offerings to enhance the request workflow and update or create related CIs. Catalogs are described in detail in Service Catalog.

Note:
The request catalog is not a CMDB table.

Prepare for ITOM products

The operations build the foundation for Information Technology Operations Management (ITOM) products, such as Service Mapping and Discovery.

Enable Automation

The operations enable more automated methods of grouping CIs for identification and management by Technology management offerings.

Tables that you work on during the Walk stage

The walk stage includes base-system CMDB tables that identify the technology provider.

Note:
Some of the classes that you implement in this stage are logical CIs. Logical CIs aren't created through Discovery, so their **Model ID** values might not refer to product model (application model, service model, or software model) records. To help you to migrate to a product-centric management paradigm, each instance of a logical CI should be associated with a product model. See Auto-generate product models for logical CIs.

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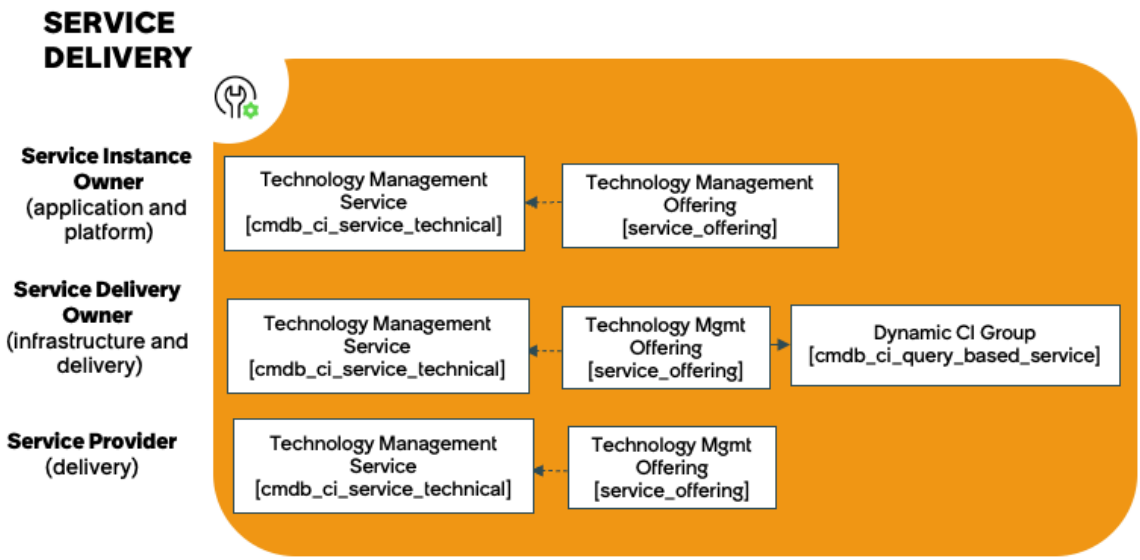

Technology management service [cmdb_ci_service_technical] table (formerly Technical service), or [cmdb_query_based_services] for Event Management

The cmdb_ci_service_technical table has a service classification of "technical service". This base-system CMDB table identifies the provider of the technology that your business consumes.

Technology management offering [service_offering] table

A technology management offering is a service offering with a service classification of "technical service". Technology management offerings may be further divided as follows:

- Location and geography
- Environment (production or non-production)
- Pricing
- Availability
- Support group (for Incident Management)
- Technical approval group (for Change Management)
- Packaging options (commitments)

The technology management offering comes from the service, based on how the parent serves a specific technical need. Every operational technology management service must be associated with at least one technology management offering.

Note:
Not all technology management offerings have to be related to applications or infrastructure CIs. Managed Service Providers can provide technology management offerings.

Dynamic CI group [cmdb_ci_query_based_service] table

A dynamic CI group is a collection of CIs based on the results of saved Query Builder queries, encoded queries, or manual entries. Query Builder is described in Exploring CMDB Query Builder. For more information about dynamic CI groups and how you can use them, see Manage Portfolio domain in the CSDM model.

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CSDM implementation stage — Run

In the Run stage, you set up the relationship between a technology and the business that sells and consumes the technology.

ITSM considerations during the Run stage

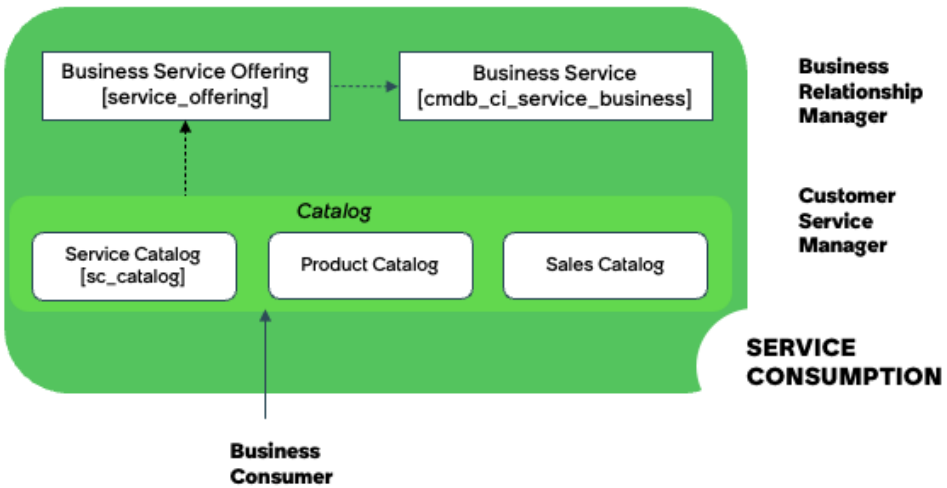
When you use ITSM, you must understand the impact that a technology can have on your business. For example, your business might perform the following actions:

- Consume the technology.
- Sell the technology (as is the case with Customer Service Management).
- Both sell the technology and consume it.

Benefits of the operations that you perform in the Run stage

- Run-stage operations promote impact assessment for Incident Management and Change Management. Within an incident or change, you can identify the impacted business, assuming relationships exist between the selected CI and the impacted businesses.
- Run-stage operations provide a foundation for using Service Portfolio Management in the Digital Portfolio Management (DPM). Service owners can monitor service portfolios and understand service-related information including service trends, improvement initiatives, service performance, and outage monitoring.
- Run-stage operations provide a foundation for ITSM capabilities. This foundation populates the related "Subscribe by" table on a service offering to identify the business and subscribers affected. Business service offerings can identify subscribers by user, company, location, department, and group.

Tables that you work on during the Run stage



Note:
Some of the classes that you implement in this stage are logical CIs. Logical CIs aren't created through Discovery, so their **Model ID** values might not refer to product model (application model, service model, or software model) records. To help you to migrate to a product-centric management paradigm, each instance of a logical CI should be associated with a product model. See Auto-generate product models for logical CIs.

Business service portfolio [service_portfolio] table

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Note:
The Business service portfolio is not a CMDB table.

A business service portfolio is not a CMDB table. A business service portfolio is a hierarchical collection of business services (products and services) that define a business objective.

Business service [cmdb_ci_service_business] table

The business service table is a base-system CMDB table. This table identifies a business objective that uses (and depends on) the infrastructure that technology uses.

This dependency means that the business service must sell or consume that infrastructure.

Business service offering [service_offering] table (service offering classified as a "business service")

Business service offerings are the starting point for configuring Service Portfolio Management. Business service offerings consist of one or more service commitments. These service commitments uniquely define the level of service in terms of availability, scope, pricing, and other factors.

The business service offering comes from the service. The business service offering is fine-tuned based on how the parent serves a specific technical need.

Every business service should have at least one business service offering.

Request catalog

A catalog (sometimes called a request catalog, service catalog, or service request catalog) is a set of business and technical products, services, service commitment options, and offerings that users can order on a self-service basis. You can manage a catalog to present your available products and services to users as catalog items. Catalogs are described in detail in Service Catalog.

CSDM implementation stage — Fly

When you reach the Fly stage, you have accomplished all or most of the process of implementing the CSDM framework. The fly stage completes the process.

Benefits of the operations that you perform in the Fly stage

The Fly stage is a foundation for using APM capabilities

You can use Application Portfolio Management (APM) capabilities to rationalize your business applications. Ask questions such as the following:

- Are you spending too much on your business capabilities?
- Are you spending too little on your business capabilities?
- Should you increase the amount you spend on emerging business capabilities?

The Fly stage is a foundation for using APM with Service Portfolio Management capabilities

You can use APM with Service Portfolio Management capabilities to rationalize your business services and related offerings. Ask questions such as the following:

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- Are you spending too much or too little on services?
- Are you spending too little or too little on services?
- Are they the right services compared to emerging capabilities?

The Fly stage is a foundation for using ITSM capabilities

Use a request catalog to relate a service offering to a catalog item. You can also enhance the request workflow to automatically populate the “Subscribe by” table. Service catalogs are described in detail in Service Catalog.

Note:
The request catalog is not a CMDB table.

The Fly stage can hep you to manage business services

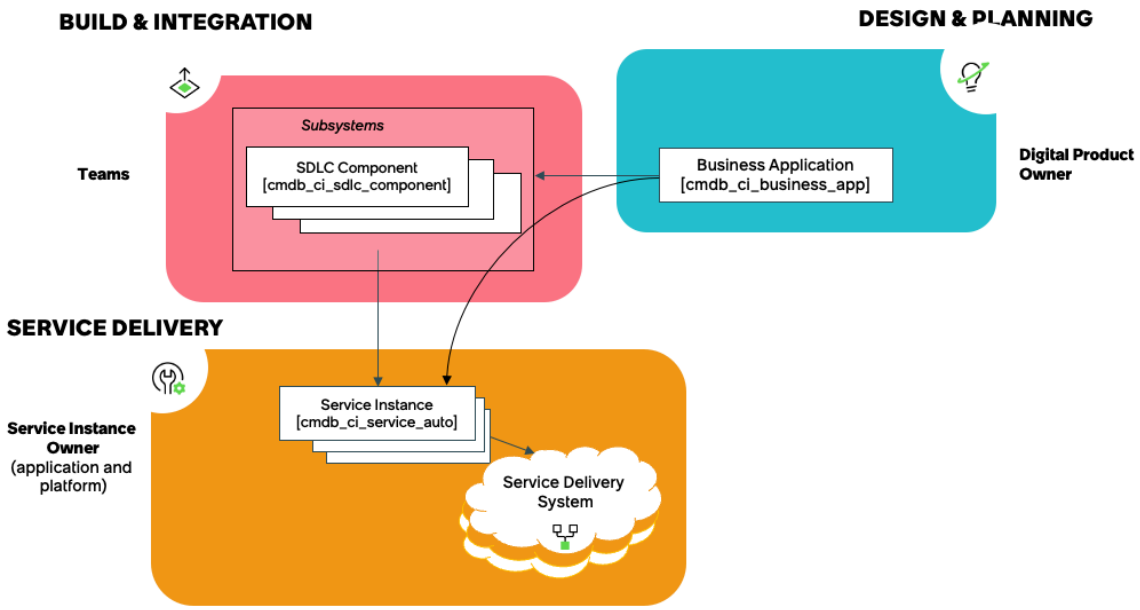
If your environment has a combination of CIs from each of the CSDM domains, this stage provides away to manage business services.

The Fly stage is a way to identify the types of data that may be contained in or used by your business applications

The information object table helps you see what's in your information portfolio.

Tables that you work on during the Fly stage

You reach the fly stage after you have accomplished all or most of the earlier stages.



Note:
Some of the classes that you implement in this stage are logical CIs. Logical CIs aren’t created through Discovery, so their **Model ID** values might not refer to product model (application model, service model, or software model) records. To help you to migrate to a product-centric management paradigm, each instance of a logical CI should be associated with a product model. See Auto-generate product models for logical CIs.

The fly stage completes the remaining aspects of CSDM framework:

Business capability [cmdb_ci_business_capability] table

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A business capability is a high-level capability that supports a business model or fulfills a mission for your organization.

Information object [cmdb_ci_information_object] table

You capture asset information as information objects. You can connect the information objects to your business applications to create an application portfolio that you can use at any time.

You can use the Information Object table to identify the types of data that a business application uses, including highly sensitive data such as:

- Personally Identifiable Information (PII)
- Payment Card Industry Data Security Standard (PCI DSS) data
- Health Insurance Portability and Accountability Act (HIPAA) data

Information objects are part of the information portfolio. The information portfolio links to the following data:

- Data Domains: Total number of records in the Data Domain[sn_apm_data_domain]. table
- Information Objects: Total number of records in the Information Object [cmdb_ci_information_object] table.
- Database Instances: Total number of records in the Database Instance [cmdb_ci_db_instance] table.
- Database Catalogs: Total number of records in the Database Catalog [cmdb_ci_db_catalog] table.

Important:
You might implement the Information object [cmdb_ci_information_object] table as part of an earlier stage. Your business requirements determine the right stage for implementing the table.

Request catalog

Users request services through the request catalog. The request catalog is not a CMDB table. Catalogs are described in detail in Service Catalog.

The fly stage includes these components:

- Business service portfolio [service_portfolio] table
- Business service [cmdb_ci_service_business] table; (service classified as a "business service")
- Business service offering [service_offering] table; (service offering classified as a "business service")

Access CSDM features

The CSDM is the data model that admins should follow when they set up ServiceNow products and applications. The standards for defining configuration items (CIs) and relationships between CIs in the CMDB helps to promote that your data resides in the appropriate CMDB tables. The result is maximum value from ServiceNow AI Platform applications.

CSDM modules

Navigate to the modules that assist you in implementing and managing the CSDM domains and their components.

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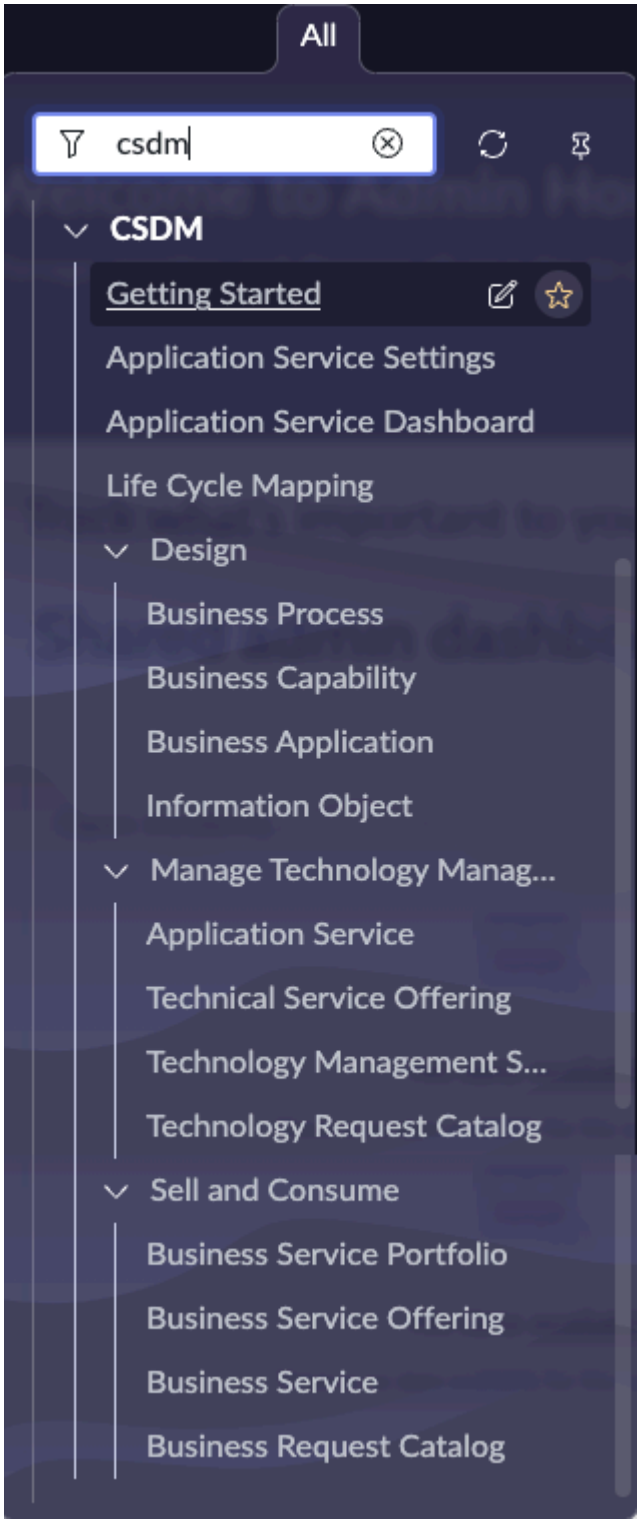

CSDM Data Foundations Dashboard

The CSDM Data Foundations dashboard displays key CSDM indicators on a single page to help you get the full benefit from your ServiceNow AI Platform products. See CSDM Data Foundations dashboard.

Getting Started

Select **Getting Started** to open the library of CSDM user documentation — the documentation you're viewing now.

Service Instance Settings

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Use the Service Instance Settings module to specify the attributes and relationships that are required when a user creates a service instance. For more information, see Modify the attributes and relationships required for application services.

See Use Application Services dashboard to monitor health.

Service instances Dashboard

The Application Services dashboard enables you to monitor and manage service instances (service instances were formerly called application services) to verify that they are fully configured and are populated in the CMDB. See Monitoring and managing Configuring service instance settings.

Life Cycle Mapping

Use the Life Cycle Mapping module to specify how existing legacy status values should be converted to CSDM life-cycle value pairs (*`life cycle stage`* and *`life cycle stage status`*). You map both asset and CI legacy status values to life-cycle value pairs. See Enabling life-cycle sync from legacy-to-asset.

Design

Work in the tables that are referenced in the Design & Planning domain of the CSDM. See Design & Planning domain in the CSDM model.

Service Delivery

Work in the tables that are referenced in the Service Delivery domain of the CSDM. See Service Delivery domain in the CSDM model.

Sell and Consume

Work in the tables that are referenced in the Service Consumption domain of the CSDM. See Service Consumption domain in the CSDM model.

Synchronize data for 'Managed by' and 'Change' groups

Synchronizing group assignment attributes

Set the group for a CI or an entire class of CIs

Synchronize user groups for a technology management offering

CSDM Data Foundations dashboard

The CSDM Data Foundations dashboard displays key CSDM indicators on a single page to help you get the full benefit from your ServiceNow AI Platform products.

Access the dashboard

Use either of the following methods to open the dashboard:

Navigate to **All** > **Configuration**, and then select **CSDM Data Foundations Dashboard**.

1. In CMDB Workspace, navigate to **Workspaces** > **CMDB Workspace**.
2. Select **Management** in the CMDB Workspace menu bar.
3. Select **CSDM Data Foundations Dashboard** in the Optimize section of the Management tools.

Select the change dashboard icon ( ) to toggle between the CSDM and CMDB dashboards.

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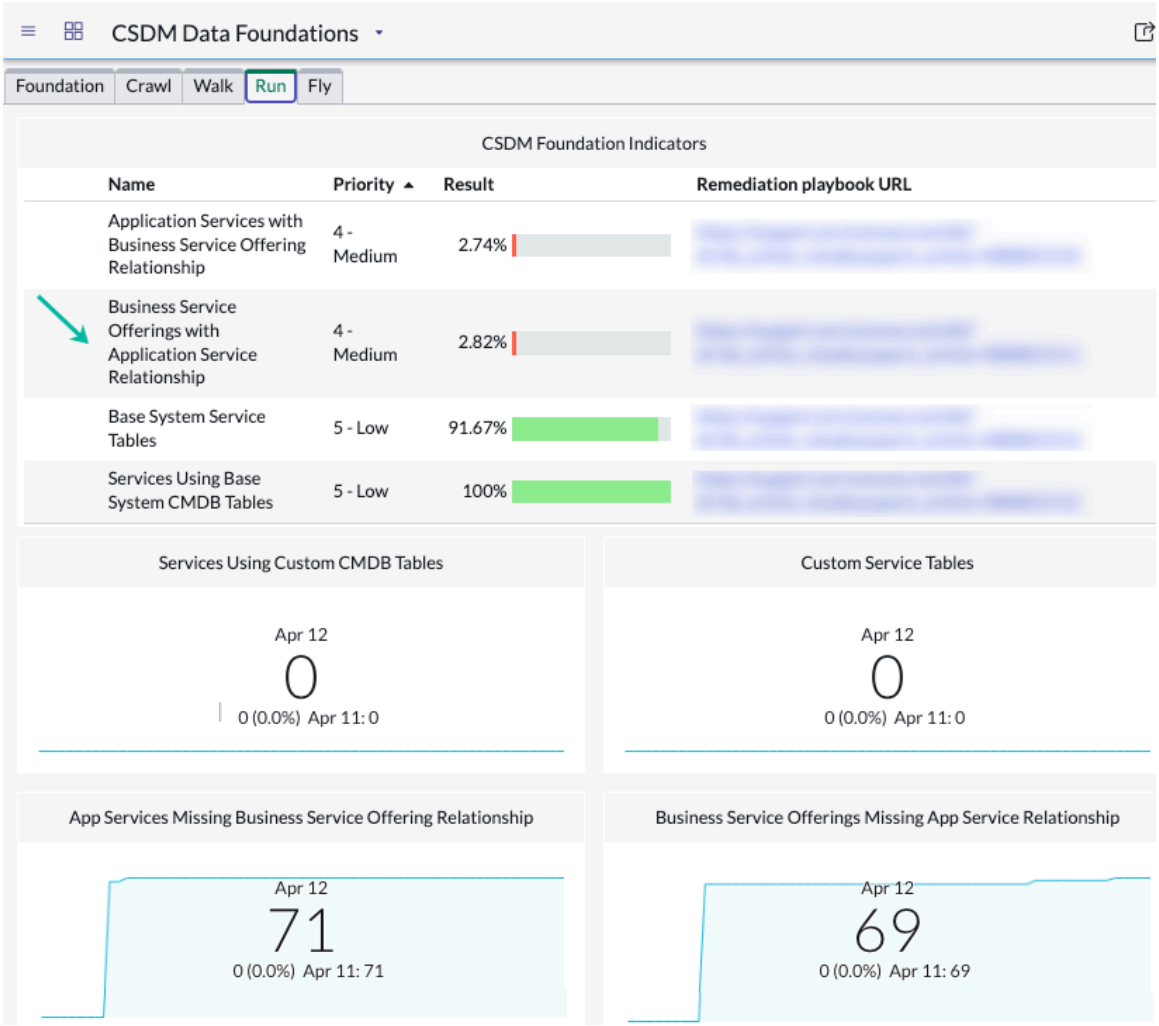
Example

The reports on each tab display the data metrics that are appropriate for the maturity of your organization's CSDM implementation stage (foundation, crawl, walk, run, and fly). A label on each report identifies the metric being displayed.

In this example, a report on the **Run** tab indicates that several business service offerings don't have the required relationships to service instances . With this knowledge, Service owners can add the relationships to promote that customer service agents get complete information on the impact of applications that are down.



Tabs on the dashboard

- Tables in the Foundation domain contain base data that is referenced from or to objects in the other CSDM domains. Before you can use ServiceNow products, you must populate foundational data. See 'Foundation' stage reports on the CSDM Data Foundations dashboard.
- In the Crawl stage, you work on base-system CMDB tables that are associated with IT Service Management (ITSM). See 'Crawl' stage reports on the CSDM Data Foundations dashboard.
- In the Walk stage, you identify and populate the network infrastructure CIs and applications that your organization's technical teams support. See 'Walk' stage reports on the CSDM Data Foundations dashboard.

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- In the Run stage, you set up the relationship between a technology and the business that sells and consumes the technology. See 'Run' stage reports on the CSDM Data Foundations dashboard.
- When you reach the Fly stage, you have accomplished all or most of the process of implementing the CSDM framework. The fly stage completes the process. See 'Fly' stage reports on the CSDM Data Foundations dashboard.

Managing performance of data collection

For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.

Related topics

Configure the CSDM Data Foundations dashboard

Monitor health in CSDM and CMDB Data Foundations Dashboards

Monitoring and managing Configuring service instance settings

The Application Services dashboard enables you to monitor and manage service instances (service instances were formerly called application services) to verify that they are fully configured and are populated in the CMDB.

Working in the dashboard

A report on the dashboard, for example, can direct you to a service instance that is not configured with a service population method so you can repair it. For information on working in the dashboard, see Use Application Services dashboard to monitor health.

Applying CSDM guidelines to your product — product views

ServiceNow products are CSDM-aware — they expect that CMDB data is organized according to CSDM guidelines and they benefit from that organization.

The topics in the next section identify the specific CMDB tables that the products update and obtain data from. The topics provide practical instructions for implementing the CSDM guidelines.

- Brief overview of the function and benefits of the product.
- CMDB tables managed by the product.
- CMDB tables used by the product.
- Mention of other ServiceNow products that add value to the product.
- Mention of other ServiceNow products that benefit from the product.
- Use case and examples.

The topics do not address the following information:

- Implementing the ServiceNow product.
- Configuring systems that are not included in the base system. Such systems might be referred to in this product view, but they are out-of-scope.
- Using other ServiceNow products, such as IT Service Management (ITSM), Strategic Portfolio Management (SPM), and IT Operations Management (ITOM).

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Note:
A CSDM use case might have one or more data types. Other ServiceNow products may also manage those data types. The use cases don't describe all possible product dependencies.

Products and features that benefit when following the CSDM guidelines

Change Management

Applying CSDM guidelines to Change Management

Customer Service Management

Customer Service Management and the CSDM guidelines

Digital Portfolio Management

Apply the CSDM guidelines to Digital Portfolio Management

Enterprise Architecture (EA) [formerly Application Portfolio Management]

Applying the CSDM guidelines to Enterprise Architecture

HR Service Delivery for Healthcare

HR Service Delivery and CSDM tables

Incident Management

Applying CSDM guidelines to Incident Management

Install Base Management

Common Service Data Model framework for Install Base Management

ITOM Health

Applying the CSDM guidelines to ITOM AIOps

ITOM Visibility

Applying the CSDM guidelines to ITOM Visibility

Operational Technology Manager

Implementing the CSDM framework for Operational Technology

Problem Management

Applying CSDM guidelines to Problem Management

RPA Hub

Applying the CSDM guidelines to RPA Hub

Service Catalog

Service Catalog and CSDM

Service Portfolio Management

Applying the CSDM guidelines to Service Portfolio Management

Vulnerability Response

Vulnerability Response applications and CSDM tables

CSDM videos in the ServiceNow Community

Playlist of all CSDM videos

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CSDM reference

Reference topics provide detailed descriptions of tables, properties, forms, and roles that are used in the CSDM framework.

Basics

CSDM terms

CI relationships in the CSDM

How CSDM concepts map to CMDB tables

Life cycles

Life cycle of document and contract entities

Life cycle of tangible/physical CIs

Life cycle of location entities

Life cycle of intangible/logical entities

Life cycle of product entities

CSDM resources

Resources and videos that complement the documentation.

Important resources

- Download the CSDM White paper from the Now Create site
- Join the ServiceNow CSDM Community to grow your CSDM expertise.

Videos for getting started

- CSDM 101: Everything you must know: https://youtu.be/hANONH1c1vQ
- Ask the experts: Getting started with CSDM: https://youtu.be/F1Qznf7kgnE

CSDM terms

Most ServiceNow products and ServiceNow AI Platform applications align closely with the Common Service Data Model. This table defines terms as they are used across the ServiceNow AI Platform.

Common CSDM terms

Term	Definition	Notes
Application	Any deployed program, module, or group of programs that provides specific functionality on a computer infrastructure.	Defines behavior and has specific functionality associated with it. Applications are typically discoverable functionality, like Apache Web Server.
Asset	An item whose financial value is tracked.	Many, but not all, assets are CIs and many, but not all, CIs are assets. Assets have a life cycle

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Common CSDM terms (continued)

Term	Definition	Notes
		with financial considerations, for example, Microsoft 365.
Business Application	Represents all software and infrastructure environments (dev, test, prod) that are configured to provide functionality.	Used to increase productivity and perform other business functions accurately. For example, Dell Online.
Business capability	High-level capability that an organization requires to execute its business model or fulfill its mission.	Typically described in the context of performing one or more specific tasks to achieve business outcomes. For example, demand management or financial planning.
Business service	A business service is a service type that is published to business users. A business service typically implements one or more business capabilities.	Usually, business users order business services. Business users can select the desired offering and service commitment levels via the Service Catalog. For example, procurement, shipping, and finance. • A business service is an operational CI. • A business service must be a one-level service and not a hierarchy of business services. • A business service can be used for impact in Incident Management, Problem Management, and Change Management and for approvals for Change. • A business service must be focused on the consumer or seller.
Business service offering	Business service offerings are the starting point for configuring Service Portfolio Management. Business service offerings inherit from Business Services. Business service offerings consist of one or more service commitments that define the level of service in terms of availability, scope, pricing, and other factors. For example, an organization might offer two levels of desktop support:	See Service Consumption domain in the CSDM model for details.

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Common CSDM terms (continued)

Term	Definition	Notes
	• A silver offering of upgrades and virus protection. • A gold offering with the silver commitments plus a response time guarantee of 30 minutes between the hours of 8:00 a.m. and 5:00 p.m., Monday through Friday.	
Configuration item (CI)	Physical and logical components of an infrastructure that are currently or soon will be under configuration management.	Might be a single module such as a server, database, or router or a more complex item, such as a complete system. For example, a web server, database, or infrastructure.
Operating model	An abstract and ideally visual representation (model) of how an organization delivers value to its customers or beneficiaries.	Typically represents the various elements of how an organization operates. It usually incorporates strategy positions such as the innovation model, degree of intelligent automation, industry alignment, provider delivery models, and the business expectations of IT.
Portfolio	Collection of services, products, projects, or applications.	Used to manage like items together for a business. Portfolios may be grouped by objective, capabilities, organization, like projects, or services.
Service	Means of delivering value to customers by facilitating outcomes that users want to achieve without the ownership of specific costs and risks.	Typically has three aspects: • Interaction • Offering • Service system ServiceNow provides three base service types: • Business • Technical • Application You can extend the base types to align with the service types in your organization.
Service catalog	Provides consumable view of available products, services, service commitment options, and offerings.	Helps manage which services a user may have access to.

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Common CSDM terms (continued)

Term	Definition	Notes
		Also, catalogs are the starting point for access to available services. For example, IT services catalog.
Service commitment	Defines the service delivery obligations agreed to between the consumer and the provider.	Often manifested in the form of contracts such as service level agreements, operational level agreements, and underpinning contracts. Service commitments include specific performance characteristics that differentiate one offering from another.
Service instance (called application service before CSDM v5)	A service type that is a logical representation of a deployed application stack.	Examples of service instances are hosting, data backup, and recovery. **Note:** Applications and service instances do not have a one-to-one relationship. A service instance can include multiple applications. An application can be included in multiple service instances. See Use Application Services dashboard to monitor health.
Service offering	A stratification of a service into capability, availability, pricing, and packaging options.	Different levels of performance and features for a given service can be made available. For example, ITSM Standard and ITSM Pro.
Technology management service (formerly Technical service)	A service type that is published to service owners and typically underpins a business or service instance.	Can typically be ordered by service owners. Service owners can select the desired offering and service commitment levels via the Service Catalog. For example, computers, storage, and networks.

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Common CSDM terms (continued)

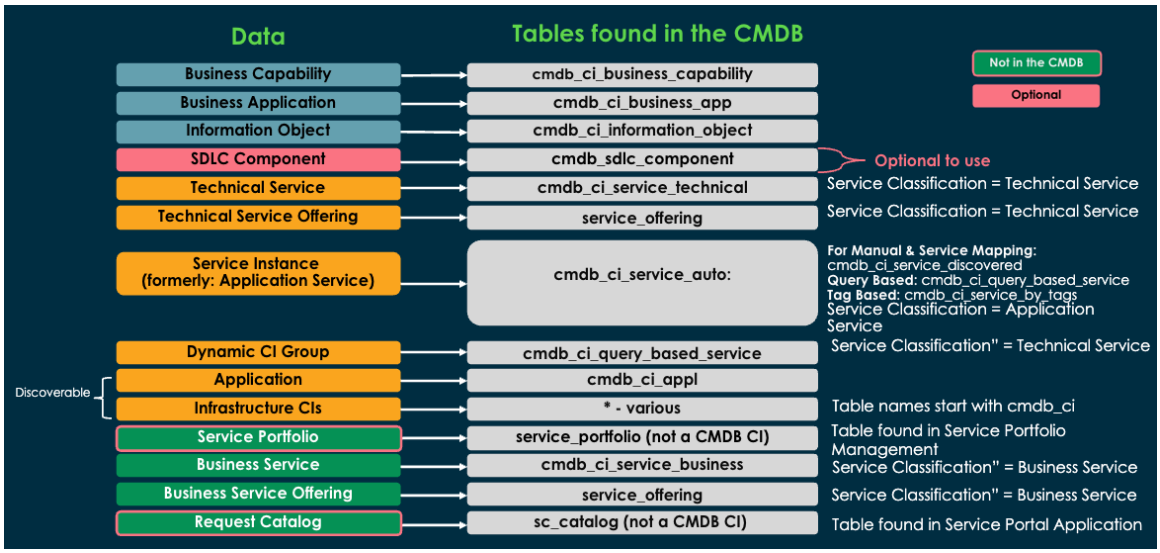
Term	Definition	Notes
Technology management offering	A technology management offering is a service offering with a service classification of "technical service". Technical service offerings may be further divided as follows: • Location and geography • Environment (production or non-production) • Pricing • Availability • Support group (for Incident Management) • Technical approval group (for Change Management) • Packaging options (commitments) The technical service offering comes from the service, based on how the parent serves a specific technical need. Every operational technical service must be associated with at least one technology management offering.	**Note:** Not all technology management offerings must be related to applications or infrastructure CIs. Managed Service Providers can provide technical service offerings.

Related topics

CSDM resources

How CSDM concepts map to CMDB tables

The objects in the conceptual CSDM framework must map to the physical model objects (CIs and CI class tables) in the CMDB. You can navigate in the platform to see dictionary attributes.



Business Application data belongs in the cmdb_ci_business_app table, and not in the cmdb_ci_app table.

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Note:
Business services and technology management services connect to the spm_service_portfolio through the spm_taxonomy_node. See Service Portfolio Management taxonomy.

CSDM videos in the ServiceNow Community

Playlist of all CSDM videos

Related topics

CSDM resources

CI relationships in the CSDM

For configuration management to be most effective, establish relationships between the objects and CIs in the conceptual CSDM.

Required CSDM relationships

- Most features and products, such as the Technology Portfolio Management risk assessment and Application Portfolio Management (APM), depend on the relationships.
- The relationships commonly created as part of Service Mapping and Discovery are the standard for infrastructure CIs. If you map the elements manually, be sure to consider how Discovery would have treated them.
- Not all objects in the CSDM conceptual model are CMDB tables, and not all the objects have relationships. You might create some of the following required relationships.
- CSDM v5 implements the **Uses::Used By** relationship between Business Applications and Application Services. Earlier CSDM versions used **Consumes::Consumed By**. A Business Application, ultimately, relates to an Application Service table and not any other type of Service Instance.

  Note:
  Enterprise Architecture Workspace users should continue to use the **Consumes::Consumed by** relationship so that the TPM and TRM life cycle timelines are displayed correctly.

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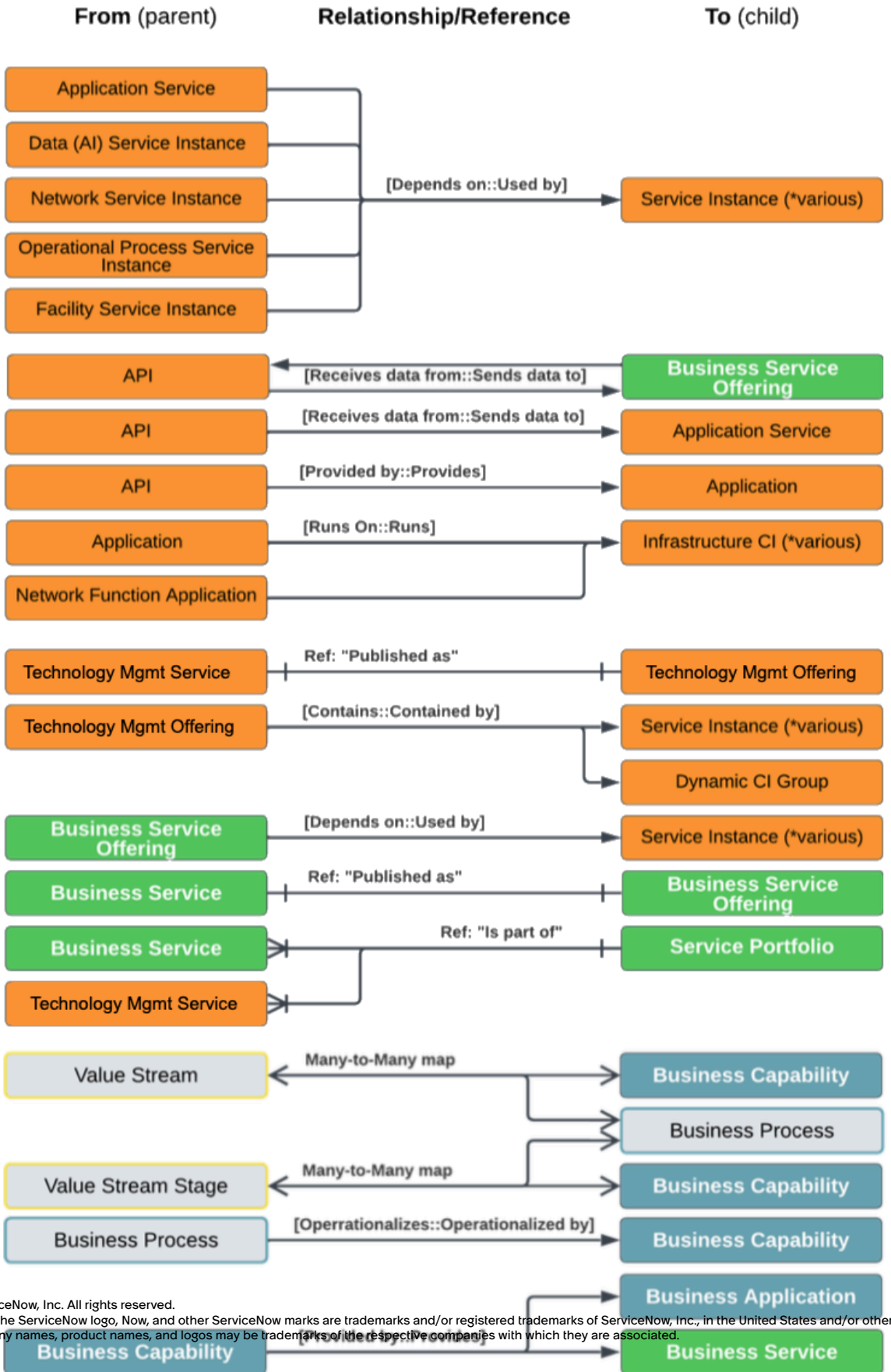

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Note:
Business services and technology management services connect to the spm_service_portfolio through the spm_taxonomy_node. See Service Portfolio Management taxonomy.

Resources in the ServiceNow Community

For an extended explanation of the business application reference attribute's role in managing platforms from a CSDM perspective, see this article in the ServiceNow community.

Playlist of all CSDM videos

Related topics

CSDM resources

How life-cycle values for Asset, CI, and IBI are synced

Your organization gains significant value from your ServiceNow AI Platform applications when you take advantage of the option to directly map legacy status values to CSDM *life cycle stage* and *life cycle stage status* values and auto-synchronize the values going forward.

How Asset, CI, and IBI life-cycle values are synced

Any item that is provided as a service or sold to your customer is tracked as an Install Base Item (IBI). The Model category table associates Asset, CI, and IBI for the item.

Sync between asset and IBI

By default, the system syncs life-cycle values between asset and IBI using the CSDM *life cycle stage* and *life cycle stage status* life-cycle value pairs.

Sync between asset and CI

When the CSDM (csdm.lifecycle.migration.activated) plugin is activated on your instance, sync between the asset and CI tables depends on the *csdm.lifecycle.sync.between.ci.and.asset.activated* system property setting:

- When the property is set to true, the system syncs the CSDM *life cycle stage* and *life cycle stage status* values directly. This option provides significant benefits to your organization.

  Important:
  The property is set to true when you select **Enable life cycle sync** on the Life cycle mappings list view.

- When the property is set to false (default), sync occurs through the legacy **status** and **substatus** values.

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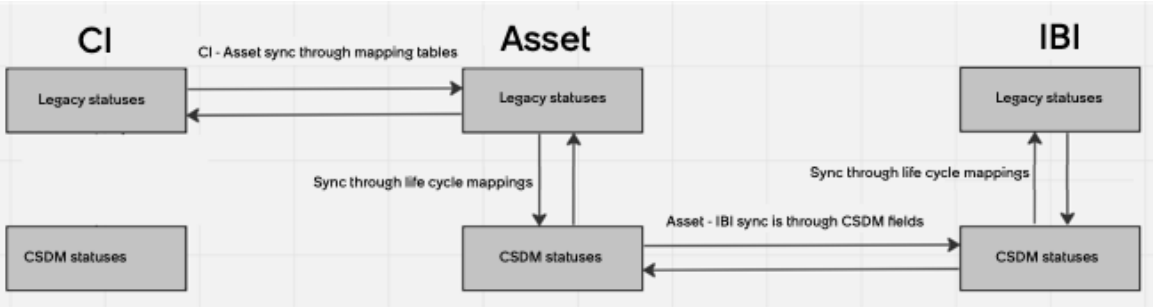
Life-cycle sync when the system property is set to false (the default setting)



When the CSDM (csdm.lifecycle.migration.activated) plugin is activated on your instance and the *csdm.lifecycle.sync.between.ci.and.asset.activated* system property is set to false:

Sync of updates from asset to IBI and CI

Updates made to the **status** or **substatus** value of an asset are synced with the associated IBI and CI. For example, when the **State** value of the asset is updated to **In use**, sync happens as follows:

- The *life cycle stage* and *life cycle stage status* values of the asset are set to **Operational** and **In use**, these values are then synced with *life cycle stage* and *life cycle stage status* values of IBI asset.
- The **status** and **substatus** values of the CI change to **Installed** and **In use**.

Sync of updates from IBI to asset and CI

Updates made to the *life cycle stage* and *life cycle stage status* values of an IBI asset are synced with the legacy **status** and **substatus** values of the asset through the CSDM values. The **status** and **substatus** values of the asset are then synced with the associated CI. For example, when the *life cycle stage* and *life cycle stage status* values of an IBI asset are updated to **Defective** and **In Stock**, sync happens as follows.

1. The *life cycle stage* and *life cycle stage status* values of the asset change to **In Stock** and **Defective**. These values are synced with the **status** and **substatus** values of the asset.
2. The **status** and **substatus** values of the asset are then synced with the associated CI.

Sync of updates from CI to asset and IBI

Updates made to the **status** and **substatus** values of a CI are synced with the associated asset. The **status** and **substatus** values of the asset are then synced with the *life cycle stage* and *life cycle stage status* values of the IBI asset through the CSDM values. For example, when the **status** and **substatus** values of a CI are updated to **Retired** and **Donated**, the corresponding values of the asset change. The changes from the asset are synced with the IBI asset and the *life cycle stage* and *life cycle stage status* values change to **End of Life** and **Retired**.

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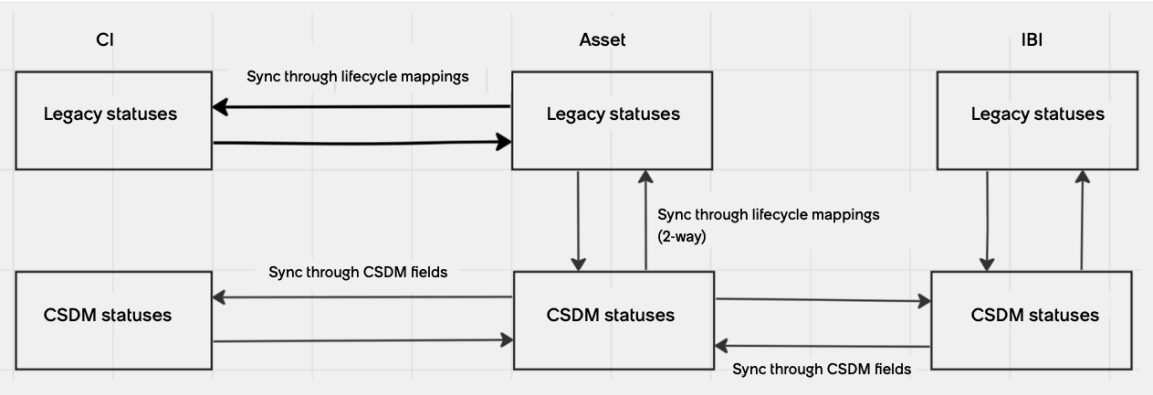
Life-cycle sync when the system property is set to true



When the CSDM (csdm.lifecycle.migration.activated) plugin is activated on your instance and the *csdm.lifecycle.sync.between.ci.and.asset.activated* system property is set to true (or you select the select **Enable life cycle sync** on the Life cycle mapping table list page, as described in Enabling life-cycle sync from legacy-to-asset):

Sync of updates from asset to CI and IBI

Updates made to the legacy **status** and **substatus** values of the asset are synced between the asset and CI as follows:

- The *life cycle stage* and *life cycle stage status* values of the asset are updated with values mapped to the legacy **status** and **substatus** values of the asset.
- The **status** and **substatus** values of the asset are then directly synced with the **status** and **substatus** values of the associated CI.
- The *life cycle stage* and *life cycle stage status* values of the asset are then directly synced with the associated CI.

However, sync of updates from asset to IBI is only through the CSDM life-cycle value pairs.

Sync of updates from IBI to asset and CI

Updates made to the *life cycle stage* and *life cycle stage status* values of the IBI are synced as follows:

- The legacy **status** and **substatus** values of the asset are synced with the CSDM life-cycle value pairs.
- The **status** and **substatus** values of the asset are synced with the **status** and **substatus** values of the associated CI.
- The life-cycle value pairs of the asset are directly synced with the associated CI.

Sync of updates from CI to asset and IBI

Updates made to the *life cycle stage* and *life cycle stage status* values of a CI are synced as follows:

- The *life cycle stage* and *life cycle stage status* values of the CI are directly synced with the associated asset.
- The **status** and **substatus** values of the asset are then updated with the values mapped to the CSDM values.

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- The **status** and **substatus** values of the asset are then synced with the associated CI.
- The **status** and **substatus** values of IBI are synced with the asset through the CSDM life-cycle value pairs.

Related topics

Asset and CI management

Life cycle mapping form

Use the Life Cycle Mapping module to specify how existing legacy status values should be converted to CSDM life-cycle value pairs (*life cycle stage* and *life cycle stage status*). You map both asset and CI legacy status values to life-cycle value pairs.

Fields on the Life cycle mapping form

Life cycle mapping form

Field	Description
Mapping for table	Legacy CMDB table and descending tables that this mapping applies to. Applies to a descending table unless there is a mapping configured specifically to the descending table.
Priority	Priority of applying this mapping definition for the table. The **Priority** value on the life cycle mapping table is used when a record update triggers the “legacy-to-life-cycle” sync, and multiple legacy value states on the record match with mapping rules. Of the multiple values, the highest priority (lowest numerical value) entry is used to set the life-cycle value pairs. If the highest priority entry can't be used, the system uses the next record in priority. **Note:** Priority is not used if **Reverse sync** is active because there should be a maximum of one reverse-sync choice for each life-cycle value per class.
Active	Denotes whether to apply this mapping definition. Deactivation results in lower-priority mappings being used or setting standard life cycle fields to **TBD**.
Legacy field name	Legacy field in the specified *Mapping for table* that is currently being used to store a

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Life cycle mapping form (continued)

Field	Description
	life cycle stage. The value should be used as the source for the life cycle mapping.
Legacy subfield name	Value to set if the **Legacy field name** has a subfield. For example, if hardware **Status** has a substatus, then specify the name of the substatus here.
Legacy field value	Legacy value in the specified *`Mapping for table`* that is currently being used store life cycle stage. The value should be used as the source for the life cycle mapping.
Legacy subfield value	Value that is set if the **Legacy field value** has a subfield. For example, if hardware **Status** has a substatus, then specify the value of the substatus here.
Life cycle control	Class and life cycle stage and life cycle stage status that are used as the authoritative source of valid combinations for life cycle mapping.
Table	Standard object table that the Life cycle control belongs to.
Life cycle stage	Standard life cycle stage to map the specified **Legacy field value** to. **Note:** The **Life cycle control** setting determines that this particular life cycle stage is appropriate for the mapping. If there is no match in the life_cycle_mapping table, the value is set to **TBD**.
Life cycle stage status	Standard life cycle stage status to map the specified **Legacy field value** to. **Note:** The **Life cycle control** setting determines that this particular life cycle stage status is appropriate for the mapping. If there is no match in the life_cycle_mapping table, the value is set to **TBD**.

'Foundation' stage reports on the CSDM Data Foundations dashboard

The **Foundation** tab on the CSDM Data Foundations dashboard identifies data that might be missing from the CMDB.

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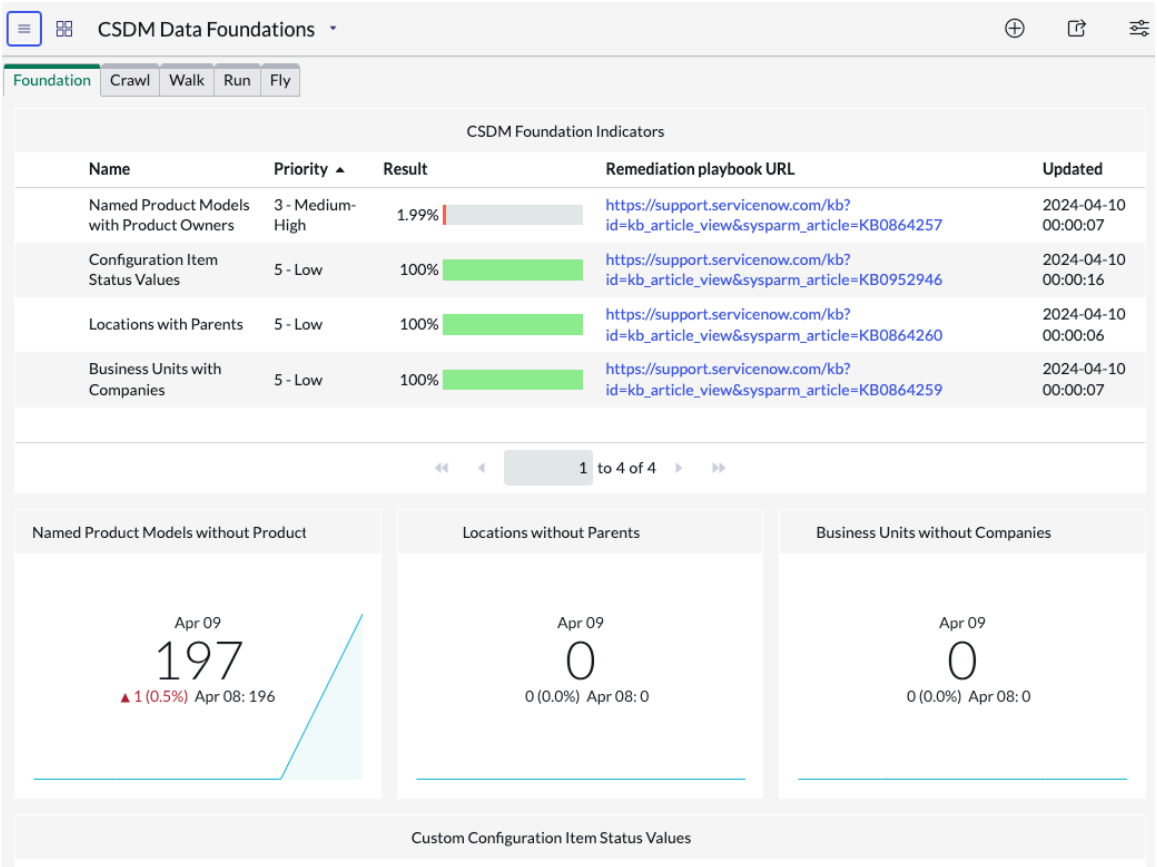
Reports on the Foundation tab

In this example, a report on the **Foundation** tab indicates that most named product models don't have associate product owners. Without this data, you might not be able, for example, to identify products that are reaching end-of-life. For more information, see Products and product models.



CSDM Foundation Indicators report

- The **Priority** value is the product of the weight of the metric and the severity of the actual score. Priority ranges from 1 — Critical (the highest priority), to 5 — Low (the lowest priority).
- The **Result** column displays a color-coded bar showing the percentage of CIs or the measured item that are in compliance for the key foundational metric.
  - Red: 0–50% are in compliance.
  - Yellow: 50–90% are in compliance.
  - Green: More than 90% are in compliance.

  To promote optimum performance, the system stops collecting data for some metrics when they reach a specified number of non-compliant CIs. For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.
- The **Remediation playbook URL** column displays links to knowledge articles in Now Support with instructions for bringing the CIs into compliance. Use your Now Support credentials to access the knowledge article.

To view detailed information on the impact of a metric and for details on working on issues, select the appropriate **Remediation playbook URL**.

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Named product models without product

Application, service, and software class instance CIs aren't created through Discovery, so their **Model ID [model_id]** values might not refer to product model records. To help you to migrate to a product-centric management paradigm, each instance of a logical CI should be associated with a product model. For recommendations, see Auto-generate product models for logical CIs.

For more information, see Products and product models.

Locations without parents

You can create a hierarchy of location data using the *Parent* attribute to match your reporting requirements. Missing parent locations break the structure. See Location [cmn_location] table.

Business units without companies

The hierarchy of your business is populated in the Business Unit table with a reference to the parent company. A business unit is a part of your organization that is responsible for specific operations, such as finance, human resources (HR), or IT. A hierarchy within a business unit is common. For large multinational organizations, you may have business units that identify independent regional operations and the specific operations within the region.

Related topics

CSDM Data Foundations dashboard

Auto-generate product models for logical CIs

Use the *CSDM Product Model Assignment* job to auto-generate a product model record (application model, service model, or software model) for each logical CI that is not yet associated with a product model. Product models are ideal for associating CIs that are parts of a single digital product.

Before you begin

Users with read access to modified CI records can view the new product models.

Role required: admin

About this task

Application, service, and software class instance CIs are not created through Discovery, so their **Model ID [model_id]** values might not refer to product model records. To assist you in migrating to a product-centric management paradigm, each instance of a logical CI should be associated with a product model. The *CSDM Product Model Assignment* job operates on the following classes and uses the name of the class instance as the name of the new product model.

- Service Offering
- Technology Management Service (formerly Technical service)
- Service Instance (called application service before CSDM v5): The script adds the version (as it relates to the business application) to the associated software model name. For example, the software model for the MyAppService service instance CI might be **MyAppService - version: 2.1**.
- Business Service
- Business Application

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The *CSDM Product Model Assignment* job calls the *CSDMModelUtil* script. The script performs these actions for each instance of the supported CSDM classes that does not refer to a product model:

1. Create an application model, service model, or software model record with the same name as the CI. If the requisite info for generating the name value does not appear in the CI, the script uses the default value that you specified.
2. For the CI, add a reference to the new product model in the **Model ID [model_id]** field.

Operation of the script:

- The script observes the access rules of the CMDB admin that runs the script.
- If an auto-generated product model record for a class instance CI would be identical to an existing record, then the existing record is used for that CI.
- If your data includes CIs with identical names (this is actually an error), then the resulting model_id values might conflict. Validate the resulting model_ids after running the script.

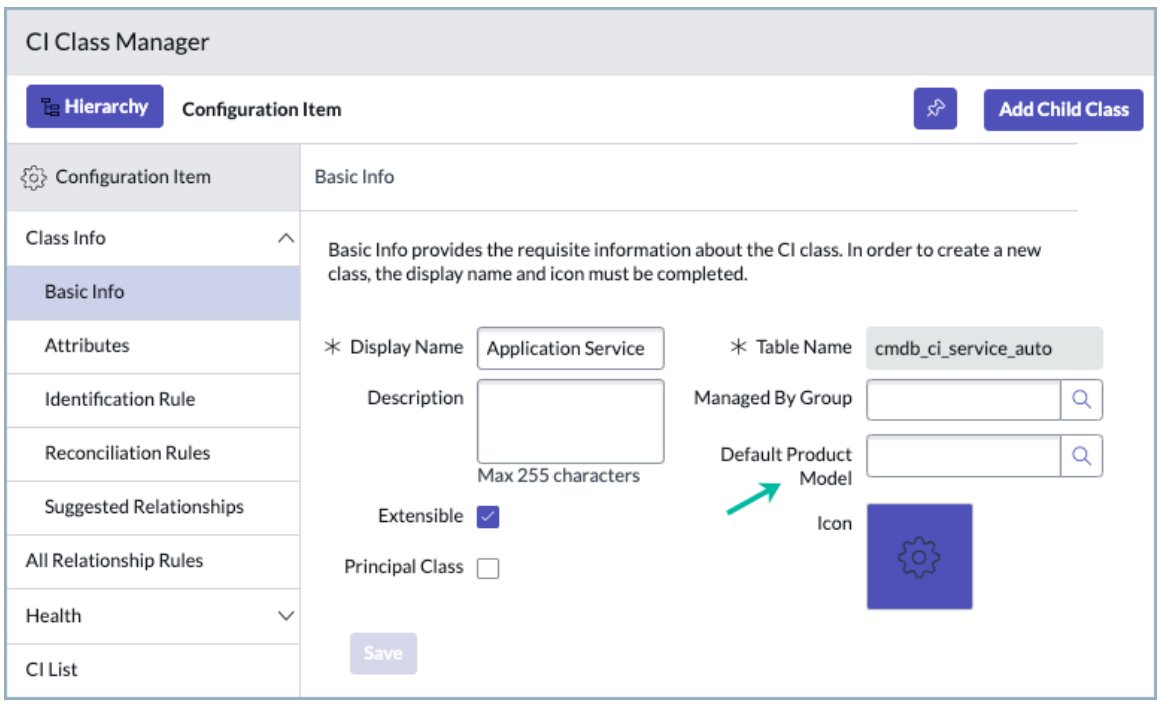
Procedure

1. Specify the default name to use if the name / version values of a CI are insufficient to auto-generate the name for the new product model.

   a. Navigate to **Configuration** > **CI Class Manager** and then select **Open Hierarchy**.

   b. Navigate to each of the supported classes in turn (service instance, business service, and so on).

   c. On the **Basic Info** page for the class, enter a name in the **Default Product Model** field.



2. Run the *CSDM Product Model Assignment* job.

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a. Navigate to **System Scheduler** > **Scheduled Jobs** > **Scheduled Jobs**.

b. Search for and open the *CSDM Product Model Assignment* job.

c. Select **Execute Now**.
The script runs and generates the product models.

3. Review the created product models to ensure that the new **Model ID [model_id]** values are correct.

   Use:

   - **All** > **Product Catalog** > **Product Models** > **Application Models**
   - **All** > **Product Catalog** > **Product Models** > **Service Models**
   - **All** > **Product Catalog** > **Product Models** > **Software Models**

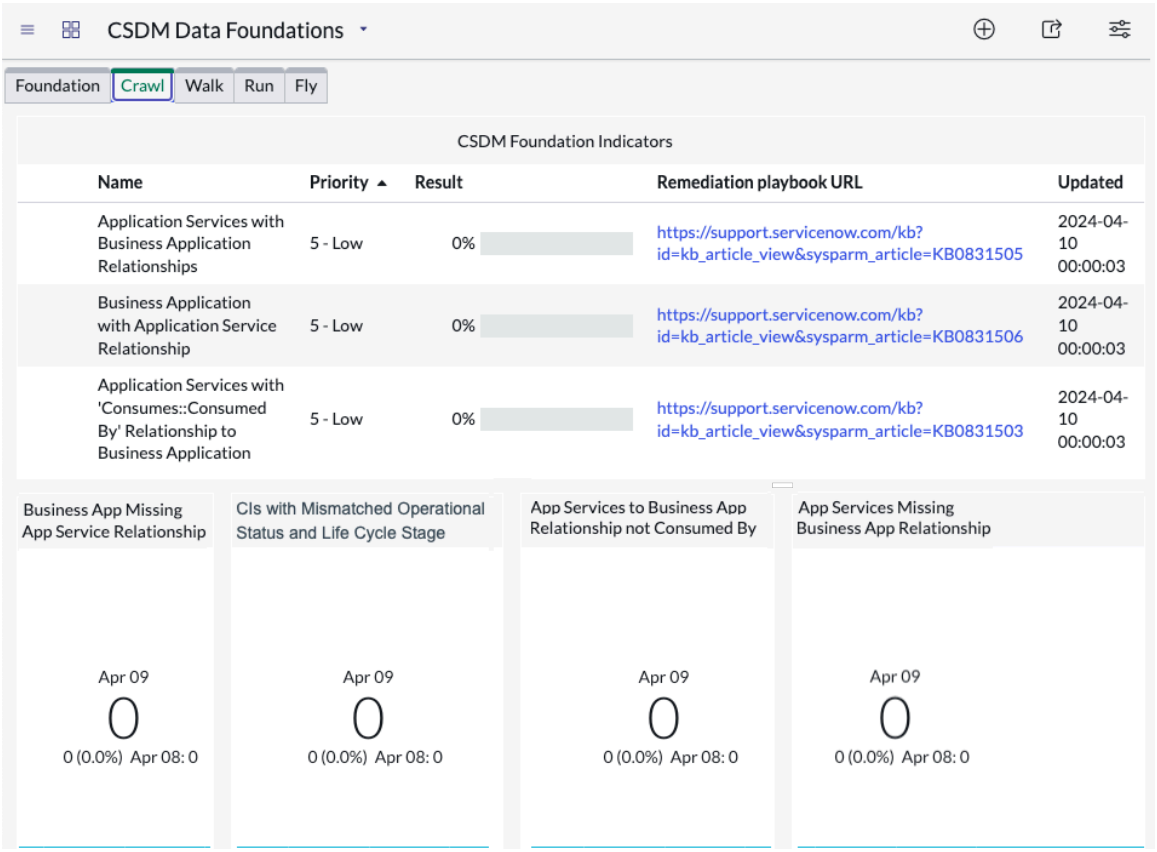
4. Run the job whenever you want to create product model settings for new class instances.

'Crawl' stage reports on the CSDM Data Foundations dashboard

Crawl stage reports on the CSDM Data Foundations dashboard

Reports on the Crawl tab

In this example, a report on the **Crawl** tab indicates that there are service instances that are not associated with a business application.



CSDM Foundation Indicators report

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- The **Priority** value is the product of the weight of the metric and the severity of the actual score. Priority ranges from 1 — Critical (the highest priority), to 5 — Low (the lowest priority).
- The **Result** column displays a color-coded bar showing the percentage of CIs or the measured item that are in compliance for the key foundational metric.
  - Red: 0–50% are in compliance.
  - Yellow: 50–90% are in compliance.
  - Green: More than 90% are in compliance.

  To promote optimum performance, the system stops collecting data for some metrics when they reach a specified number of non-compliant CIs. For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.
- The **Remediation playbook URL** column displays links to knowledge articles in Now Support with instructions for bringing the CIs into compliance. Use your Now Support credentials to access the knowledge article.

To view detailed information on the impact of a metric and for details on working on issues, select the appropriate **Remediation playbook URL**.

App services missing business app relationship

Percent of CIs missing an important relationship. The service instance is a base-system CMDB table that should map to the related business application in use. Because the service instance is typically the system that a caller identifies when they report an issue with an application, the relationship is required if you're to identify the affected business application. For more information, see Use Application Services dashboard to monitor health.

CIs with Mismatched Operational Status and Life Cycle Stage

The report identifies life-cycle value mismatches among CMDB, asset, and IBI. This information is helpful when you're aligning existing status data to the CSDM guidelines.

App service to business app not Consumed by

The report identifies incorrect relationships.

Business apps missing app service relationship

Percent of CIs missing an important relationship.

Managing performance of data collection

The system runs scheduled jobs that collect data for three CSDM metrics:

- App services that are missing a business app relationship
- Business apps that are missing an app service relationship
- App services where the relationship to business apps is not `Consumed by`

For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.

Related topics

CSDM Data Foundations dashboard

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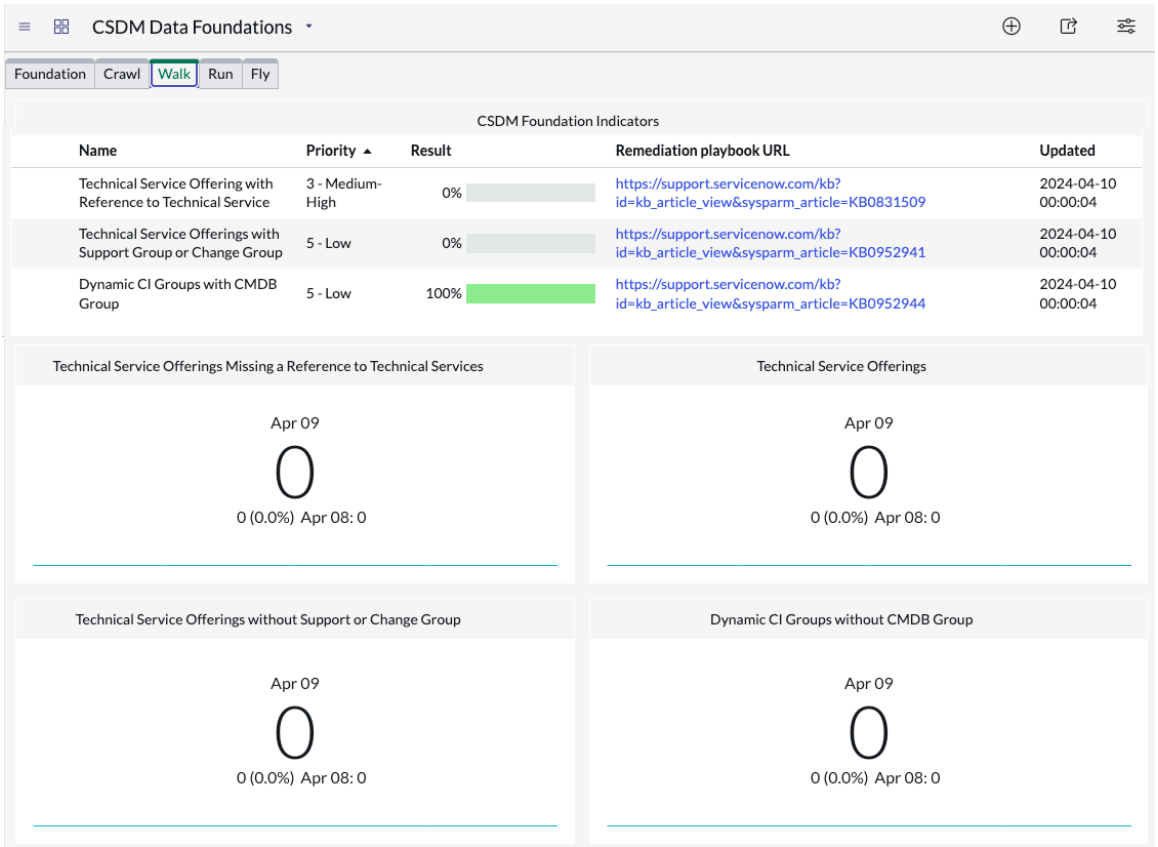
'Walk' stage reports on the CSDM Data Foundations dashboard

Walk stage reports on the CSDM Data Foundations dashboard

Reports on the Walk tab

In this example, a report on the **Walk** tab indicates that there are technology management offerings that are not associated with a support group. This indicates a risk that downtimes will take longer to remedy.

To view detailed information on the impact of a metric and for details on working on issues, select the appropriate **Remediation playbook URL**.



CSDM Foundation Indicators report

- The **Priority** value is the product of the weight of the metric and the severity of the actual score. Priority ranges from 1 — Critical (the highest priority), to 5 — Low (the lowest priority).

- The **Result** column displays a color-coded bar showing the percentage of CIs or the measured item that are in compliance for the key foundational metric.

  - Red: 0–50% are in compliance.
  - Yellow: 50–90% are in compliance.
  - Green: More than 90% are in compliance.

  To promote optimum performance, the system stops collecting data for some metrics when they reach a specified number of non-compliant CIs. For

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information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.

- The **Remediation playbook URL** column displays links to knowledge articles in Now Support with instructions for bringing the CIs into compliance. Use your Now Support credentials to access the knowledge article.

Related topics

CSDM Data Foundations dashboard

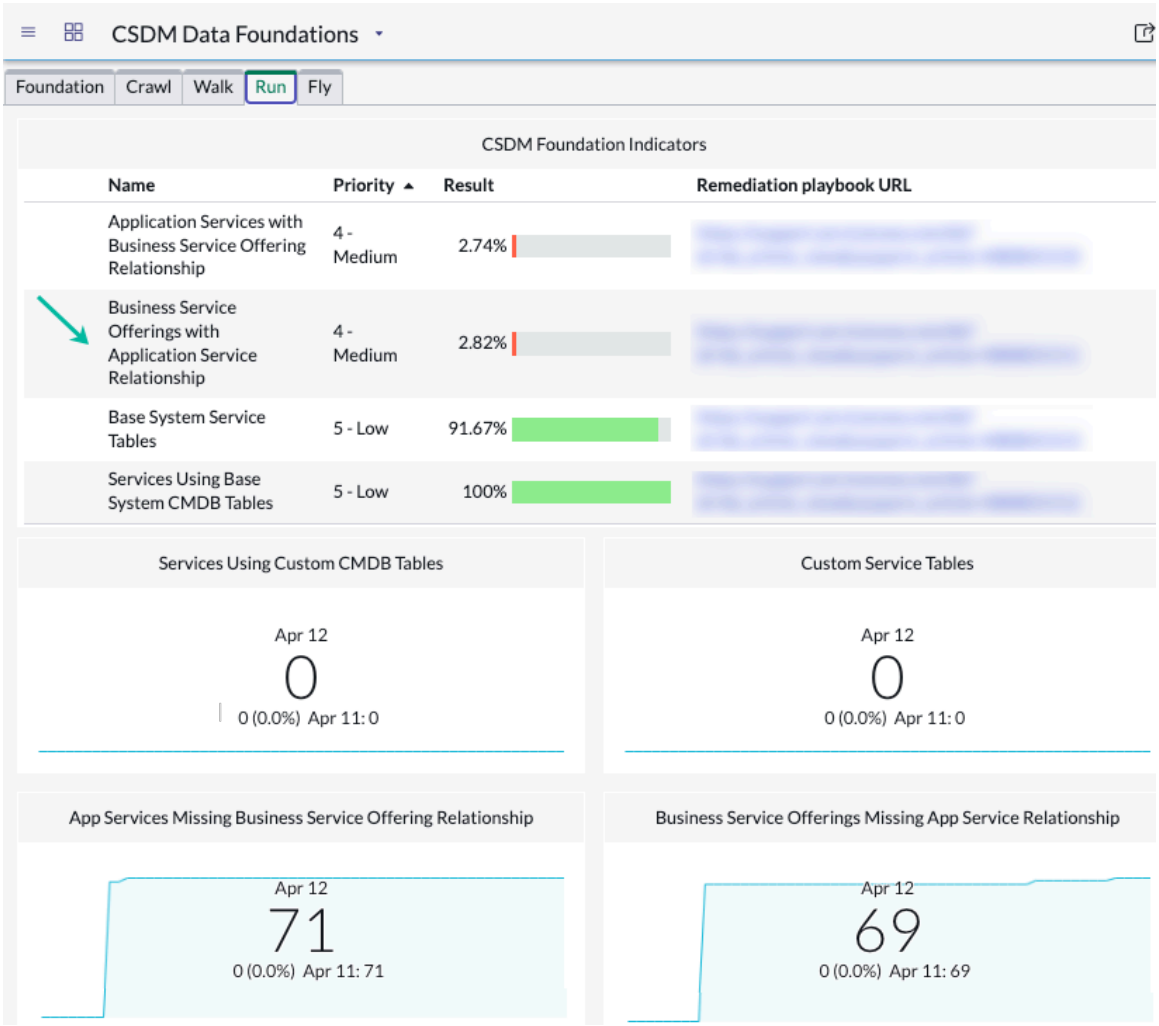
'Run' stage reports on the CSDM Data Foundations dashboard

Run stage reports on the CSDM Data Foundations dashboard

Reports on the Run tab

In this example, a report on the **Run** tab indicates that several business service offerings don't have the required relationships to service instances. With this knowledge, Service owners can add the relationships to help ensure that customer service agents get complete information on the upstream impacts of applications that are down.

To view detailed information on the impact of a metric and for details on working on issues, select the appropriate **Remediation playbook URL**.



CSDM Foundation Indicators report

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  To promote optimum performance, the system stops collecting data for some metrics when they reach a specified number of non-compliant CIs. For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.
- The **Remediation playbook URL** column displays links to knowledge articles in Now Support with instructions for bringing the CIs into compliance. Use your Now Support credentials to access the knowledge article.

Managing performance of data collection

For information on managing data collection for a metric that isn't needed or that affects performance of the dashboard, see Manage performance.

Related topics

CSDM Data Foundations dashboard

'Fly' stage reports on the CSDM Data Foundations dashboard

Fly stage reports on the CSDM Data Foundations dashboard

Reports on the Fly tab

In this example, a report on the **Fly** tab indicates that there are information objects that are not associated with a business application.

To view detailed information on the impact of a metric and for details on working on issues, select the appropriate **Remediation playbook URL**.

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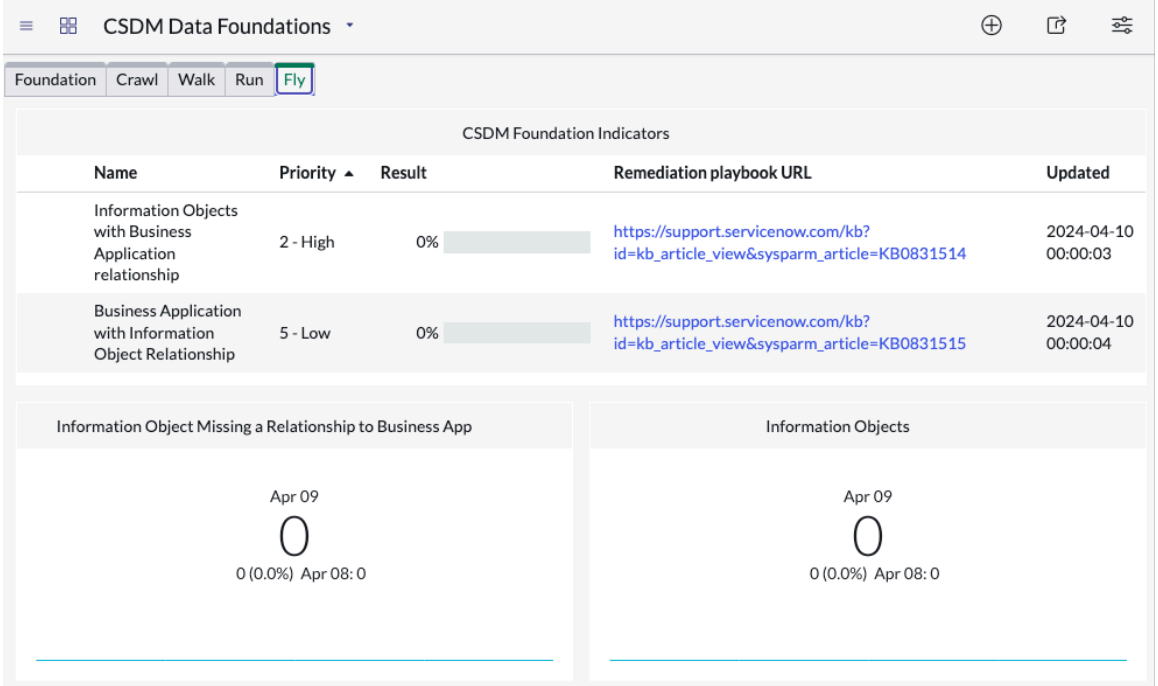

CSDM Foundation Indicators report

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- The **Remediation playbook URL** column displays links to knowledge articles in Now Support with instructions for bringing the CIs into compliance. Use your Now Support credentials to access the knowledge article.

Note:
Starting with the CSDM Data Foundations dashboard v2.2, the following metrics no longer appear on the **Fly** tab:

- Information objects missing an app service relationship
- Catalog request items related to service offerings

Related topics

CSDM Data Foundations dashboard

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CSDM life-cycle terms

Most ServiceNow products and ServiceNow AI Platform applications align closely with the Common Service Data Model. This table defines terms as they are used across the ServiceNow AI Platform.

Terms related to life cycle

CI

Configuration item: Record in the CMDB CI [cmdb_ci] table.

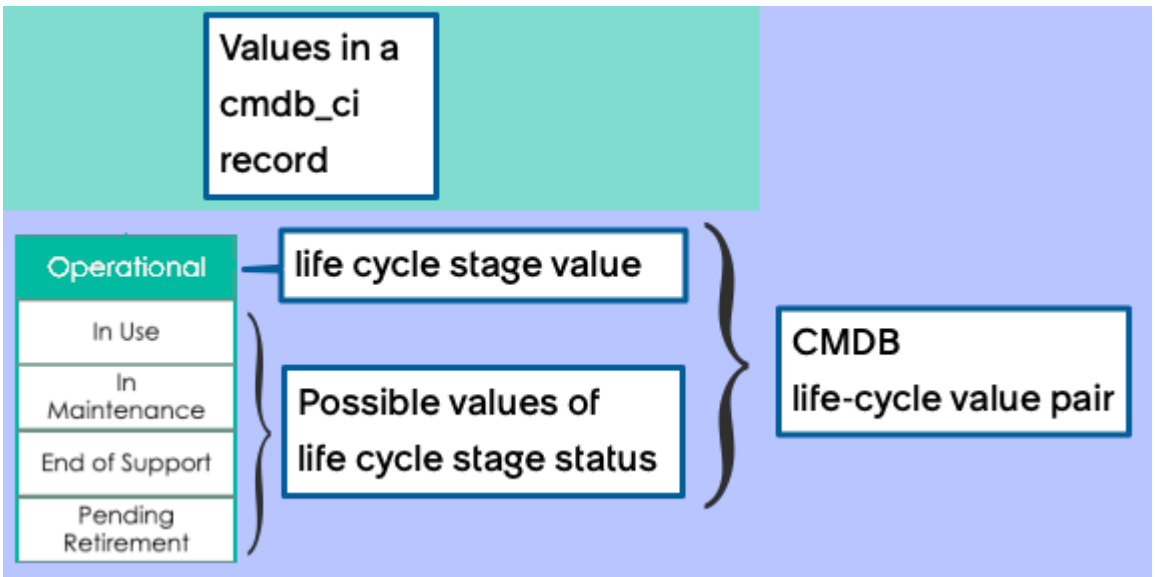
life-cycle value pair

A life-cycle value pair is the combination life cycle stage and life cycle stage status values for a CI, asset, or IBI over the life cycle of a product instance. The pair of values fully describe the life-cycle state of the product instance.

The standard CSDM life-cycle value pair covers all phases of a product instance life cycle.

- A *`life cycle stage`* is one of the broad phases that a CI moves through, for example from inception or procurement to operation and then perhaps to end of life.
- *`life cycle stage status`* is the particular status of a CI within its current life cycle stage.

For example, a tangible/physical CI in the **Operational** stage might change stage status over time from **In Use** to **In Maintenance** to **End of Support**. A different tangible/physical CI might go from **In Use** to **End of Support** without ever having been in **In Maintenance** status.



CI legacy values

Value types that were in place before CSDM life-cycle values were implemented:

- install status
- operational status
- hardware status
- hardware substatus

asset

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Production asset: Record in the asset [alm_asset] table.

install base item (IBI)

Install-Base-Item: Record in the install base item [sn_install_base_item] table. Any item that is provided as a service or sold to your customer is tracked as an Install Base Item (IBI). The Model category table associates Asset, CI, and IBI for the item.

product instance

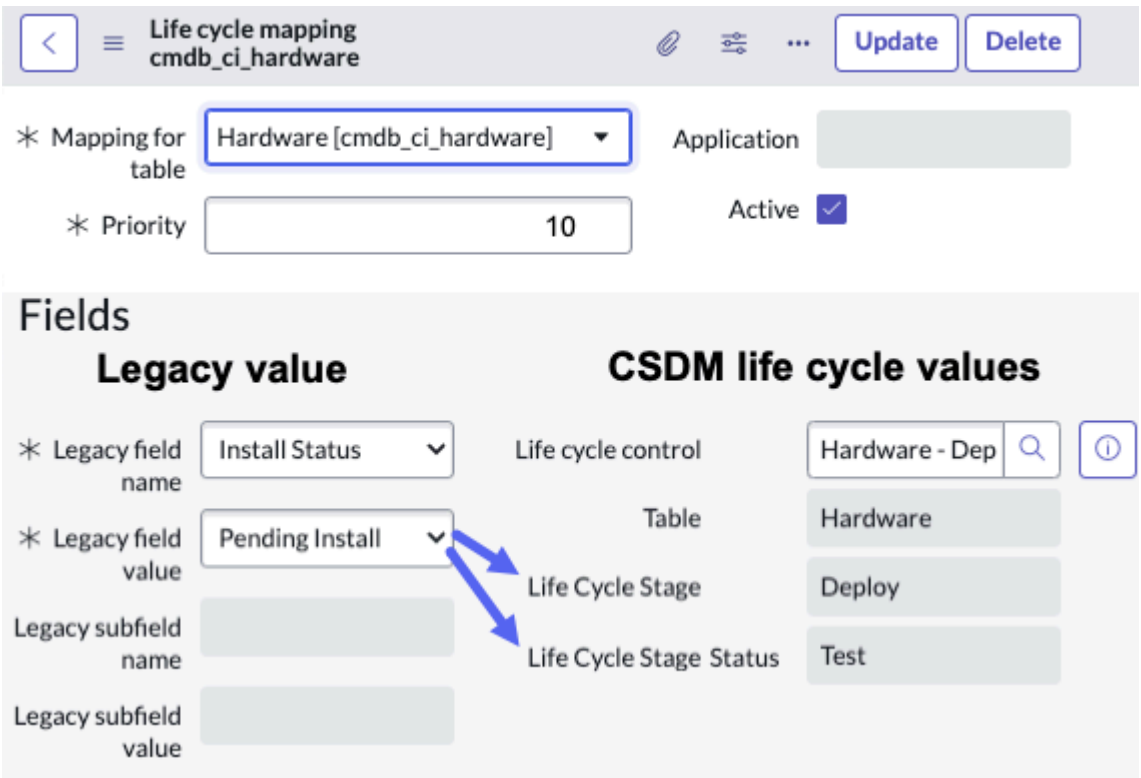
A product instance (PI) is comprised of an operational asset (asset), an install-base-item (IBI), and a configuration item (CI). A PI is a logical grouping of the [Asset/CI/IBI] that represents instances of products (goods and services) throughout their life cycles in ServiceNow applications and workflows. Possible formulations:

- Asset+CI+IBI
- Asset+CI
- Asset+IBI

Life cycle mapping table

The base system includes the life cycle mapping [life_cycle_mapping] table. The table is prepopulated with mappings between widely used legacy status values and the equivalent CSDM *`life cycle stage`* and *`life cycle stage status`* values. Each record in the table (called a mapping rule) specifies how to map a legacy status value, based on its table, to the best-fit CSDM life-cycle value pair.

The table typically contains multiple record entries per class, each entry that maps a specific legacy status to a life-cycle value pair. When there are multiple record entries for a class, the entries are prioritized by importance and likelihood for containing meaningful values for the mapping process. The highest priority rule is used when multiple candidate rules apply.



See Map legacy status values to CSDM life-cycle values and How life-cycle values for Asset, CI, and IBI are synced.

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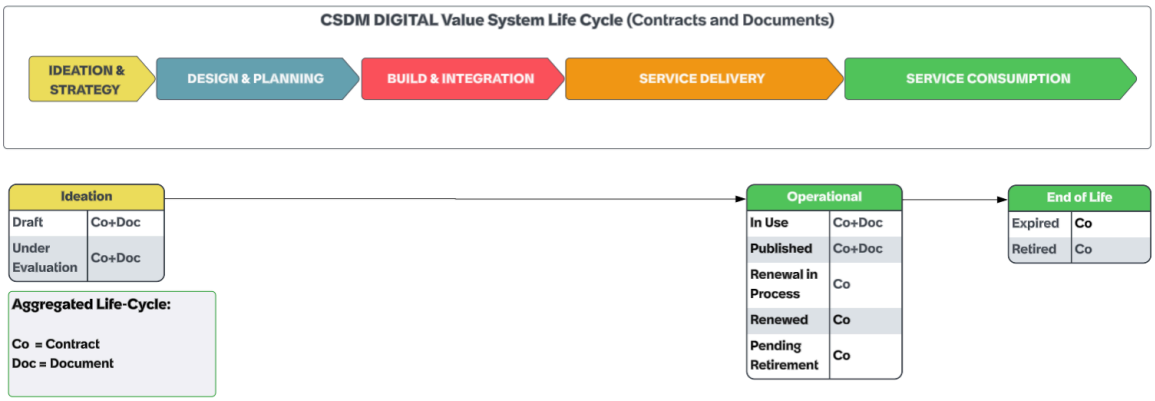
Life cycle of document and contract entities

The document and contract life-cycle value pairs represent the overall life cycle of document assets (contracts) and CIs (business process documentation) as related to their products. The life-cycle values for the document and contract life-cycle process are visible only in tables related to document entities in Contracts and CMDB.

Life-cycle values for document and contract entities

For definitions of the values in the diagram, see Definitions of life-cycle values for document and contract entities



The life-cycle value pairs for Customer Success Management documents are visible only in tables related to documents in Contract Management and the CMDB.

Note:
The [life_cycle_control] table uses the type of CI (tangible/physical, document and contract, location and so on) to determine which *`life cycle stage status`* values are available for each *`life cycle stage`*.

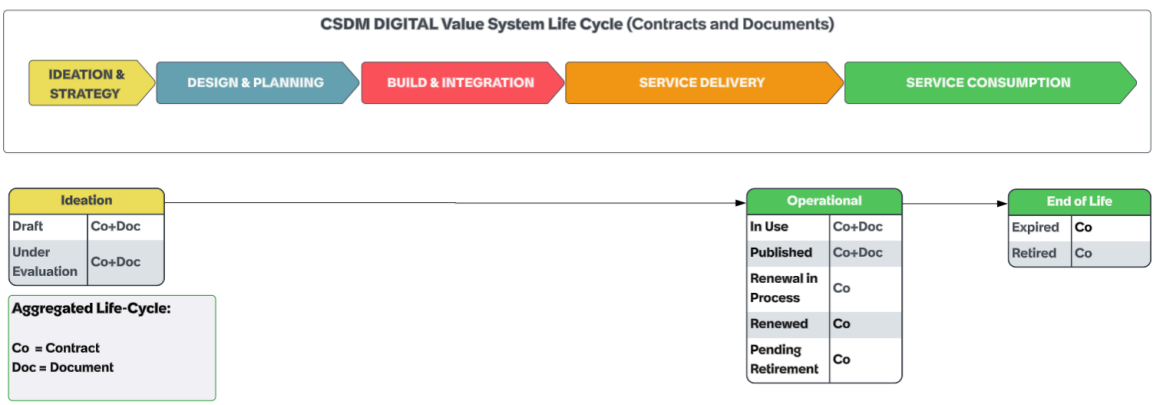
Related topics

Definitions of life-cycle values for document and contract entities

Definitions of life-cycle values for document and contract entities

The document and contract life-cycle value pairs represent the overall life cycle of document assets (contracts) and CIs (business process documentation) as related to their products. The life-cycle values for the document and contract life-cycle process are visible only in tables related to document entities in Contracts and CMDB.

Definitions of document and contract life cycle stage and life cycle stage status values



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Ideation life cycle stage

The materials are in initial draft form.

- **Draft**: The document or contract is in the initial creation and editing process.
- **Under Evaluation**: After creation, the materials are reviewed before activation as operational in use or published.

Operational life cycle stage

The materials are in active use.

- **In Use**: The document or contract is in active operational status before first renewal
- **Published**: After approval for release, publication is the formal act of making the materials visible for consumption.
- **Renewal in Process**: For an existing contract that is set to expire, the effort to renew the contract is occurring.
- **Renewed**: The contract has been renewed.
- **Pending Retirement**: The document, such as contract, has a pending expiration/ end date or expiration date.

End of Life life cycle stage

The document or contract is no longer active.

- **Expired**: Date-limited material such as contracts that are past their expiration date.
- **Retired**: Materials that are no longer needed by the organization.

Related topics

Life cycle of document and contract entities

Life cycle of tangible/physical CIs

The tangible/physical life-cycle states represent the overall life cycle of physical assets and CIs as related to their products. Tangible/physical assets are physical items that are stocked, for example computers, monitors, and keyboards. The stages and statuses for the tangible/physical life-cycle process are visible only in hardware-related tables in Asset Management and the CMDB.

Life-cycle values for tangible/physical CIs

For definitions of the values in the diagram, see Definitions of life-cycle values for tangible/ physical CIs.

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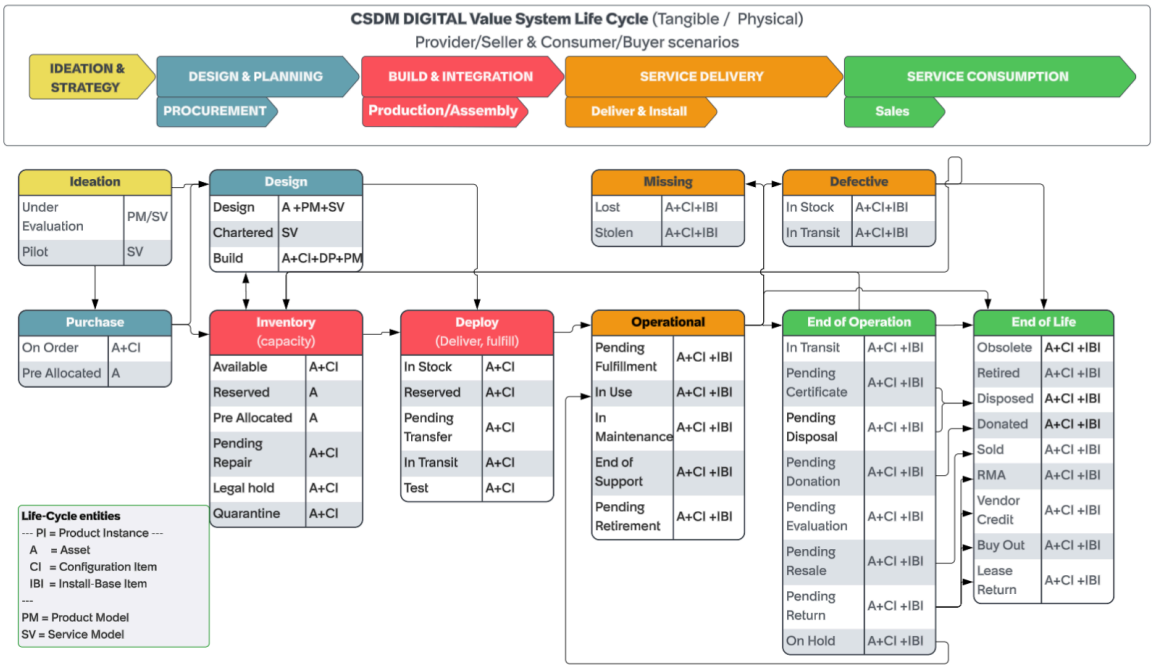

Note:
The [life_cycle_control] table uses the type of CI (tangible/physical, document and contract, location and so on) to determine which *`life cycle stage status`* values are available for each *`life cycle stage`*.

For additional information on how you can benefit from implementing life-cycle value pairs for CMDB entities, see the 'Map existing status values to CSDM life-cycle value pairs' section in the 'Foundation domain' topic.

Examples of tangible/physical classes

View attributes, identification rules, and other important schema structures for the CMDB Computer [cmdb_ci_computer] class in Hardware [cmdb_ci_hardware] class.

Related topics

Definitions of life-cycle values for tangible/physical CIs

Retiring a service instance can affect tangible/physical CIs

Definitions of life-cycle values for tangible/physical CIs

The tangible/physical life-cycle states represent the overall life cycle of physical assets and CIs as related to their products. Tangible/physical assets are physical items that are stocked, for example computers, monitors, and keyboards. The stages and statuses for the tangible/physical life-cycle process are visible only in hardware-related tables in Asset Management and the CMDB.

Definitions of tangible/physical life cycle stage and life cycle stage status values

Note:
The CI label tangible/physical includes and supersedes the "Hardware" label that had been used in earlier releases.

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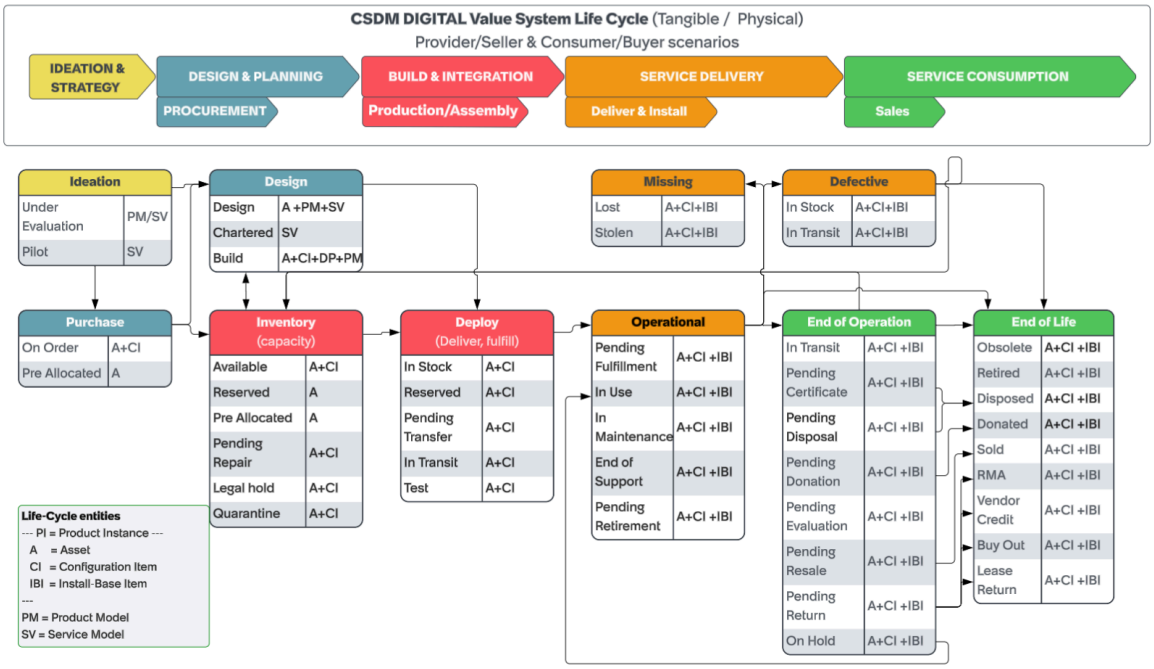

Ideation life cycle stage

New tangible or physical models in this stage are being assessed for potential use in the organization.

- **Under Evaluation**: The model is being reviewed for compatibility, functionality, and business fit before approval.
- **Pilot**: The model is in a limited deployment for real-world testing before broader adoption.

Purchase life cycle stage

After a tangible or physical model is approved, the organization proceeds with procurement.

- **On Order**: The asset has been ordered from a vendor but has not yet been received.
- **Preallocated**: The asset is already assigned to a specific purpose or user before its arrival.

Inventory life cycle stage

The asset is received and stored in inventory before deployment.

- **Available**: The asset is in stock and is ready for deployment.
- **Reserved**: The asset is set aside for a specific request but is not yet deployed.
- **Preallocated**: The asset is assigned to a request but is not yet physically allocated.
- **Pending Repair (CI)**: The asset is in stock but requires repairs before being usable such as on-site visit from manufacturer or RMA swap.
- **Legal Hold (CI)**: The asset cannot be deployed due to legal restrictions or compliance reasons.
- **Quarantine (CI)**: The asset is isolated due to potential security risks, failures, or non-compliance.

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Deploy life cycle stage

The asset is prepared and moved to operational use.

- **In Stock**: The asset is stored and is designated for deployment, but is in the process of being prepared for deployment#.
- **Reserved**: The asset is assigned to a user or department but has not been physically moved.
- **Pending Transfer**: The asset is scheduled for relocation to another facility or user.
- **In Transit**: The asset is currently being moved between locations.
- **Test**: The asset has been identified as part of a deployment activity, has been built, and is ready for testing before operational usage#.

Operational life cycle stage

The asset is actively in use or is undergoing maintenance.

- **Pending Fulfillment**: The asset is put/placed into its operational environment/location but needs to be configured/provisioned before it can be used.
- **In Use**: The asset is deployed and functioning in a live environment.
- **In Maintenance**: The asset is being serviced or is undergoing repairs while still considered operational.
- **End of Support**: The asset has reached the end of vendor or internal support but is still in use.
- **Pending Retirement**: The asset is still operational but is marked for decommissioning.

End of Operation life cycle stage

End of Operation is an intermediate stage between Operational and the next stage. Operation of the product have ended, but the product instance is transitioning to a new life cycle stage and life cycle stage status.

- **Pending Evaluation**: Non-operational intermediate status in which a product is evaluated to determine its next stage and stage status.
- **Pending Return**: Non-operational status before the asset is returned and the provider received the returned asset in an end of life stage: **RMA**, **Vendor Credit**, **Buyout** or **Lease Return**.
- **In Transit**: Non-operational, transitional status to support re-purposing the asset and true end-of-life.
- **Pending Resale**: Intermediate status before selling the asset to a third-party entity#.
- **Pending Certificate**: Intermediate status before receiving a certificate of disposal.
- **Pending Disposal**: Intermediate status before the **Disposed** end of life stage.
- **Pending Donation**: Intermediate status before the **Donated** end of life stage.
- **On Hold**: Operation of the asset is halted for one of the following reasons:
  - Suspended: service, subscription, and so on.
  - Blocked: credit card, account, and so on.
  - Paused: subscription, lease, and so on.

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Defective life cycle stage

Tangible or physical devices that have failed and require replacement or repair.

- **In Stock**: The defective asset is stored and is awaiting disposition.
- **In Transit**: The defective asset is being shipped for return, repair, or disposal.

Missing life cycle stage

The asset is unaccounted for or stolen.

- **Lost**: The asset is missing and cannot be located.
- **Stolen**: The asset has been confirmed as stolen.

End of Life life cycle stage

The asset is being decommissioned or disposed of.

- **Pending Disposal**: The asset is marked for disposal but has not yet been removed.
- **In Transit**: The asset is being shipped to a disposal or return location.
- **Pending Certificate**: The asset awaits official documentation for decommissioning or disposal.
- **Disposed**: The asset has been discarded following proper procedures.
- **Donated**: The asset has been given to a non-profit, employee, or other entity.
- **RMA**: The asset is returned to the vendor for replacement or repair under warranty.
- **Sold**: The asset has been sold as part of asset liquidation.
- **Vendor Credit**: The asset was returned to the vendor for a credit instead of replacement.
- **Buyout**: The asset was leased and has been purchased instead of returned.
- **Lease Return**: The leased asset has been returned to the vendor at the end of its lease period.

Retiring a service instance can affect tangible/physical CIs

Because a service instance might depend on a hardware (tangible/physical) device that other service instances depend on, you must take care when retiring a service instance.

Considerations

A service instance is the logical representation of the underlying tangible/physical and software CIs that work together to implement a business application or system. The service instance represents an instance of the business application or system.

Tangible/physical and software CIs are managed using the tangible/physical life-cycle value pairs. Because a service instance is a logical representation, it is managed as using the intangible/logical life-cycle value pairs. The tangible/physical CIs that are part of the service map under a service instance have their own life cycles, but they are related through the service instance as a specific set of dependencies or decomposition.

Example 1: A tangible/physical CI is not retired when the service instance is retired

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When a service instance is retired, the associated tangible/physical device might not be retired. For example, the device might remain idle, unrelated to any service instance, until it is reallocated for use by a different service instance.

Example 2: A tangible/physical CI is shared by multiple service instances

In the common scenario of a shared database, multiple service instances (each with a unique database schema) share a single database service. The database service runs on a single physical host.

When one of the service instances is retired, the database service and host cannot be retired. All other service instances still depend on the database service that is running on the host.

See Use Application Services dashboard to monitor health.

Tangible/physical tables in the CMDB

List of tangible/physical tables.

Holistic life cycle: CMDB tangible/physical tables (from cmdb_ci)

The tangible/physical life-cycle states represent the overall life cycle of physical assets and CIs as related to their products. Tangible/physical assets are physical items that are stocked, for example computers, monitors, and keyboards. The stages and statuses for the tangible/physical life-cycle process are visible only in hardware-related tables in Asset Management and the CMDB.

Label (display name)	Table name
Accessory	cmdb_ci_acc
Communication Device	cmdb_ci_comm
Computer Peripheral	cmdb_ci_peripheral
Computer Room AC	cmdb_ci_crac
Display Hardware	cmdb_ci_display_hardware
Facility Hardware	cmdb_ci_facility_hardware
Hardware	cmdb_ci_hardware
Imaging Hardware	cmdb_ci_imaging_hardware
IP Device	cmdb_ci_ip_device
Monitoring Equipment	cmdb_ci_monitoring_hardware
Network Adaptor	cmdb_ci_network_adaptor
Printing Hardware	cmdb_ci_printing_hardware
Rack	cmdb_ci_rack
Storage Device	cmdb_ci_storage_device

Life cycle of location entities

The values for the location life-cycle process reflect the locations used by your organization and are visible only in the common data locations table.

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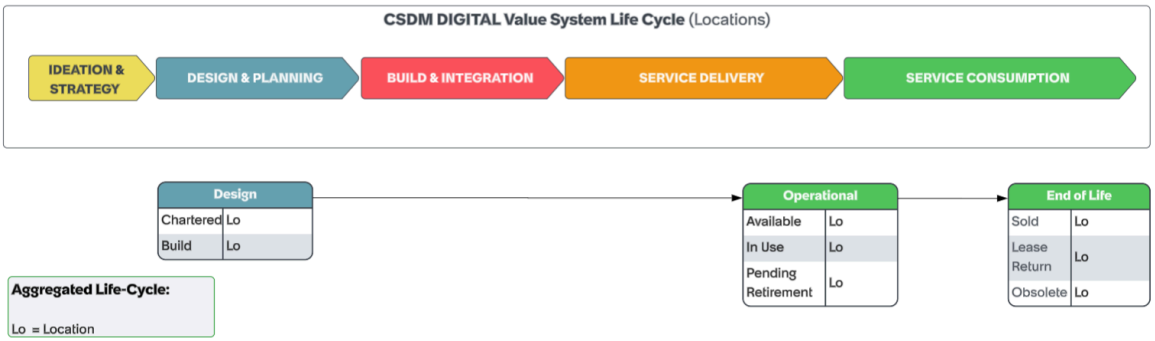
Life-cycle values for location entities

For definitions of the values, see Definitions of life-cycle values for location entities.



Note:
The [life_cycle_control] table uses the type of CI (tangible/physical, document and contract, location and so on) to determine which *`life cycle stage status`* values are available for each *`life cycle stage`*.

For additional information on how you can benefit from implementing life-cycle value pairs for CMDB entities, see the 'Map existing status values to CSDM life-cycle value pairs' section in the 'Foundation domain' topic.

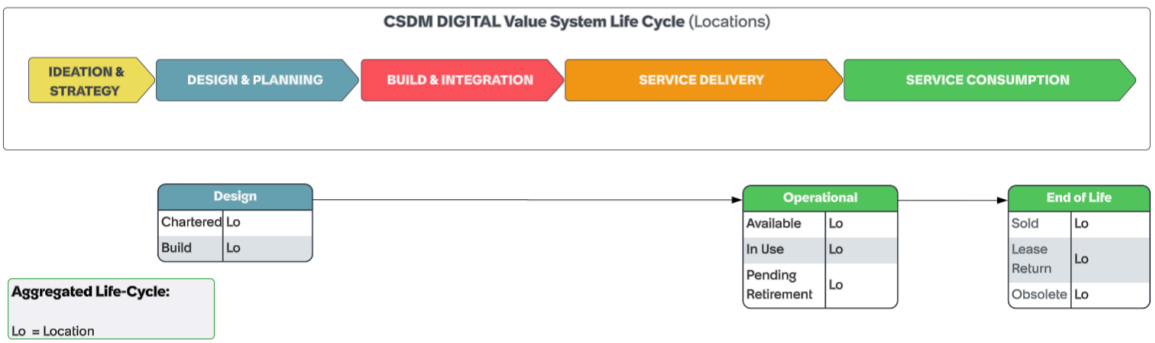
Related topics

Definitions of life-cycle values for location entities

Definitions of life-cycle values for location entities

The values for the location life-cycle process reflect the locations used by your organization and are visible only in the common data locations table.

Definitions of location life cycle stage and life cycle stage status values



Ideation life cycle stage

The location is in the initial planning and setup phase.

- **Chartered**: The location is approved for development, but no physical presence has yet been established.
- **Build**: The location is under construction, setup, or is being prepared for operational use.

Operational life cycle stage

The location is active and in use for business operations.

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- **Available**: The location is fully built and ready for use but currently unoccupied or not assigned for a specific function.
- **In Use**: The location is actively occupied and is being used for its intended purpose.
- **Pending Retirement**: The location is still operational but is scheduled for decommissioning or repurposing.

End of Life life cycle stage

The location is no longer in active use and is being decommissioned.

- **Sold**: The location has been sold to another entity.
- **Lease Return**: A leased location has been returned to the owner or landlord after the lease period ended.
- **Obsolete**: The location is no longer viable for use due to physical deterioration, business strategy changes, or other constraints.

Note:
The [life_cycle_control] table uses the type of CI (tangible/physical, document and contract, location and so on) to determine which *`life cycle stage status`* values are available for each *`life cycle stage`*.

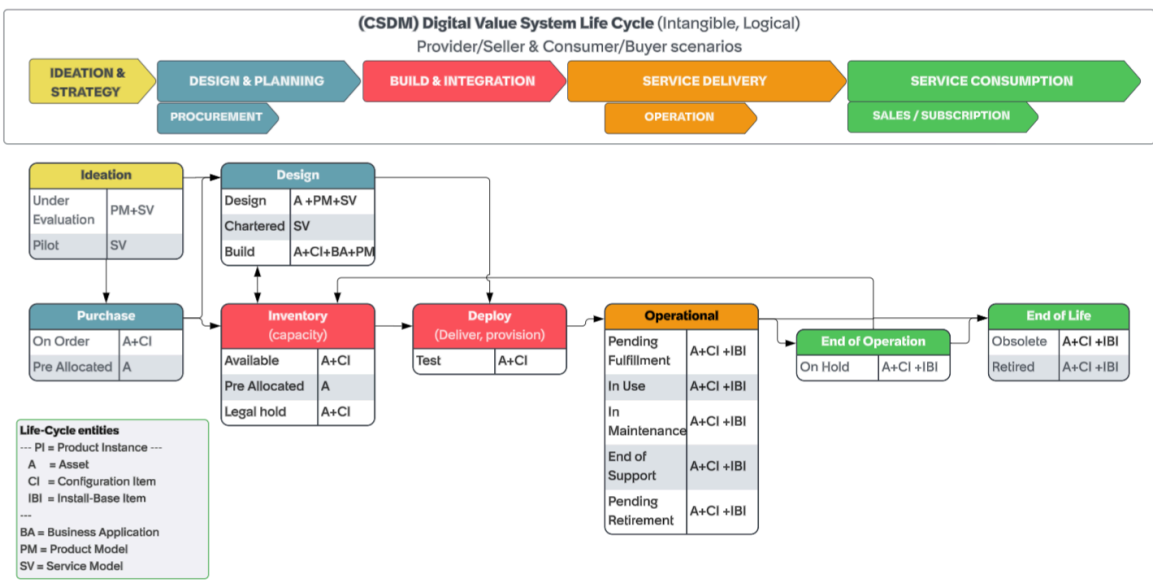
For additional information on how you can benefit from implementing life-cycle value pairs for CMDB entities, see the 'Map existing status values to CSDM life-cycle value pairs' section in the 'Foundation domain' topic.

Life cycle of intangible/logical entities

The intangible/logical life-cycle value pairs represent the overall life cycle of logical assets and CIs as related to their products. A logical or software asset includes items like applications, services, and licenses. The life cycle stage and life cycle stage status values of logical items are visible only in tables related to intangible/logical items in Asset Management and the CMDB.

Life-cycle values for intangible/logical CIs, assets, and IBIs

For definitions of the values in the diagram, see Definitions of life-cycle values for intangible/logical entities.



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Note:
The [life_cycle_control] table uses the type of CI (tangible/physical, document and contract, location and so on) to determine which *`life cycle stage status`* values are available for each *`life cycle stage`*.

Service instances use intangible/logical life cycles

Because service instances are logical in nature, they should use the Logical life-cycle value pairs. Service instances follow the same life-cycle guidance as any other logical CI.

See Use Application Services dashboard to monitor health.

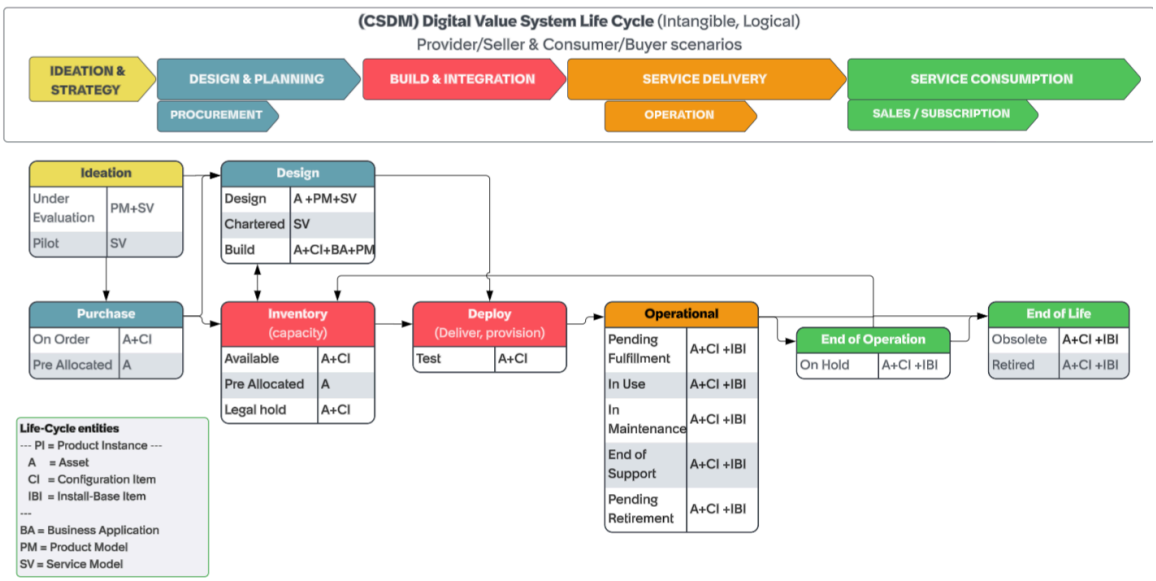
Related topics

Intangible/logical tables in the CMDB

Definitions of life-cycle values for intangible/logical entities

The intangible/logical life-cycle value pairs represent the overall life cycle of logical assets and CIs as related to their products. A logical or software asset includes items like applications, services, and licenses. The life cycle stage and life cycle stage status values of logical items are visible only in tables related to intangible/logical items in Asset Management and the CMDB.

Definitions



Ideation life cycle stage

In this stage, new software or service products are evaluated and tested before they are approved for use.

- **Under Evaluation**: The software is being assessed for business fit, licensing implications, and technical feasibility.
- **Pilot**: The software is deployed in a limited way to test its functionality and usability before full-scale implementation.

Purchase life cycle stage

After the software is approved, the organization procures the necessary licenses or subscriptions.

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- **On Order**: Licenses or software subscriptions have been purchased but are not yet available for use.
- **Preallocated**: Licenses are assigned to users or departments before they are officially deployed.

Inventory life cycle stage

The software licenses are now available for assignment and deployment.

Available: The software licenses are ready for allocation but have not yet been assigned to a specific system or user.

Design life cycle stage

For software development or major configurations, this phase defines the logical and architectural structure.

- **Chartered**: A project is initiated to design or configure software solutions.
- **Design**: The logical architecture and system requirements are being defined.
- **Build**: The software is being developed, customized, or configured for deployment.

Deploy life cycle stage

Software and services are prepared for operational use and are tested before full implementation.

Test: The software is installed in a test environment for validation before production deployment.

Operational life cycle stage

The software is actively in use by the organization.

- **In Use**: The software is deployed and functioning on production systems.
- **End of Support**: The software vendor or internal IT team no longer provide updates or technical support, but the software might still be in use.

  Note:
  A CI might be in the **Operational** stage, but might no longer be supported by the vendor or publisher or third party. That doesn't mean, however, that it can be or should be retired.

- **Pending Retirement**: The software is scheduled for decommissioning but remains operational until a replacement is implemented.

End of Operation life cycle stage

End of Operation is an intermediate stage between Operational and the next stage. Operations of the product have ended, but the product instance might transition to a new life cycle stage and life cycle status.

On Hold: Operation of the asset is halted for one of the following reasons:

- Suspended: service, subscription, and so on.
- Blocked: credit card, account, and so on.
- Paused: subscription, lease, and so on.

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End of Life life cycle stage

The software is no longer in active use and is being decommissioned.

- **Retired**: The software is no longer used and its licenses might have been revoked or reassigned.
- **Obsolete**: The software is no longer relevant due to security risks, incompatibility, or technological advancements.

Intangible/logical tables in the CMDB

List of intangible/logical tables.

Intangible/logical tables in the CMDB (from cmdb_ci)

The intangible/logical life-cycle value pairs represent the overall life cycle of logical assets and CIs as related to their products. A logical or software asset includes items like applications, services, and licenses. The life cycle stage and life cycle stage status values of logical items are visible only in tables related to intangible/logical items in Asset Management and the CMDB.

Intangible/logical tables

Table label (display name)	Table name
Application Cluster	cmdb_ci_application_cluster
Batch Job	cmdb_ci_batch_job
Business Application	cmdb_ci_business_app
Business Capability	cmdb_ci_business_capability
Business Process	cmdb_ci_business_process
CIM Profiles	cmdb_CIM_profile
Cloud Key Pair	cmdb_ci_cloud_keu_pair
Cloud Mgmt Subnet	cmdb_ci_subnet
Cloud Resource Base	cmdb ci resource base
Cluster	cmdb_ci_cluster
Cluster Node	cmdb_cil_cluster_node
Cluster Resource	cmdb ci cluster resource
Cluster Virtual IP	cmdb_ci_cluster_vip
Configuration File	cmdb_ci_config_file
Database	cmdb_ci_database
Database Catalog	cmdb_ci_db_catalog
Datastore Disk	cmdb_ci_vcenter_datastore_disk
Disk Partition	cmdb_ci_disk_partition
DNS Name	cmdb_ci_dns_name
DRS VM Config	cmdb_ci_drs_vm_config
Endpoint	cmdb_ci_endpoint

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Intangible/logical tables (continued)

Table label (display name)	Table name
Environment	cmdb_ci_environment
Fiber Channel Port	cmdb_ci_fc_port
Information Object	cmdb_ci_information_object
IP Address	cmdb_ci_ip_address
IP Network	cmdb_ci_ip_network
IP Phone	cmdb_ci_ip_phone
IP Service Instance	cmdb_ci_ip_ service
Load Balancer Interface	cmdb_ci_lb_interface
Load Balancer Pool	cmdb_ci_lb_pool
Load Balancer Pool Member	cmdb_ci_lb_pool_member
Load Balancer Service	cmdb_ci_lb_ service
Load Balancer VLAN	cmdb_ci_lb _vlan
Logical Partition	cmdb_ci_lpar
Memory Module	cmdb_ci_memory_module
Network Appliance Hostname	cmdb_ci_net_app_host
Network Hostname	cmdb_ci_network_host
Network Traffic	cmdb_ci_net_traffic
Operating System Level Virtualization Container	cmdb_ci_oslv_container
Operating System Level Virtualization Image	cmdb_ci_osiv_image
Operating System Level Virtualization Image TAg	cmdb_ci_oslv_image_tag
Operating System Level Virtualization Local Image	cmdb_ci _oslv _local_image
Package	cmdb_ci_os_packages
Patch	cmdb_ci_patches
Port	cmdb_ci_port
Print Queue	cmdb_ci_print_queue
Qualifier	cmdb_ci_qualifier
SAN Connection	cmdb_ci_san_connection
SAN Endpoint	cmdb_ci_san_endpoint
SAN Fabric	cmdb ci san fabric
SAN Zone	cmdb_ci_san_zone
SAN Zone Alias	cmdb_ci_san_zone_alias
SAN Zone Alias Member	cmdb_ci_san_zone_alias_member
SAN Zone Member	cmdb_ci_san_zone_member
SAN Zone Set	cmdb_ci_san_zone_set

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Intangible/logical tables (continued)

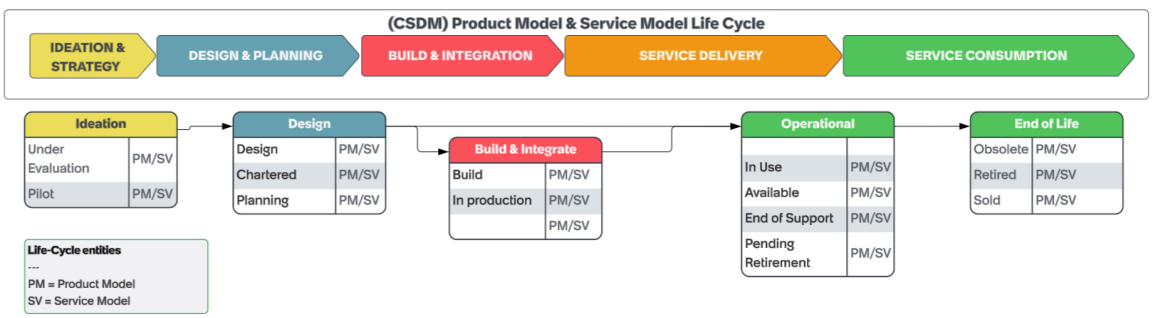
Table label (display name)	Table name
Service	cmdb_ci_service
Storage Area Network	cmdb_ci_san
Storage Controller	cmdb_ci_storage_controller
Storage Export	cmdb_ci_storage_export
Storage File Share	cmdb_ci_storage_fileshare
Storage HBA	cmdb_ci_storage_hba
Storage Pool	cmdb_ci_storage_pool
Storage Pool Member	cmdb_ci_storage_pool_member
Storage Volume	cmdb_ci _storage_volume
Tomcat Connector	cmdb_ci_tomcat_connector
UPS Bypass	cmdb_ci_ups_bypass
UPS Alarm	cmdb_ci_ups_alarm
UPS Input	cmdb_ci_ups_input
UPS Output	cmdb_ci_ups_output
Veritas Disk Group	cmdb_ci_veritas_disk_group
Virtual Machine Object	cmdb_ci_vm_object
Virtual Private Cloud	cmdb_ci_vpc
Virtual Private Network	cmdb_ci_vpn
Websphere Cell	cmdb_ci_websphere_cell

Life cycle of product entities

The product life-cycle value pairs represent the overall life cycle of a product model, a specific version, or a product configuration. The life-cycle values for the product life-cycle process are visible only in Product (Models) tables.

Life-cycle value pairs for products

For definitions of the values in the diagram, see Definitions of life-cycle values for product entities.



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Note:
The [life_cycle_control] table uses the type of CI (tangible/physical, document and contract, location and so on) to determine which *`life cycle stage status`* values are available for each *`life cycle stage`*.

For additional details on products, see Products and product models.

For additional information on how you can benefit from implementing life-cycle value pairs for CMDB entities, see the 'Map existing status values to CSDM life-cycle value pairs' section in the 'Foundation domain' topic.

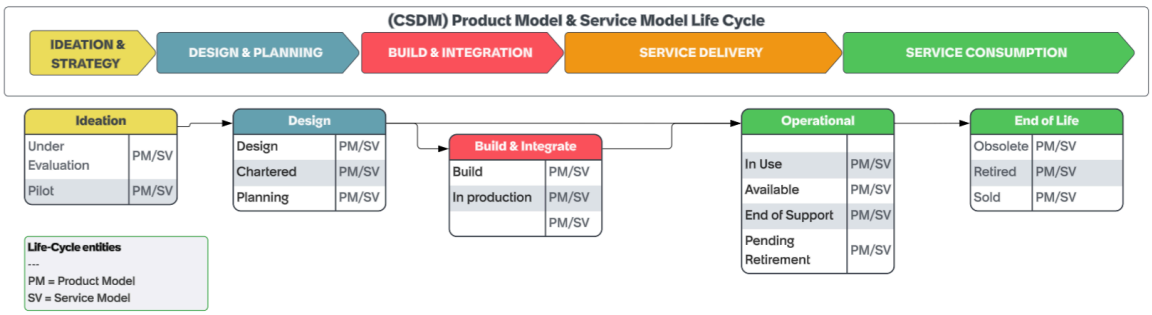
Related topics

Definitions of life-cycle values for product entities

Definitions of life-cycle values for product entities

The product life-cycle value pairs represent the overall life cycle of a product model, a specific version, or a product configuration. The life-cycle values for the product life-cycle process are visible only in Product (Models) tables.

Definitions of product life cycle stage and life cycle stage status values



Ideation life cycle stage

New product models to determine feasibility and potential adoption.

- **Under Evaluation**: The product is being assessed for business value, functionality, and technical viability.
- **Pilot**: In a small-scale deployment, the product is being tested in a controlled environment before broader adoption.

Design life cycle stage

After a product is approved for development or configuration, its structure and features are defined.

- **Design**: The product is being architected, including defining specifications, features, and configurations.
- **Chartered**: The product model has been formally approved for development or procurement.

Build & Integrate life cycle stage

The product is being developed, tested, and prepared for operational deployment.

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- **Build**: The product is being developed, covers the activities from code commit through compiled or packaged deliverables being ready for deployment to a lower (non-production) environment.
- **In Production**: Covers the final promotion and release of changes into the live, customer-facing environment, with all required governance.

Operational life cycle stage

The product is actively available and used within the organization.

- **Available**: The product is fully developed and ready for procurement or deployment.
- **Pending Retirement**: The product is still operational but is scheduled to be phased out.
- **End of Support**: The product is no longer receiving updates, maintenance, or vendor support.

> **Note:**
> A CI might be in the **Operational** stage, but might no longer be supported by the vendor or publisher or third party. That doesn't mean, however, that it can be or should be retired.

End of Life life cycle stage

The product is no longer in active use and is being retired.

- **Retired**: The product is no longer available for new purchases or deployments but may still exist in limited use.
- **Obsolete**: The product is completely phased out and is no longer supported or used.

Application services

Understand application services, learn about different application service types and how multiple ServiceNow® business units and products use them.

What application services are

A service instance is a set of interconnected applications and hosts that are configured to offer a service to the organization. Service instances can be internal, like an organization email system or customer-facing, like an organization website. For example, creating financial reports through a web-based application requires a computer, web server, application server, databases, middleware, and network infrastructure. These applications and hosts are all configured to offer the service of financial reporting. In development environments, an application service represents an instance of a business application or system.

ServiceNow applications refer to devices and applications that comprise an application service as configuration items (CIs). The various CIs and the relationships between them, that comprise an application service, are stored in the Configuration Management Database (CMDB).

Each application service contains an entry point as the top-level CI. An entry point is a point where clients access a service instance. Typically, it is a URL, or a combination of the IP address and port for application services in enterprise deployments. For cloud-based deployments, an entry point can be a URL to a cloud resource like an AWS gateway.

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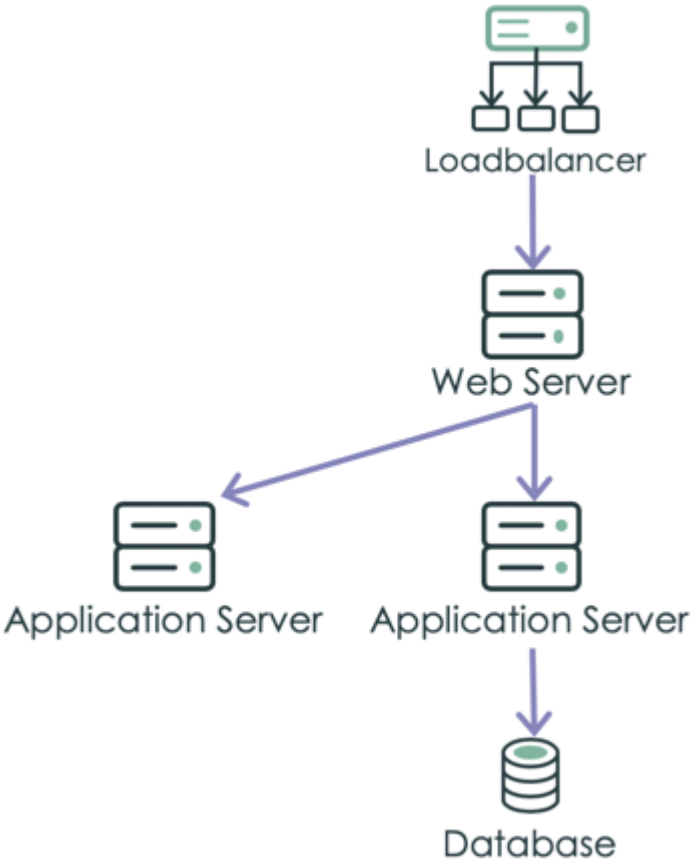
Application service



The Common Service Data Model (CSDM) helps you streamline service types and service offerings. You can add relationships between application services and other service-related objects in the CSDM: Business Application, Technical Service Offerings, or Business Service Offerings.

There are the following types of application services:

Discovered

Service Mapping discovers application services using patterns and by following traffic connections.

Pattern-based discovery creates precise and complete application services that represent the service-centric view of the IT infrastructure. It creates a high-fidelity map that is well suited to managing mission-critical application services.

In addition, it provides visibility of cloud-native services such as compute, load balancers, and API gateways. You can use service entry points such as AWS S3 buckets, AWS and Microsoft Azure API gateways, AWS Lambda functions, and Microsoft Azure functions to map services. It can also detect Lambda to Lambda calls and Lambda to RDS connections to build dynamic service maps.

Top-down method maps VMs on-premises and in public clouds. However, it requires these VMs to be fully discovered for the top-down discovery to determine which applications are running in the VM. If a VM isn't fully discovered, use the tag-based method to bridge the gap (see later in this document). Tag-based mapping also maps containers, that you cannot map using the top-down discovery.

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Discovered application services have the service classification of application service. They are stored in the Mapped Application Service [cmdb_ci_service_discovered] table.

Dynamic CI Group

Dynamic CI groups which act as application services. The members of the CMDB groups that is associated with the dynamic CI group, populates the application service. A dynamic CI group is a dynamic grouping of CIs, based on some common criteria such as the location of all web servers in Detroit or all Oracle databases in Boston. After creating a dynamic CI group, it can be used as a group offering in IT Service Management.

If created from the Application Service wizard, the service classification is application service, and if created from the legacy Event Management UI or Service Mapping UI, the classification is technical service. Application services of the Dynamic CI Group type are stored in the Dynamic CI Group [cmdb_ci_query_based_service] table.

Tag-based

A tag is a label that consists of a key-value pair. Your organization may use tags to categorize its assets, to enhance query and reporting capabilities. Discovery and Cloud Provisioning and Governance can discover tags used by all major cloud providers and container ecosystems. Once the tags are discovered, Service Mapping can create service instances based on these tags. For example, you can use tags to map all application services your organization uses in the production environment in the EMEA region.

Tag-based application services have the service classification of application service. They are stored in the Tag-based Application Service [cmdb_ci_service_by_tags] table.

Created Manually

With manual mapping, application owners manually document the applications, IT infrastructure, and relationships that support each application service. This methodology is the best fit for configuration items that are not fully discoverable due to security access issues. For example, IPS devices which support an intrusion prevention service for the security business unit.

Try to avoid manual mapping wherever possible. It's incredibly time consuming to map services manually, and often the information needed for mapping is not available due to evolving technology and a lack of processes that track and document the infrastructure dependencies needed for application context. And, whenever subsequent changes are made to the application service topology, the service map must be manually updated.

Manually created application services have the service classification of application service. Application services of the created manually type are stored in the Mapped Application Service [cmdb_ci_service_discovered] table.

Dynamic

A dynamic application service includes only CIs that are part of CI relationships stored in the CMDB CI Relationship [cmdb_rel_ci] table.

You can't edit a dynamic application service by directly adding or removing CIs from it. Dynamic application services are updated automatically to reflect any change to CI relationships in the CMDB CI Relationship [cmdb_rel_ci] table. When you add a relationship to a CI that is contained in a dynamic application service, then that

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service automatically updates to reflect the addition of the relationship and the associated new CI. In a similar manner, a dynamic application service automatically updates upon the removal of a relationship and its associated CI from a CI within the service.

One way to create dynamic application services, is by converting legacy business services or legacy manual services (created with Event Management, for example) into application services of the dynamic type.

Dynamic application services have the service classification of application service. Dynamic application services are stored in Calculated Application Services [cmdb_ci_service_calculated] table.

Who uses application services

Application services provide foundation for operation of the following business units and products of the ServiceNow AI Platform:

- ITOM Health gathers alerts from infrastructure events captured by third-party monitoring tools. It then uses IT-related information gathered by Discovery to map alerts to configuration items. Based on the collected information, then provides dashboards showing a consolidated view of all service-impact events.
- ITOM Optimization gives you tools to provision private and public cloud infrastructure and services and to achieve consistent management and cost visibility. The Cloud Cost Management application, available in the ServiceNow Store , helps you to analyze the full range of costs associated with cloud assets so you can identify and take action on opportunities to save money and optimize operations.
- IT Service Management users rely on the application services reflecting the IT infrastructure to manage and deliver services to their customers.
- Customer Service Management users efficiently diagnose and resolve issues related to the IT infrastructure in the context of application services.
- Software Asset Management users understand the software running in your IT environment and track configurations that impact software license consumption across your IT environments and datacenters.
- Strategic Portfolio Management users utilize data collected for application services to gain a comprehensive understanding of the applications used in your organization.

How to create application services

Depending on the needs of your organization, you can deploy different methods of creating and populating application services.

Important:
You can use the top-down and manual methods for the same application service. You cannot combine any other methods for creating or populating the same application service.

Analyze the IT infrastructure and service deployment in your organization to pick the optimal method of creating and populating application services.

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Choosing the right method for your deployment

Method	When to use	Additional considerations
Top-down discovery Service Mapping performs top-down discovery of application services. Service Mapping uses patterns to discover and map CIs. A pattern is a sequence of steps whose purpose is to detect attributes of a CI and its outbound connections. This method creates precise and complete application services that reliably represent the service-aware view of your organization's IT infrastructure Tag-based discovery in Service Mapping is a complimentary method that enriches the results of top-down discovery.	Use this method to discover industry-recognized or customized second-tier and third-tier applications. Such applications may include load-balancing solutions, application or web servers with database connections.	Pattern-based mapping requires configuring credentials, users, and user permissions to let Service Mapping access applications inside your organization private network. This process may take time and effort.
Tag-based If your organization uses tags for asset management, you can use these tags to map application services. Discovery and Cloud Provisioning and Governance discover tags assigned to CIs, and populate the CMDB with this data. Service Mapping uses the tag-related data from the CMDB to map services. Tag-based service mapping complements top-down service mapping. It provides visibility of containers and also maps VMs that aren't fully discovered, which top-down service mapping is unable to do. However, while tag-based mapping associates tagged components with specific application services, it doesn't map the connections between these components—This is another reason why tag-based mapping complements	Map resources on cloud workloads like IaaS/Paas/FaaS/CaaS as well as on container workloads using Kubernetes, OpenShift, or AWS ECS. Also, map resources in the Site Reliability Engineering (SRE) or Customer Reliability Engineering (CRE) deployments. Using tag-based method, you can map container resources in your deployments. Typically, you use this method to discover applications on cloud virtualizations or PaaS deployments.	Unlike other mapping methods, tag-based mapping doesn't require configuring credentials or providing users with elevated rights. Tag-based application services may not include relevant CIs, if these CIs don't have correct tags assigned to them.

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Choosing the right method for your deployment (continued)

Method	When to use	Additional considerations
rather than replaces top-down service mapping.		
Ingesting Application Performance Management (APM) maps from integrated Dynatrace or AppDynamics deployments Create application services using the integration with AppDynamics application model and Dynatrace monitoring platform available on ServiceNow Store.	Use this integration to create application services based on APM maps from Dynatrace or AppDynamics. You are able to use application services created by this method for monitoring Health.	Analyze discovered resources in the CMDB before ingesting from 3rd party to avoid creating duplicate CIs.
Populate an application service using the Dynamic CI Group method Based on CMDB groups, whose members populate the application service.	Use this method as a simple and fast way to create dynamic CI groups for deployments including Microsoft Active Directory, Microsoft Exchange or other DNS-related services. Dynamic CI Groups are especially useful if only a list of resource is available, without configuration details or credentials. Using a CMDB group lets you use CMDB Health to monitor health, and use a CMDB Query Builder saved query to filter for the CIs included in the application service.	There is no map view for application services created using this method. You can only view CIs belonging to such an application service as a list. Need to ensure that the CMDB group accurately filters for the CIs that should be included in the application service.
Application service API Create an automation for creating application services in bulk. Use this method, if your organization has performed cross-organization mapping and analysis and collected some information about services. Application services created using APIs belong to the manual type are stored in the Mapped Application Service [cmdb_ci_service_discovered] table.	Use this method for environments that require tracing of DevOps Continuous Integration/Continuous Deployment (CI/CD) process. You can import third-party service maps into manual application services individually or in bulk. For example, see the Digital Guidebook: Importing 3rd-party service maps into ServiceNow Service Mapping.	Be familiar with the exact service structure: sys_id of each CI comprising the service and the hierarchy that the CIs form. This method requires knowledge of the scripting infrastructure that your organization uses.

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Choosing the right method for your deployment (continued)

Method	When to use	Additional considerations
Populate an application service using the Manual method Create a manual application service with one CI only: the entry point. To populate a manually created application service, add other CIs manually as described in Manually add CIs to an application service. Alternatively, create and populate manual application services by converting business services created in the CMDB and stored in [cmdb_ci_service].	Use the manual method if you can't use other methods of creating or populating application services. Create application services manually for intrusion prevention.	This method doesn't require any preexisting setup or object configuration. You can include CIs of any class in manually created application services. Manually created application services reflect some changes to CIs, like CI attributes. However, they do not automatically reflect changes to CI relationships.
Populate an application service using the Dynamic Service method Application services that automatically update to reflect any change to CI relationships in the CMDB CI Relationship [cmdb_rel_ci] table. To conform with Common Service Data Model, you can also convert legacy services to dynamic application services. Those legacy services are stored in the [cmdb_ci_service] or [cmdb_ci_service_manual] CMDB tables: • Convert business services to application services • Convert legacy manual services into dynamic application services	Use this method to transform legacy business services into application services that other ServiceNow products can utilize. For example, dynamic application services can be used for service monitoring and change management.	You can't edit a dynamic application service by adding or removing CIs from it. The system automatically modifies an application service of the dynamic type when you modify relevant relationships for CIs that are part of that application service.
From CSV file Service Mapping extracts information from this file and creates potential application services referred to as service candidates. Use this method, if your organization has	If necessary, you can import service candidates from multiple CSV files.	Organize all the collected information in a specific order in a CSV file, precisely as described in the documentation.

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Choosing the right method for your deployment (continued)

Method	When to use	Additional considerations
performed cross-organization mapping and analysis and collected some information about services.		

To comply with CSDM, convert manual services created using IT Operations Management Event Management and stored in [cmdb_ci_service_manual] as covered in Convert manual services to application services or Convert manual services to application services using API. Converted services become application services of the manual type stored in the Mapped Application Service [cmdb_ci_service_discovered] table.

Domain separation

Domain separation, if deployed, impacts an service instance as follows:

- When creating an service instance, the service instance is assigned to the user's domain.
- When manually adding a CI to an service instance, you can choose only CIs that belong to the service domain.
- When using the createOrUpdateService - POST REST API for creating or updating an application service, the process stops if one of the CIs referenced in the API belongs to a different domain than the application service itself.
- When converting business services into application services, the newly created application service belongs to the same domain as the original business service. The application service comprises only CIs belonging to the same domain as the application service itself.

Create an application service

Create an application service to adhere to Common Service Data Model standards and to standardize the organization, maintenance, and monitoring of services in your organization.

Before you begin

Role required: Depending on the population method used:

- Dynamic CI Group: app_service_admin
- Manual: app_service_admin
- Dynamic Service: app_service_admin
- Top-Down Discovery: sm_admin
- Tags: sm_admin

About this task

An application service is a set of interconnected applications and hosts, which are configured to offer a service for the organization. Application services can be internal, like an organization's email system, or customer-facing, like an organization's website.

An application service has an entry point, which lets users access the application service. If you are at the planning stage and don’t know what the entry points are for an application service, you can create the application service without entry points. Such an application service is referred to as an empty application service, to which you can add entry points at any later time.

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All application services created in the Application Service wizard, are set with the *`application service`* classification.

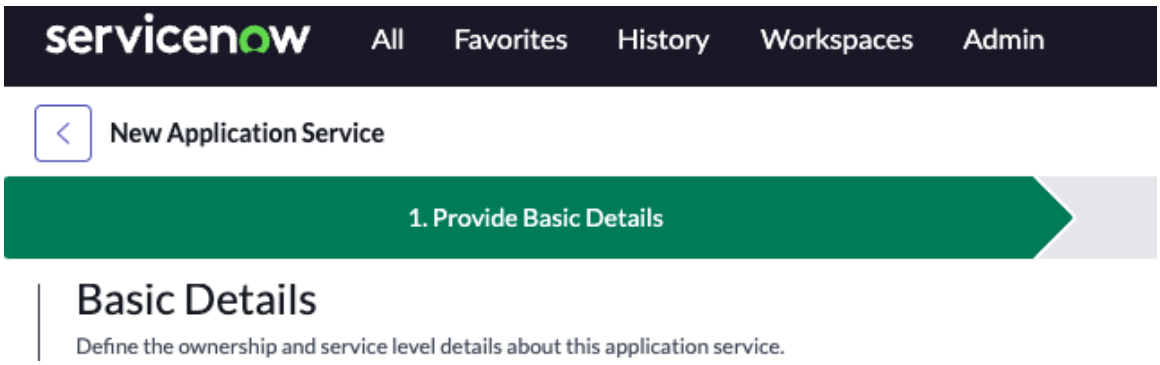
Service Mapping, if activated, can automatically discover and map application services as described in Application service mapping. A discovered application service contains the CIs and the connections between them that Service Mapping discovered and mapped.

You can also create an application service by using the createOrUpdateService - POST REST API.

Procedure

1. Navigate to **All** > **CSDM** > **Manage Technology Management Services** > **Service Instance**.
2. In the Application Services list view, select **New** to open the Application Service wizard.
3. In the **Provide Basic Details** tab:

   a. Fill out the fields for Basic Details.



Field	Description
Number	Pre-populated unique ID for the application service.
Name	Unique application service name, which isn't in use by any other type of application service. Use self-explanatory names such as `mailing service` or `printing service`.
Environment	The environment of the offering such as production, development, or test, as identified by some service offerings. Used by Incident Management and Change Management.
Version	The application service configuration version.
Model ID	A product model such as a software model where end of life data is stored.
Operational Status	Operational status of the application service, such as **Ready** or **Retired**.

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Field	Description
Support Group	Used by Incident Management as the group managing the contract covering the asset.
Change Group	Used by ITSM for routing of change and change-related tasks.
Managed By Group	Group responsible for managing the data.
Owned By	User who is familiar with the infrastructure and applications making up the service. This user is the application service Subject Matter Expert (SME) who provides information necessary for a successful creation of an application service. If the owner name is not listed, create a user with the sm_app_owner role, as the owner. Alternatively, you can choose a user with the sm_admin role.

Note:
See Teams related list for details about the automatic synchronization between the assignment group fields and the *Teams* related list.

b. In the Set Relationships section, add relationships between the application service and other components in the CSDM domain.

c. Select the **Business Application**, **Technical Service Offering**, **Business Service Offering**, or the **Parent Application Service** tab, and add items to the respective **Selected** list.

- The technical service offering list includes records in the Service Offering [service_offering] table, in which the *Service classification* attribute is **Technical Service**.
- The business service offering list includes records in the Service Offering [service_offering] table, in which the *Service classification* attribute is **Business Service**.
- The parent application service list includes application service records from the Service Instance [cmdb_ci_service_auto] table. Adding a parent application service relationship creates hierarchies and dependencies of application services in deployments such as:
  - Platform host and platform application deployments
  - Micro service deployments in which one or more micro services identified as an application service, is part of a larger application service deployment
  - Shared technical service dependencies

d. Select **Next**.

For information about CSDM relationships, see CI relationships in the CSDM.

Also, some fields and relationships are noted as required on the page. To change which fields and which relationships are required, see Modify the attributes and relationships required for application services.

4. On the **Populate the Application Service** tab:

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a. Click **Choose a Method** or select **Next** to skip selecting a service population method.

b. On the Choose a Method page, select a **Service Population Method**, and then follow the respective link to complete the specific population method:

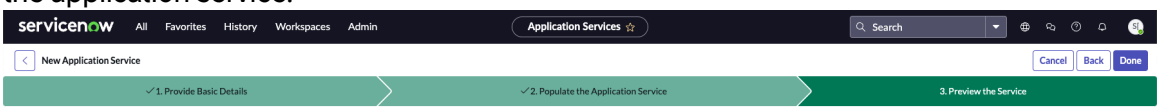
- **Top Down Discovery**: Use top-down discovery to populate application services
- **Dynamic CI Group**: Populate an application service using the Dynamic CI Group method.
- **Tags**: Use tags to populate application services
- **Manual**: Use the Manual method to populate application services
- **Dynamic Service**: Populate an application service using the Dynamic Service method

> **Note:**
> The **Top Down Discovery** and the **Tags** options are available only if Service Mapping is installed.

c. To add another method to populate the application service, click **Add Method** on the Service Population Methods page.
Or, select **Next**.

- You can add any combination of the **Top Down Discovery** and the **Manual** methods. However, if you select the **Dynamic CI Group**, **Tags**, or the **Dynamic Service** method, the **Add Method** button is grayed out and you can't add additional methods.
- You can select a card for a Converted Business Service method to see details about the service conversion, such as the conversion type. For more information, see Convert business services to application services.

5. On the **Preview the Service** tab, review and verify the summaries for creating and populating the application service.



a. Review **Relationships**.

b. You can select **Edit Relationships** to modify the relationships to other CSDM objects.

c. Review **Population Methods Summary**.

d. You can select **Edit Methods** to modify the selection methods.

e. Select **Done**.

Result

The application service is created, and you can access the new application service by navigating to application services list views:

- **CSDM** > **Manage Technology Management Services** > **Application Service**: Contains application service CIs from any class extending the Service Instance [cmdb_ci_service_auto] class, except alert groups. The list view includes the tag-based, discovered, manual, dynamic CI groups, converted, dynamic, and empty application service types.

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- **Configuration** > **Application Services** > **Application Services**: Contains application service CIs from any class extending the Service Instance [cmdb_ci_service_auto] class, except alert groups. The list view includes the tag-based, discovered, manual, dynamic CI groups, converted, dynamic, and empty application service types.
- **Service Mapping** > **Services** > **Service Instances**: Contains application service CIs from the Mapped Application Service [cmdb_ci_service_discovered] class. The list view includes the top-down (discovered) and empty application service types.

What to do next

- If the service population method is **Dynamic CI Group**:
  - Select **View CMDB Group CI's** to list all the CIs in the CMDB group that is associated with the application service.
  - Select **View Service CI's** to list all the CIs in the application service.
  Both lists of CIs are identical, unless the CMDB group contains more than 10,000 CIs. In this case, **View CMDB Group CI's** shows all the CIs in the CMDB group, and **View Service CI's** shows only the 10,000 CIs that are members of the application service.
- If the service population method is **Tags**, **Top Down Discovery**, or **Manual**, and select **View Map** to view the application service map where you can:
  - Link application services
  - View CI attributes in an application service map
  - View the change history of application services
  - Compare two versions of an application service
- Select **Advanced**, and then on the Advanced Details page, select **Additional Info**, **Questionnaire**, **Reject Messages**, or **Worknotes**, to add details.

Use top-down discovery to populate application services

Use top-down discovery to populate an application service. This discovery method deploys discovery patterns to find configuration items (CIs) belonging to the service and connections between these CIs. Pattern-based discovery creates precise and complete service instances that reliably represent the service-aware view of your organization's IT infrastructure.

Before you begin

- Top-Down Discovery is one of several methods for populating an application service with CIs. Choosing a method for populating an application service, is only one step of the generic procedure for creating an application service. Ensure that you have completed the initial steps as described in Create an application service. The procedure described here is incomplete by itself as it complements that generic procedure.
- Verify that Service Mapping is set up properly.
- Ensure you know which entry point to use for this application service and which attributes you must be able to define for this entry point. Learn about Entry point attributes available with Service Mapping.

For information about the different types of application services and the different methods you can use to populate application services, including using top-down discovery, see Application services.

Role required: sm_admin

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About this task

A pattern is a sequence of commands designed to detect attributes of a CI and its outbound connections. Service Mapping and Discovery share a set of preconfigured patterns that cover most of the commonly used devices and applications.

Service Mapping starts pattern-based top-down discovery process from the entry point you define.

An entry point is a point where clients access a service instance. Usually, it is either a URL or a combination of the IP address and port. Service Mapping starts the mapping process from this point. For example, to map your electronic mailing service instance, define an IP address or host name of the email server as an entry point.

Entry points vary depending on the nature of the service instance. Service Mapping comes with a wide range of preconfigured entry point types that cover many commonly used applications.

Procedure

1. From the **Service Population Method** list in the Choose a Method window, select **Top-Down Discovery**.
2. From the **Application Type** list, select the CI class of the application that serves as the entry point for this application service.
   Entry point parameters depend on the type you select.
3. Define attributes for the selected entry point as described in Entry point attributes.
4. **Optional:** Add free-text comment that may provide useful information for handling this application service later.
5. Click **Save**.

What to do next

Complete the generic procedure Create an application service.

Related topics

Discovery patterns used by ITOM Visibility

Use the Dynamic CI Group method to populate application services

The Dynamic CI Group method for populating an application service, automatically generates a dynamic CI group. The members of the CMDB group that the dynamic CI group is based on, populates the application service. The application service continuously synchronizes with the CMDB group to reflect any changes in membership in the CMDB group.

Before you begin

The Dynamic CI Group is one of several methods for populating an application service with CIs. Choosing a method for populating an application service, is only one step of the generic procedure for creating an application service. Ensure that you have completed the initial steps as described in Create an application service. The procedure described here is incomplete by itself as it complements that generic procedure.

Note:

- The number of CIs in an application service that is populated by the Dynamic CI Group method, is limited to 10,000, even if the associated CMDB group has more than 10,000 CIs.
- A CMDB group can be used to populate only a single application service. For more information about populating and using CMDB groups, see CMDB groups.
- A dynamic CI group contains CIs but can't contain other groups.

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For information about the different types of application services and the different methods you can use to populate application services, including Dynamic CI Group, see Application services.

Role required: app_service_admin

Procedure

1. In the Choose a Method page, select **Dynamic CI Group** as the **Service Population Method**.
2. Fill out the fields that appear, which are specific to the Dynamic CI Group service population method.

Field	Description
Service Population Method	The method used for populating the application service with CIs. Set to **Dynamic CI Group**.
CMDB Table	Notes the Dynamic CI Group [cmdb_ci_query_based_service] table, in which application services created by the Dynamic CI Group method, are stored.
Group Name	The CMDB group whose members become members the application service. **Note:** CIs from a class that extends the *cmdb_ci_service* class (Services), are automatically filtered out and are not added to the application service.

3. Select **Save**.

Result

The alert impact on dynamic CI groups is calculated on the following CIs:

- All CIs that are part of the dynamic CI's CMDB group.
- Children of current CIs with a relationship of: *Runs on::Runs*
- CIs related to either the current CIs or their children, with a relationship of: *Virtualized by::Virtualizes*

For more information, see alert impact calculation.

What to do next

Complete the generic procedure Create an application service.

Use tags to populate application services

Use tags that help categorize and organize configuration items (CIs) in your organization to populate an service instance. Tag-based mapping doesn't require configuring credentials or providing users with elevated rights. Tag-based population method requires the Service Mapping feature of ITOM Visibility.

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Before you begin

1. Tags is one of several methods for populating an application service with CIs. Choosing a method for populating an application service, is only one step of the generic procedure for creating an application service. Ensure that you have completed the initial steps as described in Create an application service. The procedure described here is incomplete by itself as it complements that generic procedure.
2. Analyze the tag usage in your organization and make a list of all tags and their purposes. Use the Key Value [cmdb_key_value] table to see the tags in the CMDB.
3. If necessary, assign tags to CIs that you want to include in an service instance.

Role required: sm_admin

About this task

A tag is a label that consists of a key-value pair. Your organization may use tags to categorize its assets, to enhance query and reporting capabilities. Discovery and Cloud Provisioning and Governance can discover tags used by all major cloud providers and container ecosystems. Once the tags are discovered, Service Mapping can create service instances based on these tags. For example, you can use tags to map all application services your organization uses in the production environment in the Europe, the Middle East and Africa (EMEA) region.

If you have configured tag-based service families and tag categories, you can use these tag definitions for populating an application service. Part of defining a tag-based service family is defining a tag category, which contains tag keys. If necessary, you can also define tag values to narrow the criteria used for populating application services. Based on the tag definitions for the tag-based service family, Service Mapping creates service candidates - suggested application services. When you use the tag-based service families to populate an application service, you must select the relevant service candidate.

Alternatively, you can define tag keys and their values while choosing the tag-based population method for a new application service. Define up to three tag keys and tag values for the population criteria. CIs that have discovered tag keys and tag values, become part of an service instance.

For information about the different types of application services and the different methods you can use to populate application services, including using tags, see Application services.

Note:
Service Mapping includes CIs that are part of CI relationships even if these CIs do not have tags assigned to them. For more information, see Tag-based discovery in Service Mapping.

Procedure

1. From the **Service Population Method** list in the Choose a Method window, select **Tags**.
2. To define new tag criteria, perform the following steps:
   a. Select **Use a list of tags**.
   b. Enter the tag key and its respective tag value.
   Matching tag keys that exist in the system, appear in the auto-fill options.

Important:
Tag-based mapping is not case-sensitive; same key names and key values spelled with upper and lower case are identified as the same.

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c. **Optional:** Click the plus icon and add another tag key and tag value.

d. Click **Preview Result** to see the list of CIs that match the defined criteria.

> **Note:**
> If necessary, refine the tag definitions. You can add no more than three tag key-value pairs for one application service.

3. To use tag definitions from a preconfigured tag-based service family, perform the following steps:
   a. Select **Use a candidate from a tag-based service family**.
   b. **Optional:** To see the tag definitions for this tag-based service family, select the **Preview** button.
   c. From the **Tag-Based Service Family** list, select the relevant family.
   d. Review the tag categories and values assigned to the service family.
   e. From the **Service Candidate** list, select the relevant candidate.
   f. **Optional:** To review the service candidate form, select the **Preview** button .
4. **Optional:** Add free-text comment that may provide useful information for handling this application service later.
5. Click **Save**.

What to do next
Complete the generic procedure Create an application service.

Use the Manual method to populate application services

The Manual method for populating an application service, is based on selecting an entry point CI, which lets users access the application service. To populate the application service, you then manually add CIs to the new application service.

Before you begin
Role required: app_service_admin

About this task
Manual is one of several methods for populating an application service with CIs. Choosing a method for populating an application service, is only one step of the generic procedure for creating an application service. Ensure that you have completed the initial steps as described in Create an application service. The procedure described here is incomplete by itself as it complements that generic procedure.

For information about the different types of application services and the different methods you can use to populate application services, including Manual, see Application services.

Procedure
1. In the Choose a Method page, select **Manual** as the **Service Population Method**.
2. Fill out the fields that appear, which are specific to the Manual service population method.

Field	Description
Service Population Method	Manual

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Field	Description
CMDB Table	Notes the Mapped Application Service [cmdb_ci_service_discovered] table, in which application services, created by the Manual service population method, are stored.
Class	The class from which to choose the entry point **CI** for the application service.
CI	The CI from the specified **Class**, to be the entry point for the application service. **Note:** To eliminate the possibility of delayed results when searching for a specific CI, make your search as specific as possible. A search with *<name> might take a long time and return a large data set.

3. Click **Save**.

What to do next

1. Complete the generic procedure Create an application service.
2. Manually add CIs to populate the application service.

Use the Dynamic Service method to populate application services

The Dynamic Service method for populating an application service generates a dynamic application service. A dynamic application service automatically updates to reflect any changes to CI relationships in the CMDB CI Relationship [cmdb_rel_ci] table.

Before you begin

The Dynamic Service is one of several methods for populating an application service with CIs. Choosing a method for populating an application service, is only one step of the generic procedure for creating an application service. Ensure that you have completed the initial steps as described in Create an application service. The procedure described here is incomplete by itself as it complements that generic procedure.

New dynamic application services initially don't contain any CIs (unless they were converted from legacy business services or legacy manual services). Dynamic application services are automatically populated when CIs that are contained in the service, get connected to other CIs by CMDB relationships. Entry points are automatically created when a relationship between a dynamic application service CI and other CIs is created.

For information about the different types of application services and the different methods you can use to populate application services, including Dynamic Service, see Application services.

Role required: app_service_admin

Procedure

1. In the Choose a Method page, select **Dynamic Service** as the **Service Population Method**.
2. Fill out the fields that appear, which are specific to the Dynamic Service service population method.

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Field	Description
Service Population Method	The method used for populating the application service with CIs. Set to **Dynamic Service**.
CMDB Table	Notes the Calculated Application Services [cmdb_ci_service_calculated] table, in which application services created by the Dynamic Service method, are stored.
Levels	The number of levels of related CIs to include in the application service.

3. Click **Save**.

What to do next
Complete the generic procedure Create an application service.

Use Application Services dashboard to monitor health

Use insights from the Application Services dashboard to reduce the number of incomplete application services by populating them and adding missing data. To use application services effectively, ensure that application services are fully configured and are populated.

Before you begin
Role required: itil_admin or app_service_admin

About this task
The dashboard queries for Application Services by checking for those records in the [cmdb_ci_service_auto] class in which the value of *`Service classification`* is **Application Service**. Reduce the number of incomplete application services by editing application services and populating any empty attributes. For example, if an application service isn't configured with a service population method, then configure a service population method for it.

The Application Services dashboard is fully integrated into the Insights view in CMDB Workspace and refreshes on a 24-hour cycle during night hours.

Procedure
1. Follow either navigation step to access the Application Services dashboard:
   - Navigate to **Workspaces** > **CMDB Workspace** and then select **Insights** on the CMDB Workspace menu bar. On the Insights view, select the Application services tile.
   - Navigate to **All** > **CSDM** > **Application Service Dashboard**.
2. View the tiles on the Overview tab, which show application services in which basic configurations are incomplete.
   - Total Application Services: Count of all application services, complete and incomplete.
   - Population method defined: Count of application services for which a service population method is specified.
   - Population method not defined: Count of application services missing a service population method. Data for the tags and top down discovery methods appear only if Service Mapping is installed.

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Note:
Some population methods for application services are available only with Service Mapping and therefore won't appear in the tile if Service Mapping isn't installed.

- Application services types: Chart of application services by population methods such as Dynamic CI Group and Manual, including application services without a population method (Empty). The chart includes business services that were converted to application services.
- Application services missing data: Chart of application services by key data that is missing, such as service offering and owner. For example, the bar 'No Service Offering' shows application services without any relationship with a business service or a technical service.

3. View counts on the Application service coverage tab, which shows application services in which other configurations are potentially incomplete.

   - Application Servers: Total number of application servers. The number of those which aren't in any application service and a breakdown of those application servers by class.
   - Databases: Total number of databases. The number of those which aren't in any application service and a breakdown of those databases by class.
   - Hardware Servers: Total number of hardware servers. The number of those which aren't in any application service and a breakdown of those hardware servers by class.

   Note:
   Application servers, hardware servers, and databases, not included in application services, are counted only up to about 100,000, even if the actual count is greater than this limit. This number limit is determined by the value of the glide.cmdb.csdm.app_service.max_results property.

4. Select **Owned by**, **Support group**, or **Change Group** to filter the list of application services that are included in the dashboard, by a key attribute.
   A filter doesn't impact counts of application services in which the respective filter attribute is missing. For example, filtering by *Owner*, doesn't change the count of the Missing Owner card.
5. Select a tile in either tab on the dashboard to drill down to the associated CIs list view.
   For example, select the Population method not defined tile to see the CIs list view of application services without a population method.

What to do next

Update application services with any missing important details:

1. Navigate to **CSDM** > **Manage Technology Management Services** > **Application Services**.
2. In the Application Services list view, select an application service to edit.
3. Add the missing details.

   For details about configuring an application service, see Create application service.

Modify the attributes and relationships required for application services

Modify the lists of attributes and relationships that are required when creating application services.

Before you begin

Role required: itil_admin

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About this task

In application service settings, the lists of required attributes and required relationships determine which of those items are required when creating application services. By default, the list of required attributes contains the required *Name* and *Number* attributes. Also by default, no relationships are required.

You can choose from predefined lists of allowed required attributes and relationships. To change the requirement status of an attribute, remove it from or add it to the list of required attributes. You can also add *Business Application*, *Technical Service Offering*, or *Business Service Offering* to the list of required relationships.

Procedure

1. Navigate to **All** > **CSDM** > **Service Instance Settings**.
2. Review the list of **Available** items in the Required attributes and Required relationships lists and then add items to the **Selected** list.
3. Click **Save**.

Result

Next time that you create an application service, the required attributes and relationships are visibly noted in the Basic Details section on the Create an Application Service page.

Convert business services to application services

Unify the way you manage services in the organization by converting manually created records in the Service [cmdb_ci_service] table into application services. Conversion lets you streamline the different types of services in your organization, leverage ITOM Visibility capabilities, and align with the Common Service Data Model (CSDM). The conversion is irreversible: You can't transform application services back into business services.

Using application services has benefits such as:

- Viewing service maps and change history of services.
- Easily seeing the service context by providing a flat list of all CIs in the application service.
- Monitoring service health. If Event Management is deployed, you can monitor service performance and identify health issues for application services.
- In Change Management, the list of impacted services on a change request form is more accurate because the list includes only application services.
- Applying Customer Service Management tools to open and manage cases at the service level.

Discovery doesn't run on converted application services, because converted services are manual. However, if after the conversion you add **Discoverable by Service Mapping** entry points to the application service, then Service Mapping starts discovering such this application service.

Choosing between application services of the manually created and dynamic type

You can convert business services into application services of the manually created type or of the dynamic type. You can edit manually created application services by adding or removing CIs at any time. The system does not update manually created services automatically. If there are changes to CIs making up a manually created application service, the service does not automatically reflect it.

Dynamic services are updated automatically to reflect any change to CI relationships stored in the CMDB CI Relationship [cmdb_rel_ci] table. When you add a relationship to a CI that is

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contained in a dynamic service, then that service automatically updates to reflect the addition of the relationship and the associated new CI. In a similar manner, a dynamic service automatically updates upon the removal of a relationship and its associated CI from a CI within the service.

To learn more about different types of application services, see application services.

Conversion process

During conversion, the following changes and processes occur:

- The service record is moved from the Service [cmdb_ci_service] table into the Calculated Application Service [cmdb_ci_service_calculated] table by changing the record class.
- The service instance is set with all the original business service attributes such as name, owner, and operational status.
- The system adds related items from the business service to the converted service instance, up to the specified level.
- The system queries the CMDB for the latest CI changes.
- Event Management, if activated, applies CI impact rules to CIs that are associated with alerts and that are part of the service instance. Event Management deploys CI impact rules for alert monitoring.
- You can edit a converted application service of the manually created type by navigating to **CSDM** > **Manage Technology Management Services** > **Application Service**. Then select a converted application service. The service population method for a converted application service, is set to **Converted Business Service**. For more information about editing application services, see Create an application service.

> **Note:**
> You can't edit a dynamic application service by adding or removing CIs from it. The system automatically modifies an application service of the dynamic type when you modify relevant relationships for CIs that are part of that application service.

Non-compliant CIs

A conversion might involve adding CIs of the following CI types, which cannot be added to an service instance:

- NAT [cmdb_ci_translation_rule]
- Endpoint [cmdb_ci_endpoint]
- Qualifier [cmdb_ci_qualifier]
- Application cluster [cmdb_ci_application_cluster]

If the original business service contains related items belonging to these CI types, then the system does not add such CIs or connections coming from them. There are system records in the Manual CI Exclusions/Inclusions [svc_manual_ci_exclusions_inclusions] table. See Components installed with application services for more information.

> **Note:**
> The Manual CI Exclusions/Inclusions [svc_manual_ci_exclusions_inclusions] table doesn't include CIs added using traversal rules.

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Domain separation

In environments with domain separation, only CIs belonging to the same domain as the service instance are added to the service instance. If there is a domain hierarchy, CIs must belong to the same child domain as the service instance.

Convert business services to application services in bulk

Convert a subset of business services to application services, in bulk and automatically rather than one at a time. Individually select the business services for the conversion, and then convert them into application services.

Before you begin

Role required: app_service_admin, ecmdb_admin, or itil_admin

About this task

Use bulk conversion to convert legacy business services to application services. For the bulk conversion, individually select the business services from the Services list view, typically up to 100 business services in a single conversion. You can create multiple bulk conversion records, each with a different set of business services. However, do not include a business service in more than one bulk conversion.

Note:
You can't undo this conversion operation.

Procedure

1. Navigate to **All** > **Configuration** > **Services**.
2. In the Services list view, select the services that you want to include in the conversion.
3. In the Actions on selected rows drop down list, select **Bulk Convert Application Services**.
4. Fill out the Bulk Convert Services form.

Field	Description
Name	Pre-populated with "Application Service Conversion: <time stamp>".
Select configuration items	List of services included in the conversion. You can unlock the list and select services to remove from the list. Or, use the Select target record search box to search and add services to the list, by service names.
Levels	The number of levels of related CIs to include in the converted application service.
Update service when CMDB updates	Select this check box to convert the business service into an application service of the dynamic type.

5. Select **Start Conversion**.

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What to do next

- Check the status of a conversion: On the Bulk Convert Services form, scroll to the Bulk Convert Services Entries section to see the status (such as Ready or Completed) of a conversion.
- Track the progress of a conversion as it runs: In the navigation filter, enter `cmdb_convert_bulk_services.list` and press the Enter key to see the list of conversions, and their progress.
- (Optional) On a change request form, view affected dynamic services. For example, after you add an affected CI that is associated with a dynamic service:
  1. Navigate to **Change** > **Open**.
  2. Select a new change request to add affected CIs to.
  3. On the Change Request form, scroll to the Related Links section.
  4. Click the **Affected CIs** tab and then click **Add** to add an affected CI to the change request.
  5. Open the form context menu and select **Refresh Impacted Services**.
  6. Click the **Impacted Services/CIs** tab to see any dynamic services that are associated with the affected CI and that are impacted by the change request.

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

Convert an individual business service to an application service

Manually convert a specific business service to an application service.

Before you begin

Review the original business service to evaluate it.

- Make sure that all CIs and CI relations are relevant for the future application service. If necessary, change the CI relations in the CMDB.
- Make sure that the original business service doesn't contain more than 5000 CI relations. Application services that contain more than 5000 CI relations cause mapping and monitoring performance issues.
- Decide how many levels of CI relations you are going to use during conversion.

> **Warning:**
> The conversion is irreversible: You can't transform application services back into business services.

Role required: app_service_admin

Procedure

1. Navigate to **All** > **Configuration** > **Business Services**.
2. Select the business service that you want to convert to an service instance.
3. Click **Convert to Application Service**.
   The Converting to Application Service dialog box opens.
4. Select a number from the **Up to** list, as the number of levels of related CIs to include in the conversion.
   The maximum number of levels is eight.
5. Select **Update service when CMDB updates** to convert the business service into an application service of the dynamic type.
6. Click **OK**.

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Result
The system adds the CIs from the business service to the converted service instance.

What to do next
Open the map for the newly converted service instances.

Make sure that the service instances aren't too large:

- Service Mapping doesn't offer to view CI list instead of a map for a service instance.
- There is no discovery message indicating that the service instance is too large: *`The map does not display the entire service, because it is too large. The number of CI connections exceeded the allowed maximum.`*

If the service is too large, perform the following actions:

- Review the converted service instance to identify CI relations irrelevant or redundant for this service. Remove such CI relations in the CMDB.
- Decide how many levels of related CIs you must include into this service instance. If necessary, change the number of levels used in conversion to reduce the service size.

Related topics

Application services

Convert legacy manual services to dynamic application services

Unify the way that you manage services in your organization by converting legacy manual services into dynamic application services. Conversion lets you streamline the different types of services in your organization, leverage ITOM capabilities, and align with the Common Service Data Model (CSDM).

Before you begin
Role required: app_service_admin

About this task

Note:
Converting a legacy manual service to a dynamic application service is irreversible. Once converted, you can’t revert it back to a legacy manual service. However, you can convert a dynamic application service to a manual application service.

You can't edit a dynamic application service directly. If you remove a CI from the map, it reappears once the service is recalculated. To ensure permanent changes, update the CI relationships in the CMDB CI Relationship [cmdb_rel_ci] table.

During conversion, the following changes and processes occur:

- A change to the record class moves the service record from the Service [cmdb_ci_service] or the Manual Service [cmdb_ci_service_manual] table to the [cmdb_ci_service_calculated] table.
- The dynamic application service is configured with all the original attributes of the legacy manual service such as name, owner, and operational status.
- Related items from the legacy manual service are added to the converted dynamic application service, up to three levels by default.

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- All connections created between CIs in the dynamic application service are endpoint CIs with the relationship *uses*, *implement*, or *application flow*.
- Event Management, if activated, applies CI impact rules to CIs that are associated with alerts and that are part of the application service. Event Management deploys CI impact rules for alert monitoring.

A conversion might involve adding non-compliant CIs, which can't be added to an application service:

- NAT [cmdb_ci_translation_rule]
- Endpoint [cmdb_ci_endpoint]
- Qualifier [cmdb_ci_qualifier]
- Application cluster [cmdb_ci_application_cluster]

If the original manual service contains related items belonging to these CI types, then these CIs or connections coming from them aren't added to the dynamic service. If necessary, you can prevent other CI types from being added to application services by modifying the Manual CI Inclusions/Exclusions [svc_manual_ci_exclusions_inclusions.list] table.

Procedure

1. Navigate to **All** > **Configuration** > **Application Services** > **Application Services**.
2. Confirm that the view is set to the default view.
   a. Select the List controls icon for the list view.
   b. Select **View** and then select **Default view**.
3. Open the legacy manual service that you want to convert to a dynamic application service.
4. In the Related Links section on the service form, select **Convert to Dynamic Service**.

Manually add CIs to an application service

Add configuration items to manually created application services or to services discovered by Service Mapping.

Before you begin

- Verify that the CI type for the configuration item (CI) that you are planning to add, exists. If necessary, create the CI type as described in Create CI types for Service Mapping and Discovery.
- Add CIs to the CMDB for the device or application that you want to add, if necessary. See Populate the CMDB for more information.

Role required: app_service_admin or service_mapping_admin

About this task

Adding a CI to an application service requires creating a relationship between the new CI and a CI in the application service. You can add CIs to an application service that was created manually, by either:

- Adding a method to populate the application service.

  Navigate to **CSDM** > **Manage Technology Management Services** > **Application Service**. Select an application service and then use the **Populate the Application Service** tab to

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choose a method to populate the application service. For more details, see Create an application service.

- Using the application service service map as described in the steps below.

  The default relationship type of the added connection in this case is *Depends on::Used by*. You can modify this default relationship type by changing the value of the *sa.it_service.manual_ci_rel_type* property. See Components installed with application services for more information.

Important:
You cannot fine-tune or edit tag-based and dynamic services from the map.

Manually adding a new CI to an existing CI in a service instance prompts the CMDB to update the information about both CIs, including their relationship type. If other application services use the same applicative flow, the CMDB recognizes the new CI and automatically adds it to those services as well.

For example, you manually add an IBM WebSphere Message Broker to an IBM WebSphere HTTP Listener in the Bank Customer Portal service. The system also adds this IBM WebSphere Message Broker to the same HTTP Listener in the Bank Internal Portal service, because it uses this HTTP Listener. Similarly, when you remove a CI you added manually, the system removes it from all application services where you either manually added it or it was automatically added by analogy.

You can manually connect a CI only to actual CIs existing in the CMDB, not to a visualization of other items on the map such as clusters or boundaries. Also, you cannot add CIs of these CI types to an application service:

- NAT [cmdb_ci_translation_rule]
- Endpoint [cmdb_ci_endpoint]
- Qualifier [cmdb_ci_qualifier]
- Application cluster [cmdb_ci_application_cluster]

There are system records in the Manual CI Exclusions/Inclusions [svc_manual_ci_exclusions_inclusions] table. See Components installed with application services for more information.

Note:
The Manual CI Exclusions/Inclusions [svc_manual_ci_exclusions_inclusions] table doesn't include CIs added using traversal rules.

In environments with domain separation, only CIs belonging to the same domain as the service instance are added to the service instance. If there is a domain hierarchy, CIs must belong to the same child domain as the service instance.

If working with an service instance discovered by Service Mapping, manually add a CI:

- To indicate that an service instance contains a device or application, which Service Mapping cannot discover. For example, add an A/C unit to the Production Floor service.
- To add a temporary placeholder for a CI, which Service Mapping did not discover. In this case you are planning to perform necessary troubleshooting to ensure that Service Mapping discovers this CI in the future. For example, add an IBM WebSphere Message Broker to the Bank Customer Portal service.

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- To create an service instance that combines entry points and CIs automatically discovered by Service Mapping with entry points and CIs from the CMDB. After you manually add an entry point, you can update the service instance with CIs from the CMDB based on the relationships defined there.

For additional information related to Service Mapping, see Pattern customization and Enable traffic-based discovery for CI types or specific CIs.

Procedure

1. Open the service instance map.
   a. Navigate to **All** > **CSDM** > **Manage Technology Management Services** > **Service Instance**.
   b. Select the needed service instance.
   c. On the service instance page, select **View Map**.
2. If needed, click **Edit** to ensure that the map is in Edit mode.

   If Service Mapping is deployed, then in Edit mode, the Discovery Messages section appears below the map.
3. To connect a CI to another CI on the map, right-click the CI to which you want to connect the new CI, and then select **Add a CI**.
4. In the Add A CI dialog box, specify the CI to add:

Field	Description
CI Type	Select the CI type (CI class) for the CI you are adding. Every CI belongs to a CI type which contains a set of attributes configured for this kind of CI, for example, *cmdb_ci_appl* for applications.
CI Name	Select the CI from the list of CIs of the selected CI type. **Note:** To eliminate the possibility of delayed results when searching for a specific CI, make your search as specific as possible. A search with *<name> might take a long time and return a large data set.

   The CI type list includes only allowed CI types. For example, you cannot add an application cluster.
5. Click **Submit**.
   The manually added CI appears on the map.

Note:
When you manually add a CI, which is an application, as a child to a service that already includes its parent application CI, the newly added child application CI is hidden inside the inclusion. Click the plus (+) symbol next to the parent application CI to see the child application CI.

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6. **Optional:** If Service Mapping is activated, add a discoverable outgoing connection for the manually added CI:

   a. Right-click the manually added CI.

   b. Select **Manually add a connection**.

   > **Note:**
   > If you do not see the **Manually add a connection** option in the right-click menu, check that you are logged in with the user that belongs to the same domain as the application service.

   c. Configure attributes for the entry point as described in Entry points attributes.

   d. Click **Submit**.
   Discovery and Service Mapping attempt to discover this CI. If successful, the CI appears on the map. Otherwise, a warning icon (⚠) appears.

7. **Optional:** If Service Mapping is activated and you want Service Mapping to automatically discover a CI, which you previously added manually:

   a. Customize the relevant pattern or fine-tune traffic-based discovery to enable Service Mapping to discover the CI.

   b. Navigate to the relevant service instance map.

   c. Click **Run discovery**.

   d. After the discovery process finishes, verify that Service Mapping discovered the CI by checking the connector leading to the CI.
   If Service Mapping discovered the CI, then two connectors, a manual and automatically discovered, appear for the CI.

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e. Right-click the CI you added manually.
In the example, it is IBM WebSphere Message Broker.

f. Select **Remove manually added CI**.
The map shows the CI with only one connector leading to it. If this CI had any manually added connections, they are removed together with the manually added CI.

Related topics

Link application services

addCI()

Manually update an application service with changes from the CMDB

Ensure that an service instance is up-to-date and reflects all the latest changes to its configuration items (CIs). Regularly update application services to reflect any changes to CIs and their relationships in the CMDB.

Before you begin

Role required: app_service_admin

About this task

There is no mechanism or an API that automatically updates application services that were created manually. Also, you may need to manually update application services discovered by Service Mapping, if they contain manually added CIs. You can only update application services which contain manually created entry points and which are not discovered by Service Mapping.

An example of a change is deleting CIs from the CMDB or connecting two CIs one of which is part of an application service. In the first case, your application service may show a CI that no longer exists. In the second case, on the contrary, the application service omits a CI.

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An update might involve adding CIs of the following CI types, which cannot be added to an application service:

- NAT [cmdb_ci_translation_rule]
- Endpoint [cmdb_ci_endpoint]
- Qualifier [cmdb_ci_qualifier]
- Application cluster [cmdb_ci_application_cluster]

There are system records in the Manual CI Exclusions/Inclusions [svc_manual_ci_exclusions_inclusions] table. See Components installed with application services for more information.

Note:
The Manual CI Exclusions/Inclusions [svc_manual_ci_exclusions_inclusions] table doesn't include CIs added using traversal rules.

Also, the system can connect a CI from the service instance only to actual CIs that exist in the CMDB, not a visualization of other items on the map like clusters or boundaries.

The maximum number of CI connections added to application services during this operation is controlled by the sa.service.max_ci_service_population property. By default, the value is 1,000 (one thousand connections). Increasing the number of CI connections may cause performance issues. To adjust the maximum number of added CI connections, add the sa.service.max_ci_service_population property, as described in Add a system property.

In environments with domain separation, only CIs belonging to the same domain as the service instance are added into the service instance. If there is a domain hierarchy, CIs must belong to the same child domain.

You can also update application services by using APIs.

Procedure

1. Navigate to **All** > **CSDM** > **Manage Technology Management Services** > **Application Service**.
2. On the Application Services list view, select the service instance that you want to update.
3. Click **Advanced** and then click **Advanced Configurations**.
4. On the Additional Info page, click the **Update with changes from CMDB** related link.
5. Select a number in the **Up to** list to limit the number of levels of related items to be updated. If the specified number is higher than the number of levels of related items that already exist in the service instance, then the system adds the missing CIs and their connections.

   Warning:
   Specifying a lower number than the number of levels that already exist in the service instance, does not result in the removal of CIs from the service instance.

6. Click **OK**.

Result

- The system updates the service instance with the changes from the CMDB and shows them on the map.
- After the update process is complete, the service instance form opens.

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Link application services

You can manually link two application services by adding a reference to one application service into another application service. The service that contains the reference, becomes a dependent service. The service that you include as a reference is a contained service. You can link application services to create dependencies for impact monitoring in Event Management.

Before you begin

You can edit discovered and manually created service instances.

Important:
You cannot fine-tune or edit tag-based and dynamic services from the map.

Ensure that you know the name and the service type of the application service, to which you want to add a reference.

Role required: app_service_admin or service_mapping_admin

About this task

To create a link, add a reference to the relevant application service as an outgoing connection of the relevant CI inside another application service. For example, you can add the UK Portal application service as a link to the Online Store application service. In this case, the Online Store service becomes dependent on the UK Portal service that it contains. The Online Store service reflects discovery errors for its contained service in the Edit map mode, as well as alerts in Event Management.

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Example of linked application services

When you link an application service to another application service, the information about the CI, to which you linked the service, is updated in the CMDB. The CMDB recognizes other application services that use the same applicative flow, and adds the contained application service to these application services by analogy. The same logic applies when you remove a contained application service: The system removes it from all application services where you either manually linked this service or the system linked this service by analogy.

When using Service Mapping, you may want to link application services to create:

- A dependency between two application services.
- A placeholder for a map branch that Service Mapping failed to discover. If you create or customize a pattern to discover the configuration item (CI) serving as an entry point for the contained service instance, Service Mapping can discover this contained service.
- An indication that an service instance contains a branch, which Service Mapping cannot discover.

You can add an service instance as a contained service to as many service instance as necessary.

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Procedure

1. Navigate to **Service Mapping** > **Application Services**.
2. Click **View map** next to the relevant application service.
3. If needed, click **Edit** to ensure that the map is in Edit mode.
4. Right-click the CI to which you want to link an application service as a reference.
5. Select **Add A CI**.
6. In the Add a CI dialog box, select the application service you want to add as a contained service:

Field	Description
CI Type	Select the relevant service type from this list: ○ `Tag-Based Application Service` ○ `Mapped Application Service` for discovered or manually created application services ○ `Calculated Application Service` for dynamic services ○ `Dynamic CI Group`
CI Name	Select the name of the application service that you want to link as a contained service.

7. Click **Submit**.
   The icon for the contained service appears on the map.

Related topics

Application services

View dependent application services in classic Service Mapping

View contained application services in classic Service Mapping

Group application services

Organize application services by groups to perform actions simultaneously on multiple services, and to control user access to services. You can use Event Management to track service health by service groups.

Before you begin

Role required: service_mapping_admin or app_service_admin

About this task

Typically, enterprises have hundreds of services which makes it impractical to manage them individually. Service groups can make service lists much shorter and easier to manage, especially in large organizations or service providers.

How you group service instances depends on the user and on service provisioning policies in your enterprise. The relation between service instances in groups is purely logical and the same service instance can belong to multiple groups. For example, the Mobile service can be part of the following service groups: Sales, Beijing, and Telephony.

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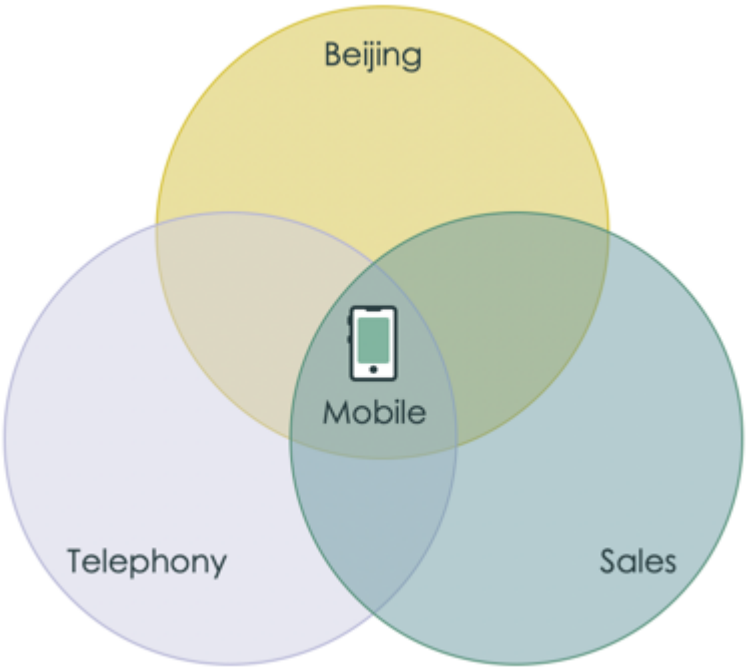
Example of a service instance belonging to different groups



You can embed a service group within another service group to create a hierarchy of service groups. If users have access to a parent service group, they automatically have access to all its child groups. By default, all new services are assigned to the **All** service group that lets all users view and manage service instances. When you assign a role to a service group, the users with this role can access service instances in this service group and in the **All** service group. To enable users with this role to access other services, assign this role to the respective service group. Do not assign user roles directly to the **All** service group.

If Service Mapping is activated, service groups can contain a mixture of manually created application services and application services discovered by Service Mapping.

You can use ServiceNow AI Platform Notifications to alert users if the service group severity changes to critical. The overall severity of the group is determined by the highest alert severity within the group.

Procedure

1. Navigate to **All** > **Configuration** > **Application Services** > **Service Groups**.
2. Click **New**.
3. Enter the name of the new service instance group in the **Name** field.
4. To embed this group in another group, enter the name of the other group in the **Parent Group** field.
5. Right-click the form header and click **Save**.
6. Add a service instance to the newly created service group.

   a. In the Service Group Members section, click **New**.

   b. In the **Name** field, enter the name of the service instance.
   If you are using Event Management, you can also enter an alert group name.

   c. Click **Submit**.

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7. Alternatively, add a service instance to a group from the service instance form.
   a. Navigate to **All** > **Configuration** > **Service Instances** > **Service Instances**.
   b. Select the service instance you want to add to a service group.
   c. In the **Service Group Members** section, double-click **Insert a new row**.
   d. Enter the name of the service group to which you want to add the selected service instance.
   e. Click the **OK** icon ( ).
   f. Click **Update**.

Control user access to application services

Assign user roles to service groups to grant users access to application services in your organization. Your organization may restrict access to some services for security or secrecy reasons.

Before you begin

Make sure that you have performed the user provisioning tasks for the users you want to grant access:

1. Add users to user groups .
2. Create new roles .
3. Assign roles to users or user groups .

Also, make sure that you have created service groups as described in Group application services.

Role required: app_service_admin or service_mapping_admin

About this task

In the base system, the following roles provide access to application services:

app_service_admin

Creates and modifies service instances, creates service groups, views, and edits service instance maps.

app_service_user

Views maps for operational service instances and retrieves service content using the getContent - GET REST API. The itil role that serves as the basic helpdesk technician role contains the app_service_user role.

Service Mapping provides these preconfigured roles:

service_mapping_admin

Sets up the Service Mapping application. Maps, fixes, and maintains service instances. Also performs advanced configuration and customization of the product. Assign this role to application administrators.

service_mapping_user

Views maps for operational service instances to plan change or migration, as well as analyze the continuity and availability of services. Assign this role to application users.

sm_app_owner

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Provides information necessary for successful mapping of a service instance. Once a service is mapped, this user reviews the results and either approves it or suggests changes. Assign the sm_app_owner role to users who own service instances and are familiar with the infrastructure and applications that make up the services.

Note:
Users with the itil role only can view all service instances.

Event Management provides these preconfigured roles:

evt_mgmt_admin

Has read and write access to all Event Management features to configure Event Management.

evt_mgmt_operator

In addition to the evt_mgmt_user permissions, can also activate operations on alerts such as acknowledge, close, open incident, and run remediations.

evt_mgmt_user

Has read access to all Event Management features. Has write access to alerts to manage the alert life. Has the itil role to be able to manage incidents that are created from alerts.

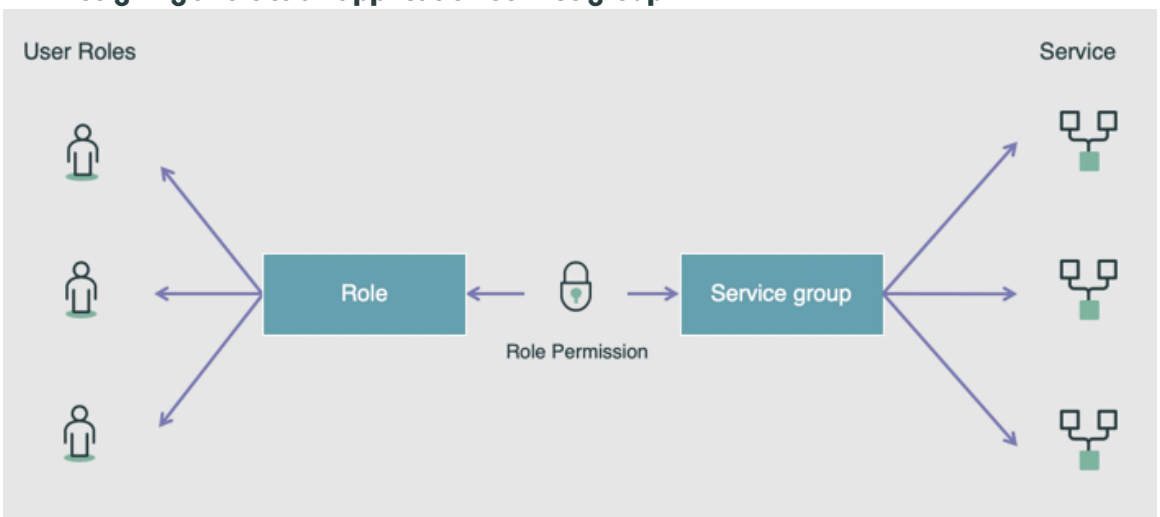
evt_mgmt_integration

Has create access to the Event [em_event] and Registered Nodes [em_registered_nodes] tables to integrate with external event sources.

Typically, enterprises have hundreds of services which makes it impractical to manage them individually. Service groups can make service lists much shorter and easier to manage, especially in large organizations or service providers. In a hierarchy of service groups, access to a parent service group automatically grants access to all the child service groups.

Users inherit permissions from roles that are assigned to them. You can assign some roles directly to service groups to allow all users with this role to access all application services belonging to this group. However, most enterprises choose to organize their roles as a hierarchy. It helps to manage roles across multiple ServiceNow applications. For example, the Service Mapping administrator [service_mapping_admin] can be part of a broader administrator role like administrator [admin]. You can add users to user groups and then assign roles to the user groups to give permissions of this role simultaneously to all the group users.

Assigning a role to an application service group



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By default, all new services are assigned to the **All** service group that lets all users view and manage service instances. When you assign a role to a service group, the users with this role can access service instances in this service group and in the **All** service group. To enable users with this role to access other services, assign this role to the respective service group. Do not assign user roles directly to the **All** service group.

Procedure

1. Navigate to either of the following:
   - **Configuration** > **Application Services** > **Service Group Responsibilities**.
   - If Service Mapping is activated: **Service Mapping** > **Services** > **Service Group Responsibilities**.
   - If Event Management is activated: **Event Management** > **Services** > **Service Group Responsibilities**.
2. Click **New** and fill out the Application Service Group Responsibilities form.

Field	Description
Application Service Group	Service group to which you want to assign a role.
Role	Role you want to assign to the selected service group. For example, financial_services_admin.

3. Click **Submit**.

Example:

To manage access to services that contain sensitive financial information in your organization:

1. Organize the services into the Financial Services group.
2. Create a new user role, financial services administrator [financial_services_admin] role, that contains the [app_service_admin] role.
3. Assign the Financial Services administrator role to the Financial Services group.

As a result, only users with the Financial Services administrator role can access application services belonging to the Financial Services group.

View an application service map in base system

An application service map provides a visualization of data for the CIs comprising an application service, and the relationships and connections between these CIs.

Before you begin

Role required: app_service_user to view the map in View mode, and app_service_admin to modify services in Edit mode.

About this task

When you create an application service, the system generates an associated application service map. The system then updates the map to reflect any changes to the application service. This map consists of icons representing CIs and arrows that represent the connections between them.

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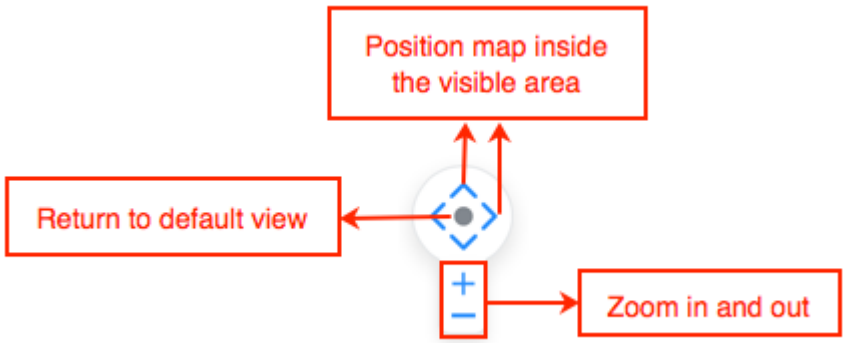
If Service Mapping is deployed, see Application service maps and View CI connection attributes in an application service map for more details.

To open an application service map, navigate to **CSDM** > **Manage Technology Management Services** > **Application Service**, select an application service, and then click **View map**.

Perform any of the following operations in the application service map.

Procedure

- Select on the windows bar to navigate to a different application service.
- Use the navigation tools to increase or decrease the view of the map and to move the map on the page.
  You can also click anywhere on the map area and drag a segment of the map into the visible



  area.
- View changes: You can view changes and change records associated with the application service as a whole or with any of its CIs, within a time range.

  For more information, see View the change history of application services.

  Records under the **Change** tab underneath the map, which are associated with a selected CI or connection, are highlighted. If you select a change record under the **Change** tab, then the associated CI icon appears yellow on the map.

- View attributes: When you select a device, application, or connector on the map, it appears in blue and its attributes appear in the Properties pane on the right of the map.

  When nothing is selected on the map, the details of the application service itself appear on the Properties pane.

  Open the CI's form for further details by clicking **Detailed Properties** at the bottom of the Properties pane.

- Select **Edit** to add or remove CIs from the map or **View** to switch the map mode.

- Select for **Additional actions**:
  - Set **Group CIs on map**: Simplify maps by grouping 10 or more CIs belonging to the same type and hosted on servers sharing prefix and domain name.
  - Set **Spanning tree view**: Simplify the map by organizing CIs into a tree structure and hiding some connection lines. This option is especially useful for very large maps.
  - **Map Indicators**: Show additional information for a CI or for the application service itself by displaying related records such as alerts, outages, incidents, and problems. For each indicator that is enabled, the corresponding indicator icon appears next to CIs with associated records, and the corresponding tab appears underneath the map. If a record is

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associated with the application service itself, the indicator appears next to the application service name.

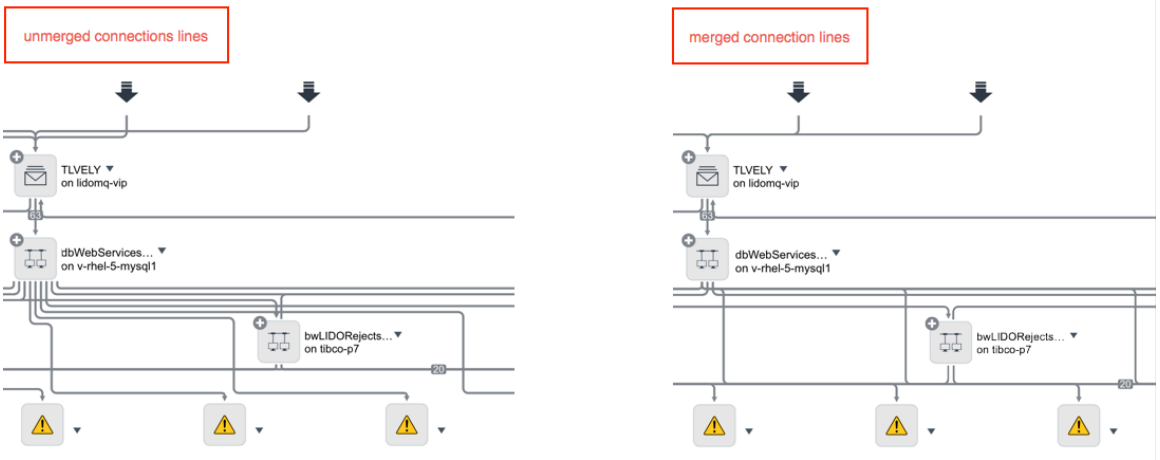
For information about managing map indicators, see Create or modify map indicators. For more general information, see Event Management Map Indicators (Video).

- **Export to PDF**: Export the map to a .PDF file which you can then share as needed. After the PDF file is ready, click to download the PDF file to your local drive.

- View the details of a connection.

By default, connection lines for the same CI on an application service map, are merged. This merge reduces clutter on the map and helps to make the map more readable. For a merged connection line, you can view details for all the underlying connection lines.

Merged connection lines



- To view the source and target CIs of a connection, right-click a connection line.

  If spanning tree view is enabled:

  1. Select the CI whose connections you want to view to show all the concealed connections for the CI.
  2. Right-click one of the connection lines.

- To view properties of a connection, click a connection line. For manually added connections, Endpoint Type is Manual Endpoint.

- To view properties of a connection within a merged connection:

  1. Right-click the merged connection line.
  2. Select one of the connections.
  3. Select **Select edge**.

What to do next

You can change the details that appear in the Properties pane by updating the form view 'Form view and section', as described in Configuring the form layout.

Related topics

Spanning tree view property

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View CI attributes in an application service map in classic Service Mapping

An application service map displays attributes for each configuration item (CI) that is part of the application service, as well as for the application service itself. The attributes come from the CMDB.

Before you begin

Role required: service_mapping_admin or service_mapping_user

About this task

You can view the following information for each CI:

Name label

The CI name. This attribute is either preconfigured on the CI or configured during CI installation.

Basic attributes

A summary of the most important CI attributes.

Detailed attributes

A complete list of all attributes collected for the CI.

Each CI type (CI class) has different attributes. For example, the Linux Server type has different attributes than the SQL Instance type.

If Service Mapping is deployed, the way CIs appear on the map depends on the view you select for the map. Attributes available for viewing also depend on the Service Mapping setup. For more information, see description of components installed with Service Mapping.

Procedure

1. Open the service instance map.
   a. Navigate to **All** > **CSDM** > **Manage Technology Management Services** > **Service Instance**.
   b. Select the needed service instance.
   c. On the service instance page, select **View Map**.
2. If needed, click **Edit** to ensure that the map is in Edit mode.

   If Service Mapping is deployed, then in Edit mode, the Discovery Messages section appears below the map.
3. To see the full name of a CI whose name has been shortened on the map, point to the CI.

   A tooltip displays the full CI name.
4. Click a CI to see its details in the **Properties** pane.

   The attributes of applications and the servers that host them appear separately.

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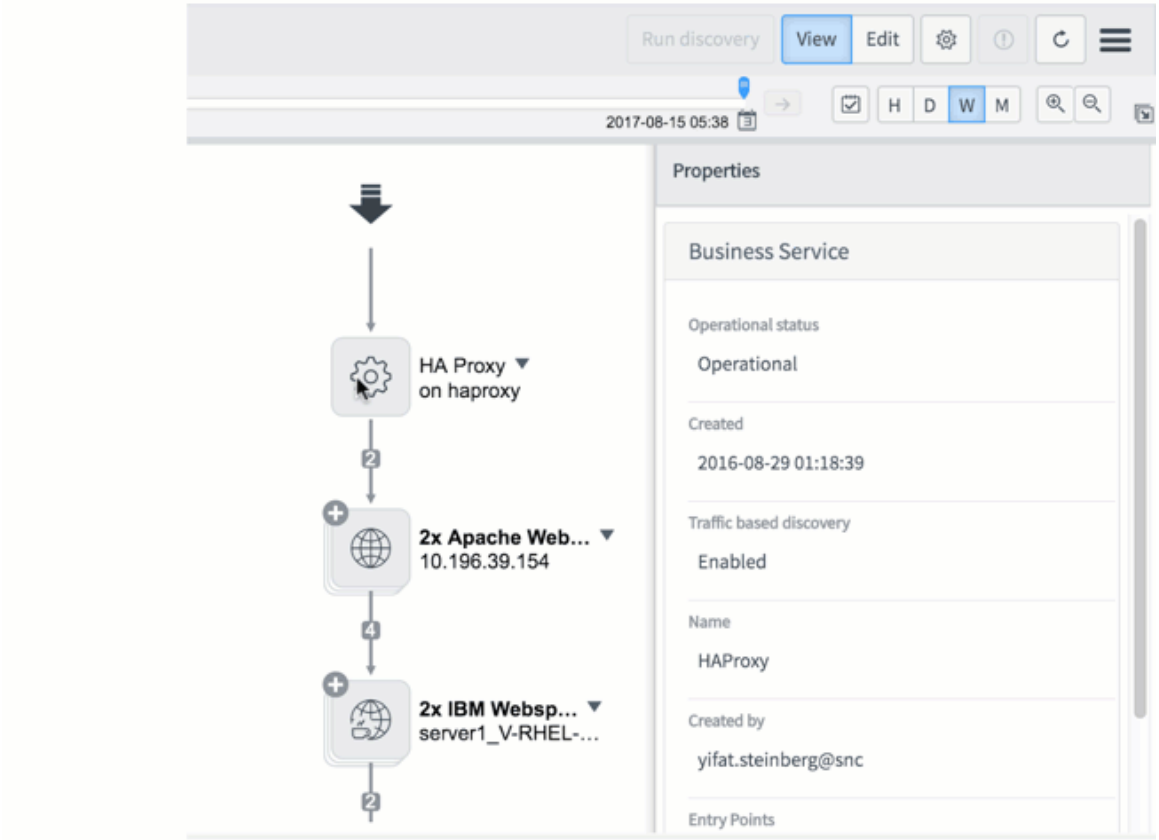

5. To view more detailed attributes for the CI, click **Detailed properties** at the bottom of the Properties pane.
6. **Optional:** To view configuration files associated with a CI in environments where Service Mapping or Discovery are enabled and tracking changes to CI configuration files is enabled):
   - Review the list of files under **Tracked Files** in the **Properties** pane. Click the file name to open the actual file.
   - Click the **Affected CIs** tab and view the list of configuration files. Click the file name to open the actual file.

View the change history of application services in classic Service Mapping

You can view the changes made to an application service as a whole and to the individual configuration items (CIs) comprising the service. Change history is useful for maintenance, planning, or troubleshooting procedures.

Before you begin

Role required: admin, service_mapping_admin, service_mapping_user, app_service_admin, or app_service_user

About this task

Details about changes to a service instance and to its CIs are stored in the CMDB. Typically, these changes reflect adding or removing CIs from a service instance, upgrading or updating CIs, or modifying CI configuration files. The system gathers this data by querying CMDB tables and then creating the change history view. In deployments where Service Mapping is activated, the type of change information Service Mapping queries depends on discovery patterns that Service Mapping uses to discover CIs.

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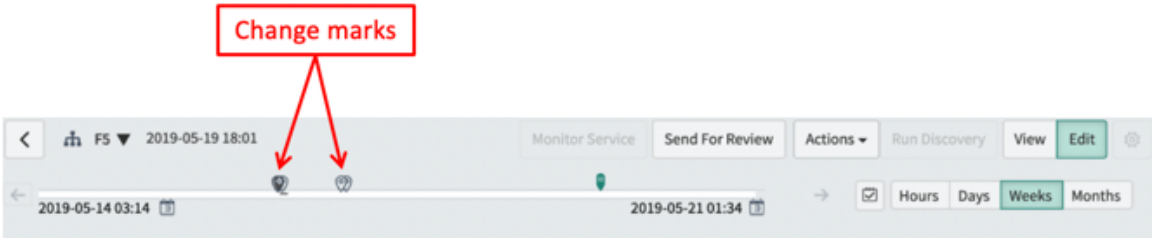
Changes to configuration files are associated with CIs to which these files belong. Maps show configuration file changes as changes to related CIs.

While you can see change records for a specific CI in the context of application services, you can also see detailed history of a specific CI separate from its service instance as described in History Timeline.

If the ServiceNow AI Platform is configured to validate changes, all changes are evaluated and rendered as valid or not. If a change is valid, its change record on the service instance map is marked as approved. For more information about configuring the platform for change validation, see Managing proposed changes.

Changes to the service instance appear on the history timeline.



The type of change mark depends on the nature of changes that it represents:

Light gray balloon ( )

Unapproved change that does not influence the service instance behavior. For example, a change in a network path or adding a node to a cluster.

Dark gray balloon ( )

Unapproved change that changes the service instance behavior.

Green balloon ( )

An approved change in deployments where the ServiceNow AI Platform is configured to validate changes.

Double balloon ( )

Multiple separate changes that happened a short time from each other.

You can mark times on the history scale by creating baselines to quickly return to the marked view.

Procedure

1. Open the service instance map.
   a. Navigate to **All** > **CSDM** > **Manage Technology Management Services** > **Service Instance**.
   b. Select the needed service instance.
   c. On the service instance page, select **View Map**.
2. Review change records created for this service instance on the **Changes** tab at the bottom of the page.

   If Service Mapping is deployed, then in Edit mode, the Discovery Messages section appears below the map.
3. On the history timeline, set the time range of changes that you want to view.
   The map shows the history view of the service instance for the time you selected.

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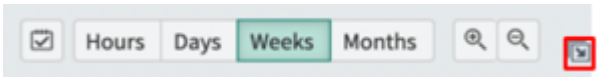
Note:
The **Change** tab shows all change records, even the ones which are filtered out of the history view.

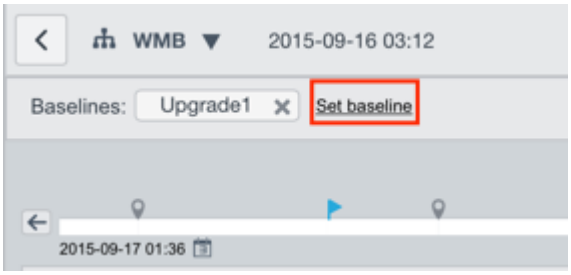
4. To mark a time on the time scale, set a baseline:

   a. Click the **Compare** icon.

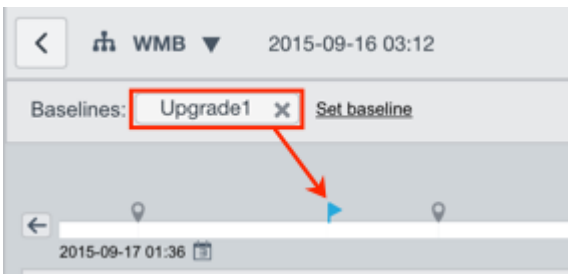


   b. Navigate to the time you want to mark as a baseline on the history scale.

   c. Click **Set baseline**.

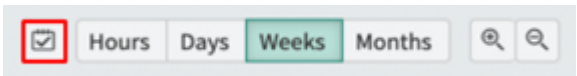


   d. Enter the name of the baseline and click **OK**.
   The new baseline appears as a button above the history scale and as a blue flag on the history scale.



5. View the change history.

6. To exit the history view and see the current status of the service instance, click the current icon.



Related topics

View an application service map in base system

Compare two versions of an application service in classic Service Mapping

Modify tracking changes in configuration files

Fine-tune tracking changes for the change history

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Compare two versions of an application service in classic Service Mapping

You can see a summary of application service changes at a glance by comparing two versions of an application service. This feature is useful for checking the application service status before and after a certain change or problem.

Before you begin

Role required: admin, app_service_admin, app_service_user, service_mapping_admin, or service_mapping_user

About this task

Specify two points in time for which to compare the two versions of an application service. You can use the change indicators on the timeline to specify one point in time that is before and another that is after a change for which to see the details. For example, if you know that the application service started to fail at a certain time, you can compare two versions of the application service, one before and one after the problem started. This comparison lets you see the summary of changes that possibly led to the problems.

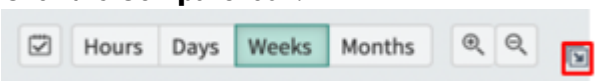
Service Mapping, if deployed, tracks and shows all changes to a CI including configuration files associated with a CI. When you compare two versions of an application service, you can see changes made to configuration files as changes to CIs. You can also compare two versions of a configuration file to see the actual changes in the files, during the time range specified for the comparison.

Procedure

1. Open the service instance map.
   a. Navigate to **All** > **CSDM** > **Manage Technology Management Services** > **Service Instance**.
   b. Select the needed service instance.
   c. On the service instance page, select **View Map**.
2. If needed, click **Edit** to ensure that the map is in Edit mode.

   If Service Mapping is deployed, then in Edit mode, the Discovery Messages section appears below the map.
3. On the history timeline, set the time range of changes that you want to view.
   The map shows the history view of the service instance for the time you selected.

   Note:
   The **Change** tab shows all change records, even the ones which are filtered out of the history view.
4. Click the **Compare** icon.



5. Set **Compare point 1** and **Compare point 2** as the two points in time for the comparison.

   You can drag the pointers on the history scale to set corresponding time points.

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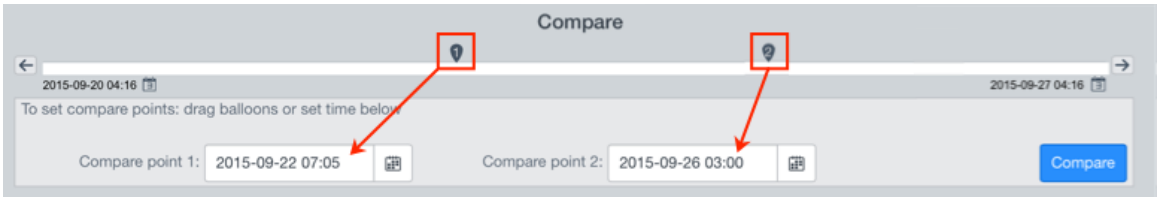
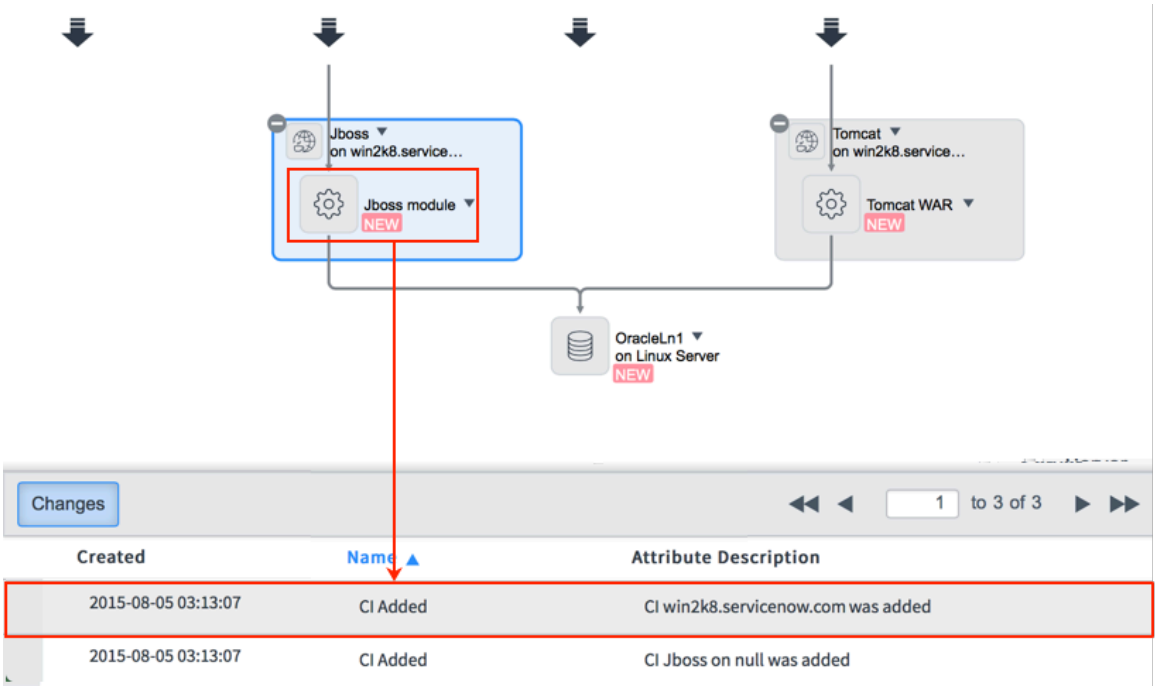


If the history scale does not include the time set for comparison, then its corresponding pointer appears next to the compare point in yellow:

Note:
If there are no changes to the service during the time interval specified by **Compare point 1** and **Compare point 2**, then no change details are displayed.

6. Click **Compare**.
   The comparison view opens in a separate tab.
7. Select a marked CI to see the relevant change record on the **Changes** tab.



8. **Optional:** If Service Mapping is deployed, you can compare two versions of a configuration file that appears on the map as Updated:

   a. Select the CI that is associated with the updated configuration file.

   b. In the **Properties** pane, click the link to the updated file.

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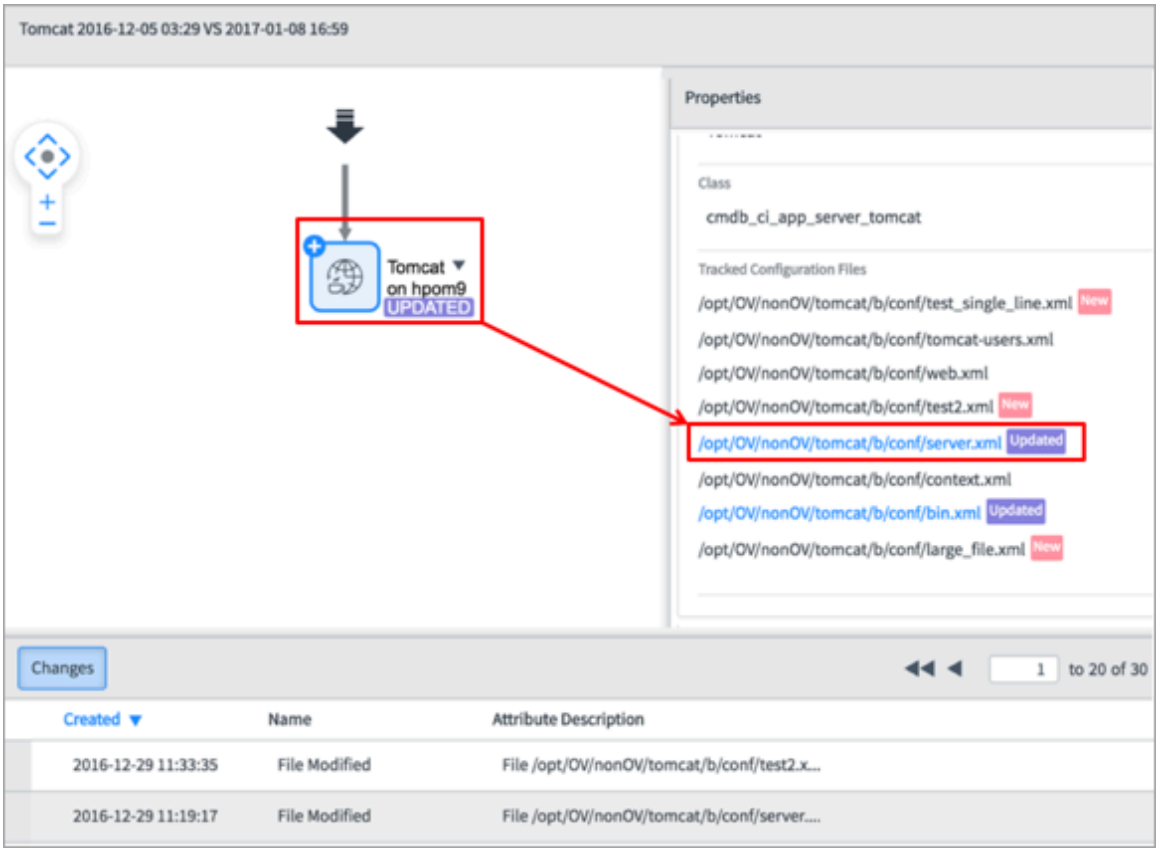

The **Tracked Configuration Files Version Compare** tab opens showing two versions of the configuration file side by side.

c. Review actual changes.

(Optional) Highlight colors indicate the type of change:

- Purple — Updated line
- Pink — New line
- Gray — Deleted line

d. Navigate between the changes using the Next difference icon and the Previous difference icon .

e. Close the **Tracked Configuration Files Version Compare** tab when finished.

9. Close the comparison view when finished.

Related topics

View the change history of application services in classic Service Mapping

Compare versions of CI configuration files

Use application services APIs

Application services provide APIs that let you perform operations such as creating and updating an service instance, populating it with CIs from the CMDB, and retrieving details from an existing service instance.

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Role required: app_service_admin

A service instance is a set of interconnected applications and hosts that are configured to offer a service to the organization. Service instances can be internal, like an organization email system or customer-facing, like an organization website.

Create an application service

Using the createOrUpdateService - POST REST API to create an service instance suits your organization if the ServiceNow CMDB already contains the CIs making up the service. Typically, it is the case when you have manually added CIs directly into the CMDB, or used the Discovery application to discover CIs and store information about them in the CMDB. You can also use this API to create an service instance containing CIs discovered using non-ServiceNow applications.

By default, when an service instance is created, all CI connections are of the *Depends on::Used by* relationship type. You can modify this default type by changing the value of the sa.it_service.manual_ci_rel_type property.

Before creating an application service, ensure that:

- The CMDB contains all the CIs comprising the application service.
- You have the sys_id of each CI comprised in the application service you want to create.
- You understand the hierarchy that the CIs form.

The Mapped Application Service [cmdb_ci_service_discovered] table contains every service instance including services you create using APIs.

You can also manually create an service instance using the user interface as described in Create an application service.

Retrieve content from an application service

Use the getContent - GET REST API to retrieve a list of CIs and the relationships between them, for an application service that was created manually.

Additional APIs

The following JavaScript APIs are also available:

- addCI(): Add a CI to a manually created an service instance.

  For restrictions on the CIs being added and other details about adding a CI to an service instance, see Manually add CIs to an application service.

- addManualConnection(): Add a manually created connection to an application service.

- migrateManualToApplicationService(): Convert a manual service to an application service.

- populateApplicationService(): Populate an application service with CIs and relationships from the designated entry point.

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- removeCI() : Remove a manually created CI from an application service.
- removeManualConnection() : Remove a manually created connection and the connected CI from an application service.

Related topics

Application Service API

Components installed with application services

Several types of components are installed with activation of the Application Service [com.snc.cmdb.it_service] plugin, including tables, user roles, and scheduled jobs.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application .

Roles installed

Role title [name]	Description	Contains roles
[app_service_user]	Views maps for operational service instances and retrieves service content using the getContent - GET REST API. The itil role that serves as the basic helpdesk technician role contains the app_service_user role.	None
[app_service_admin]	Creates and modifies service instances, creates service groups, views, and edits service instance maps.	itil

Tables installed

Table	Description
BaseLines [sa_baselines]	Storing points in the time defined as baselines for application services.
Business Service User preferences [sa_business_service_user_prefs]	User preferences associated with a specific application service.
Menu Action [sa_context_menu]	Data on configurable menu options for CIs in the application service map.
Hash [sa_hash]	Internal table which contains counters and hashes on various types of updates related to application services.
Entry Point	Maps entry points to application services.

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Table	Description
[sa_m2m_service_entry_point]	
Discovered Service Notification [sa_notification]	Internal table which contains data on notifications between different parts of the software. Mostly used after activating Service Mapping.
Service Group Members [sa_service_group_member]	Maps service groups to application service members.
Business Service Group Responsibilities [sa_service_group_responsibilities]	Data on users having access to application service groups.
Checkpoint Attribute Description [checkpoint_attribute_description]	Links between history timeline changes and service model internal entities (checkpoints). Used in lists of history of changes in application service maps.
Service Instance [cmdb_ci_service_auto]	Services that can be monitored by the system, which in the base system, includes only application services. If Service Mapping is activated, there can also be records for dynamic CI groups. If Event Management is activated, there can be records for alert groups.
Mapped Application Service [cmdb_ci_service_discovered]	Application service CIs. For each application service, there is a container CI record that models the application service.
Bulk Convert Services [cmdb_convert_bulk_services]	All bulk conversions of business services to application services (current and past), along with the conversion progress which is refreshed every 10 seconds.
Application Services Action Results [csdm_dashboard_action_report_result]	Results for the 'Application Services Missing Data' report in the Application Services dashboard.
Application Services Types Results [csdm_dashboard_type_report_result]	Results for the 'Application Services by Type' report in the Application Services dashboard.
Application Services Dashboard Results [csdm_dashboard_reports_result]	Results for the '<Application Servers | Databases | Hardware Servers> Not in an Application Service' reports in the Application Services dashboard.
Manual CI Inclusions / Exclusions [svc_manual_ci_exclusions_inclusions.list]	Contains CI classes included or excluded from application services during population of manual or dynamic application services. Service population happens when • Manually adding CIs to an application service • Converting a business service to an application service

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Table	Description
	• Creating or updating an application service using APIs • Manually updating an application service with changes from the CMDB **Note:** The Manual CI Exclusions/Inclusions [svc_manual_ci_exclusions_inclusions] table doesn't include CIs added using traversal rules. In the base system, the following CI classes are excluded: • NAT [cmdb_ci_translation_rule] • Endpoint [cmdb_ci_endpoint] • Qualifier [cmdb_ci_qualifier] • Application cluster [cmdb_ci_application_cluster] CIs of any CI class that is not configured for exclusion in this table can be added to application services. **Note:** In the CMDB hierarchy, a class derives the included/excluded setting from its closest ancestor. If a class has its own explicit setting, it overrides the derived setting. This table supports the functionality that was earlier supported using the following deprecated property: sa.mapping.user.manual.citype.blacklist.

Properties installed

To access application services properties, navigate to **All** > **Configuration** > **Application Services** > **Properties**. The role required for modifying property values, is app_service_admin.

If Service Mapping is deployed, see Properties installed with Service Mapping for additional application service properties.

Note: To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

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Property	Usage
The sys_id of the default relation type to be added between source and target when adding CI manually to application service sa.it_service.manual_ci_rel_type	• Type: string • Default value: 5599a965c0a8010e00da3b58b113d70e (Depends on::Used by) • Learn more: Manually add CIs to an application service
Coefficient of aggregation interval. 0 value means no aggregation is performed on history timeline. The purpose of this property is to decrease number of changes in history timeline by increasing the interval allowed between changes sa.history.aggr_interval_coef	• Type: integer • Default value: 1
Sync Service Mapping operations with Service Modeling sa.service_modeling.use	• Type: true|false • Default value: true
Enable limitation of application service maps drawing by number of nodes and edges. sa.map.LIMIT_MAX_GRAPH_SIZE	Limit the number of nodes and edges on application service maps. • Type: true|false • Default value: true Setting this property to false may reduce performance in maps of large services.
Maximal number of displayable nodes on application service map. Maps with larger values will not be displayed. sa.map.MAX_NODES_FOR_LAYOUT	The max number of nodes displayed on an application service map. If the number of nodes exceeds the specified number, the map does not appear and an error message appears. • Type: integer • Default value: 5000
Global flag to allow or disable spanning tree view for maps. true (default) - allows but not forces spanning tree view on maps. sa.map.ALLOW_SPANNING_TREE_VIEW	Enable spanning tree view for application service maps. • Type: true|false • Default value: true

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Property	Usage
Maximal number of displayable edges on application service map before spanning tree view applied. sa.map.MAX_EDGES_FOR_FULL_LAYOUT	The max number of edges displayed on an application service map, before applying spanning tree view. • Type: integer • Default value: 1000
Maximal number of displayable edges on application service map. Maps with larger values will not be displayed. sa.map.MAX_EDGES_FOR_LAYOUT	Max number of edges displayed on an application service map. If the number of edges exceeds the specified number, the map does not appear and an error message appears. • Type: integer • Default value: 100000 Increasing the default value may reduce performance in maps for large services.
Maximal degree of node on application service map for large map mode. Maps with smaller degrees will be displayed in regular mode. Maps with larger degrees will apply more edges merging for more compact view. sa.map.LIMIT_GRAPH_DEGREE	• Type: integer • Default value: 1000 Increasing the default value may reduce performance in maps for large services.
Limit of amount of services that displayed on Services Tree on maps. Then this limit reached, Services Tree will be blocked. sa.service_tree.MAX_ITEMS_TO_DISPLAY	• Type: integer • Default value: 7000
Maximal amount of connection properties to be shown at once when connection line selected on service map. If selected line contains more connections than defined here, then properties panel will have notification about cut-off connections. sa.map.max_connections_in_properties_panel	• Type: integer • Default value: 50
Enable grouping of CIs on map. sa.map.enable_auto_grouping	• Type: true|false • Default value: true
Minimal number of CIs on a map to apply CI grouping. Relevant only if CI grouping is enabled on the map. The following CIs are not counted: discovered clusters,	• Type: integer • Default value: 10

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Property	Usage
internal CIs inside inclusion boxes, entry points, error nodes, host CIs or CIs that are not hosted on other CIs. sa.map.min_nodes_for_auto_grouping	

Render full labels on CIs on map. Applicable to all CI labels (CI name, host name, cluster label, etc.) Enabling this will disable labels truncation, and labels will most probably overlap with other map elements. Not applicable to network/storage path maps.
 	
sncCommonMap.RENDER_FULL_LABELS
	The default value of disabled, means none.
	• Type: choice list
	• Default value: Disabled
	• Other possible values:
	  ○ Exported PDF only: pdf
	  ○ Map and PDF views: all

Maximal width of CI node labels in pixels. Relevant for any kind of labels (CI name, host name, cluster label etc.) This size also modifies horizontal space between CI elements. Applied to map view and exported PDF view. Not applicable to network/storage path maps.
 	
sncCommonMap.NODE_LABEL_WIDTH
	• Type: integer
	• Default value: 95
	• **Other possible values**:
	  ○ Min value: 20
	  ○ Max value: 1000

glide.cmdb.csdm.app_service.max_results	Max number of items that are calculated in the '<Application Servers | Databases | Hardware Servers> Not in an Application Service' report in the Application Services dashboard. • Type: integer • Default value: 100000 • Location: Add to System Properties [sys_properties] table.
sa.service.max_ci_service_population	The maximum number of CI connections added to application services during the following operations: Converting manual services created in Event Management into application services and updating application services with changes from the CMDB. • Type: integer • Default value: 1,000 • Location: Add to System Properties [sys_properties] table. Increasing the default value may cause performance issues.
sa.service.population.stop_expansion_under_ci_classes	List of application service CI classes. If an application service belongs to a CI

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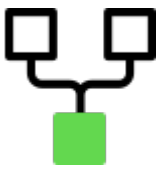
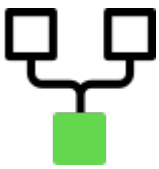
Property	Usage
	class that extends one of the CI classes in the list, the system does not insert CIs under this application service CI during Manually updating an application service with changes from the CMDB. • Type: string • Default value: cmdb_ci_service_discovered • Location: System Property [sys_properties] table.

Integrating third-party data into CMDB

Import and integrate third-party data into Configuration Management Database (CMDB) classes.

Available methods

Use the combination of the following data integration methods to integrate third-party data into CMDB.

Integration Commons for CMDB Framework that provides a set of common operations and functionalities for integrations.	**IntegrationHub ETL** ETL transform maps for integrations.	**Service Graph Connectors**  Connectors for bringing in third-party data correctly and quickly.
API Service Graph Connectors  Connectors for bringing in API data correctly and quickly.		

Enhanced integration solutions

Simplify integration and resolve issues with the following enhanced integration solutions.

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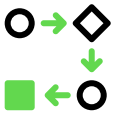
Service Graph Connector Central	Now Assist for Service Graph Connectors (SGC)
 CMDB Workspace A view for managing the full life cycle of creating, editing, monitoring, and debugging Service Graph Connector connections.	 Generative AI skills and features for resolving issues within Service Graph Connectors.

Related applications and features

CMDB schema model

A collection of class diagrams and class attributes for key CMDB classes.

CMDB tables descriptions

Descriptions of key CMDB tables in the base system.

CMDB CI Class Models

A ServiceNow Store app that adds class models that extend the base CMDB class hierarchy. The hierarchy includes class descriptions, identification rules, identifier entries, and dependent relationships, if applicable. You can then use the added classes as any other CMDB base class.

Populating the CMDB

Options for populating the CMDB.

Discovery patterns

A ServiceNow Store app that provides a library of discovery patterns for discovering specific devices and applications in the industry.

CMDB Identification and Reconciliation (IRE)

A centralized framework for identifying and reconciling data from different data sources that helps maintain the integrity of the CMDB when multiple data sources are used to create and update configuration item (CI) records.

Integration Commons for CMDB

The Integration Commons for CMDB (sn_cmdb_int_util) store app contains the CMDB Integrations Dashboard and a set of Robust Transform Engine (RTE) transforms and script includes.

Request apps on the Store

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

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Dependencies

CMDB and CSDM Data Foundations Dashboards v2.3.5 or later versions (see Monitor health in CSDM and CMDB Data Foundations Dashboards)

Using the CMDB Integrations Dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed Service Graph Connectors and any custom integrations created in IntegrationHub ETL.

See CMDB Integrations Dashboard for more information.

Using RTE transforms

The Integration Commons for CMDB (com.snc.cmdb.integration_util) plugin provides the Integration Commons functionality. You can use the transforms and script includes to standardize the values stored in the CMDB by different data integrations or by changes. The attributes that are included in the Integration Commons for CMDB store app are attributes that the Identification and Reconciliation Engine (IRE) requires for identification or attributes that could be used to derive classes.

The transforms are common operation types and template scripts available as templated operations. A templated operation is a transform that controls the logic for the transform. The result is that there can be only a single output. When a transform returns multiple values, then those values are concatenated by a triple pipe (|||). You then must use the split transform to retrieve the values that you're interested in. The inputs are either a single field or a list of fields. For all but one transform, the inputs are assumed to be a fixed list of fields as described for each of the following individual transform.

Note:
The RTE transforms are included in the Integration Commons for CMDB store app and are available in the IntegrationHub ETL store app. For more information on RTE transforms, see RTE operation types included within the Integration Commons for CMDB app and RTE transforms template scripts included within the Integration Commons for CMDB app.

ServiceNow Service Graph Connectors that are available at the ServiceNow Store, have dependencies on the transforms and script includes in the Integration Commons for CMDB store app. Therefore, when you install such CMDB integration, the Integration Commons for CMDB store app is automatically installed too.

You can also configure the Application Dependency Mapping (ADM) adapter to populate running processes, TCP connections, and applications into CMDB. For more information, see Configuring the ADM adapter for Service Graph Connectors.

Important:
After upgrades and deployments of new applications or integrations, run quick start tests to verify that Integration Commons for CMDB works as expected. See Quick start tests for Integration Commons for CMDB for more information.

Related topics

- Configuring the ADM adapter for Service Graph Connectors
- Accessing the connection details of Service Graph Connectors
- Managing CMDB data deletion

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Partition size computation for parallel loading in Integration Commons for CMDB

Quick start tests for Integration Commons for CMDB

CMDB Integrations Dashboard

You can use the CMDB Integrations Dashboard that provides a central view of status, processing results, and processing errors of all installed Service Graph Connectors and any custom integrations created in IntegrationHub ETL run.

Note:
Starting with the Xanadu release, the CMDB Integrations Dashboard is available in the Next Experience user interface. For more information on the Next Experience user interface, see Next Experience UI.

On the CMDB Integrations Dashboard, you can see metrics for all Service Graph Connector runs, or filter the view to a specific connector, a specific time duration, or a specific connector run.

Learn more about the CMDB Integrations Dashboard from the following video.

CMDB Integrations Dashboard overview

Access CMDB Integrations Dashboard

Access the CMDB Integrations Dashboard provided with the Integration Commons for CMDB store app for maintaining data consistency and accuracy across multiple data sources.

Before you begin

Role required: None

Procedure

1. Navigate to **All** > **Self-Service** > **Dashboards**.

   Tip:
   Alternatively, you can navigate to **All** > **Platform Analytics** > **Library** > **Dashboards**.

2. On the Dashboards view, select **CMDB Integrations Dashboard** and perform any of the following tasks:
   - Select the **CMDB Execution Status** tab to see metrics such as the total number of integrations and processed rows, integration runs actively running, daily statistics, and details about the classes that were updated.
   - Select the **CMDB Integration Errors** tab to see metrics such as number of import and integration errors, and number of erroneous imported records.
   - Point to the score on the various tiles to drill down to the list views for the associated records. Point to the charts to show more details for the chart.
   - Narrow down the scope of the integration runs included in the metrics on the dashboard by configuring filters on the right-hand side of the dashboard. Set any of the following filters and then select **Apply**. The filter settings apply to any metric with a filter icon in its upper left corner.

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Filters

Filter	Description
Import Date	Select **All** or a time period, such as **Last 7 days**, from which to include integration runs in metrics.
CMDB Applications	Select **All**, or a CMDB application, such as **SCCM**, or a custom integration, from which to include integration runs in metrics.
CMDB Import	Select **All**, or a specific integration run to include in metrics.

RTE operation types included within the Integration Commons for CMDB app

The Robust Transform Engine (RTE) operation types are common operation methods for use in ETL without having to write your own complex data transformations.

The following operation types are available in the Integration Commons for CMDB app.

Concatenation

Combines the values from input fields into a single string, joining them on the optional *joining_string* field.

Details	
Table	RTE Entity Concatenation Operation [sys_rte_eb_concat_operation]
Input field	*source_sys_rte_eb_fields* Input is a set of fields and constants.
Output field	*target_sys_rte_eb_field* Output is the combined value of the provided fields as a single string.
Additional fields	*joining_string* (optional)

Example

Input	joining_string	Result
"input_1", "input_2", "input_3"	", "	"input_1, input_2, input_3"

Convert to Boolean

Converts the incoming value to a Boolean.

Details	
Table	RTE Entity Convert to Boolean Operation [sys_rte_eb_to_boolean_operation]
Input field	*source_sys_rte_eb_field*

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Details	
	Input is a string value.
Output field	*target_sys_rte_eb_field* Output is `true` when input is `true` or `1`, otherwise output is `false`. (case insensitive)

Example

Input	Result
input_1	false
true	true
1	true
0	false
11	false

Convert to Date

Attempts to convert the incoming value to a GlideDateTime value by applying the date_format to the incoming value.

Details	
Table	RTE Entity Convert to Date Operation [sys_rte_eb_to_date_operation]
Input field	*source_sys_rte_eb_field* Input is a data timestamp value with date format.
Output field	*target_sys_rte_eb_field* Output is the date timestamp in the specified date format. Attempts to directly convert using GlideDateTime if the date_format is incorrect. Returns an empty value if unable to parse at all.

Example

Input	Result
"2018/09/20 11:21:00 AM EST" with date_format "yyyy/MM/dd hh:mm:ss a z"	"2018-09-20 16:21:00"
"2018/09/20 01:21:00 PM EST" with date_format "yyyy/MM/dd hh:mm:ss a z"	"2018-09-20 18:21:00"
"09/20/18" with date_format "yyyy/MM/dd hh:mm:ss a z"	""0018-09-20 00:00:0"

Convert to Numeric

Converts the incoming value to a number.

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Details	
Table	RTE Entity Convert to Numeric Operation [sys_rte_eb_to_numeric_operation]
Input field	*source_sys_rte_eb_field* Input is a value.
Output field	*target_sys_rte_eb_field* Output is a numeric value. If the input value is non-numeric the output is empty.

Example

Input	Result
input_1	null
1.23	1.23
1.00	1
two	null

Copy

Copies the value of the source field to all the target fields.

Details	
Table	RTE Entity Copy Operation [sys_rte_eb_copy_operation]
Input field	*source_sys_rte_eb_field* Input is a value.
Output field	*target_sys_rte_eb_fields* Output is the copied source field value.
Additional field	*overwrite_existing_value* (optional, Boolean): If `true`, then the values of the target fields are replaced. Otherwise, any non-empty value isn't overwritten.

Extract First Numeric

Sets the target field as the first numeric value found in the source field.

Details	
Table	RTE Extract Numeric Operation [sys_rte_eb_extract_numeric_operation]
Input field	*source_sys_rte_eb_field* Input is a value.

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Details	
Output field	*target_sys_rte_eb_field* Output is the numeric value found in the input.
Additional fields	• *decimal_places* (optional, number)#: Forces the output to have a specified number of decimal places. • *remainder_target_field* (optional, reference to field): Set to the trimmed remainder of the source field, after removing the first numeric value.

Example

Input	Result
100 mb	100
100.123 mb	100.123
100.123 mb with *decimal_places*=2	100.12
100 mb with *decimal_places*=2	100.00
100 mb with *remainder_target_field*	mb

Glide Lookup Operation

Performs a lookup in the database on the target table specified in the *target_table* field.

Details	
Table	RTE Glide Lookup Operation [sys_rte_eb_glide_lookup_operation]
Input field	*source_sys_rte_eb_fields* The database table for lookup.
Output field	*target_sys_rte_eb_fields* The resulting data based on the lookup operation.
Additional fields	• *target_table* • *glide_matching_fields* (string): Comma-separated list of column names in the target table. For each input field in source_sys_rte_eb_fields, there must be an equal number of values in glide_matching_fields. • *glide_target_fields* (string): Comma-separated list of column names in the target table. For each target field in target_sys_rte_eb_fields, there must be an equal number of values in glide_target_fields.

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Example

Input	Result
• Input Field 1: 100 South Charles Street, Baltimore • Input Field 2: MD • Target Table: Location (cmn_location) • Glide Matching Fields: street,state • Glide Target Fields: sys_id	Output Field 1: 25ab9c4d0a0a0bb300f7dabdc0ca7c1c

Multiple Input Script

Runs a script with multiple inputs setting the *target_sys_rte_eb_field* field as the output for that script.

Details	
Table	RTE Entity Multiple Input Script Operation [sys_rte_eb_multi_in_script_operation]
Input field	*source_sys_rte_eb_fields* Input is a script.
Output field	*target_sys_rte_eb_field* Output is the result of the input script.
Additional Fields	• *script* (script) • *use_unique_input_sets*(Boolean): When `true`, only unique input values are included in the data batch for IRE processing. Otherwise, all input object's field values are included.

Example for using *use_unique_input_sets*, with a script function that takes `record_type` and `operating_system` as input and returns `record_with_os`:

Examples

Record	record_type	operating_system
1	computer	Windows XP
2	computer	Linux
3	computer	Windows XP

If use_unique_inputs_sets is set to `true`, then the script processes only two values (`computer + Windows XP` and `computer + Linux`). If `use_unique_inputs_sets` is set to `false`, then each of the three values is individually processed (`computer + Windows XP`, `computer + Linux`, and `computer + Windows XP`).

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Sample script:

```
(function(batch, output) {
                for (var i = 0; i < batch.length; i++) {
                        // batch[i] is the unique set of
 inputs/individual record
                        // batch[i].<field> gives access to the
 field value
                        var in0 = gs.nil(batch[i].record_type) ?
 '' : batch[i].record_type;
                        var in1 =
 gs.nil(batch[i].operating_system) ? '' :
 batch[i].operating_system;
                        // output[i] is the output for the
 specific combination of inputs/individual record
                        output[i] = in0 + "_" + in1;
                    }
                }
            })(batch, output);
```

Multiple Input/Output Script

Runs a script with multiple inputs setting the target fields specified in the *target_sys_rte_eb_fields* field as the multiple outputs for that script.

Details	
Table	RTE Entity Multiple Input/Output Script Operation [sys_rte_eb_multiple_input_output_script_operation]
Input field	*source_sys_rte_eb_fields* Input is a script.
Output field	*target_sys_rte_eb_fields* Output is the result of the input script.
Additional Fields	*script* (script)

Sample script:

```
(function(batch, output) {
                for (var i = 0; i < batch.length; i++) {
                        var userId = (batch[i].user_id);
                        var userIdParts = userId.split(".");
                        output[i].first_name = userIdParts[0];
                        output[i].last_name = userIdParts[1];
                    }
                }
            })(batch, output);
```

Regex Replace

Replaces each substring of the input string that matches the regular expression pattern specified in the *match_regex* field with the string specified in the *replacement_regex* field.

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Details	
Table	RTE Entity Regular Expression Replace Operation [sys_rte_eb_regex_replace_operation]
Input field	*source_sys_rte_eb_field* Input is a string value.
Output field	*target_sys_rte_eb_field* Output is the replaced string.
Additional fields	• *match_regex* (string, regular expression) • *replacement_regex* (string)

Example

Input	Result
"String&With(Special)$Characters" with match_regex="[^0-9a-zA-Z]+" and replacement_regex=" "	"String With Special Characters"

Replace

Replaces each substring of the input string that matches the string specified in the *match_string* field with the string specified in the *replacement_string* field.

Details	
Table	RTE Entity Replace Operation [sys_rte_eb_replace_operation]
Input field	*source_sys_rte_eb_field* Input is a string value.
Output field	*target_sys_rte_eb_field* Output is the replaced string.
Additional fields	• *match_string* (string) • *replacement_string* (string)

Example

Input	Result
"Original String" with match_string = "Original" and replacement_string= "Replacement"	"Replacement String"

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Round Numeric

Rounds off the input numeric value to the nearest whole number.#Non-numbers are truncated.

Details	
Table	RTE Entity Round Numeric Operation [sys_rte_eb_round_numeric_operation]
Input field	*source_sys_rte_eb_field* Input is a numeric value.
Output field	*target_sys_rte_eb_field* Output is a whole number.
Additional fields	• *match_string* (string) • *replacement_string* (string)

Example

Input	Result
"1.5"	"2"
"1.4"	"1"
"i'm a string"	""

Script Operation

Runs a script with an input and sets the *target_sys_rte_eb_field* field as the output for that script.

Note:
The Script operation type has been largely superseded by the Multi Input Script Operation and is included for backwards compatibility with the existing configurations.

Details	
Table	RTE Entity Script Operation [sys_rte_eb_script_operation]
Input field	*source_sys_rte_eb_field* Input is a script.
Output field	*target_sys_rte_eb_field* Output is the result of the input script.

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Details	
Additional fields	• *script*(script) • *use_unique_input_sets* (Boolean): When `true`, only unique input values are included in the data batch for IRE processing. Otherwise, all input object's field values are included. For an example and for more details, see the Multiple Input Script transform.

The source field is included in the 'batch' variable as the JavaScript field 'input'.

```
(function(batch, output) {
                for (var i = 0; i < batch.length; i++) {
                        // batch[i] is the unique set of
 inputs/individual record
                        // batch[i].input gives access to the
 field value
                        var in0 = gs.nil(batch[i].input) ? '' :
 batch[i].input;
                        // output[i] is the output for the
 specific combination of inputs/individual record
                        output[i] = in0 + " modified by script";
                    }
                }
            })(batch, output);
```

Example:

```
/* Example Script
 (function(batch, output) {
    for (var i = 0; i < batch.length; i++) {
        //step1: access the input variables
        var a = batch[i].input; //Value of the source field.

        //step2: Your script/code goes here.
        var b = a + 1;
        //step3: set the output for each elements
        output[i] = b;
    }
 })(batch, output);
*/
```

Set

Sets the *target_sys_rte_eb_field* field value to the string provided in the *set_value* field.

Details	
Table	RTE Entity Set Operation [sys_rte_eb_set_operation]
Output field	*target_sys_rte_eb_field* Output is the value associated with the *set_value* field.

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Details	
Additional fields	• *set_value* (string) • *overwrite_existing_value* (optional, Boolean)#: When true, the current value of the target field is overwritten. Otherwise, a non-empty value isn't replaced.

Set Min/Max

Sets the target field to either the maximum or minimum of the values from all input fields.

Details	
Table	RTE Entity Min/Max Operation [sys_rte_eb_min_max_operation]
Input field	*source_sys_rte_eb_fields* Input is a set of values.
Output field	*target_sys_rte_eb_field* Output is the maximum or minimum value based on the *min_max* value.
Additional fields	• *data_type* (choice list with values as STRING, NUMERIC, and DATE) • *min_max* (choice list with values as MIN and MAX)

Examples

Input	Output
"2", "-1", "0"	2
"a", "b"	c
"2", "-1", "0"	-1
"a", "b"	a

Split

Splits the string included in the *source_sys_rte_eb_field* input value at the separator specified in the *splitting_string* field and assigns the resulting array of strings to the *target_sys_rte_eb_field* field, in order.

Details	
Table	RTE Entity Split Operation [sys_rte_eb_split_operation]
Input field	*source_sys_rte_eb_field* Input is a string value.
Output field	*target_sys_rte_eb_fields*

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Details	
	Output is list of substrings.
Additional fields	*splitting_string* (string)

Example

Input	Result
"value1||value2||value3", splitting_string:"||" with target_sys_rte_eb_fields {target1,target2,target3}	target1 : value1, target2 : value2, target3 : value3
"value1||value2||value3", splitting_string:"||" with target_sys_rte_eb_fields {target1}	target1 : value1
"value1", splitting_string:"||" with target_sys_rte_eb_fields {target1,target2,target3}	target1 : value1, target2 : <null>, target3 : <null>

Trim

Removes any whitespaces at the beginning and at the end of the string included in the *source_sys_rte_eb_field* input value and assigns the result to the *target_sys_rte_eb_field* field.#This transform is equivalent to the Java String trim() Method.

Details	
Table	RTE Entity Trim Operation [sys_rte_eb_trim_operation]
Input field	*source_sys_rte_eb_field* Input is a string value.
Output field	*target_sys_rte_eb_field* Output is the input string value but without any leading and trailing spaces.

Example

Input	Result
" value 1 "	"value 1"

Uppercase

Changes all characters of the *source_sys_rte_eb_field* input value to upper case and assigns the result to the *target_sys_rte_eb_field* field.

Details	
Table	RTE Entity Upper Case Operation [sys_rte_eb_upper_case_operation]
Input field	*source_sys_rte_eb_field*

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Details	
	Input is a string value.
Output field	*target_sys_rte_eb_field* Output is the upper case string value.

Example

Input	Result
"value1"	"VALUE1"

Uppercase Trim

Combines both the Uppercase and the Trim transforms.

Details	
Table	RTE Entity Upper Case Trim Operation [sys_rte_eb_upper_case_trim_operation]
Input field	*source_sys_rte_eb_field* Input is a string value.
Output field	*target_sys_rte_eb_field* Output is the upper case string value without any whitespaces at the beginning and end.

Example

Input	Result
"##value1##"	"VALUE1"

RTE transforms template scripts included within the Integration Commons for CMDB app

The Robust Transform Engine (RTE) transforms are templated operations included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

The following script-based RTE transforms are available in the Integration Commons for CMDB app.

CI Lookup Operation

Use to get the value of a field on an existing configuration item (CI) in the CMDB by the source native key.

Details	
Table	Robust Transform Engine CI Lookup Operation [sn_cmdb_int_util_ci_lookup_operation]
Input field	*source_sys_rte_eb_field*

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Details	
	Input in order is: **1.** Discovery Source **2.** Source Native Key **3.** CI Field The operation queries the Source [sys_object_source] table for the discovery source and the associated source native key, and then returns the CI Field value of the matching record in the target table and the associated target sys ID.
Output field	*target_sys_rte_eb_field* Output is the value of the field name on the CI matched by the source native key lookup or an empty string if there is no match.

The Source [sys_object_source] table is queried using the discovery source and source native key ordering by the last scan. The table iterates through the results of the query and queries the target table by the target sys ID until a valid CI is found. After a valid CI is found, the operation returns the value of the CI Field on the matching CI.

Example

Discovery Source	Source Native Key	CI Field	Result
ServiceNow	ServiceNow||| COMPUTER-NAME||| Computer-01	name	Computer-01

Cleanse Company

Use to cleanse hardware manufacturer name and add the record to the Company [core_company] table to populate a reference, when the manufacturer is not linked to a model or software (cpu_manufacturer).

Details	
Table	Robust Transform Engine Entity Cleanse Company Operation [sn_cmdb_int_util_cleanse_company_operation]
Input field	*source_sys_rte_eb_field* Input is a company/manufacturer name.
Output field	*target_sys_rte_eb_field* Output is the resulting sys_id and name of the company in core_company, concatenated by triple pipe (|||).
Script include function	*sn_cmdb_int_util.CmdbIntegrationHardwareModelUtil().cleanseComp*

If a matching record does not exist, then a new record is created in core_company so the return always includes a sys_id and name (unless the input is empty or invalid). The name is cleansed

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and a fuzzy lookup is done via the CmdbIntegrationCompanyModelUtil script include before the MakeAndModelJS platform API is called.

Example

Input	Result
SERVICENOW	93d4ecfac0a8000b6294d71b733977fb||| ServiceNow

Cleanse Hardware Model

Use to create, cleanse, or lookup a hardware model to create a reference (model_id).

Details	
Table	Robust Transform Engine Entity Cleanse Hardware Model Operation [sn_cmdb_int_util_cleanse_hardware_model_operation]
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The manufacturer name **2.** The model name If either value is provided by itself, then the operation only processes what is found.
Output field	*target_sys_rte_eb_field* Output is the resulting sys_id and name of the company in core_company, and sys_id and name of the model in cmdb_model - all concatenated by triple pipe (|||).
Script include function	*sn_cmdb_int_util.CmdbIntegrationHardwareModelUtil().cleanseMode model_in)*

For either the manufacturer or model, if a matching record does not exist then a new record is created so the return always includes sys_ids and names for both records (unless the input is empty or invalid).

The manufacturer name is processed like the Cleanse Company transform and then the manufacturer name and model name are sent to the MakeAndModelJS platform API.

Example

Manufacturer Name	Model Name	Result
ServiceNow Incorporated	SERVICENOW	93d4ecfac0a8000b6294d71b733977fb||| ServiceNow||| ba29cb303710200044e0bfc8bcbe5d6d |||ServiceNow

Cleanse Hardware Model with Model Number

Use to create, cleanse, or lookup a hardware model to create a reference (model_id).

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Details	
Table	Robust Transform Engine Entity Cleanse Hardware Model With Model Number Operatio [sn_cmdb_int_util_cleanse_hardware_model_number_operation]
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The manufacturer name **2.** The model name **3.** The model number **4.** CI Class **Note:** The `CI Class` field is an optional input field, and when included, the *MakeAndModelJS* platform API gets the model record by querying the product model class from the Model Category [cmdb_model_category] table. Else, the API gets the model record from the Hardware Models [cmdb_hardware_product_model] table only. If either value is provided by itself, then the operation only processes what is found.
Output field	*target_sys_rte_eb_field* Output is the resulting sys_id and name of the company in core_company, and sys_id and name of the model in cmdb_model - all concatenated by triple pipe (|||).
Script include function	*sn_cmdb_int_util.CmdbIntegrationHardwareModelUtil().cleanseMode* *model_in)*

For either the manufacturer or model, if a matching record does not exist then a new record is created so the return always includes sys_ids and names for both records (unless the input is empty or invalid).

The manufacturer name is processed like the Cleanse Company transform and then the manufacturer name, model name, and model number are sent to the *MakeAndModelJS* platform API.

Example

Manufacturer Name	Model Name	Model Number	Result
ServiceNow Incorporated	SERVICENOW	BC0AA8000C56	93d4ecfac0a8000b6294d71b733977fb ServiceNow||| ba29cb303710200044e0bfc8bcbe5d6 |||ServiceNow

Cleanse IP Address

Use when a field provides an IP address.

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Details	
Table	Robust Transform Engine Entity Cleanse IP Operation [sn_cmdb_int_util_cleanse_ip_operation]
Input fields	*source_sys_rte_eb_field* Input is the IP address to cleanse.
Output field	*target_sys_rte_eb_field* Output is the resulting IP address, which can be empty.
Script include function	*sn_cmdb_int_util.CmdbIntegrationNetworkUtil().cleanseIpAddress(*

The IP address is tested for both IPv4 and IPv6 structures along with some known derivations (an IPv4 with spaces instead of periods). If a result is found, then it is formatted and returned.

Examples

Ip	Ip Results
192.160.89.1	192.160.89.1
192.160.89.1,54.21.12.311	192.160.89.1
192 160 89 1 54 21 12 311	192.160.89.1
192-160-89-1	192.160.89.1
2001:0db8:0000:0000:0000:ff00:0042:8329	2001:0db8:0000:0000:0000:ff00:0042:8329
junk	
175912537	10.124.54.89
-1	
0	

Cleanse IP Version

Use when the source of data does not provide an IP version or when the IP version might be unreliable.

Details	
Table	Robust Transform Engine Entity Cleanse IP Version Operation [sn_cmdb_int_util_cleanse_ip_version_operation]
Input fields	*source_sys_rte_eb_field* Input is the IP address to cleanse.
Output field	*target_sys_rte_eb_field* Output is the resulting cmdb_ci_ip_address.ip_version lookup key (either 4, 6, or empty).

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Details	
Script include function	*sn_cmdb_int_util.CmdbIntegrationNetworkUtil().deriveIpVersion(i*

The input IP address value is checked for either proper IPv4 or IPv6 structure, otherwise the return is empty. This function provides no IP cleansing.

Example

Input	Result
192.160.89.1	4

Cleanse MAC Address

Use when a field provides a MAC address.

Details	
Table	Robust Transform Engine Entity Cleanse MAC Operation [sn_cmdb_int_util_cleanse_mac_operation]
Input fields	*source_sys_rte_eb_field* Input is the MAC address to cleanse.
Output field	*target_sys_rte_eb_field* Output is the resulting MAC address which can be empty.
Script include function	*sn_cmdb_int_util.CmdbIntegrationNetworkUtil().cleanseMacAddress*

The MAC address is tested for proper structure along with some known derivations (for example, a MAC address with spaces instead of colons). If a result is found, then it is formatted and returned.

Example

Input	Result
00 0A 95 9D 68 16	00:0a:95:9d:68:16

Cleanse Operating System

Use to extract, cleanse, and format an operating system name, when the source provides an operating system value.

Details	
Table	Robust Transform Engine Entity Cleanse OS Operation [sn_cmdb_int_util_cleanse_os_operation]
Input fields	*source_sys_rte_eb_field*

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Details	
	Input is the operating system name to cleanse.
Output field	*target_sys_rte_eb_field* Output is the resulting operating system name. The resulting operating system name is also written to the cmdb_ci_computer.os list field.
Script include function	*sn_cmdb_int_util.CmdbIntegrationOsUtil().cleanseAndInsertOs(inp*

Most of the current cleansing is centered on Microsoft operating system values aside from common cleansing such as fixing casing.

Examples

Operating System	Operating System Results
Windows Server 2003 R2 64 bit Edition Service Pack 2	Windows Server 2003 R2
Windows 2003	Windows 2003
Windows Vista 64 bit Edition	Windows Vista
Windows 2000 Professional Service Pack 4	Windows 2000 Professional
Windows XP Service Pack 2-3	Windows XP
Microsoft Windows Server 2003 R2 64 bit Edition Service Pack 2	Windows Server 2003 R2
Microsoft Windows 2003	Windows 2003
Microsoft Windows Vista 64 bit Edition	Windows Vista
Microsoft Windows 2000 Professional Service Pack 4	Windows 2000 Professional
Microsoft Windows XP Service Pack 2-3	Windows XP
linux ubuntu	Linux Ubuntu
Linux Ubuntu Server	Linux Ubuntu Server

Cleanse Serial Number

Use to cleanse and remove invalid serial numbers.

Details	
Table	Robust Transform Engine Entity Cleanse Serial Number Operation [sn_cmdb_int_util_cleanse_serial_number_operation]
Input fields	*source_sys_rte_eb_fields* Input is the serial number to cleanse.
Output field	*target_sys_rte_eb_field* Output is the resulting serial number.

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Examples

Serial Number	Serial Number Results
ec2aa2da-5312-aa3e-804c-c35feabeda5f	ec2aa2da-5312-aa3e-804c-c35feabeda5f
1045–1209–6738–4668–7696–2783	1045–1209–6738–4668–7696–2783

Cleanse Serial Number With Alternate Value Return if Invalid

Use to cleanse Serial Number and verify the length of the cleansed serial number. Returns the alternate value if the length of serial number is invalid.

Details	
Table	Robust Transform Engine Entity Cleanse Serial Number With Alternate Value Return [sn_cmdb_int_util_cle $anse_serial_number_with_alternate_value_return_if_invalid]
Input fields	*source_sys_rte_eb_fields* Inputs: serial number, Alternate value
Output field	*target_sys_rte_eb_field* Output: Cleansed serial number if the length is valid, Alternate value otherwise.
Script include function	*global.SerialNumberManager().isValid(input)*

The operation cleanses the serial number and checks If the cleansed serial number length is greater than or equal to the value specified in the *sn_cmdb_int_util.minimum_valid_serial_number_length* system property. The default value of the property is set to 7.

Cleanse IMEI Number With Alternate Value Return if Invalid

Use to cleanse the IMEI number and verify the length of the cleansed IMEI number. Returns the alternate value if the length of IMEI number is invalid.

Details	
Table	Robust Transform Engine Entity Cleanse IMEI With Alternate Value Return if Inval [sn_cmdb_int_util_cleanse_imei_with_alternate_value_return_if_invalid]
Input fields	*source_sys_rte_eb_fields* Inputs: IMEI number, Alternate value
Output field	*target_sys_rte_eb_field*

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Details	
	Output: IMEI number if the length is valid, Alternate value otherwise.
Script include function	None

The operation cleanses the IMEI number and checks If the cleansed IMEI number length is equal to the value specified in the *sn_cmdb_int_util.valid_imei_number_length* system property. The default value of the property is set to 15.

Cleanse Software Model

Use to cleanse and create a software model. Also, to create manufacturer and software model if they do not exist and follow with a split operation.

Details	
Table	Robust Transform Engine Entity Cleanse Software Model Operation [sn_cmdb_int_util_cleanse_software_model_operation]
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The manufacturer name **2.** The software name **3.** The software version (not required) If only manufacturer or name is provided, then only those values are processed and returned.
Output field	*target_sys_rte_eb_field* Output is the resulting sys_id and name of the company in core_company, the cleansed software name, and the cleansed software version all concatenated by a triple pipe (|||).
Script include function	*sn_cmdb_int_util.CmdbIntegrationSoftwareModelUtil().cleanseSoft model, version)*

If a matching manufacturer record does not exist, then a new record is created so the return always includes the sys_id and name for the manufacturer (if the manufacturer is not empty or invalid).

The manufacturer name is processed the same as in the Cleanse Company transform and then the manufacturer name is sent to the MakeAndModelJS platform API.

The software name and version are cleansed and formatted and returned. The version is removed from the software name if present.

Examples

Manufacturer	Software Name	Software Version	Results
Dell Inc.			
	NoManufacturer		

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Examples (continued)

Manufacturer	Software Name	Software Version	Results
		1.0.0.0	
Dell Inc.	DataEngine	1.0.17.2	b7e7d7d8c0a8016900a5d7f291acce5c||| Dell Inc.|||DataEngine|||1.0.17.2
GenuineIntel	TestSoftware	1.0.0.1	7aad6d00c611228400f00e0f80b67d2d||| Intel|||TestSoftware|||1.0.0.1
Dell Inc.	TestSoftware	232	b7e7d7d8c0a8016900a5d7f291acce5c||| Dell Inc.|||TestSoftware|||232
Dell Inc.	TestSoftware	123.0.0.0	b7e7d7d8c0a8016900a5d7f291acce5c||| Dell Inc.|||TestSoftware|||123.0
America Online	TestSoftware	1.0.0.0	0c43d035c61122750000251553f6f8e8||| America Online|||TestSoftware|||1.0
America Online	TestSoftware	1.0.0.0	0c43d035c61122750000251553f6f8e8||| America Online|||TestSoftware|||1.0
dell	LowerCase	1.0.0.0	b7e7d7d8c0a8016900a5d7f291acce5c||| Dell Inc.|||LowerCase|||1.0
Dell Corporation. Incorporated, Corp.	TestSoftware	1.0.0.0	b7e7d7d8c0a8016900a5d7f291acce5c||| Dell Inc.|||TestSoftware|||1.0
Microsoft	Microsoft SQL Server 2016 Enterprise	2.0.0	0e8b8e650a0a0b3b004f285ffbb1a4fc||| Microsoft|||Microsoft SQL Server 2016 Enterprise|||2.0
Dell Computer	DataEngine	1.0.17.2	b7e7d7d8c0a8016900a5d7f291acce5c||| Dell Inc.|||DataEngine|||1.0.17.2
Adobe	TestSoftware	1	b7e8b5c4c0a80169008b49e468920048||| Adobe Systems|||TestSoftware|||1.0

Create Software Instance Name

Use when a hardware name, software name, and software version is provided, to create a new software instance name.

Details	
Table	Robust Transform Engine Entity Create Software Instance Name Operation [sn_cmdb_int_util_create_software_instance_name_operation]
Input fields	*source_sys_rte_eb_fields* Input in order is:

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Details	
	1. The hardware name **2.** The software name **3.** The software version (not required)
Output field	*target_sys_rte_eb_field* Output is the software instance name.
Script include function	*sn_cmdb_int_util.CmdbIntegrationSoftwareModelUtil().createSoftw* *sw_name_in, sw_version_in)*

Examples

Hardware Name	Software Name	Software Version	Results
computer1	microsoft	2.0.1	microsoft 2.0.1-computer1
computer2	adobe		adobe-computer2
computer3	adobe	2.1	adobe 2.1-computer3
hw2	sw3	301	sw3 301-hw2

Derive CI Class from Model

Use when processing a computer record and a model is provided but the class of the computer is ambiguous otherwise. Can be used along with other Derive CI Class transforms.

Details	
Table	Robust Transform Engine Entity Derive Class From Model Operation [sn_cmdb_int_util_derive_class_from_model_operation]
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The model name **2.** The current class name
Output field	*target_sys_rte_eb_field* Output is the resulting class name.
Script include function	*sn_cmdb_int_util.CmdbIntegrationClassUtil().deriveClassNameFrom* *class_in)*

Does not return a value of a class which is higher in the class hierarchy (a parent class) than the provided input class. For example, does not return cmdb_ci_computer if the input is cmdb_ci_server. Looks only at the cmdb_ci_computer hierarchy, going through cmdb_ci_server (cmdb_ci_computer, cmdb_ci_server, children of cmdb_ci_server).

Currently looks for Server, Windows Server, and Linux Server indicators in the model.

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Examples

Model	Class	Class Results
window server	cmdb_ci_computer	cmdb_ci_win_server
Microsoft server	cmdb_ci_computer	cmdb_ci_win_server
linux server	cmdb_ci_computer	cmdb_ci_linux_server
Microsoft server	cmdb_ci_server	cmdb_ci_win_server
linux server	cmdb_ci_server	cmdb_ci_linux_server
Red hat server	cmdb_ci_server	cmdb_ci_linux_server
Arch server	cmdb_ci_server	cmdb_ci_linux_server
Centos server	cmdb_ci_server	cmdb_ci_linux_server
Debian server	cmdb_ci_server	cmdb_ci_linux_server
Fedora server	cmdb_ci_server	cmdb_ci_linux_server
Suse server	cmdb_ci_server	cmdb_ci_linux_server
Oracle server	cmdb_ci_server	cmdb_ci_linux_server
Rhel server	cmdb_ci_server	cmdb_ci_linux_server
Ubuntu server	cmdb_ci_server	cmdb_ci_linux_server
Junk		
	cmdb_ci_server	cmdb_ci_server
Junk server	cmdb_ci_computer	cmdb_ci_server
Junk	cmdb_ci_computer	cmdb_ci_computer

Derive CI Class from Native Class Identifier

Use when processing a computer record and a native class indicator is provided but the class of the computer is ambiguous otherwise. Can be used along with other Derive CI Class transforms.

Details	
Table	Robust Transform Engine Entity Derive Class From Native Value Operation [sn_cmdb_int_util_derive_class_from_native_value_operation]
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The native class identifier **2.** The current class name
Output field	*target_sys_rte_eb_field* Output is the resulting class name.
Script include function	*sn_cmdb_int_util.CmdbIntegrationClassUtil().deriveClassNameFrom class_in)*

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Does not return a value of a class which is higher in the class hierarchy (a parent class) than the provided input class. For example, does not return cmdb_ci_computer if the input is cmdb_ci_server. Looks only at the cmdb_ci_computer hierarchy, going through cmdb_ci_server (cmdb_ci_computer, cmdb_ci_server, children of cmdb_ci_server).

Currently looks for Server, Windows Server, and Linux Server indicators in the native identifier.

Examples

Native Class	Class	Class Results
window server	cmdb_ci_computer	cmdb_ci_win_server
Microsoft server	cmdb_ci_computer	cmdb_ci_win_server
linux server	cmdb_ci_computer	cmdb_ci_linux_server
Microsoft server	cmdb_ci_server	cmdb_ci_win_server
linux server	cmdb_ci_server	cmdb_ci_linux_server
Red hat server	cmdb_ci_server	cmdb_ci_linux_server
Arch server	cmdb_ci_server	cmdb_ci_linux_server
Centos server	cmdb_ci_server	cmdb_ci_linux_server
Debian server	cmdb_ci_server	cmdb_ci_linux_server
Fedora server	cmdb_ci_server	cmdb_ci_linux_server
Suse server	cmdb_ci_server	cmdb_ci_linux_server
Oracle server	cmdb_ci_server	cmdb_ci_linux_server
Rhel server	cmdb_ci_server	cmdb_ci_linux_server
Ubuntu server	cmdb_ci_server	cmdb_ci_linux_server
Junk		
	cmdb_ci_server	cmdb_ci_server
Junk server	cmdb_ci_computer	cmdb_ci_server
Junk	cmdb_ci_computer	cmdb_ci_computer

Derive CI Class from Operating System

Use when processing a computer record and an operating system is provided but the class of the computer is ambiguous otherwise. Can be used along with other Derive CI Class transforms.

Details	
Table	Robust Transform Engine Entity Derive Class From OS Operation [sn_cmdb_int_util_derive_class_from_os_operation]
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The operating system name **2.** The current class name
Output field	*target_sys_rte_eb_field*

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Details	
	Output is the resulting class name.
Script include function	*sn_cmdb_int_util.CmdbIntegrationClassUtil().deriveClassNameFrom class_in)*

Does not return a value of a class which is higher in the class hierarchy (a parent class) than the provided input class. For example, does not return cmdb_ci_computer if the input is cmdb_ci_server. Looks only at the cmdb_ci_computer hierarchy, going through cmdb_ci_server (cmdb_ci_computer, cmdb_ci_server, children of cmdb_ci_server).

Currently looks for Server, Windows Server, and Linux Server indicators in the operating system name.

Examples

Operating System	Class	Class Results
window server	cmdb_ci_computer	cmdb_ci_win_server
Microsoft server	cmdb_ci_computer	cmdb_ci_win_server
linux server	cmdb_ci_computer	cmdb_ci_linux_server
Microsoft server	cmdb_ci_server	cmdb_ci_win_server
linux server	cmdb_ci_server	cmdb_ci_linux_server
Red hat server	cmdb_ci_server	cmdb_ci_linux_server
Arch server	cmdb_ci_server	cmdb_ci_linux_server
Centos server	cmdb_ci_server	cmdb_ci_linux_server
Debian server	cmdb_ci_server	cmdb_ci_linux_server
Fedora server	cmdb_ci_server	cmdb_ci_linux_server
Suse server	cmdb_ci_server	cmdb_ci_linux_server
Oracle server	cmdb_ci_server	cmdb_ci_linux_server
Rhel server	cmdb_ci_server	cmdb_ci_linux_server
Ubuntu server	cmdb_ci_server	cmdb_ci_linux_server
Junk		
	cmdb_ci_server	cmdb_ci_server
Junk server	cmdb_ci_computer	cmdb_ci_server
Junk	cmdb_ci_computer	cmdb_ci_computer

Derive Virtual From Hardware Model

Use when processing a computer record that may be virtual, a hardware model is provided, and the virtual status is ambiguous. Can be used along with other Derive Virtual From transforms.

Details	
Table	Robust Transform Engine Entity Derive Virtual From Model Operation [sn_cmdb_int_util_derive_virtual_from_model_operation]

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Details	
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The hardware model name **2.** The current virtual flag value
Output field	*target_sys_rte_eb_field* Output is the resulting virtual flag (true/false). If the current virtual flag is 'true', the result is true. Otherwise the result is 'true' or 'false'.
Script include function	*sn_cmdb_int_util.CmdbIntegrationVirtualDetectionUtil().detectVi is_virtual_in)*

Looks for indicators in the model name for a virtual device (VMware).

Examples

Hardware Model	Virtual Flag	Virtual Flag Results
thinkpad	true	true
thinkpad	false	false
thinkpad		false
vmware inc	true	true
	true	true
	false	false
		false

Derive Virtual From Native Indicator

Use when processing a computer record that may be virtual, a virtual indicator is provided by the source, and the virtual status is ambiguous. Can be used along with other Derive Virtual From transforms.

Details	
Table	sn_cmdb_int_util_derive_virtual_from_native_value_operation
Input fields	*source_sys_rte_eb_fields* Input in order is: **1.** The native indicator **2.** The current virtual flag value
Output field	*target_sys_rte_eb_field* Output is the resulting virtual flag (true/false). If the current virtual flag is 'true', the result is true. Otherwise the result is 'true' or 'false'.
Script include function	*sn_cmdb_int_util.CmdbIntegrationVirtualDetectionUtil().detectVi is_virtual_in)*

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Tests native indicator against a list of common values and looks for a 'true' boolean indicator.

Examples

Native Virtual Value	Virtual Flag	Virtual Flag Results
virtual	false	true
virtual		true
virtual	true	true
y	false	true
y		true
y	true	true
yes	false	true
yes		true
yes	true	true
true	false	true
true		true
true	true	true
t	false	true
t		true
t	true	true
other	false	false
other		false
other	true	true
not virtual	false	false
not virtual		false
not virtual	true	true
	false	false
		false
	true	true

Derive Virtual From Serial Number

Use when processing a computer record that may be virtual, a serial number is provided by the source, and the virtual status is ambiguous. Can be used along with other Derive Virtual From transforms.

Details	
Table	sn_cmdb_int_util_derive_virtual_from_serial_number_operation
Input fields	*source_sys_rte_eb_fields* Input in order is:

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Details	
	1. The serial number **2.** The current virtual flag value
Output field	*target_sys_rte_eb_field* Output is the resulting virtual flag (true/false). If the current virtual flag is 'true', the result is true. Otherwise the result is 'true' or 'false'.
Script include function	*sn_cmdb_int_util.CmdbIntegrationVirtualDetectionUtil().detectVi (serial_in, is_virtual_in)*

Looks for indicators in the serial number for a virtual device (VMware).

Examples

Serial Number	Virtual Flag	Virtual Flag Results
123	true	true
123	false	false
123		false
vmware-123	true	true
	true	true
	false	false
		false

Extract and Scale by Units

Use when the source has numerical values that need to be scaled and numerical value with an input such as 2048Mb. The source does not always provide the units so it may be required to calculate or guess the units being provided. The target units depend on the target field in the CMDB. If not specified, the decimal place field is set at 2 by default.

Note:
This field is case sensitive.

Details	
Table	sn_cmdb_int_util_extract_and_scale_by_units_operation
Input fields	*source_sys_rte_eb_fields*
Output field	*target_sys_rte_eb_field*
Script include function	*sn_cmdb_int_util.CmdbIntegrationExtractScaleUnitUtil().extractA*

Examples

Input Value	Default Unit	Output Unit	Result
2048Mb	Mb	GB	2GB

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Examples (continued)

Input Value	Default Unit	Output Unit	Result
17179869184	B	GB	16GB

First Non Null Value

Use when you have a list of fields providing similar information that must map to a single field and you want to rank the order in which they can provide those values.

For Example Internally in SolarWinds, there is a hierarchy of tables that are join. In one example, a computer's name could come from the child most table or any of that tables parents but each of those is a separate field in the pull. Starting with the most specific table, the values are searched for the first instance of a name value.

Details	
Table	sn_cmdb_int_util_first_non_null_operation
Input fields	*source_sys_rte_eb_fields* Input is a list of fields of any length.
Output field	*target_sys_rte_eb_field* Output is the value from the first field in the list that doesn't have a null (or empty) value.
Script include function	*sn_cmdb_int_util.CmdbIntegrationFirstNonNullValueUtil().firstNo*

Example

Field 1	Field 2	Field 3	Result
	foo	foo2	foo

Process Name, Domain, FQDN, DNS set

Use when the source provides name, domain, FQDN, or DNS information. Can be used for only a subset of these (if for example, the source only provides name and domain). In the case that a source only provides fields that are lower in the input list (FQDN) the CmdbIntegrationHardwareNameUtil script include can be called from a script operation to minimize having to create empty dummy fields.

Details	
Table	sn_cmdb_int_util_process_name_set_operation
Input fields	*source_sys_rte_eb_fields* Takes up to four Input fieldss (any additional fields are ignored), in the following order: **1.** Name **2.** Domain

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Details	
	3. FQDN **4.** DNS You don't have to provide all four input values, but you must provide those values in the specified order. If for example, you only want to cleanse domain, you must provide a name attribute, even it if empty.
Output field	*target_sys_rte_eb_field* Output is a concatenated set of values in the same order, using a triple pipe (|||): {name}|||{domain}|||{fqdn}|||{dns}
Script include function	*sn_cmdb_int_util.CmdbIntegrationHardwareNameUtil().processNameD domain, fqdn, dns)*

FQDN and DNS are first processed to see if their formats are correct. FQDN has an additional discovery regex it must pass (via properties): `glide.discovery.fqdn.regex – default : ^([^.]+)\\.((?:[^.]+\\.)+[^.]+)$`

Possible name and domain values are extracted if possible. When name and domain are processed, if there is no FQDN, a value is generated if possible. A resulting name value is also modified using the following discovery flags:

1. glide.discovery.hostname.case – default: No change. Can be set to 'Lower case', 'Upper case', 'No change'
2. glide.discovery.hostname.include_domain – default: false. If 'true' the domain is added to the final name value

Examples

Name	Domain	FQDN	DNS	Results
myName	other.net	otherName.other.net	mycomp.servicenow.com	myName||| other.net||| otherName.other.net||| mycomp.servicenow.com
na	other.net	otherName.other.net	mycomp.servicenow.com	otherName||| other.net||| otherName.other.net||| mycomp.servicenow.com
			servicenow.com	||| servicenow.com|||||
			name.servicenow.com	name||| servicenow.com||| name.servicenow.com||| name.servicenow.com
		name.servicenow.com		name||| servicenow.com||| name.servicenow.com|||

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Examples (continued)

Name	Domain	FQDN	DNS	Results
		name.servicenow.com		name||| servicenow.com||| name.servicenow.com|||
name	servicenow.com			name||| servicenow.com||| name.servicenow.com|||

Process FQDN

Use when the source provides a suspected FQDN value but no other naming fields such as name, domain, or DNS.

Details	
Table	sn_cmdb_int_util_process_fqdn_operation
Input fields	*source_sys_rte_eb_field* Input is a single field containing an FQDN.
Output field	*target_sys_rte_eb_field* Output is a concatenated set of values in the same order using a triple pipe (|||): {name}|||{domain}|||{fqdn}|||{dns}
Script include function	*sn_cmdb_int_util.CmdbIntegrationHardwareNameUtil().processNameD* *'', fqdn, '')*

The processing follows the same logic as the 'Process Name, Domain, FQDN, DNS set' transform except that only FQDN is used as an input.

Example

Input	Result
mycomputer.servicenow.com	mycomputer|||servicenow.com||| mycomputer.servicenow.com|||

Scale Unit

Use when the source has numerical inputs that must be scaled. The source does not always provide the current units so it may be required to calculate or guess the units being provided. The target units depend on the field being targeted in the CMDB.

Details	
Table	sn_cmdb_int_util_scale_unit_operation
Input fields	*source_sys_rte_eb_fields* Inputs in order are:

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Details	
	1. The input value **2.** The current units **3.** The target units
Output field	*target_sys_rte_eb_field* Output is the input value scaled from the current units to the target units. If no units are found for the current units, then the input value is returned. If no current or target units are found the input is returned as the output.
Script include function	*sn_cmdb_int_util.CmdbIntegrationScaleUnitUtil().scaleUnits(inpu input_unit, output_unit)*

Example

Input	Result
• Input Field 1: 1 • Input Field 2: GB • Input Field 3: MB	1024

Software Bundle ID Lookup

Use when a source, such as Jamf, does not provide the software publisher but does provide a Mac software bundle ID. Software Bundle ID Lookup looks up records in the Bundleid Lookup [sn-cmdb_int_util_bundleid_lookup] table by bundle_id. If a record with the specified bundle_id exists, it extracts the respective software publisher. Otherwise, it creates a new record which will be queried the next time the Lookup Mac Software Bundle IDs data source runs.

Details	
Table	sn_cmdb_int_util_software_bundle_id_lookup_operation
Input fields	• source_sys_rte_eb_field • Bundle ID
Output field	*target_sys_rte_eb_field* Output is the resulting artist name, track name, and seller name, all concatenated by a triple pipe (|||), or an empty string if no match is found.
Script include function	*sn_cmdb_int_util.CmdbIntegrationSoftwareBundleIdLookup. lookupSoftware(bundleId)*

Example

Input	Result
Input Field 1: com.microsoft.Word	Microsoft Corporation|||Microsoft Word||| Microsoft Corporation

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User Lookup

Use to look up a user in the User [sys_user] table by user name or email, attempting to match in the following order:

1. The User Name matching the *user_name* attribute.
2. The Email matching the email attribute.
3. If nothing is matching, it returns empty.

Details	
Table	sn_cmdb_int_util_user_lookup_operation
Input fields	*source_sys_rte_eb_fields* Inputs in order are: 1. User Name 2. Email (Optional)
Output field	*target_sys_rte_eb_field* sysId of the sys_user.
Script include function	*sn_cmdb_int_util.CmdbIntegrationUserLookup.lookupUser(username, email)*

Examples

Input	Result
Input Field 1: abel.tuter	62826bf03710200044e0bfc8bcbe5df1
• Input Field 1: atuter • Input Field 2: abel.tuter@example.com	62826bf03710200044e0bfc8bcbe5df1

Configuring the ADM adapter for Service Graph Connectors

You can configure the Application Dependency Mapping (ADM) adapter to populate running processes, TCP connections, and applications into CMDB.

As a user with the admin role, you can use the *ADMHelper* script include to configure the ADM adapter that populates running processes, TCP connections, and applications into CMDB. The *ADMHelper* script include is available within the Integration Commons for CMDB (sn_cmdb_int_util) store app. The *ADMHelper* script include invokes the *ApplicationDependencyMapping* script include that is available within the Discovery and Service Mapping Patterns application (sn_itom_pattern).

The ADM adapter requires the inputs as discussed in the following table:

Inputs for the ADM adapter

Input	Input type
Running Process Details	Required

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Inputs for the ADM adapter (continued)

Input	Input type
Computer Sys Id	Required
TCP connection details	Optional
ADM Properties	Optional

For interpreting and populating the CIs, the ADM processor requires the input data in a specific format. Ensure that the keys are formed as shown in the following example:

Example keys for ADM processor

TCP connections data

```
[
{
"pid": "1068",
"local_ip":
 "127.0.0.1",
"local_port":
 "199",
"ip": "0.0.0.0",
"port": "199",
"state":
 "LISTEN",
"type": "on"
}
]
```

Running process

```
[
   {
"pid": "1",
"ppid": "0",
"command": "/usr/lib/systemd/systemd",
 "name": "systemd",
"parameters": "--switched-root --system
 --deserialize 21"
}

]
```

The *ApplicationDependencyMapping* script include processes TCP connections and running process data and populates the following tables:

- TCP Connections [cmdb_tcp]
- Running Process [cmdb_running_process]
- Application [cmdb_ci_appl]

Note:
After the data is populated into the TCP Connections [cmdb_tcp] and Running Process [cmdb_running_process] tables, the *ApplicationDependencyMapping* script include reconciles the TCP connections and running process data for populating the Application [cmdb_ci_appl] table based on the data in the Network Adapter [cmdb_ci_network_adapter] and IP Address [cmdb_ci_ip_address] tables. Classified processes are added to the corresponding child class in the Application [cmdb_ci_appl] table. The addition of unclassified processes to the Application [cmdb_ci_appl] table depends on the system property value.

Accessing the connection details of Service Graph Connectors

The common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app enables accessing connection details of Service Graph Connectors in a single view.

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With the CCF, you can access all the connections used by Service Graph Connectors or the connections that are specific to a Service Graph Connector. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection for a Service Graph Connector.

Viewing connections

To view the connection details for all Service Graph Connectors that use the CCF, navigate to **All** > **Service Graph Connectors** > **Connections** from the application navigator.

If a Service Graph Connector uses CCF, you can also view the connections specific to the connector. To view the connection details, open the Service Graph Connector from the application navigator, access its Connections module to view the Service Graph Connections list, and then select the connection name.

The Service Graph Connections page displaying the connection details also includes the **Test Connection** related link that you can select to test the connection. If the connection is successful, a success message is displayed. Else, an error message with the reason of failure is displayed.

CCF tables

The CCF uses the following tables:

Service Graph Connections [sn_cmdb_int_util_service_graph_connection]

Stores the connection records for all the Service Graph Connectors that use the CCF. The Service Graph Connections [sn_cmdb_int_util_service_graph_connection] table also includes other CCF tables as related lists.

Properties [sn_cmdb_int_util_service_graph_connection_property]

Stores the connection properties associated with a specific connection.

Service Graph Connection Data Sources [sn_cmdb_int_util_service_graph_connection_data_source]

Stores the many-to-many (m2m) connection details between the Service Graph Connections [sn_cmdb_int_util_service_graph_connection] table and the data sources for a Service Graph Connector.

Service Graph Connection Scheduled Data Imports [sn_cmdb_int_util_service_graph_connection_scheduled_data_import]

Stores the m2m connection details between the Service Graph Connections [sn_cmdb_int_util_service_graph_connection] table and the scheduled data imports for a Service Graph Connector.

Service Graph Connection Test Script [sn_cmdb_int_util_service_graph_connection_test_script]

Stores records that include scripts for triggering the test connection process for Service Graph Connectors.

Managing CMDB data deletion

The Integration Commons for CMDB (sn_cmdb_int_util) store app uses post-script and transform map methods to remove imported Configuration Management Database (CMDB) records that were deleted later from the source third-party application.

Post-script method

The post-script method checks the Source [sys_object_source] table for configuration items (CIs) not updated in the last run for a specific source feed. It then removes any non-updated CIs from

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the associated target CMDB tables synchronously, handling the removal of target records one at a time.

Most Service Graph Connectors use the post-script method to manage the removal of any CMDB records.

The post-script method uses the `RecordRemoval` script to handle various record deletion strategies. Hard deletion involves permanently and completely removing records from the CMDB, making them unrecoverable and suitable for data that is no longer needed. Soft deletion marks records as deleted without actually removing them from the CMDB, allowing for potential recovery and preserving historical data. Optimized soft deletion, managed by the Identification and Reconciliation Engine (IRE), enhances this soft deletion approach by using a specialized table, such as the extension attributes table, and applying reconciliation rules to manage deleted records more efficiently. By default, the table can hold up to 100 records at a time, but as a user with the admin role, you can adjust this limit by setting the *sn_cmdb_int_util.ire_payload_items_size* system property. This property is not available by default and you must create this property of type integer within the Integration Commons for CMDB (sn_cmdb_int_util) store app. For more information, see Add a system property.

Transform map-based method

The transform map-based method checks the Source [sys_object_source] table for configuration items (CIs) not updated in the last run for a specific source feed. It then utilizes the multi-threaded deletion approach to remove any non-updated CIs from the associated target CMDB tables concurrently, handling the removal of all target records within an import set at once. Multiple import sets are created to store target record data within the Integration Commons Remove Record [sn_cmdb_int_util_remove_record] staging table enabling multi-threaded deletion of records. Therefore, reducing the data processing time.

The Integration Commons Remove Record [sn_cmdb_int_util_remove_record] staging table tracks non-updated CIs by storing target record details including the discovery source, source feed, target table sys_id, and target table name of these CIs. The on-start script defined within the *Remove Record Transform Map* then deletes the records from the associated target tables.

The transform map-based method is used by a Service Graph Connector to improve the data processing time. For example, the SG-Tanium Remove Software data source within the Service Graph Connector for Tanium removes software data using the transform map-based method. See Service Graph Connector for Tanium.

Partition size computation for parallel loading in Integration Commons for CMDB

Integration Commons for CMDB supports computed partition size for the parallel loading framework, if supported in a Service Graph Connector.

The parallel loading feature of ServiceNow AI Platform, executes data load using multiple threads. The partition size for a data source is computed by the Integration Commons for CMDB application used by the parallel loading feature. This partition size confirms that the workload is evenly distributed among the available threads. By balancing the data load, a data source within a Service Graph Connector can manage data loading uniformly across the available nodes, reducing processing time and improving overall efficiency. This approach promotes efficient data loading, minimizes latency, and optimizes the performance of data sources.

The partition size computation for the parallel loading feature within the Integration Commons for CMDB application is based on the following calculations:

- Partition size calculation
- Parallel jobs calculation

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Partition size calculation

The partition size for parallel loading in a data source is determined by both the number of active primary nodes on your ServiceNow instance and the total volume of data to be loaded by the data source using the following formula:

```
Partition size = Total data volume / (10% * Active primary
 nodes)
```

For example, if there are `4` active primary nodes and the data volume to be loaded is `1000` units, the partition size is calculated as:

```
Partition size = 1000 / (10% * 4) = 1000 / 0.4 = 25
```

Parallel jobs calculation

Parallel jobs enable distributing the workload evenly across multiple jobs, reducing the data loading time and improving the efficiency of data retrieval. The calculation of the number of parallel jobs created for a partition is based on the following formula:

```
Number of parallel jobs = Total data volume/Partition size
```

In the earlier example, where the total data volume is `1000` units and the partition size is `25`, the number of parallel jobs created is calculated as:

```
Number of parallel jobs = 1000/25 = 40
```

Quick start tests for Integration Commons for CMDB

Validate that integrations for CMDB pass validation and still work after you make any configuration changes such as applying an upgrade or developing an application.

Danger:
By default, the system property that is used to run automated tests is disabled to prevent you from accidentally running these tests on a production system. To avoid data corruption or an outage, run tests only on development, test, and other non-production instances. See Enable or disable executing Automated Test Framework tests.

Integration Commons for CMDB

CMDB INT: CMDB Integrations Validation test suite
Test suite to verify the integrity of an integration using multiple tests.

Test	Description	Release version
CMDB INT: Set Test Session Application	Modify the run server-side script to set an application name so that you can test only one integration. Otherwise, all integrations installed will be tested.	Paris
CMDB INT: Test Against Source Analysis	Test an integration against the values in the CMDB Integration Source Analysis [sn_cmdb_int_util_cmdb_integration_source_analysis] table.	Paris

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CMDB INT: CMDB Integrations Validation test suite

Test suite to verify the integrity of an integration using multiple tests.

(continued)

Test	Description	Release version
CMDB INT: Validate Application Feed	Validate all application feeds in an integration.	Paris
CMDB INT: Validate Discovery Source	Validate that the discovery source exists.	Paris
CMDB INT: Validate Entity Mappings	Validate all entity mappings of an integration.	Paris
CMDB INT: Validate Fields	Validate fields for CMDB Integrations.	Paris
CMDB INT: Validate Lookups	Validate CMDB integration lookups.	Paris
CMDB INT: Validate Mandatory Operations	Validate that all integrations for mandatory operations exist for mapped fields.	Paris
CMDB INT: Validate Operations	Validate all operations for an integration.	Paris
CMDB INT: Validate References	Validate CMDB integration references.	Paris
CMDB INT: Validate Related Entries	Validate all related classes against the data dictionary for related entries.	Paris
CMDB INT: Validate Relationships	Validate CMDB integration relationships.	Paris

To learn more about Integration Commons for CMDB, see Integration Commons for CMDB.

Related topics

Quick start tests

IntegrationHub ETL

Use the IntegrationHub ETL store app to create and manage ETL transform maps, which integrate third-party data into the CMDB or into non-CMDB tables without compromising the integrity of data. IntegrationHub ETL provides a simplified user interface that guides you through the integration process end-to-end, including a test integration run of sample data.

The IntegrationHub ETL (sn_int_studio) plugin provides the IntegrationHub ETL functionality.

- Use the CMDB Integrations Dashboard to track progress, results, and errors associated with using custom integrations created in IntegrationHub ETL. The CMDB Integrations Dashboard is included in the Integration Commons for CMDB store app.
- Watch the IntegrationHub ETL | Importing resources into the CMDB video for an introduction and walk through of the IntegrationHub ETL tool.

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Request apps on the Store

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

Roles required

Users with the cmdb_inst_admin role can use IntegrationHub ETL to create integrations, or customize a pre-existing integration provided by ServiceNow or a vendor at the ServiceNow Store. A vendor can create a new integration and provide it as an application for anyone to use.

Support for non-CMDB tables

Starting with the Zurich release, IntegrationHub ETL supports the integration of third-party data into some non-CMDB tables. IntegrationHub ETL supports those non-CMDB tables that are supported by Identification and Reconciliation (IRE). For details about which non-CMDB tables are supported and any needed configuration, see IRE support for non-CMDB tables.

Supported non-CMDB tables are available in IntegrationHub ETL when specifying classes, conditional classes, class associations, and reference sources in mapping definitions. However, there are some differences between using CMDB classes and non-CMDB tables in IntegrationHub ETL:

- Specifying class associations isn't mandatory for non-CMDB tables.
- Adding relationships doesn't apply to non-CMDB tables.
- Class associations for a non-CMDB table is based on a reference field instead of a CMDB relationship.

Note:
Although the IntegrationHub ETL user interface and accompanying documentation references CMDB and CMDB elements, most of those references also apply to supported non-CMDB tables.

Process

The two key components that IntegrationHub ETL uses for processing are:

- Robust Transform Engine (RTE): Used to transform raw source data that is stored in staging tables, into the data that is mapped and integrated into the CMDB. RTE uses ETL transform maps that were created for the integration during data transformation.
- Identification and Reconciliation engine (IRE): Used as a centralized framework for identification and reconciliation processes across different data sources. IRE processes help maintain data integrity in the CMDB and in supported non-CMDB tables.

IntegrationHub ETL uses RTE and IRE which work together to process and integrate data. Data is first imported from a data source, and is then stored in temporary staging tables in Import Sets systems. Using the data in the staging tables and the ETL transform map created by IntegrationHub ETL, RTE creates IRE payloads which are then processed by IRE. IRE applies reconciliation processes to avoid potential problems such as duplicate CIs, ensuring that the CMDB or non-CMDB tables remain healthy, and then integrates the resulting data.

When you create an integration, you import source data, transform data if needed, and select target CMDB classes (or non-CMDB tables) and attributes to map the data to. Eventually, you run an integration test of the sample data, using your settings in the IntegrationHub ETL. You can then preview the integration test results and adjust any settings before scheduling

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recurring integration runs for large data sets. If you develop and test the ETL transform map on a development instance, then you can test and adjust the configuration before implementation on a production instance.

For example, you can integrate data from SCCM (Microsoft System Center Configuration Manager).

Refer to the community page IntegrationHub-Extract Tranform Load (IH-ETL) is GA in ServiceNow store for an overview of IntegrationHub ETL, including its components and workflow.

Guided Setup

A guided setup organizes all the tasks in the correct order, tracks the completion of tasks, and enforces any task dependencies. Tasks that depend on the completion of other tasks, are enabled or disabled as you step through the tool and complete tasks.

Read-only mode

When opening a Service Graph Connector in which IntegrationHub ETL isn't detecting any incoming data from the data source, the integration is available in read-only mode. In read-only mode you can access all the guided setup tasks on the ETL Transform Map Assistant page. You can examine all the settings and definitions in the integration even though it isn't populated with actual data. However, you can't make any updates to a read-only connection.

Read-only mode is useful for studying an existing connection for the purpose of creating a new connection that is similar to the read-only connection. The read-only mode can also assist in troubleshooting issues with the connection.

IntegrationHub ETL and Import Sets

Using IntegrationHub ETL and ETL transform maps has the following advantages over using Import Sets and transform maps:

- Identification and Reconciliation Engine (IRE) processes are incorporated into the IntegrationHub ETL so all data is automatically processed by IRE as part of the integration. Using Import Sets and transform maps does not provide a simple way to apply IRE processes.
- IntegrationHub ETL uses guided setup which provides guidance and a simple user interface for the entire process of integrating third-party data.
- IntegrationHub ETL includes an integration test for a small data set using the new ETL transform map. This test lets you review the results and adjust configuration settings before scheduling recurring integrations.

Terms

The following terms are associated with the IntegrationHub ETL:

CMDB application

Name of the third-party vendor such as SCCM 2019. A CMDB application has two associated attributes: *`Name`* and *`Discovery Source`*. When creating a new integration, ensure to configure a discovery source for the CMDB application that you plan to use, before using the IntegrationHub ETL.

Data source

The source feed, such as SCCM 7.0 Computer Identity, where the raw source data is imported from. If you use various REST endpoints for different types of data, then each REST endpoint is associated with its own data source and an ETL transform map.

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ETL transform map

The output generated by IntegrationHub ETL. You can integrate third-party data into the CMDB or into non-CMDB tables using an ETL transform map which is configured for the respective integration.

Source data

Original, raw data that have been imported into IntegrationHub ETL. Source data can be used in its original form, or you can transform the data before mapping and integration.

Transform

An operation, that you can apply to a specific data column to transform the data values. For example, to transform the format of the data values. Use transforms to standardize data formats and meet other system requirements.

Transformed data

Some of the source data might not be compliant with the requirements of its target CMDB attributes and classes or non-CMDB tables. In those cases, you can apply various types of transforms to the source data, before mapping the data to the target CMDB classes and attributes or non-CMDB tables. Transforms, can for example convert data format, replace values, and concatenate values from multiple data columns.

Each CMDB application can have multiple connections for retrieving raw data. Each connection that is used to retrieve a certain type of data, has its own pair of data source and an ETL transform map. Therefore, one CMDB application can have multiple ETL transform maps, and each of those ETL transform maps is associated with a single Data Source.

For example:

CMDB Application	ETL Transform Map	Data Source
SCCM	SCCM Computer Identify	/sccm/2019/comp
	SCCM Disk	/sccm/2019/disk
	SCCM Application	/sccm/2019/appl

Nested data payloads

To process nested data payloads, you must first ensure that the data source that is used for the integration, is set with the Data in single column option. With that setting, you can correctly represent nested data in a JSON payload which IntegrationHub ETL then processes as nested data, rather than as flat data.

Sample of nested data:

```
{
            "u_computer_fqdn": "computer2-fqdn",
            "u_computer_id": 2,
            "u_computer_ip": "computer2-ip",
            "u_computer_location": "PDX",
            "u_computer_mac": "computer2-mac",
            "u_computer_name": "nested-payload-computer2",
            "u_computer_os": "computer2-os",
            "interfaces": [
                {
                    "u_interface_ip": "computer2-eth1-ip",
```

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```
                    "u_interface_mac": "computer2-eth1-mac",
                    "u_interface_name": "computer2-eth1",
                    "ip": ""
                },
                {
                    "u_interface_ip": "computer2-eth2-ip",
                    "u_interface_mac": "computer2-eth2-mac",
                    "u_interface_name": "computer2-eth2",
                    "ip": {
                        "u_ip_address": "computer2-eth2-ip",
                        "u_mac_address": "computer2-eth2-mac"
                    }
                }
            ],
            "software": [
                {
                    "u_software_name": "computer2-software2",
                    "u_software_version":
"computer2-software2-1.0",
                    "instance": {
                        "u_software_instance_name":
"computer2-software1-instance"
                    }
                },
                {
                    "u_software_name": "computer2-software2",
                    "u_software_version":
"computer2-software2-2.0",
                    "instance": {
                        "u_software_instance_name":
"computer2-software2-instance"
                    }
                }
            ]
        },
```

You can view the layers of nested data in a separate panel in IntegrationHub ETL, apply transforms, map, and integrate that data into the CMDB.

When creating a nested data JSON payload, the following restrictions apply:

- Field names must start with a letter (between A-Z or a-z) or with '_', and must only contain letters (between A-Z or a-z), digits (0-9), or the '_' character.

  For example, a field name can't contain special characters such as *, [,], #, $, spaces, and dot.

- Field names can't be "temp" or "object", which are reserved for internal use.
- Consistently throughout the payload, you must use an array or an object to represent data in a specific level, regardless of the number of items in the level. If you use an array for multiple items in one object, you must also use an array to represent a single item in other objects.

For a demo about working with nested payload data, watch the Integration Hub - ETL nested payload feature demo video on the ServiceNow YouTube channel.

Related topics

Teams related list

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Create an ETL transform map

IntegrationHub ETL provides a guided setup which walks you through the completion of all necessary tasks for creating an ETL transform map for a specific integration.

Guided setup

Guided setup organizes all the tasks in the correct order, tracks the completion of tasks, and enforces any task dependencies. Tasks that depend on the completion of other tasks, are enabled or disabled as you step through the tool and complete tasks.

Use guided setup on the ETL Transform Map Assistant page to complete the following tasks.

Import source data and specify basic details

Provide basic details for the integration, such as the source of the data that you want to integrate into CMDB, and import the source data.

Before you begin

The data source that you plan to select for the ETL Transform Map must exist in the same application scope as the one being used in the current session.

When you open an ETL transform map, by default the map is not validated. You can enable this validation step by adding the system property *sn_int_studio.validation.enabled* to the System Properties [sys_properties] table and then setting it to **true**. After validation is complete, you choose how to handle validation errors.

Role required: cmdb_inst_admin

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**.
   The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store. Starting with IntegrationHub ETL v3.2, integrations are grouped by the *CMDB Application* value, in which case expand the respective group to locate an integration.
2. Click the **Name** of an integration to view or modify, or click **Create new**.
   If the system property *sn_int_studio.validation.enabled* is set to **true**, then IntegrationHub ETL validates the ETL transform map that you are loading. If there are any validation errors, the Invalid Mapping Data Detected dialog box appears, listing all the specific errors that were detected. You can choose to delete the invalid mappings and continue with only the valid mappings, or you can choose to keep the invalid mappings. However, notifications about invalid mappings will continue to appear as you continue to work with the integration.

   The system detects errors such as:

   - Missing source or target fields in corresponding Robust Transform Engine (RTE) field mappings records
   - Missing table columns in an import set

     Note:
     In this situation, any corresponding metadata records in RTE are no longer valid and are automatically deleted. Records such as field mappings and transform operations that are associated with the missing table columns in the import set, are deleted.

   - Missing an Identification and Reconciliation Engine (IRE) lookup rule for a lookup class

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3. On the ETL Transform Map Assistant page, in the Specify Basic Details section of the guided setup, select the **Import Source Data and Provide Basic Details** task.
4. Fill out the form.

Field	Description
CMDB Application	The CMDB application associated with the ETL transform map. You can select **Add new**, which adds the **CMDB Application** and the **Discovery Source** fields for the new CMDB application.
Name	Name of the ETL transform map.
Description	Description of the integration.
Data Source	List of all data sources in the system. **Note:** Be cautious in subsequently modifying the data source as it can result in substantial changes to the data integration. Aligning to the import set table of the new data source might require the removal of columns and associated transforms, or the addition of new columns. IntegrationHub ETL validation processes will detect any required updates and let you agree or reject these updates.
Sample Import Set	An Import Set that is associated with the specified **Data Source**. A subset of that Import Set data is used to preview source data. Select the **Auto-pull a new import set** option to pull a new Import Set of the associated data source. Starting with IntegrationHub ETL v3.2, if no Import Set is specified, then the map is loaded and is automatically set to be in read-only mode. You can review configurations in the map but can't edit mappings or transforms.
Preview Size Override	Number of data records that are loaded and used as sample for the preview for this transform map. If set, this custom setting overrides the value of the *sn_int_studio.preview.size*

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Field	Description
	system property, and applies only to the current transform map. If **Load Complete Schema** is disabled, then the nested data structure for the map is generated based only on the specified number of records that are loaded. Field available starting with IntegrationHub ETL v3.2.
Load Complete Schema	Enable or disable loading the entire data schema for generating the data structure for the map. When disabled, the nested data structure for the map is generated based only on the number or records loaded as sample records for preview. The number of records loaded is determined by either the **Preview Size Override** setting, or by the global system property *sn_int_studio.preview.size*. Field available starting with IntegrationHub ETL v3.2.
CMDB Application	Name of a new **CMDB Application**. Appears if you set **CMDB Application** to **Add new**.
Discovery Source	Discovery source associated with a new **CMDB Application**. Appears if you set **CMDB Application** to **Add new**.

5. Click **Save** to save the current changes or **Mark as Complete**.

   A time stamp appears in the header when you click **Save**, which remains for the duration of the IntegrationHub ETL session for the ETL transform map. When you re-enter the session or switch between ETL maps, the time stamp disappears.

Related topics

Create an Import Set data source

Preview and prepare data

Review sample records of raw source data, which will be integrated into the CMDB. Transform and prepare data to align with the target classes and attributes, if needed.

Before you begin

The number of records in the sample data is globally determined by the system property *sn_int_studio.preview.size*, which is set to 100 by default. The maximum number of records in the sample data that IntegrationHub ETL can process is 10,000. If you set that property above the 10,000 limit, then IntegrationHub ETL will only process up to 10,000 records and a message will appear to that effect.

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Starting with IntegrationHub ETL v3.2, you can override the value of the *sn_int_studio.preview.size* property by setting the **Preview Size Override** field on the Import Source Data and Provide Basic Details form, per map.

To process nested data from a nested payload, the respective data source must be set with the **Data in single column** option.

Role required: cmdb_inst_admin

About this task

Review the values in the data columns of the sample data and identify columns that do not align with the requirements of the intended target classes and attributes. You can transform data, for example, by converting the data format, replacing values, and concatenating data columns. You can apply transformations one on top of another, creating a chain of data transformations. You can also set a data column to be ignored in the mapping and integration process.

Note:
To set a CMDB attribute to be empty, use the string '<EMPTY#_STRING>'.

Columns for nested data appear alongside the rest of the data, with a **Nested Objects** notation in the data column header. The count of nested data items per object appear with a link which lets you drill to deeper levels of the nested data. To show the data structure of nested data in a separate panel, enable the **Show data structure** option.

The Data Structure panel has two options for displaying nested data:

- **Tree**: Nested data grouped by objects, where each object node corresponds to a record entry in the source data. Expand object nodes to show all nested data for the record.
- **Collection**: Nested data grouped by the top-level object (by default) and then by nested data items such as software. Expand a node such as software, to show which software is installed on each computer.

You can navigate through the levels of nested data in the Data Structure panel, the breadcrumbs path, or through number links that appear in the source data itself. Your selections and the data that appears are kept synchronized between all views of the nested data, regardless of navigation.

For a demo about working with nested payload data, watch the Integration Hub - ETL nested payload feature demo video on the ServiceNow YouTube channel.

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**, and click the **Name** of an integration. The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store.
2. In the ETL Transform Map Assistant page, in the Prepare Source Data for Mapping section of the guided setup, select **Preview and Prepare Data**.
3. **Optional:** Select **Show data structure** to open the Data Structure panel which shows the structure of nested data. In the Data Structure panel, you can drill down through the levels of nested data.
4. **Optional:** Select the action menu for a column and then select a Sort operation.
5. Select the action menu for a column and then select **Group by** to group the data by the respective column. Select **Ungroup** to undo the grouping operation.
6. **Optional:** Click **New Transform** and then select **Use Source Column** . Or, select the action menu for a column, and then select **New Transform** to transform the selected column.

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(Optional) You can't create new transforms for nested objects at this top-level view of the data. A nested object column contains number links which indicate the number of nested items for the record. To create a new transform for nested objects, click that number link to drill down to the actual nested data. Alternatively, navigate in the Data Structure panel to the nested object for which you want to create a transform.

A transform of nested data can reference parent objects of the nested data being transformed. Using the sample payload for nested data as an example, a transform for an interface object can reference the parent computer object but can't reference a software object.

a. In the New Transform sidebar on the right, select a **Transform Type** and modify the **Transform Description** if appropriate.
For more details about transform types, see Transform types in IntegrationHub ETL.

b. Optional: Select **Hide initial column used for this transform** to hide from the current view all the columns that were used for this transform.
This setting is temporary for the current session, and if you refresh the page, the hidden column reappears. To show a hidden column, you can also click the gear icon on the banner frame. Then, move the hidden column from the Available to the Selected list and click **OK**.

c. Select or verify the **Input Column** whose values are being transformed.

d. Optional: Modify the **Output Column Name** for any of the columns that will be added with the transformed values.

e. Click **Apply**.
A new column with the transformed values appears, placed in alphabetical order based on the output column name. If you used the suggested output column name, then the new column appears to the right of the input column.

f. Review the transformed data and adjust any transforms, if needed.

7. **Optional:** To apply the 'Set Fixed Value Column' transform:
   a. Click **New Transform** and then select **Set Fixed Value Column**.
   b. In the Set Fixed Value Column sidebar, enter a **Column Name** and a **Column Description** for the new column. Then, set **Assign Column Value** to the value that is fixed for the new column.
   c. Click **Apply**.
8. **Optional:** Select the action menu for a column, and then select **Ignore in Mapping** to exclude the column from mapping and integration in the current session.

   (Optional) In a subsequent session, the **Ignore in Mapping** setting does not apply, and the column will be included in mapping.

   You can click **Include in Mapping** to undo the **Ignore in Mapping** setting for the column.
9. **Optional:** Select the action menu for a column, and then select **Delete This and Downstream Columns**. This delete action deletes the column along with any columns that were added using this column as an input column.
10. **Optional:** Click **New Transform** and then select **Table Lookup** which lets you specify a table to look up and extract additional values from. Fill out the fields in the Table Lookup sidebar on the right.

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Values from the specified lookup table are matched with the mapped data. For the records that match, the specified values from the lookup table, are added as a column, to the data that is being prepared for mapping.

Table Lookup

Field	Description
Lookup Table	Table to use for matching with the data that is being mapped. When records from the lookup table and the mapped data satisfy the **Look Up Condition**, then specified values from the **Lookup Table** are extracted from the respective record and added to the mapped data.
Lookup Condition	(Optional) A set of pairs of column conditions. Each pair specifies a column in the lookup table and a column in the mapped data, which are attempted to be matched. ○ **If values of target table column**: The column in the target table to match to a column in the mapped data. ○ **Match values of source data table**: The column in the mapped data to match to a column in the lookup table. You can add multiple pairs of columns to match on.
Lookup Condition	(Optional) Values to extract from the **Lookup Table** when there is a match with the mapped data. **Then output values from the following columns**: The lookup table columns to extract values from, when values from the lookup table and the mapped data, satisfy the **Lookup Condition**. You can specify multiple lookup table columns to extract values from. For every column that you specify, a corresponding **Output Column Name** field automatically appears. Specify a label for the column that will be added with the extracted values.
Output Column Name	(Optional) A label for the column that will be added to the mapped data, with the values extracted from the lookup table. An **Output Column Name** field is automatically added for every column that

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Field	Description
	you specify in **Then output values from the following columns**.

11. Review the data and ensure that the intended set of data to be integrated is transformed, correctly formatted and prepared for import.
12. Click **Mark as Complete**.

Result

Data is prepared when the set of source data columns and transformed columns that you want to integrate, meet any formatting and other value requirements of the target CMDB classes and attributes. These columns are then ready to be mapped and integrated to CMDB classes and attributes.

About mapping data columns to CMDB classes and attributes

There are several requirements and guidelines for mapping source data to target CMDB classes and attributes. Also, there is an option of deactivating class mappings while preserving the settings for an easy reactivation. Review these concepts to ensure proper processing by the Identification and Reconciliation Engine (IRE).

Required mappings

You must map data to all required attributes of the target class in addition to mapping to attributes that are not configured as required. Also, the following two fields appear by default and you cannot delete them:

Source Native Key

IRE uses to uniquely identify a record and for building relationships and references. Also, improves performance of insert and update operations. When processing a payload, IRE generates an error if this field is empty.

Source Recency Timestamp

IRE uses to identify records that are older than the current record and therefore can be ignored, to help resolve conflicting attribute values. If a value is provided, it is used only if it is later than the value that is currently stored in the CMDB. If a value is not provided, IRE updates the attribute with the current timestamp.

The following system properties let you modify how IRE uses the *source_recency_timestamp* value in a payload to update the *last_scan* attribute in the Source [sys_object_source] table:

- glide.identification_engine.skip_updating_last_scan_if_older
- glide.identification_engine.ire_message_listener_skip_updating_last_scan_to_now

For more information about how IRE uses *source_native_key* and *source_recency_timestamp* for CI identification, see Identification and Reconciliation engine (IRE).

Conditional class

A conditional class lets you map different sets of data records to different target classes according to specific column values, or the status of a specific plugin.

For example, if a display name contains 'Windows', then 'Windows Server' is selected as the target class. But if the display name contains 'Linux', then 'Linux Server' is selected as the target

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class. For records that do not meet any of these conditions (display name does not contain 'Windows' nor 'Linux'), 'Server' is selected as the target class.

Associated class

An associated class lets you select the CMDB class to be associated with a target non-CMDB table. Setting an associated class is required for IRE processing if the non-CMDB table is not configured for IRE processing. For a non-CMDB table that is supported and configured for IRE processing, setting an associated class is optional. See IRE support for non-CMDB tables for more information.

The software Instance is a non-CMDB class but it does not have IRE rules associated with it. So, things we said about it here pre-Utah are still valid. But for non-CMDB classes with IRE rules it's not mandatory to have an association. For example “If the target class for mapping is a non-CMDB class with a reference to a CMDB class, you must select the CMDB class to associate the non-CMDB target class with” non-CMDB class with IRE rules Instead of “you must” it should be. “You can”. Same with the Example it's not valid for non-CMDB with IRE rules.

If the target class for mapping is a non-CMDB class with a reference to a CMDB class, you must select the CMDB class to associate the non-CMDB target class with. A non-CMDB class refers to a class, such Serial Number [cmdb_serial_number], that does not extend the Configuration Item [cmdb_ci] class. The Related Entry [cmdb_related_entry] class might contain multiple CMDB class associations for the same non-CMDB class. Therefore, select the appropriate association to allow IRE processes to update the target non-CMDB class.

For example, the Related Entry [cmdb_related_entry] class has a record which associates the non-CMDB Software Instance [cmdb_software_instance] class with the CMDB Software Package [cmdb_ci_spkg] class. If you select Software Instance as a target class, you must associate the Software Instance class with the Software Package [cmdb_ci_spkg] class.

Deactivating class mappings

When you edit an ETL transform map, provided by a Service Graph Connector for example, you can delete a class mapping to prevent the class from being populated when the integration runs. However, if you later decide to populate that class, you must readd that class and reconfigure all the class mappings. Instead, you can deactivate a class mapping to temporarily ignore the class during the integration run, while preserving all of its mapping configuration. A class that you choose to deactivate is grayed out in the user interface but you can continue and edit the class mappings. Later, you can reactivate a class mapping to enable populating the class, without needing to reconfigure the class mappings.

Some classes that you choose to deactivate, trigger an automatic deactivation of additional classes that you did not directly choose to deactivate. Which classes are automatically deactivated, depends on the class that you chose to deactivate. For example, whether the class has dependent relationships or associated classes. Those automatically deactivated classes:

- Appear in light gray in the user interface and you can't reactivate them.
- Are automatically reactivated when you reactivate:
  - The class that you initially deactivated which triggered the automatic deactivation
  - Any class that the deactivated class depends on

All classes that you directly deactivate mappings for and the resulting class mappings that are automatically deactivated, are not populated when the integration runs. Also, any relationships and lookup tables associated with those classes, are not populated when the integration runs.

Class mapping and other deactivation scenarios:

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- Deactivate a class which no class depends on and which has no associated classes:

  Triggers an automatic deactivation of any lookup rules and relationships associated with the deactivated class.

- Deactivate a lookup rule, such as serial number, within a class mapping:

  Does not trigger any automatic deactivations.

- Deactivate a CMDB class which is associated with a non-CMDB class:
  - Triggers an automatic deactivation of the associated non-CMDB class.
  - Deactivating the non-CMDB class, does not impact the associated CMDB class.

- Deactivate a class with dependent relationships (Applies only if the dependent relationship exists in IntegrationHub ETL):
  - Triggers an automatic deactivation of any class that has a single dependent relationship with the deactivated class.
  - If a class has multiple dependent relationships, then it is automatically deactivated only when you deactivate all of the dependent on classes.

    For example, a scenario in which the File System class has dependent relationships with both, the Computer and a Server class. If you deactivate the Computer class, the File System class is not automatically deactivated. Only if you also deactivate the Server class, the File System class is automatically deactivated.

- Deactivate a conditional class or a class mapping within a conditional class:
  - Deactivating or activating a conditional class, triggers an automatic deactivation or activation of all conditional class mappings within the conditional class.
  - Deactivating a class mapping within a conditional class: Prevents the deactivated class from getting populated during integration runs. However, the associated 'If', 'Else if', or 'Else' conditions themselves remain in effect within the condition of the conditional class. For example, if you deactivate the following class mapping:

    [If] [operating_system] [contains] [Linux] Then [Class] [is] [Linux Server].

    Then, the Linux Server class is not populated, but the **[If] [operating_system] [contains] [Linux]** condition is in effect.

Map data columns to CMDB classes and attributes

Choose target classes and attributes in the CMDB to map source data columns to. You can map a data column to a specific target class, or add conditions so that the choice of target class depends on specific data values.

Before you begin

Role required: cmdb_inst_admin

About this task

Data columns that you map can be either source data columns which were not transformed, or transformed data columns. For example, to integrate a data column into the Computer and Software Package classes, select those classes as target classes and then map data columns into specific attributes in those classes.

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When you configure mapping for a class, relationship, or a lookup rule, those items are always initially set as activated. For details about the results of deactivating mappings, see Deactivating class mappings.

Note:
Changing a class impacts any mappings that were already configured for the class, sometimes deleting those mappings. Details about the affected mappings and the impact, appear in the Affected mappings dialog box before you proceed with the class change. However, these details appear only when the change is from a CMDB class to another CMDB class or from a non-CMDB class to another non-CMDB class.

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**, and click the **Name** of an integration.
   The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store.
2. In the ETL Transform Map Assistant page, in the Map Data to CMDB and Add Relationships section of the guided setup, select **Select CMDB Classes to Map Source Data**.
   Attributes that are configured as required in the platform, are noted, and you must map a data column to each of those attributes.
3. Click **Add Class** to add a target class to map to, or click **Edit Class** to edit a class.

   a. In the Add Class dialog box, select a CMDB **Class**.

   b. Click **Save**.

   c. **Optional:** Set the **Activate/Deactivate Mapping** toggle switch for a class, to on or off. If the Affected class mappings dialog box appears, review the list of affected classes, and then click **Proceed**.
   When you add a non-CMDB class, it is initially deactivated and the **Activate/Deactivate Mapping** toggle switch is disabled, until you add an associated class that is active.

4. Click **Add Conditional Class** and then in the **Add Conditional Class** dialog box, specify the conditions that must be met for data to be mapped to different target classes.

   a. **Collection** is automatically set to the data branch in the hierarchy which is associated with the lowest-level attribute. You can modify the value to the data branch from which you want to map data from, which must be at a higher level in the same data branch of the hierarchy.

   b. In the **If** drop-down list, select attribute conditions that data values must meet, or enter `plugins` in the search box and specify a plugin condition. You can then specify that the rest of the records, which did not match any conditions, are mapped to yet a different target class. Data records will be mapped to different target classes according to the conditions met.

   When processing nested data, a prefix denotes the first level in the nested hierarchy for attribute items.

   Note:
   When you select a non-CMDB class, it is initially deactivated and the **Activate/Deactivate Mapping** toggle switch is disabled, until you add an associated class that is active.

   c. Click **Save**.

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d. **Optional:** Set the **Activate/Deactivate Mapping** toggle switch for a conditional class, to on or off. If the Affected class mappings dialog box appears, review the list of affected classes, and then click **Proceed**.

e. **Optional:** Click **Edit Class** to edit the settings of a conditional class. In the Edit Conditional Class dialog box, set the **Activate/Deactivate Mapping** toggle switch for a class mapping, to on or off. Click **Save**, and if the Affected class mappings dialog box appears, review the list of affected classes and then click **Proceed**.

- A deactivated class is not populated during integration runs, however, this doesn't affect the associated condition. The 'If', 'Else if', and 'Else' conditions themselves remain in effect within the condition of the conditional class and matching CIs are filtered accordingly.
- The toggle switch of the conditional class reflects the summary of the states of all the conditional class mappings within the conditional class. If at least one of the conditional class mappings is activated, then the toggle switch of the conditional class appears as activated. Otherwise, the toggle switch of the conditional class appears as deactivated.

5. For a non-CMDB class, click **Add Associated Class** to associate the non-CMDB class with a CMDB class and to enable the **Activate/Deactivate Mapping** toggle switch.. Or, click **Edit Associated Class** to edit an already associated class.

a. In the Add Associated Class dialog box, select a CMDB class. The list includes all entries in the Related Entry [cmdb_related_entry] class for the specified non-CMDB table (deactivated classes are not included).

b. Click **Add**.

c. **Optional:** Set the **Activate/Deactivate Mapping** toggle switch for an associated class, to on or off.

> **Note:**
> If an associated class was not added or is deactivated, then the **Activate/Deactivate Mapping** toggle switch is disabled.

6. Click **Set Up Mapping** to configure mapping for a newly added class, or click **Edit Mapping** to edit a mapping.

a. To map, drag data columns from the Data sidebar on the right, to CMDB target attribute on the left side of the mapping page. Or, click the icon to search and select data columns for the mapping.
When mapping nested data:

- Data columns in the Data sidebar appear in a tree format that represents the structure of the nested data. Each attribute is associated with sample data for the attribute.
- Transformed columns are noted by a cyan-shaded dot.
- All mappings to a specific CMDB class must be from the same source branch in the nested data. Only the branch from which you selected the first column to map, is valid for selecting columns in subsequent mappings.

  This restriction applies differently when mapping to attributes in lookup tables. All mappings to attributes in a lookup table also must be from the same source branch.

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However, that source branch can be different than the source branch you used with non-lookup tables.

> **Note:**
> You can work around this restriction by using the Copy transform in the data preparation step, to copy attributes from a parent level to a child level. Prepare the data so that all the attributes that you want to map, are at the same level.

- When you drag a column to map from the Data sidebar, the fields of CMDB target attributes that are valid for the mapping, are highlighted by a green frame. If you attempt to drop a column in an invalid target attribute, the respective field is highlighted by a red frame and an error appears.

b. Click **Add Attribute**. Then, in the Add Attribute dialog box, from the **Attribute** list, select one or more items as target attributes to map data to. You can also scroll down to the **IRE Settings** section of the list and select one of the robust import set transformer properties . Click **Save**.
For information about precedence order between robust import set transformer properties defined at the individual item level and at the IRE payload level, see robust import set transformer properties .

c. Map any lookup rules such as the 'Serial Number Lookup 1' rule.

Lookup rules are in a deactivated state until you map them. Click the filter icon for the lookup rule to edit or add any lookup filters. In the lookup filter dialog box, specify attribute or plugin conditions that must be met for data to be mapped to various target classes. Then click **Save**.

After mapping a field of a lookup rule, you can set the Activate/Deactivate Lookup rule toggle switch for a rule, to on or off.

d. Optional: Click **View Class Details** to view the current class in CI Class Manager.

e. Optional: Click the **Transform Data** tab to navigate to the data preparation page where you can review and further transform data that you want to map.

f. Return to the Select CMDB Classes to Map Source Data page.

7. Click **Mark as Complete**.

Add Relationships

Add relationships that exist among the target CMDB classes, for an integration.

Before you begin

- A class that you want to add in the relationship, must be in an activated state.
- A base relationship or a relationship within a conditional relationship, that you want to edit, must be in an activated state.
- In a conditional relationship that you want to edit, at least one relationship condition must be in an activated state. Otherwise, the **Edit Relationship** button is grayed out.

Role required: cmdb_inst_admin

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About this task

When creating relationships with nested data, you can't create a relationship between sibling objects from the nested data. Using the sample payload for nested data as an example, you can't create a relationship between interfaces and software.

ITOM Visibility, if available, uses enhanced discovery patterns to identify and add CI relationships to the Suggested Relationships table in the base system. When applicable, use the Suggested Relationships table to select relationships that are in compliance with Common Service Data Model (CSDM) standards.

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**, and click the **Name** of an integration.
   The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store.
2. In the ETL Transform Map Assistant page, in the Map Data to CMDB and Add Relationships section of the guided setup, select **Add Relationships**.
3. To add relationships, select **Add Relationship** or **Add Conditional Relationship** if you want to specify attribute conditions that must be met before adding a relationship. Then, complete the following actions as needed.
   The **Relationship Type** list menu changes based on the selected parent and child class:
   - If there is a dependent relationship, the list is disabled and the relationship type is automatically populated.
   - If there is more than one dependent relationship, the list displays both containment and hosting relationship options and the containment relationship type is automatically populated.
   - If there is no dependent relationship, the list displays **Suggested relationships** with the first suggested relationship automatically selected, followed by the base system relationship types.
   - If there is no suggested relationship, the list displays **No suggested relationships** followed by the base system relationship types.
4. Click **Save** to save the current changes or **Mark as Complete**.

   A time stamp appears in the header when you click **Save**, which remains for the duration of the Integration Hub ETL session for the ETL transform map. When you re-enter the session or switch between ETL maps, the time stamp disappears.

Preview mapping results

Preview the results of the sample data integration.

Before you begin

Role required: cmdb_inst_admin

About this task

Run an integration test and view a summary of the results, for the sample data (by default, up to 100 records). The summary includes total numbers for relationships that were created, mapped classes, partial and incomplete payloads that IRE couldn’t process. You can also view detailed messages from Robust Transform Engine (RTE) and from Identification Reconciliation Engine (IRE).

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Note:
Most IntegrationHub ETL log messages (from RTE and IRE) are informational. However, even if the *com.glide.import_set.importlog_level* and the *glide.importlog.log_to_table* system properties are set to not add INFO log messages, IntegrationHub ETL does render INFO log messages. For more details about these properties, see Import sets properties.

After you view the details in the summary page, you can return to any step to make adjustments and then rerun the integration.

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**, and click the **Name** of an integration. The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store.
2. In the ETL Transform Map Assistant page, in the Preview Sample Integration Results and Schedule Import section of the guided setup, select **Test and Rollback Integration Results**.
3. On the Test and Rollback Integration Results page, click **Run Integration**.
4. View the summary page and click the various tabs to see the integration run results for the affected CMDB classes. You can select the preview icon to open CI forms and view information.

   Note:
   The order of the attribute columns follows the default columns list for the class in the platform. First, the default columns for the class appear from left to right, followed by the rest of the attribute columns organized in alphabetical order. For example, to see the default columns list for the Computers class, navigate to **All** > **Configuration** > **Computers**.

5. **Optional:** Select any class tab and click **Edit Mapping** to return to the Select CMDB Classes to Map Source Data page where you can review and change mapping settings.

   Note:
   Clicking **Edit Mapping** rolls back all the changes that were made to the CMDB as a result of this integration run.

6. **Optional:** Click the **Relationships** tab and review any relationships that were created.
7. **Optional:** Click **Edit Relationships** to return to the Add Relationships page where you can review and change any relationship configurations.

   Note:
   Clicking **Edit Relationships** rolls back all the changes that were made to the CMDB as a result of this integration run.

8. Click the **Error Log**, **Activity Log**, or the **Warning Log** tabs to see the respective details logged by IRE and RTE during the integration.

   IRE log records are grouped by categories and further organized by the respective class. For IRE log messages, the Message column contains only the messages themselves which were extracted from the raw log message. The Log Message column contains the complete log message, which includes class and category in addition to the message itself. RTE logs appear under the Other category.

   Use the **Verbose** toggle switch to change the viewing mode for the Message and the Log Message columns:

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- Verbose on: Shows fully expanded text of log messages.
- Verbose off: Shows a condensed version of the log messages. The fully expanded text of the log messages appears when you point to a message.

9. Click the **Incomplete Payloads** and **Partial Payloads** tabs for details about IRE payloads for the integration run.
10. Select **Mark as Complete**.
    The Rollback options dialog box appears and you can choose either of the following options.
    - **Retain Data**: All the changes to the CMDB resulting from this integration, are retained.
    - **Perform Rollback**: All the changes to the CMDB resulting from this integration, are rolled back and the CMDB is restored to its state before running the integration.

Provide integration schedule

Configure a schedule for importing data to CMDB using this ETL Transform Map.

Before you begin

Role required: cmdb_inst_admin

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**, and click the **Name** of an integration.
   The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store.
2. In the ETL Transform Map Assistant page, in the Preview Sample Integration Results and Schedule Import section of the guided setup, select **Set Import Schedule**.
3. On the Provide Schedule page, click **Set Schedules**.
4. In the Scheduled Data Imports list view (which opens in a new tab), click **New**.
5. Fill out the Scheduled Data Import form and then click **Submit**.
   See Schedule a data import for details about the form fields.
6. Click **Mark as Complete**.

Transform types in IntegrationHub ETL

Use various transforms in IntegrationHub ETL to convert and prepare source data for mapping to the CMDB.

Transforms from the Integration Commons for CMDB store app, are also available in IntegrationHub ETL.

Concatenation

Combines the values from input fields into a single string, joining them on the optional *joining_string* field.

Details	
Table	sys_rte_eb_concat_operation
Input fields	*source_sys_rte_eb_fields*
Output field	*target_sys_rte_eb_field*
Additional Fields	*joining_string* (optional)

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Example	
Input	“input_1”, “input_2”, “input_3”
Additional Fields	*joining_string* = ”, ”
Result	“input_1, input_2, input_3”

Convert to Boolean

Converts the incoming value to a boolean. ‘`true`’ and ‘`1`’ values convert to 'true' (case insensitive), and any other values convert to 'false'.

Details	
Table	sys_rte_eb_to_boolean_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*

Examples:

- All of the following inputs return 'true':
  - true
  - 1
- All of the following inputs return 'false':
  - “input_1”
  - “”
  - 0
  - 11

Convert to Date

Attempts to convert the incoming value to a *GlideDateTime* value by applying the *date_format* to the incoming value. Attempts to directly convert using *GlideDateTime* if the *date_format* is incorrect.

Details	
Table	sys_rte_eb_to_date_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field* Returns an empty value if unable to parse at all.
Additional Fields	*date_format* (Java simple date format)

Example	
Input	"2018/09/20 11:21:00 a.m. EST”

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Example	
Additional Fields	*date_format* = “yyyy/MM/dd hh:mm:ss a z”
Result	“2018-09-20 16:21:00”

Example	
Input	"2018/09/20 01:21:00 PM EST”
Additional Fields	*date_format* = “yyyy/MM/dd hh:mm:ss a z”
Result	“2018-09-20 18:21:00”

Example	
Input	"09/20/18”
Additional Fields	*date_format* = “yyyy/MM/dd hh:mm:ss a z”
Result	“0018-09-20 00:00:00”

Convert to Numeric

Converts the incoming value to a number.

Details	
Table	sys_rte_eb_to_numeric_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field* If the incoming value is non-numeric, then the output is empty.

Example	
Input	1.23
Result	1.23

Example	
Input	1.00
Result	1

Example	
Input	input_1
Result	null

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Example	
Input	two
Result	null

Copy

Copies the source field's value to all of the target fields.

Details	
Table	sys_rte_eb_copy_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_fields*
Additional Fields	*overwrite_existing_value* (optional, boolean): If **true**, then the values of target fields are replaced. Otherwise, any non-empty value is not overwritten.

Extract Leading Numeric

Sets the target field to be the first numeric value found in the source field.

Details	
Table	sys_rte_eb_extract_numeric_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*
Additional Fields	• *decimal_places* (optional, number): Forces the output to have a specified number of decimal places. • *remainder_target_field* (optional, reference to a field): Set to the trimmed remainder of the source field, after removing the first numeric value.

Example	
Input	“100 mb”
Result	"100”

Example	
Input	“100.123 mb”
Result	“100.123"

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Example	
Input	“100.123 mb”
Additional Fields	*decimal_places* = 2
Result	“100.12”

Example	
Input	“100 mb”
Additional Fields	*decimal_places* = 2
Result	“100.00”

Example	
Input	“100 mb”
Additional Fields	*remainder_target_field* = <field>
Result	“100” and <field> = “mb”

Glide Lookup

Performs a lookup in the database on the *target_table*.

Details	
Table	sys_rte_eb_glide_lookup_operation
Input fields	*source_sys_rte_eb_fields*
Output field	*target_sys_rte_eb_fields*
Additional Fields	• *target_table* • *glide_matching_fields* (string): Comma-separated list of column names in the target table. For each input field in *source_sys_rte_eb_fields*, there must be an equal number of values in *glide_matching_fields* • *glide_target_fields* (string): Comma-separated list of column names in the target table. For each target field in *target_sys_rte_eb_fields*, there must be an equal number of values in *glide_target_fields*.

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Example	
Input	• Input Field 1: 100 South Charles Street, Baltimore • Input Field 2: MD
Additional Fields	• Target Table: Location (cmn_location) • Glide Matching Fields: street,state • Glide Target Fields: sys_id
Result	Output Field 1: 25ab9c4d0a0a0bb300f7dabdc0ca7c1c

Min/Max

Sets the target field to either the maximum or minimum of the values from all input fields.

Details	
Table	sys_rte_eb_min_max_operation
Input fields	*source_sys_rte_eb_fields*
Output field	*target_sys_rte_eb_field*
Additional Fields	• *data_type* (choice list <STRING,NUMERIC,DATE>) • *min_max* (choice list <MIN,MAX>)

Example	
Input	“2”, “-1”, “0”
Additional Fields	• *data_type* = NUMERIC • *min_max* = MAX
Result	“2”

Example	
Input	“a”, “b”
Additional Fields	• *data_type* = STRING • *min_max* = MAX
Result	“b”

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Example	
Input	"2", "-1", "0"
Additional Fields	• *data_type* = NUMERIC • *min_max* = MIN
Result	"-1"

Example	
Input	"a", "b"
Additional Fields	• *data_type* = STRING • *min_max* = MIN
Result	"a"

Multiple Input Script

Runs a script with multiple inputs, setting the *target_field* == output for that script.

Each source field is available inside of the 'batch' variable as JavScript fields. The name of the JavaScript field is the field attribute of the entity field (looking at *sys_rte_eb_field.field*, not *sys_rte_eb_field.name*).

Details	
Table	sys_rte_eb_multi_in_script_operation
Input fields	*source_sys_rte_eb_fields*
Output field	*target_sys_rte_eb_field*
Additional Fields	• *script* (script) • *use_unique_input_sets* (boolean): When **true**, only unique input values are included in the data batch for IRE processing. Otherwise, all input object's field values are included.

Example for using *use_unique_input_sets*, with a script function that takes *record_type* and *operating_system* as input and returns *record_with_os*:

Input data

Record	record_type	operating_system	record_with_os
1	computer	Windows XP	
2	computer	Linux	
3	computer	Windows XP	

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If *use_unique_inputs_sets* is set to **true**, then the script processes only two values (computer + Windows XP and computer + Linux). If *use_unique_inputs_sets* is set to **false**, then each of the three values is individually processed (computer + Windows XP, computer + Linux, and computer + Windows XP).

Sample script:

```
            (function(batch, output) {
                for (var i = 0; i < batch.length; i++) {
                        // batch[i] is the unique set of
inputs/individual record
                        // batch[i].<field> gives access to the
field value
                        var in0 = gs.nil(batch[i].record_type) ?
'' : batch[i].record_type;
                        var in1 =
gs.nil(batch[i].operating_system) ? '' :
batch[i].operating_system;
                        // output[i] is the output for the
specific combination of inputs/individual record
                        output[i] = in0 + "_" + in1;
                    }
                }
            })(batch, output);
```

Sample script:

```
            /* Example Script
             // In this example the script input fields are
'input_field_1', 'input_field_2' - replace these with the
fields used as script inputs // There is a static field
'input' that has all the input field values concatenated with a
'|' (function(batch, output) {
                 for (var i = 0; i < batch.length; i++) {

                    //step1: access the input variables
                    var a = batch[i].input_field_1; //Value of
the first source field.
                    var b = batch[i].input_field_2; //Value of
the second source field.

                    //step2: Your script/code goes here.
                    var c = a + b;

                    //step3: set the output for each elements
                    output[i] = b;
                 }

             })(batch, output);
            */
```

Rexeg Replace

Replaces each substring of the incoming string that matches the specified *match_regex*, with the specified *replacement_regex* string value.

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Details	
Table	sys_rte_eb_regex_replace_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*
Additional Fields	• *match_regex* (string, regular expression) • *replacement_regex* (string)

Example	
Input	“String&With(Special)$Characters”
Additional Fields	• *match_regex* = “[^0-9a-zA-Z]+” • *replacement_regex* = “ ”
Result	“String With Special Characters”

Replace

Replaces each substring in the incoming string that matches the specified *match_string*, with the *replacement_string* string value.

Details	
Table	sys_rte_eb_replace_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*
Additional Fields	• *match_string* (string) • *replacement_string* (string)

Example	
Input	“Original String”
Additional Fields	• *match_string* = “Original” • *replacement_string* = “Replacement”
Result	“Replacement String”

Round Numeric

Rounds the number value to the nearest whole number. Non-numbers are truncated.

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Details	
Table	sys_rte_eb_round_numeric_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*

Example	
Input	“1.5”
Result	"2"

Example	
Input	“1.4”
Result	"1"

Example	
Input	“i’m a string”
Result	""

Script

Runs a script with input, setting the target_field == output for that script.

This transform has been superseded by the Multi Input Script transform and is included for backwards compatibility with existing configurations.

Details	
Table	sys_rte_eb_script_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*
Additional Fields	• *script* (script) • *use_unique_input_sets* (boolean): When **true**, only unique input values are included in the data batch for IRE processing. Otherwise, all input object’s field values are included. For an example and for more details, see the Multiple Input Script transform.

The source field is included in the ‘batch’ variable as the JavaScript field ‘input’.

```
        (function(batch, output) {
              for (var i = 0; i < batch.length; i++) {
                    // batch[i] is the unique set of
inputs/individual record
                    // batch[i].input gives access to the
field value
```

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```
                        var in0 = gs.nil(batch[i].input) ? '' :
batch[i].input;
                        // output[i] is the output for the
specific combination of inputs/individual record
                        output[i] = in0 + " modified by script";
                    }
                }
            })(batch, output);
```

Example:

```
/* Example Script
 (function(batch, output) {
     for (var i = 0; i < batch.length; i++) {
         //step1: access the input variables
         var a = batch[i].input; //Value of the source field.

         //step2: Your script/code goes here.
         var b = a + 1;
         //step3: set the output for each elements
         output[i] = b;
     }
 })(batch, output);
*/
```

Set

Sets the target field's value to the string specified in *set_value*.

Details	
Table	sys_rte_eb_set_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*
Additional Fields	• *set_value* (string) • *overwrite_existing_value* (optional, boolean): When **true**, the current value of the target field is overwritten. Otherwise, a non-empty value isn't replaced.

Split

Splits the source field's value on the *splitting_string* and assigns each resulting item from the split to the *target_sys_rte_eb_fields*, in order.

Details	
Table	sys_rte_eb_split_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_fields*
Additional Fields	*splitting_string* (string)

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Example	
Input	“value1||value2||value3”, with *target_sys_rte_eb_fields* {target1,target2,target3}
Additional Fields	*splitting_string* = ”||”
Result	target1 : value1, target2 : value2, target3 : value3

Example	
Input	“value1||value2||value3”, with *target_sys_rte_eb_fields* {target1}
Additional Fields	*splitting_string* = ”||”
Result	target1 : value1

Example	
Input	“value1”, with *target_sys_rte_eb_fields* {target1,target2,target3}
Additional Fields	*splitting_string* = ”||”
Result	target1 : value1, target2 : <null>, target3 : <null>

Trim

Trims leading and trailing whitespace from the *source_sys_rte_eb_field* value and assigns the result to the *target_sys_rte_eb_field*. This transform is equivalent to a Java String.trim().

Details	
Table	sys_rte_eb_trim_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*

Example	
Input	“ value 1 ”
Result	“value 1”

Uppercase

Uppercases the *source_sys_rte_eb_field* value and assigns the result to *target_sys_rte_eb_field*.

Details	
Table	sys_rte_eb_upper_case_operation

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Details	
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*

Example	
Input	“value1”
Result	“VALUE1”

Uppercase Trim

Combines both the Uppercase and the Trim transforms.

Details	
Table	sys_rte_eb_upper_case_trim_operation
Input fields	*source_sys_rte_eb_field*
Output field	*target_sys_rte_eb_field*

Example	
Input	“ value1 ”
Result	“VALUE1”

Add before and after scripts to an integration data source

Add custom before and after scripts for a data source of a CMDB integration application. Those scripts provide access to the input and output payloads of IRE. When a CMDB integration invokes Identification and Reconciliation Engine (IRE), those scripts run before and after IRE processes the integration payload.

Before you begin

Role required: cmdb_inst_admin

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**.

   The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store.

2. Click the **CMDB Application** link for the integration that you want to add scripts for.
3. On the CMDB Integration Studio Application form, in the CMDB Integration Studio Application Data Sources related list, open the data source record for the CMDB integration.
4. On the CMDB Integration Studio Application Data Source form, check **Execute Before Script** or **Execute After Script**. Review the **Before Script** and **After Script** comments and enter your custom scripts at the bottom of the script field.
   The comments in the script fields provide details for the before and after scripts. Use those guidelines, explanations such as what operations are supported, and examples when creating your custom script.
5. Click **Update**.

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Related topics

Identification and Reconciliation engine (IRE)

Duplicate an ETL transform map

Use an existing ETL transform map if you need to create a map that is mostly similar to that existing map. Select an existing map, specify a new data source for the new duplicate map, and then change or retain other settings such as data transforms.

Before you begin

The data source for the new duplicated ETL transform map must satisfy these requirements:

- The schema of the data source must be identical to the schema of the original ETL transform map. For example, both data sources must have an identical number of columns and identical column labels.
- The data source must preexist.
- The data source must not be used in any other ETL transform map.

Role required: cmdb_inst_admin

Procedure

1. Navigate to **All** > **Configuration** > **IntegrationHub ETL**.
   The landing page of the IntegrationHub ETL lists all integrations that exist in the system, including integrations that were downloaded from the ServiceNow Store.
2. Click **Duplicate** and then fill out the Duplicate ETL Transform Map form.

Field	Description
Duplicate from	The ETL transform map to duplicate from.
CMDB application	The CMDB application associated with the ETL transform map. You can select **Add new**, which adds the **CMDB Application** and the **Discovery Source** fields for the new CMDB application.
Discovery Source	Discovery source associated with a new CMDB Application. Appears if you set **CMDB Application** to **Add new**.
CMDB Application Name	Name of a new CMDB Application. Appears if you set **CMDB Application** to **Add new**.
Name	Name of the ETL transform map.
Data Source	The source feed, unique for this ETL transform map, where the raw source data is imported from.

3. Click **Create Duplicate**.

Result

Data for the new duplicated ETL transform map is imported, and the **Import Source Data and Provide Basic Details** task, is set as complete.

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What to do next

Continue with the next steps on the guided setup steps to review the imported data and complete the integration using the duplicated ETL transform map.

Getting started with Service Graph Connectors

Service Graph Connectors, including API Service Graph Connectors, are predefined integrations that ingest third-party data and API data into the Configuration Management Database (CMDB) from various domains, such as security, servers, software or monitoring, Internet of Things (IoT), and cloud.

Important:
See Service Graph Connectors and API Service Graph Connectors for a list of connectors provided by ServiceNow.

Request apps on the Store

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

Service Graph Connectors overview

The following video provides an overview of Service Graph Connectors.

Service Graph Connectors

As a purpose-built app, you can use a Service Graph Connector, including an API Service Graph Connector, to maintain the quality and consistency of third-party data in your CMDB.

You can use the following connector types:

Service Graph Connectors

A Service Graph Connector imports and integrates third-party data into CMDB and non-CMDB tables. For a list of Service Graph Connectors, see Service Graph Connectors.

API Service Graph Connectors

An API Service Graph Connector imports and integrates third-party API data into CMDB and non-CMDB tables. For a list of API Service Graph Connectors, see API Service Graph Connectors.

Partner-built connectors

Service Graph Connectors can be built by partners and vendors. For a list of partner-built connectors, see the ServiceNow Store website.

The connectors also make sure that third-party data is mapped to the right locations in your CMDB as specified by the Common Service Data Model (CSDM). The CSDM enables ServiceNow products to use the data and increases reporting accuracy. For more information on CSDM, see Common Service Data Model.

The Service Graph Connectors, including API Service Graph Connectors, manage the configuration data pipeline in the following steps:

1. Ingest the data by identifying class, attribute, and data sources by using the identification rules.
2. Standardize the data to comply with your CMDB.

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3. Reconcile the data into a single coherent picture by using the reconciliation rules.
4. Ingest the data into your CMDB.

You can track the status and processing results of all installed integrations using the SGC Central view within the Service Graph Workspace, CMDB Workspace, or integrations dashboard provided with the Integration Commons for CMDB store app. For more information, see SGC Central, Integration Commons for CMDB, and CMDB Integrations Dashboard.

Service Graph Connector user roles

Service Graph Connector users can be assigned specific roles to limit the assignment of the Administrator (admin) user role. The following roles are available for Service Graph Connector users.

User roles

User role	Description
Administrator	Users with the admin role can install and upgrade Service Graph Connectors, including API Service Graph Connectors. Administrators can perform the following tasks: • Create a connection and configure connection properties. • Monitor connections and data imports. • Manage connections. • Upgrade the connector. • Run background scripts. • Provide access to tables in the global scope.
SGC-admin	The sn_cmdb_int_util.sgc_admin user role has the second-highest level of permissions for Service Graph Connectors. SGC-admin users can perform the following tasks: • Create, update, and delete connections. • Configure connectors using the guided setup. • Read and write the system properties that are used by the connectors. • Perform all operations that are allowed by other user roles that have lower levels of permission.
CMDB installation administrator	Users with the cmdb_inst_admin role can use IntegrationHub ETL to create and customize integrations. CMDB installation administrators can perform the following tasks: • Read all Service Graph Connector application modules. • Read and write the system properties that are used by the connectors. • Create, update, and delete custom tables.

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User roles (continued)

User role	Description
	• Create, update, and delete scheduled imports and data sources. • Read records that are owned by other applications and are related to the functionality of Service Graph Connectors (for instance, records in the em_event table).

Using SGC Central for connectors

The Service Graph Connector Central application also called as SGC Central is available as a view in the Service Graph Workspace or CMDB Workspace. The application enables you to discover and install Service Graph Connectors, including API Service Graph Connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. The SGC Central application also ensures that connectors remain supported and up-to-date with certified partners.

The SGC Central application minimizes customization and accelerates time to value with intuitive setup options and playbook-guided connector deployment. If the playbook experience isn't available for a connector, you can follow the guided setup provided with the connector.

To learn more, see SGC Central.

Using connectors

By using Service Graph Connectors and API Service Graph Connectors, you can mandate data governance and design practices. Examples of mandated practices using connectors include:

- Consistently associating data with specific CI types. For instance, IP addresses are assigned to network interfaces rather than a mix of interfaces and servers. Ensuring that ServiceNow products know where to find third-party data. For more information, see CMDB classifications and class dependency.
- Using the Identification and Reconciliation (IRE) engine to identify and classify data correctly before it's loaded into the CMDB. Helping prevent duplicate CIs and ensuring that attribute values are consistent across multiple data sources.

  For information on the IRE-related rules used in Service Graph Connectors, see the following topics:

  - CMDB Identification and Reconciliation (IRE)
  - Identification rules
  - Reconciliation rules
  - Create an IRE data source rule
  - Detecting duplicate CIs
  - Create a data refresh rule
  - Create an identification inclusion rule
- Using the IntegrationHub ETL functionality so that data is transformed and loaded in the fastest and most efficient manner. For more information, see IntegrationHub ETL.

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Resolving connector issues

You can use the Now Assist for Configuration Management Database (CMDB) application to resolve any issues or perform a general analysis on a connector installed on your instance. See Fix SGC import set issues with the Now Assist SGC diagnosis skill.

Service Graph Connectors

You can use a Service Graph Connector to import and integrate third-party data into CMDB and non-CMDB tables.

Important:
Visit the ServiceNow Store website to view the latest list of all Service Graph Connectors.

To learn more, see Getting started with Service Graph Connectors.

Select an application to learn about the Service Graph Connector available for ingesting data from the application into your CMDB.

Public cloud providers

AWS	GCP	Microsoft Azure
Wiz		

Endpoint or IT asset management applications

Google Console	Jamf	Microsoft Intune

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Microsoft SCCM	Tanium	VMware Workspace ONE UEM

Monitoring and observability applications

AppDynamics	Datadog	Dynatrace
OpenTelemetry	New Relic	SolarWinds

Security solutions

Microsoft Defender for Endpoint	Microsoft Active Directory	Netskope
Qualys	Rapid7	Splunk
Akamai API Security		

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Software, server, or network applications

Infoblox	Trellix

Operational Technology (OT) applications

Claroty CTD	Microsoft Defender for IoT (On-premises Management Console)	Microsoft Defender for IoT (Azure)

Operational Technology (Excel import)

Service Graph Connector for Active Directory

The Service Graph Connector for Active Directory retrieves computer and software information from the Microsoft Active Directory (AD) product and imports it into the Configuration Management Database (CMDB) in your instance using Lightweight Directory Access Protocol (LDAP).

Request apps on the Store

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

Supported versions

- Microsoft Active Directory version: Last tested on
- Supported ServiceNow® versions:
  - Utah
  - Vancouver
  - Washington

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Use cases

Import computer and software details about your assets from the Microsoft Active Directory product into your CMDB.

Guided setup

The guided setup for the Service Graph Connector for Active Directory provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, Configure Service Graph Connector for Active Directory.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Microsoft Active Directory integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Service Graph Connector for Active Directory data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

After you complete the guided setup, you configure the integration to periodically pull data from the Active Directory. The data is loaded into the following tables.

You can use the Integration Hub ETL application to view the data maps.

Data sources and staging tables for Active Directory

Data source	Staging table
SGC Active Directory Import	SGC Active Directory Import [sn_sec_sgc_ad_active_directory_import]
Computer	Computer [cmdb_ci_computer]
Software	Software [cmdb_ci_spkg], [cmdb_software_instance], [cmdb_sam_sw_install]
SGC Active Directory Computer	SGC Active Directory Computer [sn_sec_sgc_ad_active_directory_computer]

Configure Service Graph Connector for Active Directory

Configure your Lightweight Directory Access Protocol (LDAP) connections and verify them, set up scheduled imports, and optionally add multiple instances with the Guided Setup.

Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM

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Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This app must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

After you have followed the instructions provided to you to download and activate the Service Graph Connector for Active Directory application, refer to Download an application from the ServiceNow Store for the first time and Install a Security Operations integration. There are a few steps you need to complete before you configure this integration.

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Active Directory** > **Setup**.
2. On the Welcome to Guided Setup Home page, select **Continue**.
3. On the Experience page, select **Best Experience** followed by **Continue**.
   The Service Graph Connector for Active Directory (AD) page is displayed with the following tasks:
   - Configure LDAP Server
   - Add Multiple Instances
   - Set up scheduled import jobs
4. Select **Configure LDAP Server** to expand it.
   The following steps are displayed in the left navigation panel:
   - Configure Inactive threshold
   - Update LDAP OU definition
   - Configure LDAP Server Details
   - Test LDAP Server Connection

   A single LDAP server is supplied along with the application. This server includes a computer organizational (OU) unit that retrieves a computer's object information from the computers OU.
5. **Optional:** Select **Configure Inactive threshold** to open the record.
   The System Property sn_sec_sgc_ad.inactive_threshold form is displayed.
6. Select the **here** link in the message at the top of the form to edit the record.
7. **Optional:** Alternatively, you can select the **Globe** icon in the upper right of the screen and select **Service Graph Connector for Active Directory** from the list to change the application scope so you can edit the form.

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As you progress through the Guided Setup, follow any instructions you see at the top of the pages in for modifying the application scope so you can open, edit, and save the record.

8. Enter a threshold in the **Value** field.
   The default value is 90 days. Before you modify this value, refer to the information about the threshold setting at the top of the page. With this setting, assets that match the day threshold value are excluded from import.
9. Right-click in the gray header titled System Property sn_sec_sgc_ad.inactive_threshold of the record and select **Save**.
10. Select **Mark as complete** followed by **Continue**.
    The LDAP OU Definition Access record is displayed.
11. Update LDAP OU Definition Access.

    a. Follow the steps listed at the top of the page and on the LDAP OU Definition record to verify or switch the application scope to 'Global' with the application picker.

    b. Select the **LDAP OU Definition** record on the table to open it.

    c. On the record, if not selected, select the **Application Access** tab.

    d. If displayed, select the link to edit the record followed by the check boxes for the permission settings you want.

    e. Right-click in the gray header of the Table LDAP OU Definition record and select **Save**.

    f. Select **Mark as complete** followed by **Continue**.
    The Configure LDAP Server Details page is displayed.

12. Provide the details for LDAP server connection.

    a. Verify values or fill in the fields.

Field	Value
Name	Read-only: Unique name for the LDAP server for example SGC-AD-computer.
Application	Read-only: Service Graph Connector for Active Directory (AD).
Active	Check box selected.
Login distinguished name	Login name for the AD server.
Login password	Password for the AD server.
Starting search directory	Directory you want to search for example `DC=Ops`.
(Optional) MID Server	Dedicated MID Server for the connection, if available.

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Field	Value
	Note: A MID Server is required for on-premise connections if the instance is not publicly accessible.
LDAP Server URLs	Add the URL for the server for example `ladp://host-name:389/`.

b. Right-click in the gray header titled LDAP Server and select **Save**.

c. Select **Mark as complete** followed by **Continue**.
The Test LDAP Server Connection page is displayed.

13. Test the LDAP Server Connection.

a. Scroll to the Related links section on the form and select the **Test Connection** link
If the connection is successful, a Connected Successfully message is displayed. If your connection test fails, a message is displayed with information about why the connection failed. Review the Message field for how to proceed.

b. If you edit the record to fix the connection, right-click in the gray header titled LDAP Server and select **Save**.

c. Select **Mark as complete** followed by **Continue**.
Add Multiple Instances is displayed in the top header the tasks.

Adding Multiple instances is optional. If you don't want to add multiple instances, you can proceed to step 14 and the Set scheduled import jobs task.

14. Optional: Add multiple instances.
To add multiple instances, you must update data source access. You must edit the permissions on the Datasource [sys_data_source] table to create a data source for the new connection in the Service Graph Connector for Active Directory.

15. Select **Add Multiple Instances** from the top header drop down list.
The following tasks are displayed:

- Update Data Source Access
- Update Scheduled Data Import Access
- Add Another LDAP Server
- List of configured LDAP servers

16. Select **Update Data Source Access**.

a. Follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.

b. Select the Data Import record from the list to open it.

c. With the **Application Access** tab selected, follow the instructions to edit the record and modify the check boxes.

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d. Right-click in the gray header titled Table Data Source and select **Save**.

e. Select **Mark as complete** followed by **Continue**.
The Update scheduled data import access page is displayed.

17. Update scheduled data import access.

a. Select the **Scheduled Data Import** record from the list to open it.

b. **Optional:** With the **Application Access** tab selected, follow the instructions to edit the record and modify the check boxes.

c. Right-click in the gray header titled Table Scheduled Data Import and select **Save**.

d. Select **Mark as complete** followed by **Continue**.
The Add Another LDAP Server page is displayed. There are two steps for this task:

- LDAP server configuration
- Basic LDAP server information

18. Provide LDAP server configuration information.

a. Fill out the fields.

Field	Value
Type of LDAP server	Active Directory
Server name	Unique name of the LDAP server.
Server URL	URL for example `ldap://host-name:389/`.
Start search directory	Directory you want to search for example `DC=SecOps`.

b. Select **Submit**.
After you submit these edits, complete the second configuration step.

c. Fill in the fields for the basic LDAP server information.

Field	Value
Application	Read-only Service Graph Connector for Active Directory.
Active	Check box selected.
Login distinguished name	Login name for the AD server.
Login password	Password for the AD server.
Starting search directory	Directory you want to search for example `DC=SecOps`.
MID Server	Dedicated MID Server for the connection.

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Field	Value
	Note: A MID Server is not required for the LDAP server.

d. Right-click in the gray header titled LDAP Server and select **Save**.

e. Select **Mark as complete** followed by **Continue**.
The List of configured LADP server page is displayed.

f. Select your new record from the list to open it and test the connection.

g. Optional: Edit information on the form.

h. When you are satisfied with the information, scroll to the Related links and select the **Test Connection** link.
If the connection is successful, a message is displayed. If your connection test fails, review the Message and Suggestion fields for how to proceed.

i. After a successful connection, right-click in the gray header titled LDAP Server and select **Save**.

j. Select **Mark as complete** followed by **Continue**.

19. To set up scheduled jobs, select **Set up scheduled import jobs** from the drop down list in the top header.
You must activate a scheduled job from the configuration page.

a. On the Configure the scheduled jobs page, select a record from the Scheduled Data Imports list to open it.

b. Select the **Active** check box and fill in the fields.

Field	Value
Name	Unique name for the LDAP server, SGC-AD-computer.
Application	Read-only Service Graph Connector for Active Directory (AD).
Run	How often you want the job to run. If you want to run a test import prior to scheduling it, you might prefer to set this to **Once**.
Run as	Run the scheduled job with the credentials of another specified user.
Time	When you want the job to run.
Active	Select the check box.

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Field	Value
Conditional	Specific conditions under which this job is run.
Use connection	Leave this deactivated for the first run. Specifies another connection and credentials for this job.
Concurrent import	Leave activated. Splits data into multiple imports sets. See the message for more information.
Partition Method	Leave as Custom size.
Partition size	15,000. Import set size for early scheduling.
Execute pre-import script	Leave activated. Specifies a script to run before the import is performed.
Execute post-import script	Leave activated. Specifies a script to run after the import is performed.

c. **Optional:** Select **Execute now** to run the job.
If you do not choose to run the job on-demand, the next job runs according to the schedule you set.

d. Right-click in the gray Scheduled Data Imports header and select **Save**.

e. Select **Mark as complete** followed by **Continue**.

20. On the Home page for Guided Setup, select **Complete** to finish the configuration.

CMDB classes targeted in Service Graph Connector for Active Directory

When you complete setting up the connection, you can configure the integration to periodically pull data. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data.

Attribute label	Attribute name
Name	name
Category	category
Object ID	object_id
Fully qualified domain name	fqdn
Checked out	check_out
Check in	check_in
First discovered	first_discovered
Operating System	os

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Attribute label	Attribute name
OS Version	os_version

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data.

Attribute label	Attribute name
Name	name
Key	key
Version	version

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data.

Attribute label	Attribute name
Name	name
Install On	installed_on
Product Name	software

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data.

Attribute label	Attribute name
Display Name	display_name
Version	version
Discovery source	discovery_source

SGC Active Directory Computer [sn_sec_sgc_ad_active_directory_computer]

The following attributes in the SGC Active Directory Computer [sn_sec_sgc_ad_active_directory_computer] table are populated by collected data.

Attribute label	Attribute name
Account expires	account_expires
Bad password count	bad_pwd_count
Bad password time	bad_password_time
Code page	code_page
Common name	cn

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Attribute label	Attribute name
Country code	country_code
Description	description
Display name	display_name
Distinguished name	distinguished_name
DN	dn
Dscorepropagation data	dscore_propagation_data
Instance type	instance_type
Iscritical system object	iscritical_system_object
Keywords	keywords
Last logon	last_logon
Local policy flags	local_policy_flags
Logon count	logon_count
Member of	member_of
Ms-DS-Host service account	msds_host_service_account
Ms-DS-Supported encryption types	msds_support_ncryptiontypes
Name	name
Object class	object_class
Object GUID	object_guid
Other well known objects	other_well_known_objects
Password last set	pwd_last_set
Primary group id	primary_groupid
SamAccount name	sam_account_name
SamAccount type	sam_account_type
Service binding information	service_binding_information
Service class name	service_class_name
Service DNS name	service_dns_name
Service DNS name type	service_dns_name_type
Service principal name	service_principal_name
Show in advanced view only	show_in_advanced_view_only
Source	source
User account control	user_account_control
USN changed	usn_changed
USN created	usn_created
When changed	when_changed

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Service Graph Connector for Akamai API Security

Use the Service Graph Connector for Akamai API Security to integrate the APIs discovered by Akamai into your ServiceNow instance to support various API management use cases.

Request apps on the Store

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

Supported versions

- Supported ServiceNow versions:
  - Xanadu
  - Yokohama
  - Zurich
- Supported Akamai API Security REST APIs:
  - /api/v3/apis
  - /api/v3/sources
  - /auth/token

Use cases

The Service Graph Connector for Akamai API Security brings data into the new API Insights capability of the ServiceNow platform, enabling the management of different APIs in one instance. The connector adds information discovered by Akamai API Security to the API Component CI class.

The Service Graph Connector for Akamai API Security populates attributes that are security- and risk-related, such as the request and response data types, whether an API endpoint is internet-facing, and the type of authentication used for the endpoint. These data points enable risk and security use cases to be implemented for API security.

Configuring a connection for the connector

Use the SGC Central view in the Service Graph Workspace or CMDB Workspace to install the connector and configure the connection. The view enables you to install and discover connectors and to manage the full life cycle of creating, editing, monitoring, and debugging connections. For instructions, see Configure Service Graph Connector for Akamai API Security using SGC Central.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Akamai API Security integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Akamai API Security data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

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The following table lists the data sources, the staging tables, and the target tables as CMDB CI and non-CMDB classes for Akamai API Security.

Data mapping for Akamai API Security

Data source	Staging table	Target tables
Sources	sn_akamai_api_sec_akamai_sources	Akamai API Security Sources [sn_akamai_source]
API Component	sn_akamai_api_sec_sga_akamai_api_component	API Component [cmdb_ci_api_component] Key Value [cmdb_key_value]

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Scheduled script for full data load

The Service Graph Connector for Akamai API Security supports both full load and delta load data ingestion methods. A full data load retrieves all API-related data and populates the corresponding CMDB tables. Delta loads fetch only the data that changed since the previous execution.

During the initial scheduled data import, a full data load is executed. Subsequent data imports perform delta loads.

To run a full data load on a recurring basis, customize the execution schedule of the *`Reset Last Run Datetime for SG-Akamai`* scheduled script based on your requirements. To open the Scheduled Script Executions table, enter `sysauto_script.list` in the navigation filter.

Additional resource

Management API Reference

Related topics

- Service Graph Connectors
- Configure Service Graph Connector for Akamai API Security using SGC Central
- CMDB classes targeted in Service Graph Connector for Akamai API Security

Configure Service Graph Connector for Akamai API Security using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Akamai API Security for pulling in Akamai API Security data into the CMDB.

Before you begin

- Install Service Graph Connector for Akamai API Security version 1.0.0 from the ServiceNow Store.

  For ServiceNow Store installation steps, see Install a ServiceNow Store application.

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- Create a service account on the Akamai platform and generate client credentials to enable data retrieval using the Service Graph Connector for Akamai API Security.

  The Akamai API Security platform supports client credentials-based authentication. Client credentials are required to authenticate and securely access API data.

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the Akamai connector type, and then select **Create connection**.
4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

5. Complete the setup for configuring the connector for importing data.

   a. Create and test a connection.

      i. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

      ii. On the form, fill in the fields.

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Create and test connection form

Field	
Akamai Connection Name	Name to identify the Akamai connection record. For example, `Akamai`.
Connection URL	URL of the connection.
OAuth Client ID	Application (client) ID of your Akamai client application.
OAuth Client Secret	Client secret of your Akamai client application.
OAuth Token URL	Token URL of your Akamai client application.

iii. Select **Create and test connection**.

iv. After the connection test is complete, select **Continue**.

b. Set the configuration properties to import tags and to configure source-based filtering.

i. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

ii. (Optional) In the **Data retrieval configuration** section, specify the **Source name** or **Source alias** as a comma-separated list to fetch API Component data from specific sources or gateways, respectively.

> **Note:**
> When a value is specified or updated in the **Source name** or **Source alias** field, the last_run_datetime field for SG-Akamai data sources is reset. This triggers full data ingestion during the next scheduled import. Subsequent runs perform delta loads based on the configured filters.

iii. In the **Tags settings** section, select the **Import tags** check box to import tags for the records.

iv. In the **Tags value separator** field, specify `=` as the key-value pair separator.

v. Select **Continue**.

c. Configure the import schedule to import data at regular intervals.

i. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

ii. Expand the Parent scheduled data import within the Import schedules list, and select the Sources import schedule.

iii. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

iv. Select **Save**.

Alternatively, select **Execute Now** to execute the import schedule immediately.

v. Select **Continue**.

d. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to verify whether the connection was created.

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What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for Akamai API Security

CMDB classes targeted in Service Graph Connector for Akamai API Security

CMDB classes targeted in Service Graph Connector for Akamai API Security

When you complete setting up the connection, you can configure the integration to periodically pull data from Akamai API Security. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

API Component [cmdb_ci_api_component]

The following attributes in the API Component [cmdb_ci_api_component] table are populated by collected data:

Attribute label	Attribute name
Host	host
Method	method
Path	path
URL	url
Attributes	attributes
Authorization	authorization
Correlation ID	correlation_id
Internet Facing	internet_facing
Name	name
Operational status	operational_status
Product instance identifier	product_instance_id
Request Data Types	request_data_types
Response Data Types	response_data_types

Relationship created for API Component

Parent class	Relationship type	Child class
API Component [cmdb_ci_api_component]	Reference	Key Value [cmdb_key_value]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

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Attribute label	Attribute name
Key	key
Value	value
Configuration item	configuration_item

Related topics

Service Graph Connector for Akamai API Security

Accessing the connection details of Service Graph Connector for Akamai API Security

You can access the connection details of the Service Graph Connector for Akamai API Security in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Akamai API Security. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of an Akamai API Security connection

Access the details of an Akamai API Security connection configured for the Service Graph Connector for Akamai API Security.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Akamai API Security** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Related topics

Service Graph Connector for Akamai API Security

Service Graph Connector for Akamai API Security properties

Service Graph Connector for Akamai API Security properties control the behavior of the connector.

Connection properties

These connection properties are available for the Service Graph Connector for Akamai API Security.

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Note:
To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **Akamai API Security** > **Connections**, and select the connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

Connection properties for Service Graph Connector for Akamai API Security

Property	Description
Import tags	Set the property to `true` to import API tags. • Type: true | false • Default value: `false`
Tags storage type	Specify whether the tag values should be stored in the Key Value [cmdb_key_value] table or in the *`Attributes`* field of the API Component [cmdb_ci_api_component] table. • Type: cmdb_key_value | attributes • Default value: `cmdb_key_value`
Tags value separator	Specify the delimiter to parse tag strings into key-value pairs. • Type: custom • Default value: null

Service Graph Connector for AWS

Use the Service Graph Connector for AWS to securely bring in Amazon Web Services (AWS) data into your ServiceNow instance.

Request apps on the Store

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

The integration uses AWS native technologies and AWS security best practices to enable cloud teams to connect the data within their ServiceNow workflow. For more information about the Service Graph Connector for AWS, see the Service Graph Connector for AWS - Introduction article on the ServiceNow Community site.

Supported ServiceNow versions

- Yokohama
- Zurich
- Australia

Use cases

The following are examples on how you can use the Service Graph Connector for different ServiceNow applications:

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- Visibility into cloud resources, relationships, and state.
- Deep discovery of applications for ITAM or SAM outcomes.
- Governance and compliance outcome.

Important information for upgrading Service Graph Connector for AWS

Before you begin the upgrade process, complete the following tasks:

- If there are any customizations, delete the records associated with the Service Graph Connector for AWS from the Customer Updates [sys_update_xml] table. See Customer Updates table.
- Upgrade any dependencies.

After you've installed the latest version of the Service Graph Connector for AWS:

- Perform a full import of data from your AWS instance. Verify that the **Use last run datetime** field value is cleared for all the AWS data sources in the Data Source [sys_data_source] table.
- Download and rerun the AWS scripts. See Configure the AWS environment.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the Service Graph Workspace or CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for AWS using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring AWS integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

BYOL support

Bringing your own licenses (BYOL) is the process of bringing previously purchased on-premises licenses to Amazon AWS Cloud. The connector supports the BYOL of the Image CIs for Oracle Database servers on Amazon AWS Cloud by populating the Key Value [cmdb_key_value] table with the licensing information. When the licensing information is found, the key is set to `Windows_OS_License_Type_automatic` and the key value is set to `BYOL` in the Key Value [cmdb_key_value] table.

To support BYOL, the *`sn_aws_integ.load_all_images`* system property is enabled during the initial pull to import the metadata of all Image CIs included in the SG-AWS-Image-Id data source. After the initial pull, the property is deactivated automatically. The SG-AWS-Image-Id data source then imports the metadata of the Image CIs without names only.

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Event-based discovery

The Service Graph Connector for AWS works with event-based discovery. Events that are pulled from AWS can create and update CIs that were brought by the Service Graph Connector for AWS.

Managing retired CIs in EKS components

If the Amazon Elastic Kubernetes Services (EKS) CIs are deleted in EKS components such as pods, services, and volumes, the corresponding CI entries are automatically set to **Retired** in the following CMDB CI classes:

Kubernetes Cluster, Kubernetes Node, Kubernetes Pod, Kubernetes Service, Kubernetes DaemonSet Kubernetes Namespace, Kubernetes Deployment, Docker Container, Kubernetes Volume

Shared VPC and subnets support

Import CI relationships established between virtual private clouds (VPCs), subnets, and network interfaces hosted in different AWS accounts. For example, a VPC in one AWS account can be connected to a subnet in the same account, which can then link to a network interface and a virtual machine in another AWS account.

Additional resources

See the following articles on the ServiceNow Community site for any additional information on the AWS set up:

- Service Graph Connector for AWS - Introduction
- How do I configure the AWS Service Graph Connector?
- Service Graph Connector for AWS - Diagnostic Tool & Troubleshooting Issues
- Service Graph Connector for AWS - Functional Spec and CI
- Cloud Discovery and SG-AWS

Related content

Service Graph Connectors

Data mapping for Service Graph Connector for AWS

CMDB classes targeted in Service Graph Connector for AWS

Enable optimized deletion of retired CIs in AWS

Enable optimized SG-AWS-SendCommand data source performance

Handling import failures for large AWS resources

Handling memory utilization errors for Service Graph Connector for AWS

Life cycle management of records in Service Graph Connector for AWS

Record removal process in Service Graph Connector for AWS

Service Graph Connector for AWS properties

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Configure the AWS environment for the Service Graph Connector for AWS

Configure your Amazon Web Services (AWS) environment to import data using the Service Graph Connector for AWS.

Before you begin

Install the Service Graph Connector for AWS application (sn_aws_integ). For more information, see Install a ServiceNow Store application.

Role required: application administrator

Procedure

1. Learn about the AWS resources used by the connector.
   Get familiar with the AWS concepts to learn how the Service Graph Connector for AWS is integrated with AWS.
2. Download the AWS scripts.
   Download the AWS scripts included within the guided setup of the Service Graph Connector for AWS.
3. Review the requirements before executing the AWS scripts.
   Complete the prerequisites before you execute the AWS scripts.
4. Execute the AWS scripts.
   Execute scripts provided with the Service Graph Connector for AWS to set up the AWS environment for importing data.

AWS resources used by the Service Graph Connector for AWS

Get familiar with the AWS concepts to learn how the Service Graph Connector for AWS is integrated with Amazon Web Services (AWS).

AWS Config service and configuration recorder

Important:
The AWS Config service and AWS configuration recorder are required for setting up the connector.

The AWS Config service monitors and records changes to your AWS resource configurations.

The AWS configuration recorder detects changes in resource configurations and captures these changes as configuration items (CIs). The is required for setting up the connector. The configuration recorder enables recording all hardware data in AWS Config. See What Is AWS Config? on the AWS Documentation site.

The Service Graph Connector for AWS includes the *`EnableAWSConfig.yml`* script to enable the AWS Config service that instead enables the configuration recorder. See Executing scripts required for setting up AWS.

Note:
Ensure that the AWS Config service is enabled for all applicable AWS accounts and regions.

AWS Config aggregator

Important:
The AWS Config aggregator is optional for setting up the connector.

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The AWS Config aggregator collects the AWS Config configuration and compliance data from the following sources:

- Multiple accounts and multiple regions
- Single account and multiple regions
- An organization in AWS organizations and all the accounts within the organization that have AWS Config enabled.

The advantages of using an AWS Config aggregator with the Service Graph Connector for AWS are:

- Gets all the data from a single location.
- Gets the bootstrap updates (baseline configurations) and the incremental updates (new configurations added after the last update).
- Doesn't require looping into each account and region.
- Accelerates pulling data.

Due to these advantages, consider leveraging the AWS Config aggregator for pulling data from multiple accounts or multiple regions.

Note:
For detecting any deleted resources, the connector uses the `config:ListDiscoveredResources` API to loop through each AWS account and region and update the CMDB CI accordingly. As a date range for selecting resources can't be specified in the `ListDiscoveredResources` API, the connector might make multiple API calls to gather all the data that might impact the performance of the connector.

For more information on setting up an AWS Config aggregator, see Multi-Account Multi-Region Data Aggregation and Setting Up an Aggregator Using the Console on the AWS Documentation site.

AWS Systems Manager and AWS Systems Manager Inventory

Important:
AWS Systems Managerand AWS Systems Manager Inventory are required for setting up the deep discovery feature.

The AWS Systems Manager enables fetching server data, also called as deep discovery data, from EC2 instances across AWS accounts and regions through SSM documents. The deep discovery data includes host name, serial number, CPU data, TCP data, and process information.

The AWS Systems Manager Inventory imports the software data installed on the EC2 instances. The Inventory resource group in AWS Systems Manager collects information about the EC2 instances and the software applications installed on them.

Ensure that the following items are configured in all AWS accounts:

- The AWS Systems Manager Agent (SSM Agent) is installed on all managed EC2 instances.
- The AmazonSSMForInstancesRole IAM instance profile role is attached as the instance profile on EC2 instances.
- The AWS Systems Manager Inventory is configured in each AWS region.

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- The AWS Systems Manager has access to the managed EC2 instances.

> **Note:**
> By default, AWS Systems Manager doesn't have permission to perform actions on EC2 instances. You can grant access by attaching the AmazonSSMForInstancesRole IAM instance profile role to the EC2 instance. See Setting up AWS Systems Manager on the AWS Documentation site.

The advantages of using AWS Systems Manager and AWS Systems Manager Inventory are:

- The AWS Systems Manager enables getting the detailed server data such as host name, serial number, CPU data, TCP data, and process information.
- The AWS Systems Manager Inventory enables the server classification and getting the software data.

Download the AWS scripts

Download the AWS scripts included within the guided setup of the Service Graph Connector for AWS.

Before you begin

- Ensure that you have installed the Service Graph Connector for AWS application (sn_aws_integ). For more information, see Install a ServiceNow Store application.
- Ensure that you've selected the **Service Graph Connector for AWS** application scope by using the application picker. See Application picker.

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connector for AWS** > **Setup**.
2. On the Getting started page, select **Get Started**.
3. In the Configure the AWS environment section of the Service Graph Connector for AWS page, select **Get Started**.
4. For the Download the scripts task, select **Configure**.
5. When you download all the scripts onto your local machine, select **Close** to close the Download the scripts dialog box and return to the guided setup.
6. Set the Download the scripts task to complete by selecting **Mark as Complete**.

Prerequisites for executing scripts

Complete the prerequisites before you execute the AWS scripts.

> **Important:**
> Ensure that you have downloaded the scripts available within the Service Graph Connector for AWS. See Download the AWS scripts.

Decide the following details to be used later during the execution of the AWS scripts:

- ServiceNow IAM role
- ServiceNow IAM username

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- S3 bucket for the ServiceNow IAM role

Note:
Define an S3 bucket only when you are using deep discovery scripts.

Determine the ServiceNow IAM role

Determine the identity and access management (IAM) role that performs read-only operations in member accounts to fetch the configuration items (CIs) from the AWS environment.

By default, the `CreateSnowOrganizationAccountAccessRoleInMemberAccount.yml` script creates the SnowOrganizationAccountAccessRole IAM role. You can use the default name created by the script or create a new IAM role. However, when required as an input parameter, you must enter the same IAM role across scripts. See Executing scripts required for setting up AWS.

Determine the ServiceNow IAM username

Determine the name of the IAM user that assumes the ServiceNow IAM role in the member accounts.

By default, the `CreateServiceNowUser.yml` script creates the NOWSGCUser IAM user. You can use the default name created by the script or create a new IAM user. However, when required as an input parameter, you must enter the same IAM username across scripts. See Executing scripts required for setting up AWS.

Define the S3 bucket for deep discovery

Set up an S3 bucket with read and delete privileges for the ServiceNow IAM role to store and delete the `SendCommand` API responses when importing AWS data.

Before you begin
Role required: Application administrator

About this task
Create an S3 bucket for the Service Graph Connector for AWS application and enable the ServiceNow IAM role to have access to this bucket in the organization.

Note:
Use an S3 bucket only when you want to perform deep discovery on EC2 instances.

Procedure

1. Create an S3 bucket in an AWS account region.
   See Creating a bucket on the AWS documentation site.

Note:
The S3 bucket must have the following permission settings.

S3 bucket permissions and their settings

Permission	Setting
Access	Bucket and objects not public
S3 Block Public Access	Block public access to S3 buckets and objects

For more information, see S3 Block Public Access on the AWS documentation site.

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2. Add a bucket policy.

   See Bucket policies on the AWS documentation site.

   To access the S3 bucket you created in step 1, its bucket policy must allow the IAM instance profile role attached to the managed EC2 instances. You can either create a bucket policy or grant access to your AWS member account in the bucket access control list (ACL). The member account must include the EC2 instances.

   Note:
   Adding an AWS member account to the bucket ACL allows all users and roles in the member account to access the S3 bucket.

   Refer to the following sample code when adding a bucket policy.

```
{
    "Version": "2012-10-17",
    "Id": "S3PolicyforServiceNowIAMrole",
    "Statement": [
        {
            "Sid": "EC2S3Access",
            "Effect": "Allow",
            "Principal": {
                "AWS":
 "arn:aws:iam::AWS-ACCOUNT:role/INSTANCE-PROFILE-ROLE-NAME"
            },
            "Action": [
                "s3:GetObject",
                "s3:PutObject",
                "s3:PutObjectAcl"
            ],
            "Resource": "arn:aws:s3:::DOC-EXAMPLE-BUCKET/*"
        }
    ]
}
```

   Where

   - *SOURCE-AWS-ACCOUNT* is the AWS account ID of the member account that includes the EC2 instances.
   - *INSTANCE-PROFILE-ROLE-NAME* is the IAM instance profile that is attached to the EC2 instances.

     By default, the *AmazonSSMForInstancesRoleSetup.yml* script creates the AmazonSSMForInstancesRole IAM instance profile role and attaches the role to the AmazonSSMManagedInstanceCore bucket policy. See Executing scripts required for setting up AWS.

   - *DOC-EXAMPLE-BUCKET* is the S3 bucket name.

   The following example bucket policy shows the effect, principal, action, and resource elements. The policy allows AmazonSSMRoleForInstances, an IAM instance profile role in an account with ID `123456789000`, `s3:GetObject`, `s3:PutObject`, and `s3:PutObjectAcl` S3 permissions on the `myS3Bucket` bucket.

```
{
    "Version": "2012-10-17",
    "Id": "S3PolicyforServiceNowIAMrole",
```

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```
    "Statement": [
        {
            "Sid": "EC2S3Access",
            "Effect": "Allow",
            "Principal": {
                "AWS": [

 "arn:aws:iam::123456789000:role/AmazonSSMRoleForInstances",

 "arn:aws:iam::123456789001:role/AmazonSSMRoleForInstances",

 "arn:aws:iam::123456789002:role/AmazonSSMRoleForInstances",

 "arn:aws:iam::123456789003:role/AmazonSSMRoleForInstances",

 "arn:aws:iam::123456789004:role/AmazonSSMRoleForInstances"
                ]
            },
            "Action": [
                "s3:GetObject",
                "s3:PutObject",
                "s3:PutObjectAcl"
            ],
            "Resource": "arn:aws:s3:::myS3Bucket/*"
        }
    ]
}
```

3. Attach IAM permissions to the instance profile role for EC2 instances to publish the *SendCommand* API responses to the S3 bucket you created in step 1.
See Using instance profiles and Attach an IAM role to an instance on the AWS documentation site.

   The IAM instance profile role attached to the managed EC2 instances must have the `s3:GetObject`, `s3:PutObject`, and `s3:PutObjectAcl` S3 permissions to allow access to the S3 bucket as shown in the following sample policy.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
        "Sid": "PublishTerminalOutputToS3",
            "Effect": "Allow",
            "Action": [
                "s3:PutObject",
                "s3:GetObject",
                "s3:PutObjectAcl"
            ],
            "Resource": "arn:aws:s3:::DOC-EXAMPLE-BUCKET/*"
        }
    ]
}
```

   Where, *DOC-EXAMPLE-BUCKET* is the S3 bucket name.

   Note:
   Make sure you add the suffix `/*` at the end of the bucket name to enable creating files under the bucket name.

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Executing scripts required for setting up AWS

You must execute scripts provided with the Service Graph Connector for AWS to set up the AWS environment for importing data.

Important:
Before executing an AWS script, ensure that you have completed the prerequisites. See Prerequisites for executing scripts.

The AWS scripts provided with the connector configure AWS resources to import the configuration items (CIs) data into the CMDB. To learn more, see AWS resources used by the Service Graph Connector for AWS.

Based on the AWS environment requirements, the scripts provided with the Service Graph Connector for AWS are categorized as described in the following table.

Basic scripts	Deep discovery scripts	Amazon EKS scripts
Scripts for configuring the AWS environment to import data by using the connector.	Scripts for setting up deep discovery on Amazon Elastic Compute Cloud (Amazon EC2) instances.	Scripts for setting up Amazon Elastic Kubernetes Service (EKS) clusters.

Basic scripts

Use the basic scripts to configure the AWS environment for importing data using the Service Graph Connector for AWS.

The following table describes the basic AWS scripts available with the connector, the input parameters entered when executing a script, the conditions to execute the scripts, and the script execution results.

Basic script details

Script	Input parameters
EnableAWSConfig.yml	None
CreateServiceNowUser.yml	**SNUserName** Name of the ServiceNow IAM user t created as part of the setup. See Pre for executing scripts. Default value: `NOWSGCUser` **MbrActRoleName**

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Basic script details (continued)

Script	Input parameters
	Name of the ServiceNow IAM role th created as part of the setup. See Pre for executing scripts. Default value: `SnowOrganizationAccountA`
CreateSnowOrganizationAccountAccessRoleInMemberAccount.yml	**ACNNBR** Management account ID when the S IAM user is in a management accou Or Designated member account ID whe ServiceNow IAM user is in a designa member account. **S3Bucket** Amazon S3 bucket name to get the `SendCommand` output. **ServiceNowUserName** Name of the ServiceNow IAM user t created as part of the setup. See Pre for executing scripts. Default value: `NOWSGCUser`
SnowDesignatedAccountAccessRoleInManagementAccount.yml	**MEMBERACTNBR** Member account ID where the Servi user was created.
AWS-SystemsManager-AutomationExecutionRole.yml	None

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Basic script details (continued)

Script	Input parameters
AWS-SystemsManager-AutomationAdministrationRole.yml	None

Deep discovery scripts

Use the deep discovery scripts to set up deep discovery on Amazon EC2 instances.

Note:
Execute the deep discovery scripts only when you want to perform deep discovery on EC2 instances.

The following table describes the deep discovery scripts, the input parameters entered when executing a script, the conditions to execute the scripts, and the script execution results.

Deep discovery script details

Script	Input parameters	Execution condition	Result
AmazonSSMForInstancesRoleSetup.yml	**S3Bucket** S3 bucket name that collects the details from EC2 instances. See Prerequisites for executing scripts.	Execute the script in all the AWS accounts by creating a CloudFormation StackSet in the management account. See Create a stack set on the AWS	Creates the AmazonSSMForInstance IAM instance profile role to be attached to the EC instances.

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Deep discovery script details (continued)

Script	Input parameters	Execution condition	Result
		documentation site.	
SG-AWS-RunShellScript-Setup.yml	None	Execute the script in all the AWS accounts and the AWS regions by creating a CloudFormation StackSet in the management account. AWS administrators must update SSM documents and verify that EC2 instances can execute relevant commands for proper integration. See Create a stack set on the AWS documentation site.	Creates AWS Systems Manager (SSM) docume to fetch deep discovery from a Linux EC2 instanc Retrieves version details middleware applications including Apache HTTP server, Nginx server, Apa Tomcat server, and MyS instance.
SG-AWS-RunPowerShellScript-Setup.yml	None	Execute the script in all the AWS accounts and the AWS regions by creating a CloudFormation StackSet in the management account. See Create a stack set on the AWS documentation site.	Creates AWS SSM docu to fetch deep discovery from a Windows EC2 ins

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Amazon EKS scripts

Use the Amazon EKS scripts to set up Amazon Elastic Kubernetes Service (EKS) clusters.

Note:
Execute the Amazon EKS scripts only when the Amazon EKS service for Kubernetes clusters is required.

The following table describes the Amazon EKS scripts, the conditions to execute the scripts, and the script execution results.

Amazon EKS script details

Script	Execution condition	Result
SG-AWS-RunKubeCtlEKSNamesShellScript.yml	Execute the script in all the AWS accounts and the AWS regions where the EC2 Bastion hosts are located by creating a CloudFormation StackSet in the management account. See Create a stack set on the AWS documentation site.	Creates an AWS SSM document to discover EKS clusters associated with EC2 Bastion hosts. **Note:** An AWS Cloud administrator can update the SSM document in their AWS setup.
SG-AWS-RunKubeCtlShellScript.yml	Execute the script in all the AWS accounts and the AWS regions where the EC2 Bastion hosts are located by creating a CloudFormation StackSet in the management account. See Create a stack set on the AWS documentation site.	Creates an AWS SSM document to fetch CIs related to Kubernetes components, such as pods, services, and deployments, from EKS clusters. **Note:** An AWS Cloud administrator can update the SSM document in their AWS setup.

Configure Service Graph Connector for AWS using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for AWS for pulling in AWS data into the CMDB

Before you begin

- Install Service Graph Connector for AWS version 2.7.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.
- Verify that you've completed the prerequisites for setting up AWS. See Configure the AWS environment.

Role required: The following table shows the roles required for each stage of the playbook.

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Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the AWS connector type and then select **Create connection**.
4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

5. Complete the prerequisites for setting up the AWS environment.

   a. Configure the basic setup in the AWS environment required for importing data using the connector.

      i. In the **Prerequisites** stage of the playbook, select the **Download basic scripts** activity.

      ii. Execute the scripts to configure the AWS environment.

      For more information on executing scripts, see Basic scripts.

      iii. Select the **I have read the instructions and executed the script accordingly** check box to confirm that you have executed the scripts.

      iv. Select **Continue**.

   b. Set up deep discovery on Amazon Elastic Compute Cloud (Amazon EC2) instances.

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Note:
Complete this step only to perform deep discovery on EC2 instances. Else, select **Skip**.

i. In the **Prerequisites** stage of the playbook, select the **Download deep discovery scripts** activity.

ii. Execute the scripts to configure Amazon EC2 instances for deep discovery.

For more information on executing scripts, see Deep discovery scripts.

iii. Select **Continue**.

c. Set up Amazon Elastic Kubernetes Service (EKS) clusters.

Note:
Complete this step only when the Amazon EKS service for Kubernetes clusters is required. Else, select **Skip**.

i. In the **Prerequisites** stage of the playbook, select the **Download Amazon EKS scripts** activity.

ii. Execute the scripts to set up Amazon EKS clusters.

For more information on executing scripts, see Amazon EKS scripts.

iii. Select **Continue**.

6. Complete the setup for configuring the connector for importing data.

a. Create and test connection.

i. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

ii. On the form, fill in the fields.

Create and test connection form

Field	
Connection name	Name to identify the AWS connection record. For example, `SG_AWS_CredentialAlias_Org`.
Access Key ID	Access key ID of the IAM user that has permissions to interact with the AWS resources.
Secret Access Key	Secret access key that corresponds to the Access key ID required for authenticating the connection securely.
Use MID Server	Option to use a MID Server. **Note:** Use of a MID Server is optional.
Mid Selection	Name of the MID Server used by the connector. This field appears only when the **Use MID Server** check box is selected.

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iii. Select **Create and test connection**.

iv. Once the connection test is complete, select **Continue**.

b. Set configuration properties for the connection to access the AWS resources.

i. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

ii. In the Organization details section, fill in the organization details including the account identifier, name and description of the AWS organization.

iii. In the S3 account details section, fill in the details.

S3 account details

Field	Description
S3 account ID	Numeric identifier of the AWS account that hosts the Amazon Simple Storage Service (Amazon S3) bucket.
S3 bucket name	Name of the Amazon S3 bucket that collects the details from Amazon EC2 instances.
S3 region	Region where the Amazon S3 bucket resides.

iv. In the **AWS regions** field of the AWS regions and STS assume role name section, enter the AWS regions to collect the CI data.

By default, the Service Graph Connector for AWS runs through all the AWS regions to collect the CI data.

You can enter AWS specific regions to speed up the CI data import process. For example, `us-east1, us-east-2`.

If you update the **AWS regions** field value later, clear the value of the **Last run datetime** field in all the data sources related to the Service Graph Connector for AWS to import a new set of data.

v. In the **STS assume role name** field of the AWS regions and STS assume role name section, enter the AWS Identity and Access Management (IAM) role name.

The AWS IAM role name is obtained by the ServiceNow user by calling the *`AssumeRole`* API offered by the AWS Security Token Service (STS). The *`AssumeRole`* API returns a set of temporary security credentials for the ServiceNow user to access the AWS resources.

Note:
Enter the IAM role name but don't prefix `arn` in the name. If you leave this field is empty, the value of this field is automatically set to **SnowOrganizationAccountAccessRole**, which is the default IAM role name for the ServiceNow user.

vi. In the SSM SendCommand document details section, enter the name of the document that defines the actions run by the AWS Systems Manager (SSM) on a Linux-based Amazon EC2 instance or a Windows-based Amazon EC2 instance in their respective fields.

vii. In the **Management account ID** field of the Management account ID and standalone account ID section, enter the management account ID in the AWS organization.

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Enter a value for this field when the ServiceNow user was created in an AWS member account.

The account calls the `ListAccounts` API associated with the AWS organization to collect CI information from all the accounts. For more information, see ListAccounts on the AWS documentation site.

viii. In the **Standalone account ID** field of the Management account ID and standalone account ID section, enter the ID of a member account in the AWS organization.

> **Note:**
> When specifying a standalone account, the AWS organization-related data such as the organization name, organization units, organization ID, and service accounts are not imported. To import the full data later, clear any value mentioned in the **Standalone account ID** field. See the Service Graph Connector for AWS - Standalone Setup [KB1642159] article in the Now Support Knowledge Base.

ix. In the AWS config aggregator details section, enter the AWS account details for the aggregator resource type.

AWS config aggregator details

Field	Description
Config aggregator account	AWS account where the aggregator resource type in the AWS Config service has been configured. Enter a value in this field when you're using an AWS Config aggregator.
Config aggregator name	Name of the aggregator resource type. This field is available only when you enter a value in the **Config aggregator account** field.
Config aggregator region	Region where the aggregator resource type resides. This field is available only when you enter a value in the **Config aggregator account** field.

x. In the AWS key rotation setup section, enter the key rotation process details.

AWS key rotation setup

Field	Description
AWS rotate keys	Option to enable the key rotation process.
AWS key rotation date	Key rotation date. Set the value to the required key rotation date for the first run. For subsequent runs, this field is automatically set to the rotation date. This field is available only when you select the **AWS Rotate Keys** check box.
AWS key rotation period (in days)	Key rotation period in days. This field is available only when you select the **AWS rotate keys** check box.

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Field	Description
AWS key rotation status	Status message of a key rotation displaying whether the rotation was a success or a failure. This field is automatically set to display the key rotation status message. This field is available only when you select the **AWS rotate keys** check box. If the rotation status is a failure, an email notification is triggered, if configured.
Email accounts for receiving error notifications	Comma-separated list of the email addresses of recipients who receive notifications about the AWS key rotation errors.
Email account groups for receiving error notifications	Comma-separated list of the ServiceNow groups who receive notifications about the AWS key rotation errors.

xi. Select the **Is gov cloud** check box in the Gov cloud setup section to indicate that the connection setup is for the AWS GovCloud.

xii. In the SSM EKS SendCommand document details section, enter the AWS SSM document details.

SSM EKS SendCommand document details

Field	Description
EKS cluster names document	Name of the AWS SSM document to discover EKS clusters associated with EC2 Bastion hosts.
EKS shell script document	Name of the AWS SSM document to fetch CIs related to Kubernetes components, such as pods, services, and deployments, from EKS clusters.

xiii. Select **Save properties**.

xiv. Select **Continue**.

c. Configure the required EC2 resources for Amazon Elastic Kubernetes Service (EKS) to import EKS cluster data.

Note:
Complete this step only when EC2 resources are needed. Else, select **Skip** for the **Configure EKS EC2 resources** activity.

An EKS EC2 resource is a bastion host that has network access to EKS clusters. The EKS clusters aren't directly accessible to the connector. Therefore, you must provide the EKS EC2 resource details. For importing EKS cluster data, the connector uses the SSM Send Command on EKS EC2 resources to run kubectl commands remotely.

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Note:
Ensure that you've configured your AWS environment for the EKS integration. For more information, see the Service Graph Connector for AWS - Amazon EKS Integration [KB1437138] article in the Now Support Knowledge Base.

i. In the **Setup** stage of the playbook, select the **Configure EKS EC2 resources** activity.

ii. On the Configure EKS EC2 resources page, select **New**.

iii. On the Configure EKS EC2 resources window that appears, fill in the fields.

Configure EKS EC2 resources fields

Field	Description
EKS EC2 Resource Id	Identifier of the EKS EC2 resource.
EC2 Region	AWS region where the EKS EC2 resource is located.
EC2 Account	User name assigned to the EKS EC2 resource account.
Connection Alias	Connection alias associated with the AWS environment setup and configured in step 6.a.ii.
Connection	Connection name associated with the AWS environment setup and configured in step 6.a.ii.
Active	Option to activate the EKS EC2 resource.

iv. Select **Save**.

v. Repeat steps from 6.c.ii to 6.c.iv to add more EKS EC2 resources.

vi. Select **Continue**.

d. Run the AWS diagnostic tool before running a scheduled import job to identify any issues in the AWS environment setup.

i. In the **Setup** stage of the playbook, select the **Run diagnostic tests** activity.

ii. On the Run diagnostic test page, select an option to exclude the corresponding test results from the diagnostic summary.

Skip SSM setup tests

Excludes the software inventory data from the summary results by not calling the `GetInventory` API. Select this option when you've opted out or not set up the configuration for SSM.

Skip SSM Deep Discovery tests

Excludes the deep discovery data from the summary results. Select this option when you've opted out or not set up the configuration for SSM deep discovery.

Skip EKS setup tests

Excludes the EKS data from the summary results by not running the kubectl commands.

Note:
This check box appears only when you've configured EC2 resources in the **Configure EKS EC2 resources** activity.

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iii. Select **Run diagnostic test** and wait for the test to complete.

iv. Review the diagnostic summary, the API access results, and the IAM permission validation logs.

v. When the test results are successful, select **Continue**.

e. Configure the import schedule to import data at regular intervals.

i. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

ii. Expand the Parent scheduled data import within the Import schedules list to select the **SG-AWS-Organization** import schedule.

iii. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

iv. Select **Save**.

Alternatively, select **Execute Now** to execute the import schedule immediately.

v. Select **Continue**.

f. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for AWS

CMDB classes targeted in Service Graph Connector for AWS

Supported AWS resource types

Accessing the connection details of Service Graph Connector for AWS

Additional features within the Service Graph Connector for AWS

Configure Service Graph Connector for AWS using the guided setup

Set up the AWS environment and scheduled jobs to pull in AWS data into the CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

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Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- Discovery Core plugin (com.snc.discovery.core), which is automatically installed by Discovery.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.

Ensure that you've completed the prerequisites for setting up AWS. See Configure the AWS environment.

Note:
When upgrading from an earlier version, ensure that you've updated the SSM documents and IAM permissions in your AWS instance.

- For updating SSM documents, run the `SG - AWS - RunShellScript - Setup . yml`, `SG - AWS - RunPowerShellScript - Setup . yml`, and `SG - AWS - RunKubeCtlShellScript . yml` scripts.
- For updating the IAM permissions assigned to the SnowOrganizationAccountAccessRole role, run the `CreateSnowOrganizationAccountAccessRoleInMemberAccount . yml` script.

Role required: SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

For more information on the **Service Graph Connector for AWS** setup instructions, see the following articles:

- Service Graph Connector for AWS - Setup Instructions [KB1220597] article on the Now Support Knowledge Base.
- Service Graph Connector for AWS - Introduction on the ServiceNow Community site.
- SGC-AWS - Release 2.0 Features on the ServiceNow Community site.

If you upgrade the connector, complete the following tasks before the upgrade process:

- If there are any customizations, delete the records associated with the Service Graph Connector for AWS from the Customer Updates [sys_update_xml] table. See Customer Updates table.
- Upgrade any dependencies.

After you've installed the latest version of the Service Graph Connector for AWS:

- Perform a full import of data from your AWS instance. Verify that the **Use last run datetime** field value is cleared for all the AWS data sources in the Data Source [sys_data_source] table.
- Download and rerun the AWS scripts. See Configure the AWS environment.

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Procedure

1. Ensure that you've selected the **Service Graph Connector for AWS** application scope by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **AWS** > **Setup**.
3. Configure the AWS environment.

   Note:
   For the Download the scripts task, select **Configure** to download the scripts.

   After you've downloaded the scripts and configured the AWS environment, set the Download the scripts and AWS Setup Instructions tasks to complete.
4. Configure the authentication credentials to authenticate requests sent to the AWS APIs.

   a. Configure your AWS credentials.
      i. For the Configure the connection section of the Service Graph Connector for AWS page, select **Get Started**.
      ii. For the Configure the credentials task, select **Configure**.
      iii. In the **Name** field, enter a name for the authentication.

      `SG-AWS-Credentials-Org` is the default credential alias name. You can add multiple AWS instances. However, don't modify the default connection alias.

      iv. Enter the access key ID and the secret access key in the **Access Key ID** and **Secret Access Key** fields respectively.

      The AWS access keys are long-term credentials for the IAM user and include two parts: an access key ID and a secret access key. You must use both the access key ID and the secret access key together to authenticate requests.

      v. Return to the Configure the connection task page by selecting the back icon (<).
      vi. Set the Configure the credentials task to complete by selecting **Mark as Complete**.

   b. Test the AWS API connection to import data from the AWS application.
      i. For the Test the connection task in the Configure the connection section, select **Configure**.
      ii. Select the **Test Connection** related link.
      iii. When the **Status** field is set to **Success**, select the back icon (<) to return to the guided setup.
      iv. Set the Test the connection task to complete by selecting **Mark as Complete**.

   c. Update the required configuration properties for an AWS instance.
      i. For the Update configuration properties for instance task, select **Configure**.
      ii. On the SG-AWS Configuration Properties form that opens in a new tab, review, and modify the fields.

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SG-AWS Configuration Properties form

Field	Description
Connection Details	
Connection Alias	Name to identify the AWS connection record. For example, `SG_AWS_CredentialAlias_Org`. You can add multiple AWS instances. However, don't modify the name for the default connection alias `SG_AWS_CredentialAlias_Org`.
Organization Details	
Organization Account	Numeric account identifier of the AWS organization.
Organization Name	Name of the AWS organization.
Organization Description	Description of the AWS organization.
AWS Regions	
Regions	AWS regions to collect the CI data. By default, the Service Graph Connector for AWS runs through all the AWS regions to collect the CI data. You can enter AWS specific regions to speed up the CI data import process. For example, `us-east1, us-east-2`. If this field is left empty, the Service Graph Connector for AWS pulls the resources from all the AWS regions. However, for the AWS GovCloud regions, don't leave the **Regions** field empty. The supported AWS GovCloud regions are `us-gov-east-1` and `us-gov-west-1`. If you update the **Regions** field value later, clear the value of the **Last run datetime** field in all the data sources related to the Service Graph Connector for AWS to import a new set of data.
STS Assume Role Name	
STS Role	AWS Identity and Access Management (IAM) role name that is obtained by the ServiceNow user by calling the *`AssumeRole`* API offered by the AWS Security Token Service (STS). The *`AssumeRole`* API returns a set of temporary security credentials for the ServiceNow user to access the AWS resources. **Note:** Enter the IAM role name but don't prefix `arn` in the name. If you leave this field is empty, the value of this field is automatically set to **SnowOrganizationAccountAccessRole**, which is the default IAM role name for the ServiceNow user.
S3 Account Details	

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Field	Description
S3 Account Id	Numeric identifier of the AWS account that hosts the Amazon Simple Storage Service (Amazon S3) bucket.
S3 Bucket Name	Name of the Amazon S3 bucket that collects the details from Amazon EC2 instances.
S3 Region	Region where the Amazon S3 bucket resides.
SSM SendCommand Document Details	
SSM Send Command Linux Name	Name of the document that defines the actions run by the AWS Systems Manager (SSM) on a Linux-based Amazon EC2 instance.
SSM Send Command Windows Name	Name of the document that defines the actions run by the AWS SSM on a Windows-based Amazon EC2 instance.
Management Account ID	
Management Account ID	Management account in the AWS organization. The account calls the *ListAccounts* API associated with the AWS organization to collect CI information from all the accounts. For more information, see ListAccounts on the AWS documentation site. Enter a value for this field when the ServiceNow user was created in an AWS member account.
Standalone Account ID Details	
Standalone Account ID	ID of a member account in the AWS organization. **Note:** When specifying a standalone account, AWS organization-related data such as the organization name, organization units, organization ID, and service accounts are not imported. If you want to import the full data later, clear any value mentioned in the **Standalone Account ID** field. See the Service Graph Connector for AWS - Standalone Setup [KB1642159] article in the Now Support Knowledge Base.
AWS Config Aggregator Details	
Config Aggregator Account	AWS account where the aggregator resource type in the AWS Config service has been configured. Enter a value in this field when you're using an AWS Config aggregator.
Config Aggregator Name	Name of the aggregator resource type. This field is available only when you enter a value in the **Config Aggregator Account** field.
Config Aggregator Region	Region where the aggregator resource type resides. This field is available only when you enter a value in the **Config Aggregator Account** field.
AWS Key Rotation Setup	
AWS Rotate Keys	Option to enable the key rotation process.

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Field	Description
AWS Key Rotation Date	Key rotation date. Set the value to the required key rotation date for the first run. For subsequent runs, this field is automatically set to the rotation date. This field is available only when you select the **AWS Rotate Keys** check box.
AWS Key Rotation Period (in Days)	Key rotation period in days. This field is available only when you select the **AWS Rotate Keys** check box.
AWS Key Rotation Status	Status message of a key rotation displaying whether the rotation was a success or a failure. This field is automatically set to display the key rotation status message. This field is available only when you select the **AWS Rotate Keys** check box. If the rotation status is a failure, an email notification is triggered, if configured.
Email accounts for receiving error notifications	Comma-separated list of the email addresses of recipients who receive notifications about the AWS key rotation errors.
Email account groups for receiving error notifications	Comma-separated list of the ServiceNow groups who receive notifications about the AWS key rotation errors.
Gov Cloud Setup	
Is Gov Cloud	Option to indicate that the connection setup is for the AWS GovCloud.
SSM EKS SendCommand Document Details	
EKS Cluster Names Document	Name of the AWS SSM document to discover EKS clusters associated with EC2 Bastion hosts.
EKS Shell Script Document	Name of the AWS SSM document to fetch CIs related to Kubernetes components, such as pods, services, and deployments, from EKS clusters.

iii. Select **Save** and then **Close** to close the tab and return to the guided setup tab.

iv. Set the Update configuration properties for instance task to complete by selecting **Mark as Complete**.

5. Configure the required EC2 resources for Amazon Elastic Kubernetes Service (EKS) to import EKS cluster data.
An EKS EC2 resource is a bastion host that has network access to EKS clusters. The EKS clusters aren't directly accessible to the connector. Therefore, you must provide the EKS EC2 resource details. For importing EKS cluster data, the connector uses the SSM Send Command on EKS EC2 resources to run kubectl commands remotely.

Note:
Ensure that you've configured your AWS environment for the EKS integration. For more information, see the Service Graph Connector for AWS - Amazon EKS Integration [KB1437138] article in the Now Support Knowledge Base.

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a. For the Configure the EKS Resource Details section of the Service Graph Connector for AWS page, select **Get Started**.

b. For the Enter the EKS EC2 Resource Details task, select **Configure**.

c. On the form that opens in a new tab, fill in the fields.

SG-AWS-EKS-EC2-Resource form

Field	Description
EKS EC2 Resource Id	Identifier of the EKS EC2 resource.
EC2 Account	User name assigned to the EKS EC2 resource account.
EC2 Region	AWS region where the EKS EC2 resource is located.
Active	Option to activate the EKS EC2 resource. **Note:** Set to false, if you are not using the EKS EC2 resource resource.
Connection	Connection alias associated with the AWS environment setup and configured in step 4.a.

d. Select **Submit** to return to the guided setup.

e. Repeat steps from 5.b to 5.d to add multiple EKS EC2 resources.
All the EKS EC2 resources are added to the SG-AWS-EKS-Master [sn_aws_integ_sg_aws_eks_master] table.

f. Set the Enter the EKS EC2 Resource Details task to complete by selecting **Mark as Complete**.

6. Run the AWS diagnostic tool before running a scheduled import job to identify any issues in the AWS environment setup.

a. For the Service Graph AWS Diagnostic Tool section of the Service Graph Connector for AWS page, select **Get Started**.

b. For the AWS Setup Diagnostic Tool task, select **Configure**.

c. Select the organization ID from the text field.

d. Select **Run Diagnostic Test**.

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Tip:
Select one of the following options to exclude the corresponding test results from the diagnostic summary:

Skip SSM setup tests

Excludes the software inventory data from the summary results by not calling the *GetInventory* API. Select this option when you've opted out or not set up the configuration for SSM.

Skip SSM Deep Discovery tests

Excludes the deep discovery data from the summary results. Select this option when you've opted out or not set up the configuration for SSM deep discovery.

Skip EKS setup tests

Excludes the EKS data from the summary results by not running the kubectl commands. Select this option when you've opted out or not set up the EKS integration.

e. **Optional:** View only EKS cluster test results by selecting **View EKS Test Details**.

f. **Optional:** Preview any previous diagnostic tool results by selecting **Load DT Results**, selecting a diagnostic ID, and then selecting **Load Results**.

g. When you finish reviewing the diagnostic summary results, select the back button of your browser to return to the guided setup.

h. Set the AWS Setup Diagnostic Tool task to complete by selecting **Mark as Complete**.

7. Configure the scheduled jobs to import data from the AWS application.

a. In the Configure the scheduled import jobs section of the Service Graph Connector for AWS page, select **Get started**.

b. For the Configure the scheduled job task, select **Configure**.

c. Select the scheduled job that you want to activate.

d. On the Scheduled Data Import form, verify the field values for the scheduled job. For more information, see Schedule a data import.

e. Select **Update**.

f. Repeat the steps 7.c to 7.e for each scheduled job for data import.

g. Select the back icon (<) to return to the guided setup page.

h. Set the Configure the scheduled job task to complete by selecting **Mark as Complete** in the guided setup.

8. **Optional:** Add multiple AWS instances.

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a. In the Add Multiple Instances section of the Service Graph Connector for AWS page, select **Get Started**.

b. Ensure that you have edit permissions for the Datasource [sys_data_source] table to create data sources for the new instance.

   i. Select the **Global** application scope by using the application picker.

   ii. For the Update Data Source Access task, select **Configure**.

   iii. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

   iv. Select **Update** to close the tab and return to the guided setup.

   v. Modify the application scope again to **Service Graph Connector for AWS** by using the application picker.

   vi. Set the Update Data Source Access task to complete by selecting **Mark as Complete**.

c. Update access for scheduled import jobs.

   i. Select the **Global** application scope by using the application picker.

   ii. For the Update Scheduled Data Import Access task, select **Configure**.

   iii. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

   iv. Select **Update** to close the tab and return to the guided setup tab.

   v. Set the Update Scheduled Data Import Access task to complete by selecting **Mark as Complete**.

   vi. Modify the application scope again to **Service Graph Connector for AWS** by using the application picker.

d. Clear the cache of the Data Source [sys_data_source] and Scheduled Data Imports [scheduled_import_set] tables to enable creating a data source for the new connection in the Service Graph Connector for AWS.

   i. For the Clear Cache for Data Source and Scheduled Data Imports tables task, select **Configure**.

   ii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
      GlideCacheManager.flushTable("sys_data_source");


 GlideTableManager.invalidateTable("scheduled_import_set");
      GlideCacheManager.flushTable("scheduled_import_set");

      GlideTableManager.invalidateTable("sys_db_object");
      GlideCacheManager.flushTable("sys_db_object");
```

   iii. Select **Run Script** to run the background script in the **global** scope.

   The script may take several minutes to execute.

   iv. After the script is executed, select **Close**.

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v. Set the Clear Cache for Data Source and Scheduled Data Imports tables task to complete by selecting **Mark as Complete**.

vi. Modify the application scope again to **Service Graph Connector for AWS** by using the application picker.

e. Create a credential alias for the new AWS connection in the Service Graph Connector for AWS.

i. For the Create new Connection & Credentials Alias Record task, select **Configure**.

ii. On the Connection & Credential Aliases form that opens in a new tab, fill in the connection details.

iii. Select **Submit** and close the tab and return to the guided setup tab.

iv. Set the Create new Connection & Credentials Alias Record task to complete by selecting **Mark as Complete**.

f. Create credentials for the new AWS credential alias.

i. For the Create new Connection & Credentials Alias Record task, select **Configure**.

ii. On the Connections page of the Workflow Studio, select **Add Connection**.

iii. In the Create Connection window, fill in the connection name, access key, and secret key details.

iv. Select **Create Connection**.

v. Close the Workflow Studio and return to the guided setup tab.

vi. Set the Create new Connection & Credentials Alias Record task to complete by selecting **Mark as Complete**.

g. Update properties for the new instance for the Service Graph Connector for AWS by selecting **Configure** for the Configure AWS environment for the new Instance task.
For more information, follow the step 4.c discussed earlier for configuring the properties of the AWS connection available by default.

When you're done updating the properties, set the Configure AWS environment for the new Instance task to complete by selecting **Mark as Complete**.

h. Enter the EKS EC2 Resource details by selecting **Configure** for the Update EKS Resource Details task.
For more information, follow the step 5 discussed earlier for configuring the EKS EC2 Resource details for the AWS connection available by default.

When you're done updating the properties, set the Update EKS Resource Details task to complete by selecting **Mark as Complete**.

i. Configure the scheduled imports for the new AWS instance.

i. For the Configure the Scheduled Imports task, select **Configure**.

ii. In the Scheduled Data Imports list that opens in a new tab, select the organization of the AWS instance that you want to configure.

iii. Select the scheduled data import that you want to activate.

iv. On the Scheduled Data Import form, modify the field values for the scheduled job.

v. Select **Update**.

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vi. Repeat the steps 8.i.iii to 8.i.v for each scheduled job for data import.

vii. Close the tab for the Scheduled Data Imports list and return to the guided setup tab.

viii. Set the Configure the Scheduled Imports task to complete by selecting **Mark as Complete** in the guided setup.

Related topics

Handling import failures for large AWS resources

Handling memory utilization errors for Service Graph Connector for AWS

Data mapping for Service Graph Connector for AWS

Data from the AWS data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow® CMDB using the Identification and Reconciliation Engine (IRE).

Data mapping for AWS

Data from the AWS data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

Note:
If the **Use last run datetime** field for an AWS data source in the Data Source [sys_data_source] table is empty, the connector imports all available initial data. If the **Use last run datetime** field includes a date stamp, the connector imports incremental data that has been newly added since the previous run.

The following table lists the import schedule order, the data sources and import schedules of the same name, the staging tables, the target tables as CMDB CI classes, the import schedule requirement type, and the import schedule dependencies for AWS.

Data mapping for AWS

Order	Name (data source or import schedule)	Staging table	CMDB CI classes
1	SG-AWS-Organization	SG-AWS-Organization [sn_aws_integ_sg_aws_organization]	Cloud Organizations
2	SG-AWS-Org-Units	SG-AWS-Org-Units [sn_aws_integ_sg_aws_org_units]	AWS Organizational Unit
3	SG-AWS-Service-Account	SG-AWS-Service-Account [sn_aws_integ_sg_aws_service_account]	Cloud Service Account Cloud Organizations Key Value
4	SG-AWS-Service-Account-Tags	SG-AWS-Service-Account-Tags [sn_aws_integ_sg_aws_service_account_tags]	Cloud Service Account Key Value

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes
5	SG-AWS-Org-Unit-Accounts	SG-AWS-Org-Unit-Accounts [sn_aws_integ_sg_aws_org_unit_accounts]	Cloud Service Account
6	SG-AWS-Datacenters	SG-AWS-Datacenters [sn_aws_integ_sg_aws_datacenters]	Cloud Service Account AWS Datacenter
7	SG-AWS-VPC	SG-AWS-VPC [sn_aws_integ_sg_aws_vpc]	Cloud Service Account Cloud Network AWS Datacenter Key Value SG-AWS Extension Attributes
8	SG-AWS-Subnets	SG-AWS-Subnets [sn_aws_integ_sg_aws_subnets]	Availability Zone Cloud Network Cloud Subnet AWS Datacenter Key Value SG-AWS Extension Attributes
9	SG-AWS-Network-Interface	SG-AWS-Network-Interface [sn_aws_integ_sg_aws_network_interface]	Cloud Network Cloud Subnet Cloud Mgmt Network Interface AWS Datacenter

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes
			Key Value SG-AWS Extension Attributes
10	SG-AWS-Security-Group	SG-AWS-Security-Group [sn_aws_integ_sg_aws_security_group]	Cloud Network Compute Security Group AWS Datacenter Key Value SG-AWS Extension Attributes
11	SG-AWS-Storage-Volume	SG-AWS-Storage-Volume [sn_aws_integ_sg_aws_storage_volume]	Storage Volume Storage Volume Snapshot AWS Datacenter Key Value SG-AWS Extension Attributes
12	SG-AWS-Image-Private	SG-AWS-Image [sn_aws_integ_sg_aws_image]	Image
13	SG-AWS-Image-Id	SG-AWS-Image-Id [sn_aws_integ_sg_aws_image_id]	Image

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes
14	SG-AWS-Hardware-Type	SG-AWS-Hardware-Type [sn_aws_integ_sg_aws_hardware_type]	Hardware Type AWS Datacenter
15	SG-AWS-EC2	SG-AWS-EC2 [sn_aws_integ_sg_aws_ec2]	Virtual Machine Instance The following CIs are populated when populating the Virtual Machine Instanc Server VNIC Endpoint Storage Mapping Block Endpoint IP Address Network Adapter Key Value

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes
16	SG-AWS-ELB-V1	SG-AWS-ELB-V1 [sn_aws_integ_sg_aws_elb_v1]	Cloud Load Balancer Compute Security Group Availability Zone AWS Datacenter Key Value SG-AWS Extension Attributes
17	SG-AWS-ELB-V2	SG-AWS-ELB-V2 [sn_aws_integ_sg_aws_elb_v2]	Cloud Load Balancer Compute Security Group Availability Zone AWS Datacenter Key Value SG-AWS Extension Attributes
18	SG-AWS-RDS	SG-AWS-RDS [sn_aws_integ_sg_aws_rds]	Cloud DataBase AWS Datacenter Key Value SG-AWS Extension Attributes
19	SG-AWS-API-Gateway	SG-AWS-API-Gateway [sn_aws_integ_sg_aws_api_gateway]	Cloud Gateway [cmdb_ci_cloud_gatew AWS Datacenter Key Value SG-AWS Extension Attributes
20	SG-AWS-Lambda	SG-AWS-Lambda [sn_aws_integ_sg_aws_lambda]	Cloud Function

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes
21	SG-AWS-S3	SG-AWS-S3 [sn_aws_integ_sg_aws_s3]	Cloud Object Storage
22	SG-AWS-DynamoDb	SG-AWS-DynamoDb [sn_aws_integ_sg_aws_dynamodb]	DynamoDB Table AWS Datacenter Key Value SG-AWS Extension Attributes
23	SG-AWS-Software-Inventory	SG-AWS-Software-Inventory [sn_aws_integ_sg_aws_software_inventory] SG-AWS-Software-Staging [sn_aws_integ_sg_aws_temp_software_staging]	When the Software Asset Managemen application isn't installed: Software Packages Software Instance Server When the SAM application is installed Software Installation Server

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes
24	SG-AWS-Software-Remove	SG-AWS-Software-Remove [sn_aws_integ_sg_aws_software_remove]	None

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes
25	SG-AWS-SSM-SendCommand	SG-AWS-SSM-SendCommand [sn_aws_integ_sg_aws_ssm_sendcommand]	Application Running Process [cmdb_running_proc TCP Connections [cmdb_tcp]
26	SG-AWS-Tags	SG-AWS-Tags [sn_aws_integ_sg_aws_tags]	DynamoDB Table Cloud Load Balancer Cloud Function Key Value

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes
27	SG-AWS-VM-Hw-Consolidation	SG-AWS-VM-Hw-Consolidation [sn_aws_integ_sg_aws_vm_hw_consolidation]	Virtual Machine Instance Server
28	SG-AWS-EKS-Cluster	SG-AWS-EKS-Cluster [sn_aws_integ_sg_aws_eks_cluster]	Kubernetes Cluster AWS Datacenter Key Value

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes
			SG-AWS Extension Attributes
29	SG-AWS-EKS-Cluster-2	SG-AWS-EKS-Cluster-2 [sn_aws_integ_sg_aws_eks_cluster_2]	Kubernetes Cluster AWS Datacenter Key Value SG-AWS Extension Attributes

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes
30	SG-AWS-EKS-FULL	SG-AWS-EKS-FULL [sn_aws_integ_sg_aws_eks_full]	Kubernetes Cluster Server Kubernetes Namespace Kubernetes Node Kubernetes Service Kubernetes Pod Docker Container Docker Image Kubernetes Volume Kubernetes Deployment Kubernetes DaemonSet Kubernetes ReplicaSet

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes
31	SG-AWS-Generic-Resources	SG-AWS-Generic-Resources [sn_aws_integ_sg_aws_generic_resources]	Cloud Resource SG-AWS Extension Attributes
32	SG-AWS-Redshift-Cluster	SG-AWS-Redshift-Cluster [sn_aws_integ_sg_aws_redshift_cluster]	Amazon Redshift
33	SG-AWS-Get-Inventory	SG-AWS-Get-Inventory [sn_aws_integ_sg_aws_get_inventory]	Server

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes
34	SG-AWS-GenericTags	SG-AWS-GenericTags [sn_aws_integ_sg_aws_generictags]	Cloud Resource Key Value
35	SG-AWS-SendCommand	SG-AWS-SendCommand [sn_aws_integ_sg_aws_ssm_sendcommand]	None **Note:** The SG-AWS-SendCommand data doesn't have target CMDB CI class data source populates the data int sn_aws_integ_sg_aws_ssm_sendc staging table, but the import recor transformed, and the import sets r pending state.
36	SG-AWS-SSM-GetS3Object	SG-AWS-SSM-GetS3Object [sn_aws_integ_sg_aws_ssm_gets3object]	Server Running Process [cmdb_running_proc TCP Connections [cmdb_tcp]

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Data mapping for AWS (continued)

Order	Name (data source or import schedule)	Staging table	CMDB CI classes

For more information on where data is saved when pulling data from AWS, see CMDB classes targeted in Service Graph Connector for AWS and Supported AWS resource types.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

For more information about how CI information is pulled from AWS, see the Service Graph Connector for AWS - Functional Spec and CI article on the ServiceNow Community site.

Additional information about AWS data sources:

- The SG-AWS-Generic-Resources data source imports data for generic resources that aren't tracked by other data sources. The connector uses the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table to differentiate between generic and other supported resource types.

  The connector first populates all supported resources in the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table. These resources, categorized under their respective supported resource types, have specific data sources designated for ingestion within the connector. When the SG-AWS-Generic-Resources data source is executed and retrieves unsupported resource types, they are added to the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table and categorized as generic.

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- In Service Graph Connector for AWS version 2.13.0 and later, parallel loading is enabled for SG-AWS-Generic-Resources data source if the AWS Config aggregator is used for discovery. Partitions are created for the SG-AWS-Generic-Resources data source based on the Resource Types in the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table. Additionally, delete jobs aren't created for a full data load.

  If the AWS Config aggregator isn't used for discovery, API calls are made to multiple accounts and the **Partition info** field is populated with Account and Region details.

- To import global generic resources such as IAM user and IAM group, specify a standard AWS region that has `Config` enabled with *`includeGlobalResourceTypes`* set to `true` by updating the value of the *`sn_aws_integ.global_generic_resource_region`* system property for the SG-AWS-Generic-Resources data source.

  If an aggregator is configured, and the *`sn_aws_integ.global_generic_resource_region`* value is not specified, the aggregator region is assigned as the value of this system property for importing global generic resources.

- If the AWS Systems Manager (SSM) service isn't enabled, the connector populates the server records in the Server [cmdb_ci_server] class. If the AWS SSM service is enabled, then based on the platform type obtained through the SSM service, the server records are populated in either the Linux Server [cmdb_ci_linux_server] class or the Windows Server [cmdb_ci_win_server] class. The Server [cmdb_ci_server] class is the parent class of the Linux Server [cmdb_ci_linux_server] and the Windows Server [cmdb_ci_win_server] classes.
- All labels associated with an AWS resource are added to the Key Value [cmdb_key_value] table.

  Note:
  You can use the CMDB Data Manager to delete tag data from retired CIs in the Key Value [cmdb_key_value] table based on conditions like retention time and discovery source. A scheduled job runs the policy, which can be configured to execute during off-peak hours.

- The basic information about an AWS resource is stored in the SG-AWS Extension Attributes [sn_aws_extension_attributes] table.
- In Service Graph Connector for AWS version 2.10.0 and later, the SG-AWS-Get-Inventory data source runs before the SG-AWS-EC2 data source and creates a Server [cmdb_ci_server] CI with the host name mapped to the Name attribute, instead of being mapped to the VM name.
- The SG-AWS-GenericTags data source imports tag data only for generic resources that have an ARN key. You can use the SG-AWS Extension Attributes [sn_aws_extension_attributes] table to verify which generic resources have an ARN key.

  Note:
  The SG-AWS-GenericTags data source doesn't import tag data for Amazon CloudFront resources.

- The AWS configuration data for each connection is stored in the SG AWS Application Properties [sn_aws_integ_sg_aws_application_properties] table.
- When you run the diagnostic test, the data is loaded in the following tables:

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- SG AWS Diagnostic Details [sn_aws_integ_sg_aws_diagnostic_details]
- SG-AWS Diagnostic Summary [sn_aws_integ_sg_aws_diagnostic_summary]
- SG AWS Diagnostic Summary Notes [sn_aws_integ_sg_aws_diagnostic_summary_notes]

- In Service Graph Connector for AWS version 2.13.0 and later, the SG-AWS-Image-Id data source doesn't access cross-account records during lookup.

Related content

CMDB classes targeted in Service Graph Connector for AWS

Service Graph Connector for AWS properties

CMDB classes targeted in Service Graph Connector for AWS

When you complete setting up the connection, you can configure the integration to periodically pull data from AWS. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Amazon Redshift [cmdb_ci_aws_redshift]

The following attributes in the Amazon Redshift [cmdb_ci_aws_redshift] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
TCP port(s)	tcp_port
Cluster Availability Status	cluster_availability_status
Install Status	install_status
Availability Zone	availability_zone
Fully qualified domain name	fqdn
Node Count	node_count
Node Type	node_type
Operational status	operational_status
Start date	start_date
VPC ID	vpc_id

Relationships created for Application

Parent class	Relationship type	Child class
Amazon Redshift [cmdb_ci_aws_redshift]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Amazon Redshift [cmdb_ci_aws_redshift]	Reference	Availability Zone [cmdb_ci_availability_zone]

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Application [cmdb_ci_appl]

The following attributes in the Application [cmdb_ci_appl] table are populated by collected data:

Attribute label	Attribute name
Class	sys_class_name
Version	version
TCP port(s)	tcp_port
Running Process	running_process
Running process key parameters	running_process_key_parameters
Name	name
Running process command	running_process_command

Relationship created for Application

Parent class	Relationship type	Child class
Application [cmdb_ci_appl]	Runs on::Runs	Server [cmdb_ci_server]

Availability Zone [cmdb_ci_availability_zone]

The following attributes in the Availability Zone [cmdb_ci_availability_zone] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status
State	state

Relationships created for Availability Zone

Parent class	Relationship type	Child class
Availability Zone [cmdb_ci_availability_zone]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]
Availability Zone [cmdb_ci_availability_zone]	Contains::Contained by	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]

AWS Datacenter [cmdb_ci_aws_datacenter]

The following attributes in the AWS Datacenter [cmdb_ci_aws_datacenter] table are populated by collected data:

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Attribute label	Attribute name
Name	name
Object ID	object_id
Region	region
Install Status	install_status
Operational status	operational_status

Relationships created for AWS Datacenter

Parent class	Relationship type	Child class
AWS Datacenter [cmdb_ci_aws_datacenter]	Contains::Contained by	Availability Zone [cmdb_ci_availablity_zone]
AWS Datacenter [cmdb_ci_aws_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

AWS Organizational Unit [cmdb_ci_aws_org_unit]

The following attributes in the AWS Organizational Unit [cmdb_ci_aws_org_unit] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Install Status	install_status
Name	name
Operational status	operational_status
Org Unit Parent ID	org_unit_parent_id
Organizational ID	aws_org_id
Root ID	root_id

Relationship created for AWS Organizational Unit

Parent class	Relationship type	Child class
AWS Organizational Unit [cmdb_ci_aws_org_unit]	Contains::Contained by	Cloud Service Account [cmdb_ci_cloud_service_account]

Block Endpoint [cmdb_ci_endpoint_block]

The following attributes in the Block Endpoint [cmdb_ci_endpoint_block] table are populated by collected data:

Attribute label	Attribute name
Host	host

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Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status

Cloud DataBase [cmdb_ci_cloud_database]

The following attributes in the Cloud DataBase [cmdb_ci_cloud_database] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
TCP port(s)	tcp_port
Automated Backups	automated_backup
Category	category
Fully qualified domain name	fqdn
Install Status	install_status
Operational status	operational_status
State	state
Type	type
Version	version

Relationships created for Cloud DataBase

Parent class	Relationship type	Child class
Cloud DataBase [cmdb_ci_cloud_database]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	Key Value [cmdb_key_value]

Cloud Function [cmdb_ci_cloud_function]

The following attributes in the Cloud Function [cmdb_ci_cloud_function] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Code Size	code_size

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Attribute label	Attribute name
CodeSha256	codesha256
Function Last Modified	function_last_modified
Install Status	install_status
Language	language
Operational status	operational_status
Version	version

Relationships created for Cloud Function

Parent class	Relationship type	Child class
Cloud Function [cmdb_ci_cloud_function]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Function [cmdb_ci_cloud_function]	Reference	Key Value [cmdb_key_value]

Cloud Gateway [cmdb_ci_cloud_gateway]

The following attributes in the Cloud Gateway [cmdb_ci_cloud_gateway] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Fully qualified domain name	fqdn
Install Status	install_status
Operational status	operational_status

Relationships created for Cloud Gateway

Parent class	Relationship type	Child class
Cloud Gateway [cmdb_ci_cloud_gateway]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Gateway [cmdb_ci_cloud_gateway]	Reference	Key Value [cmdb_key_value]

Cloud Hardware Type [cmdb_ci_cloud_hardware_type]

The following attributes in the Cloud Hardware Type [cmdb_ci_cloud_hardware_type] table are populated by collected data:

Attribute label	Attribute name
Name	name

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Attribute label	Attribute name
Object ID	object_id
Provider	provider
Cores	cores
Install Status	install_status
IP Address	ip_address
Local Storage GB	local_storage_gb
Memory MB	memory_mb
Operational status	operational_status
vCPUs	vcpus
Zone	zone

Relationships created for Cloud Hardware Type

Parent class	Relationship type	Child class
Cloud Hardware Type [cmdb_ci_cloud_hardware_type]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Cloud Image [cmdb_ci_cloud_os_image]

The following attributes in the Cloud Image [cmdb_ci_cloud_os_image] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Description	short_description
Environment	environment
Guest OS	guest_os
Image Source	image_source
Image Type	image_type
Provider	provider
Root Device Type	root_device_type

Relationships created for Cloud Image

Parent class	Relationship type	Child class
Cloud Image [cmdb_ci_cloud_os_image]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Image [cmdb_ci_cloud_os_image]	Reference	Key Value

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Cloud Load Balancer [cmdb_ci_cloud_load_balancer]

The following attributes in the Cloud Load Balancer [cmdb_ci_cloud_load_balancer] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Canonical Hosted Zone ID	canonical_hosted_zone_id
Canonical Hosted Zone Name	canonical_hosted_zone_name
DNS Name	dns_name
Fully qualified domain name	fqdn
Install Status	install_status
Operational status	operational_status
State	state

Relationships created for Cloud Load Balancer

Parent class	Relationship type	Child class
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Contains::Contained by	Compute Security Group [cmdb_ci_compute_security_group]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	Key Value [cmdb_key_value]

Cloud Mgmt Network Interface [cmdb_ci_nic]

The following attributes in the Cloud Mgmt Network Interface [cmdb_ci_nic] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Name	name
Object ID	object_id
Public IP	public_ip
Install Status	install_status
Operational status	operational_status
Private DNS	private_dns
Private IP	private_ip
Public DNS	public_dns

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Attribute label	Attribute name
State	state
Configuration Item	cmdb_ci

Relationships created for Cloud Mgmt Network Interface

Parent class	Relationship type	Child class
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Use End Point To::Use End Point From	VNIC Endpoint [cmdb_ci_endpoint_vnic]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	Key Value [cmdb_key_value]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	Virtual Machine Instance [cmdb_ci_vm_instance]

Cloud Network [cmdb_ci_network]

The following attributes in the Cloud Network [cmdb_ci_network] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Cidr	cidr
Install Status	install_status
Operational status	operational_status
State	state

Relationships created for Cloud Network

Parent class	Relationship type	Child class
Cloud Network [cmdb_ci_network]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Network [cmdb_ci_network]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]
Cloud Network [cmdb_ci_network]	Contains::Contained by	Compute Security Group [cmdb_ci_compute_security_group]
Cloud Network [cmdb_ci_network]	Reference	Key Value [cmdb_key_value]

Cloud Object Storage [cmdb_ci_cloud_object_storage]

The following attributes in the Cloud Object Storage [cmdb_ci_cloud_object_storage] table are populated by collected data:

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Attribute label	Attribute name
Name	name
Object ID	object_id
ACL Access Type	acl_access_type
Cloud Provider	cloud_provider
Creation Date	creation_date
Encryption Type	encryption_type
Install Status	install_status
Operational status	operational_status
Policy Access Type	policy_access_type
Service Name	service_name

Relationships created for Cloud Object Storage

Parent class	Relationship type	Child class
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Reference	Key Value [cmdb_key_value]

Cloud Organizations [cmdb_ci_cloud_org]

The following attributes in the Cloud Organizations [cmdb_ci_cloud_org] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Install Status	install_status
Master Email	master_email
Name	name
Operational status	operational_status
Root ID	root_id

Relationships created for Cloud Organizations

Parent class	Relationship type	Child class
Cloud Organizations [cmdb_ci_cloud_org]	Contains::Contained by	Cloud Service Account [cmdb_ci_cloud_service_account]
Cloud Organizations [cmdb_ci_cloud_org]	Contains::Contained by	AWS Organizational Unit [cmdb_ci_aws_org_unit]

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Cloud Resource [cmdb_ci_cmp_resource]

The following attributes in the Cloud Resource [cmdb_ci_cmp_resource] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Description	short_description
Install Status	install_status
Operational status	operational_status
Resource type	resource_type
State	state

Relationship created for Cloud Resource

Parent class	Relationship type	Child class
Cloud Resource [cmdb_ci_cmp_resource]	Reference	Key Value [cmdb_key_value]

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data:

Attribute label	Attribute name
Name	name
Account Email	account_email
Install Status	install_status
Is management account	is_master_account
Operational status	operational_status
Parent account	parent_account
Datacenter Type	datacenter_type
Account Id	account_id
Object ID	object_id
Organization Id	organization_id

Relationships created for Cloud Service Account

Parent class	Relationship type	Child class
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	Cloud Service Account [cmdb_ci_cloud_service_account]

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Relationships created for Cloud Service Account (continued)

Parent class	Relationship type	Child class
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	Key Value [cmdb_key_value]

Cloud Subnet [cmdb_ci_cloud_subnet]

The following attributes in the Cloud Subnet [cmdb_ci_cloud_subnet] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Available IP Count	available_ip_count
CIDR	cidr
Install Status	install_status
Operational status	operational_status
State	state

Relationships created for Cloud Subnet

Parent class	Relationship type	Child class
Cloud Subnet [cmdb_ci_cloud_subnet]	Contains::Contained by	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
Cloud Subnet [cmdb_ci_cloud_subnet]	Contains::Contained by	Cloud Mgmt Network Interface [cmdb_ci_nic]
Cloud Subnet [cmdb_ci_cloud_subnet]	Reference	Key Value [cmdb_key_value]

Compute Security Group [cmdb_ci_compute_security_group]

The following attributes in the Compute Security Group [cmdb_ci_compute_security_group] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status

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Relationships created for Compute Security Group Table

Parent class	Relationship type	Child class
Compute Security Group [cmdb_ci_compute_security_group]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Compute Security Group [cmdb_ci_compute_security_group]	Reference	Key Value [cmdb_key_value]

Docker Container [cmdb_ci_docker_container]

The following attributes in the Docker Container [cmdb_ci_docker_container] table are populated by collected data:

Attribute label	Attribute name
Container id	container_id
Image id	image_id
Install Status	install_status
Name	name
Operational status	operational_status
Status	status

Docker Image [cmdb_ci_docker_image]

The following attributes in the Docker Image [cmdb_ci_docker_image] table are populated by collected data:

Attribute label	Attribute name
Image id	image_id
Install Status	install_status
Name	name
Operational status	operational_status

Relationship created for Docker Image

Parent class	Relationship type	Child class
Docker Image [cmdb_ci_docker_image]	Instantiates::Instantiated by	Docker Container [cmdb_ci_docker_container]

DynamoDB Table [cmdb_ci_dynamodb_table]

The following attributes in the DynamoDB Table [cmdb_ci_dynamodb_table] table are populated by collected data:

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Attribute label	Attribute name
Name	name
Object ID	object_id
Cloud Provider	cloud_provider
Creation Date	creation_date
Encryption	encryption
Install Status	install_status
Operational status	operational_status
Read Units	read_units
Service Name	service_name
Write Units	write_units

Relationships created for DynamoDB Table

Parent class	Relationship type	Child class
DynamoDB Table [cmdb_ci_dynamodb_table]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
DynamoDB Table [cmdb_ci_dynamodb_table]	Reference	Key Value [cmdb_key_value]

Hardware Type [cmdb_ci_compute_template]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Cores	cores
Install Status	install_status
Local Storage GB	local_storage_gb
Memory MB	memory_mb
Operational status	operational_status
vCPUs	vcpus

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Note:
If the *sn_itom_pattern.use a single hardware type for cloud data center* property is set to `true`, hardware type data is populated in the Cloud Hardware Type [cmdb_ci_cloud_hardware_type] table. If this property is set to `false`, hardware type data is populated in the Hardware Type [cmdb_ci_compute_template] table. Before you configure the *sn_itom_pattern.use a single hardware type for cloud data center* property, the existing hardware type data must be cleaned. For instructions, see the Service Graph Connector For AWS - Migrating to a new hardware type model [KB1705233] article in the Now Support Knowledge Base.

Relationship created for Hardware Type

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Image [cmdb_ci_os_template]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Class	sys_class_name
Description	short_description
Environment	environment
Guest OS	guest_os
Image Source	image_source
Image Type	image_type
Install Status	install_status
Operational status	operational_status
Root Device Type	root_device_type

Relationships created for Image

Parent class	Relationship type	Child class
Image [cmdb_ci_os_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Image [cmdb_ci_os_template]	Reference	Key Value

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

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Attribute label	Attribute name
Install Status	install_status
Nic	nic
IP Address	ip_address
Name	name
Operational status	operational_status

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	Value

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

The following attributes in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table are populated by collected data:

Attribute label	Attribute name
Cluster Resource ID	cluster_resource_id
IP Address	ip_address
Name	name
Port	port
Fully qualified domain name	fqdn
Install status	install_status
Namespace	namespace
Operational status	operational_status

Relationships created for Kubernetes Cluster

Parent class	Relationship type	Child class
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Namespace [cmdb_ci_kubernetes_namespace]

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Relationships created for Kubernetes Cluster (continued)

Parent class	Relationship type	Child class
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Pod [cmdb_ci_kubernetes_pod]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Service [cmdb_ci_kubernetes_service]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Cluster of::Cluster	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Managed by::Manages	Server [cmdb_ci_server]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Reference	Key Value [cmdb_key_value]

Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset]

The following attributes in the Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Install Status	install_status
Operational status	operational_status
SelfLink	self_link

Relationship created for Kubernetes DaemonSet

Parent class	Relationship type	Child class
Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Deployment [cmdb_ci_kubernetes_deployment]

The following attributes in the Kubernetes Deployment [cmdb_ci_kubernetes_deployment] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace

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Attribute label	Attribute name
Available Replicas	available_replicas
Install Status	install_status
Operational status	operational_status
SelfLink	self_link

Relationship created for Kubernetes Deployment

Parent class	Relationship type	Child class
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Namespace [cmdb_ci_kubernetes_namespace]

The following attributes in the Kubernetes Namespace [cmdb_ci_kubernetes_namespace] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Install Status	install_status
Namespace	namespace
Operational status	operational_status

Kubernetes Node [cmdb_ci_kubernetes_node]

The following attributes in the Kubernetes Node [cmdb_ci_kubernetes_node] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Install Status	install_status
Operational status	operational_status

Kubernetes Pod [cmdb_ci_kubernetes_pod]

The following attributes in the Kubernetes Pod [cmdb_ci_kubernetes_pod] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name

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Attribute label	Attribute name
Namespace	namespace
Install Status	install_status
IP Address	ip_address
Operational status	operational_status
Resource version	resource_version

Relationships created for Kubernetes Pod

Parent class	Relationship type	Child class
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Container [cmdb_ci_docker_container]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Kubernetes Volume [cmdb_ci_kubernetes_volume]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Image [cmdb_ci_docker_image]

Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]

The following attributes in the Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Install Status	install_status
Operational status	operational_status
SelfLink	self_link

Relationships created for Kubernetes ReplicaSet

Parent class	Relationship type	Child class
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Service [cmdb_ci_kubernetes_service]

The following attributes in the Kubernetes Service [cmdb_ci_kubernetes_service] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid

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Attribute label	Attribute name
Name	name
Namespace	namespace
Install Status	install_status
IP Address	ip_address
Operational status	operational_status
Selector	selector

Kubernetes Volume [cmdb_ci_kubernetes_volume]

The following attributes in the Kubernetes Volume [cmdb_ci_kubernetes_volume] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Mount Path	mount_path
Name	name
Volume ID	volume_id
Install Status	install_status
Namespace	namespace
Operational status	operational_status

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
MAC Address	mac_address
Configuration Item	cmdb_ci
Name	name
Install Status	install_status
Operational status	operational_status

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Server [cmdb_ci_server], Linux Server [cmdb_ci_linux_server], or Windows Server [cmdb_ci_win_server]

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Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data:

Attribute label	Attribute name	Data source
Name	name	SG-AWS-SSM-GetS3Object SG-AWS-Get-Inventory (if the AWS SSM service is enabled) SG-AWS-EC2 (if the AWS SSM service isn't enabled)
Class	sys_class_name	SG-AWS-Software-Inventory (if the AWS SSM service is enabled)
CPU core count	cpu_core_count	SG-AWS-SSM-GetS3Object
CPU core thread	cpu_core_thread	SG-AWS-SSM-GetS3Object
CPU count	cpu_count	SG-AWS-SSM-GetS3Object
CPU name	cpu_name	SG-AWS-SSM-GetS3Object
CPU manufacturer	cpu_manufacturer	SG-AWS-SSM-GetS3Object
CPU speed (MHz)	cpu_speed	SG-AWS-SSM-GetS3Object
CPU type	cpu_type	SG-AWS-SSM-GetS3Object
Disk Space (GB)	disk_space	SG-AWS-SSM-GetS3Object SG-AWS-EC2
DNS Domain	dns_domain	SG-AWS-EC2
Fully qualified domain name	fqdn	SG-AWS-EC2
Host Name	host_name	SG-AWS-SSM-GetS3Object
Install Status	install_status	SG-AWS-EC2
Is Virtual	virtual	SG-AWS-EC2

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Attribute label	Attribute name	Data source
Model ID	model_id	SG-AWS-SSM-GetS3Object
Object ID	object_id	SG-AWS-EC2
Operating System	os	SG-AWS-EC2 SG-AWS-Software-Inventory
Operational status	operational_status	SG-AWS-EC2
OS Version	os_version	SG-AWS-Software-Inventory
RAM (MB)	ram	SG-AWS-SSM-GetS3Object SG-AWS-EC2
Serial Number	serial_number	SG-AWS-SSM-GetS3Object

Note:

- If the AWS Systems Manager (SSM) service isn't enabled, the connector populates the server records in the Server [cmdb_ci_server] class. If the AWS SSM service is enabled, then based on the platform type obtained through the SSM service, the server records are populated in either the Linux Server [cmdb_ci_linux_server] class or the Windows Server [cmdb_ci_win_server] class. The Server [cmdb_ci_server] class is the parent class of the Linux Server [cmdb_ci_linux_server] and the Windows Server [cmdb_ci_win_server] classes.
- If the AWS SSM service is enabled, the *name* field is populated by the SG-AWS-Get-Inventory data source, and the *sys_class_name* field is populated by the SG-AWS-Software-Inventory data source. If the AWS SSM service isn't enabled, the *name* field is populated by the SG-AWS-EC2 data source, and the *sys_class_name* field isn't populated.

Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]
Server [cmdb_ci_server]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Server [cmdb_ci_server]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Server [cmdb_ci_server]	Reference	Software Installation [cmdb_sam_sw_install]
Server [cmdb_ci_server]	Reference	Key Value [cmdb_key_value]

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Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data when the Software Asset Management (SAM) application isn't installed:

Attribute label	Attribute name
Key	key
Discovery source	discovery_source
Name	name
Version	version
Manufacturer	manufacturer

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data when the SAM application is installed:

Attribute label	Attribute name
Display name	display_name
Publisher	publisher
Version	version
Discovery source	discovery_source

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data when the SAM application isn't installed:

Attribute label	Attribute name
Name	name
Installed on	installed_on
Install date	install_date

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Server [cmdb_ci_server]

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Storage Mapping [cmdb_ci_storage_mapping]

The following attributes in the Storage Mapping [cmdb_ci_storage_mapping] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Host	host
Install Status	install_status
Mapping Type	mapping_type
Mount Point	mount_point
Operational status	operational_status

Relationship created for Storage Mapping

Parent class	Relationship type	Child class
Storage Mapping [cmdb_ci_storage_mapping]	Use End Point To::Use End Point From	Block Endpoint [cmdb_ci_endpoint_block]

Storage Volume [cmdb_ci_storage_volume]

The following attributes in the Storage Volume [cmdb_ci_storage_volume] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Volume ID	volume_id
Install Status	install_status
Name	name
Operational status	operational_status
Size	size
Size bytes	size_bytes
State	state
Storage Type	storage_type

Relationships created for Storage Volume

Parent class	Relationship type	Child class
Storage Volume [cmdb_ci_storage_volume]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

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Relationships created for Storage Volume (continued)

Parent class	Relationship type	Child class
Storage Volume [cmdb_ci_storage_volume]	Reference	Key Value [cmdb_key_value]

Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]

The following attributes in the Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status

Relationship created for Storage Volume Snapshot

Parent class	Relationship type	Child class
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
CPUs	cpus
Disks	disks
Disks size (GB)	disks_size
Fully qualified domain name	fqdn
Install Status	install_status
IP Address	ip_address
Memory (MB)	memory
Monitor	monitor
Network adapters	nics
Operational status	operational_status
Placement Group ID	placement_group_id

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Attribute label	Attribute name
State	state
VM Instance ID	vm_inst_id

Relationships created for Virtual Machine Instance

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Located in::Houses	Availability Zone [cmdb_ci_availability_zone]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Contains::Contained by	Storage Mapping [cmdb_ci_storage_mapping]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Image [cmdb_ci_os_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Cloud Hardware Type [cmdb_ci_cloud_hardware_type]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Hardware Type [cmdb_ci_compute_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	Key Value [cmdb_key_value]
Virtual Machine Instance [cmdb_ci_vm_instance]	Contains::Contained by	Storage Volume [cmdb_ci_storage_volume]
Virtual Machine Instance [cmdb_ci_vm_instance]	Use End Point To::Use End Point From	Cloud Mgmt Network Interface [cmdb_ci_nic]

VNIC Endpoint [cmdb_ci_endpoint_vnic]

The following attributes in the VNIC Endpoint [cmdb_ci_endpoint_vnic] table are populated by collected data:

Attribute label	Attribute name
Host	host
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status

Related content

Data mapping for Service Graph Connector for AWS

Service Graph Connector for AWS properties

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Quick start tests for Service Graph Connector for AWS

Validate that Service Graph Connector for AWS still works after you make any configuration change such as applying an upgrade or developing an application. Copy and customize these quick start tests to pass when using your instance-specific data.

Danger:
By default, the system property that is used to run automated tests is disabled to prevent you from accidentally running these tests on a production system. To avoid data corruption or an outage, run tests only on development, test, and other non-production instances. See Enable or disable executing Automated Test Framework tests.

SG-AWS: Service Graph Connector for AWS Validation test suite

Test suite to verify the integrity of an integration using multiple tests.

Test	Description	Release version
SG-AWS API Gateway	Validate the ingestion of multiple CI records in the Cloud Gateway.	Utah
SG-AWS DynamoDb	Validate the ingestion of multiple CI records in the DynamoDB table.	Utah
SG-AWS EC2	Loads data in the CMDB such as all dependent CIs such as Organizations, Service-Accounts, Networks, Subnets, and Network-Interfaces, after which mock data for SG-AWS-EC2 is prepared.	Utah
SG-AWS EKS Cluster	Validates the ingestion of multiple CI records in the Kubernetes Cluster table.	Utah
SG-AWS ELB V1	Validates the ingestion of multiple CI records in the Cloud Load Balancer.	Utah
SG-AWS ELB V2	Validates the ingestion of multiple CI records in the Cloud Load Balancer.	Utah
SG-AWS Generic Resource	Validates the ingestion of multiple CI records in the Cloud Resource table.	Utah
SG-AWS Hardware Type	Validates the ingestion of multiple CI records in the Hardware Type table.	Utah
SG-AWS Image Id	Validates the ingestion of multiple CI records in the Image table.	Utah
SG-AWS Image Private	Validates the ingestion of multiple CI records in the Image table.	Utah

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SG-AWS: Service Graph Connector for AWS Validation test suite

Test suite to verify the integrity of an integration using multiple tests.

(continued)

Test	Description	Release version
SG-AWS Lambda	Validates the ingestion of multiple CI records in the Cloud function table.	Utah
SG-AWS Network Interface	Validates the ingestion of multiple CI records in the Cloud Mgmt Network Interface table.	Utah
SG-AWS Organization	Tests RTE mappings for the ingestion of CIs in the Cloud Organization table.	Utah
SG-AWS RDS	Validates the ingestion of mutliple CI records in the Cloud Database table.	Utah
SG-AWS S3	Validates the ingestion of multiple CI records in the Cloud Object Storage table.	Utah
SG-AWS Security Group	Validates the ingestion of multiple CI records in the Compute Security Group table.	Utah
SG-AWS Service Account	Tests RTE mappings for the ingestion of CIs in the Cloud Service Account table.	Utah
SG-AWS Software Inventory	Validates the ingestion of Software Data and classification of CI records in the Server table. It tests whether the server is classified as Linux or Windows.	Utah
SG-AWS Software Remove	Validates the removal of Software Data from the cmdb_software_instance or the cmdb_sam_sw_install table.	Utah
SG-AWS Storage Volume	Loads mock import data for Storage Volume into the relevant staging table. Validates if fields are populated as expected in the cmdb_ci_storage_volume, cmdb_ci_storage_vol_snapshot, and sn_aws_extension_attributes tables and if the appropriate	Utah

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SG-AWS: Service Graph Connector for AWS Validation test suite

Test suite to verify the integrity of an integration using multiple tests.

(continued)

Test	Description	Release version
	relationships have been created between the inserted CIs.	
SG-AWS SSM SendCommand	Validates the ingestion of multiple CI records in the TCP Connection and Running Process tables. Updates records in the Server table.	Utah
SG-AWS Subnets	Validates the ingestion of multiple CIs in the Cloud Subnet table.	Utah
SG-AWS VM Hw Consolidation	Validates the update of multiple CI records in the Virtual Machine Instance and Server table.	Utah
SG-AWS VPC	Tests RTE mappings associated with SG-AWS VPC Data source. It loads import set data for VPCs, Datacenters, Service-Acccount, and Organizations. Validates if the CIs have been added to the cmdb_ci_network table, the fields are populated with the expected value, and appropriate relationships verified through the cmdb_rel_ci table.	Utah

Related topics

Quick start tests

Accessing the connection details of Service Graph Connector for AWS

You can access the connection details of the Service Graph Connector for AWS in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for AWS. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of an AWS connection

Access the details of an AWS connection configured for the Service Graph Connector for AWS.

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Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Service Graph Connectors** > **AWS** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Additional features within the Service Graph Connector for AWS

Use the additional features available within the Service Graph Connector for AWS to maximize its use for importing data.

The following features are available within the Service Graph Connector for AWS:

Enabling optimized deletion of retired CIs in AWS

Enable the *sn_aws_integ.enableOptimizedDeletion* system property for the optimized deletion of retired configuration items (CIs) in AWS during delta import of data.

Enabling optimized SG-AWS-SendCommand data source performance

When using the SG-AWS-Software-Inventory data source, enable the *sn_aws_integ.is_software_inventory_enabled* system property for optimizing the performance of the SG-AWS-SendCommand and SG-AWS-SSM-GetS3Object data sources.

Handling import failures for large AWS resources

Manage the data source failure when importing resources from AWS.

Handling memory utilization errors for Service Graph Connector for AWS

Avoid the memory utilization errors when using the Service Graph Connector for AWS to import a large number of CIs from an AWS instance.

Setting up partition size with parallel loading enabled

Optimize the performance of the SG-AWS-Image-Private, SG-AWS-Tags, SG-AWS-SendCommand, and AWS-SSM-GetS3Object data sources by configuring the partition size setting in the *aws_account_partition_size* connection property.

Disable parallel loading for Service Graph Connector for AWS data sources

Disable parallel loading for specific data sources in the Service Graph Connector for AWS.

Handling parallel deletion of CIs in Service Graph Connector for AWS

Optimize performance when using the Service Graph Connector for AWS by enabling the parallel deletion of CIs.

Enable mapping for Cloud Os Image in AWS

Enable mapping of AWS Cloud Os Image data to the Cloud Image [cmdb_ci_cloud_os_image] table.

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Enable optimized deletion of retired CIs in AWS

Enable the *sn_aws_integ.enableOptimizedDeletion* system property for the optimized deletion of retired configuration items (CIs) in AWS during full import of data.

Before you begin

Set the application scope to Service Graph Connector for AWS using the application picker. For more information, see Application picker.

Role required: admin

About this task

By default, the *ListDiscoveredResources* API is used in batches of 20 to ascertain deleted resource data as there's no other API in AWS that provides deleted resource deltas. This action adversely impacts performance, particularly with a large number of resources, as the majority of time is dedicated to API calls.

When your AWS instance has a large number of CIs to import, you can enable the *sn_aws_integ.enableOptimizedDeletion* property to accelerate the import time. The property enables deleting any retired CI classes with an improved logic. In this optimized deletion approach, a complete pull is conducted. Without depending on AWS API calls, the deleted CI is determined by comparing imported resources from the last run with the resources imported in the current run. By default, the value of the property is set to `false`.

Procedure

1. Enter `sys_properties.list` in the navigation filter, and then open the *sn_aws_integ.enableOptimizedDeletion* property.
2. In the **Value** field, enter `true`.
3. Select **Update**.

Enable optimized SG-AWS-SendCommand data source performance

When the SG-AWS-Software-Inventory data source is being used, enable the *sn_aws_integ.is_software_inventory_enabled* system property for optimizing the performance of the SG-AWS-SendCommand and SG-AWS-SSM-GetS3Object data sources.

Before you begin

Important:
The *sn_aws_integ.is_software_inventory_enabled* system property is not supported in Service Graph Connector for AWS version 2.10.0 and later.

Set the application scope to Service Graph Connector for AWS using the application picker. For more information, see Application picker.

Role required: admin

About this task

The SG-AWS-SendCommand and SG-AWS-SSM-GetS3Object data sources use *SSM GetInventory* API calls for importing software data, impacting performance. To enhance the performance of the SG-AWS-SendCommand and SG-AWS-SSM-GetS3Object data sources, consider leveraging the SG-AWS-Software-Inventory data source by enabling the *sn_aws_integ.is_software_inventory_enabled* system property.

This optimization skips a substantial number of *SSM GetInventory* API calls, enhancing the performance of the SG-AWS-SendCommand and SG-AWS-SSM-GetS3Object data sources. However, the SG-AWS-SendCommand and SG-AWS-SSM-GetS3Object data sources import data from the same servers that are configured for the SG-AWS-Software-Inventory data source.

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By default, the *sn_aws_integ.is_software_inventory_enabled* property is set to `false`. To enhance the performance of the SG-AWS-SendCommand and SG-AWS-SSM-GetS3Object data sources, set the *sn_aws_integ.is_software_inventory_enabled* property to `true`.

Procedure

1. Enter `sys_properties.list` in the navigation filter, and then open the *sn_aws_integ.is_software_inventory_enabled* property.
2. In the **Value** field, enter `true`.
3. Select **Update**.

Handling import failures for large AWS resources

Manage the data source failure when importing resources from AWS.

When importing large AWS resources, the data sources in the Service Graph Connector for AWS might fail because of a Direct REST response exceeding the 1024-MB limit. For more information, see REST step.

You can save the response as an attachment to handle the REST response size limitation error in the Service Graph Connector for AWS.

Save the response as an attachment

With the save response as an attachment feature, the response of each data source is temporarily stored as an attachment and after the response is read, the attachment is deleted automatically. The save response as an attachment feature is activated by default and is triggered by the *sn_aws_integ.save_payload_as_attachment* system property.

As a user with the admin role, you can deactivate the save response as an attachment feature by setting the *sn_aws_integ.save_payload_as_attachment* property to `false`. When the feature is deactivated and the response size is within the limit, the data sources run normally.

Handling memory utilization errors for Service Graph Connector for AWS

You can use the `SgAwsApplicationProperties` script include to avoid memory utilization errors when importing a large number of configuration items (CIs) from an AWS instance via the Service Graph Connector for AWS.

By making multiple database calls to ingest AWS data in smaller batches, the `SgAwsApplicationProperties` script include avoids overloading of the Robust Transform Engine (RTE) and results in reduced memory usage. However, for the script include to function properly, verify that the AWS Config aggregator is enabled on your AWS instance.

To access the script include, navigate to **All** > **System Definitions** > **Script Includes**, and then search for and select `SgAwsApplicationProperties`. For more information, see Script includes.

In the `SgAwsApplicationProperties` script include, you can modify the functions as described in the following table to resolve memory utilization errors.

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SgAwsApplicationProperties script include functions

Functionality	Implementation
Enable multiple database calls to import the AWS Config data.	Set the value of the *isConfigDbLoadEnabled* function to `true`. For the function to work correctly, verify that the AWS Config aggregator is enabled. **Note:** Enabling *isConfigDbLoadEnabled* might impact the import set load time as multiple database calls are being made instead of a single database call. Enabling the *isConfigDbLoadEnabled* function resolves the memory utilization error for the following data sources: • SG-AWS-API-Gateway • SG-AWS-DynamoDb • SG-AWS-EC2 • SG-AWS-EKS-Cluster • SG-AWS-ELB-V1 • SG-AWS-ELB-V2 • SG-AWS-Generic-Resources • SG-AWS-Lambda • SG-AWS-Network-Interface • SG-AWS-RDS • SG-AWS-S3 • SG-AWS-Security-Group • SG-AWS-Storage-Volume • SG-AWS-Subnets • SG-AWS-VPC
Enable multiple database calls to import the tag-related data from your AWS service account.	Set the value of the *isConfigTagsDbLoadEnabled* function to `true`. For the function to work correctly, verify that both the AWS Config aggregator and the *isConfigDbLoadEnabled* function are enabled. Enabling the *isConfigTagsDbLoadEnabled* function facilitates the AWS Config aggregator to reduce the load time for tag-related data in the following data sources: • SG-AWS-Lambda • SG-AWS-DynamoDb • SG-AWS-ELB-V1 • SG-AWS-ELB-V2

Set partition size for parallel loading-enabled AWS accounts

When using the SG-AWS-Image-Private, SG-AWS-Tags, SG-AWS-SendCommand, and AWS-SSM-GetS3Object data sources, you can optimize their performance by setting the partition size in the *aws_account_partition_size* connection property.

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Before you begin

Set the application scope to Service Graph Connector for AWS using the application picker. For more information, see Application picker.

Role required: admin

About this task

The parallel loading feature is available for the SG-AWS-Image-Private, SG-AWS-Tags, SG-AWS-SendCommand, and AWS-SSM-GetS3Object data sources from the *Washington DC* Patch 5 release. This feature determines the number of AWS accounts that can be executed as parallel jobs to retrieve configuration item (CI) data. Partition size determines how many AWS accounts a single parallel-thread evaluates for data retrieval. For example, if you set the *aws_account_partition_size* property to 5 and there are 25 AWS accounts, the application generates 5 parallel jobs during data loading.

Note:
If the *aws_account_partition_size* property isn't configured, the partition size computation feature of the Integration Commons for CMDB application automatically determines the partition size for parallel loading at runtime. See Partition size computation for parallel loading in Integration Commons for CMDB.

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **AWS** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. From the **Property** column of the Service Graph Connection Properties related list, select **aws_account_partition_size**.
4. In the **Value** field, enter a numeric value greater than 0 for the partition size.
5. Select **Update**.

Disable parallel loading for Service Graph Connector for AWS data sources

You can disable parallel loading for specific data sources in the Service Graph Connector for AWS.

Before you begin

Set the application scope to Service Graph Connector for AWS using the application picker. For more information, see Application picker.

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **AWS** > **Data sources**.
2. From the list of data sources, open the data source for which you want to disable parallel loading.
3. Clear the **Enable parallel loading** check box.
4. Select **Update**.

Handling parallel deletion of CIs in Service Graph Connector for AWS

Parallel deletion of configuration items (CIs) in the Service Graph Connector for AWS optimizes performance.

The parallel deletion feature is available for the following data sources from Washington DC patch 5 after the parallel job plugin is activated:

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- SG-AWS-API-Gateway
- SG-AWS-DynamoDb
- SG-AWS-EC2
- SG-AWS-ELB-V1
- SG-AWS-ELB-V2
- SG-AWS-Generic-Resources
- SG-AWS-Lambda
- SG-AWS-Network-Interface
- SG-AWS-RDS
- SG-AWS-S3
- SG-AWS-Security-Group
- SG-AWS-Storage-Volume
- SG-AWS-Subnets
- SG-AWS-VPC

Note:
If you upgraded to Service Graph Connector for AWS version 2.9.1 before the parallel job plugin was activated, you must run the SGC - `Parallel Loading Fix` script to enable parallel deletion.

Multiple jobs are created for deleting CIs based on the number of accounts in your configuration. You can modify the number of jobs that are created by setting the partition size in the *`aws_account_partition_size`* connection property. See Set partition size for parallel loading-enabled AWS accounts.

Note:
Only one job is created to import new and updated CIs.

Enable mapping for Cloud Os Image in AWS

Enable the *`sn_cmdb_ci_class.use_single_cloud_os_image`* system property to add Cloud Os Image data to the Cloud Image [cmdb_ci_cloud_os_image] table instead of adding the data to the Image [cmdb_ci_os_template] table.

Before you begin

Set the application scope to Service Graph Connector for AWS using the application picker. For more information, see Application picker.

Role required: admin

About this task

In Service Graph Connector for AWS version 2.9.1 and earlier, the Cloud Os Image data was added to the Image [cmdb_ci_os_template] table. Multiple records were created for the same image because the Image [cmdb_ci_os_template] table is a dependent class. In Service Graph Connector for AWS version 2.10.0 and later, Cloud Os Image data is added to the Cloud Image [cmdb_ci_cloud_os_image] table, which is an independent class, when the *`sn_cmdb_ci_class.use_single_cloud_os_image`* system property is enabled.

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Procedure

1. Enter `sys_properties.list` in the navigation filter, and then open the *`sn_cmdb_ci_class.use_single_cloud_os_image`* property.
2. In the **Value** field, enter `true`.
3. Select **Update**.

Service Graph Connector for AWS reference

Reference topics provide additional information about Service Graph Connector for AWS components.

Supported AWS resource types

Several AWS resource types are imported as CMDB data by the Service Graph Connector for AWS.

AWS Config resources

When the AWS Config aggregator is enabled, the following APIs are invoked:

- ListDiscoveredResources
- BatchGetAggregateResourceConfig
- SelectAggregateResourceConfig

When the AWS Config aggregator is disabled, the following APIs are invoked:

- ListDiscoveredResources
- SelectResourceConfig
- BatchGetResourceConfigAction

Note:
For a list of AWS resource types supported by AWS Config, see Supported Resource Types on the AWS documentation site.

CMDB CI classes and AWS Config resources

CMDB CI classes	AWS resource type	AWS Config resource identifier
Cloud Network [cmdb_ci_network]	Amazon VPC	AWS::EC2::VPC
Cloud Subnet [cmdb_ci_cloud_subnet]	Amazon subnet	AWS::EC2::Subnet
Cloud Mgmt Network Interface [cmdb_ci_nic]	Amazon Elastic network interface	AWS::EC2::NetworkInterface

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CMDB CI classes and AWS Config resources (continued)

CMDB CI classes	AWS resource type	AWS Config resource identifier
Compute Security Group [cmdb_ci_compute_security_group]	Amazon EC2 security group	AWS::EC2::SecurityGroup
Storage Volume [cmdb_ci_storage_volume]	Amazon EBS volume	AWS::EC2::Volume
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Classic load balancer	AWS::ElasticLoadBalancing::LoadBalancer
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Application load balancer, network load balancer, or gateway load balancer	AWS::ElasticLoadBalancingV2::LoadBalancer
Cloud Gateway [cmdb_ci_cloud_gateway]	API gateway with WebSocket APIs or HTTP APIs	AWS::ApiGatewayV2::Api
Virtual Machine Instance [cmdb_ci_vm_instance]	Amazon EC2 instance	AWS::EC2::Instance
Server [cmdb_ci_server]	Amazon EC2 instance	AWS::EC2::Instance
Cloud DataBase [cmdb_ci_cloud_database]	Amazon RDS DB instance	AWS::RDS::DBInstance
Cloud Function [cmdb_ci_cloud_function]	Lambda function	AWS::Lambda::Function
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Amazon S3 bucket	AWS::S3::Bucket
DynamoDB Table [cmdb_ci_dynamodb_table]	DynamoDB table	AWS::DynamoDB::Table

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CMDB CI classes and AWS Config resources (continued)

CMDB CI classes	AWS resource type	AWS Config resource identifier
Software [cmdb_ci_spkg]	Software configuration for managed instances	AWS::SSM::ManagedInstanceInventory
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Amazon EKS cluster	AWS::EKS::Cluster
Amazon Redshift [cmdb_ci_aws_redshift]	Amazon Redshift	AWS::Redshift::Cluster

Amazon EC2 resources

CMDB CI classes and Amazon EC2 resources

CMDB CI classes	AWS resource type	AWS API action
Availability Zone [cmdb_ci_availability_zone]	AWS availability zone	None
Hardware Type [cmdb_ci_compute_template]	Amazon EC2 instance types	DescribeInstanceTypes
Image [cmdb_ci_os_template]	Amazon Machine Image (AMI)	DescribeImages
Cloud Image [cmdb_ci_cloud_os_image]	Amazon Machine Image (AMI)	DescribeImages
Cloud Hardware Type [cmdb_ci_cloud_hardware_type]	Amazon EC2 instance types	DescribeInstanceTypes

AWS Systems Manager resources

All AWS Systems Manager resources invoke the SendCommand API action.

CMDB CI classes and AWS Systems Manager resources

CMDB CI classes	AWS resource type	AWS API action
Running Process [cmdb_running_process]	Running process in EC2 instances	SendCommand

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CMDB CI classes and AWS Systems Manager resources (continued)

CMDB CI classes	AWS resource type	AWS API action
TCP Connections [cmdb_tcp]	TCP connections in EC2 instances	
Kubernetes Node [cmdb_ci_kubernetes_node]	Amazon EKS node	
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Amazon EKS pod	
Kubernetes Service [cmdb_ci_kubernetes_service]	Amazon EKS service	
Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset]	Kubernetes DaemonSet	
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Kubernetes namespace	
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Kubernetes deployment	
Docker Container [cmdb_ci_docker_container]	Docker container	
Kubernetes Volume [cmdb_ci_kubernetes_volume]	Kubernetes Volume	

Organizations resources

CMDB CI classes and organizations

CMDB CI classes	AWS resource type	AWS API action
Cloud Organizations [cmdb_ci_cloud_org]	AWS Organizations	DescribeOrganization
Cloud Service Account [cmdb_ci_cloud_service_account]	AWS accounts	ListAccounts
AWS Datacenter [cmdb_ci_aws_datacenter]	AWS regions	DescribeRegions

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Resource Group Tagging resources

CMDB CI class and resource group tagging

CMDB classes	AWS resource type	AWS API action
Key Value [cmdb_key_value]	Tags for AWS Lambda, Amazon DynamoDB, ELBv1, and ELBv2	GetResources

Generic resources

Generic resources are stored in the Cloud Resource [cmdb_ci_cmp_resource] CMDB CI class.

CMDB CI classes and generic resources

CMDB CI class	AWS resource type	AWS API action
Cloud Resource [cmdb_ci_cmp_resource]	State Manager association compliance	AWS::SSM::AssociationCompliance
	Database subnet group	AWS::RDS::DBSubnetGroup
	AWS WAF rate based rule	AWS::WAF::RateBasedRule
	AWS WAF regional rule group	AWS::WAFRegional::RuleGroup
	AWS WAF regional rate based rule	AWS::WAFRegional::RateBasedRule
	Managed policies and inline policies	AWS::IAM::Policy
	AWS WAF Web ACL rule	AWS::WAF::WebACL
	AWS WAF Regional Web ACL rule	AWS::WAFRegional::WebACL
	AWS Certificate Manager (ACM) certificate	AWS::ACM::Certificate
	Amazon EC2 Auto Scaling group	AWS::AutoScaling::AutoScalingGroup

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CMDB CI classes and generic resources (continued)

CMDB CI class	AWS resource type	AWS API action
	IAM user for AWS account	AWS::IAM::User
	Amazon Redshift event subscription	AWS::Redshift::EventSubscription
	Amazon RDS DB snapshot	AWS::RDS::DBSnapshot
	Amazon Redshift cluster parameter group	AWS::Redshift::ClusterParameterGroup
	Amazon EC2 Auto Scaling group launch configuration	AWS::AutoScaling::LaunchConfiguration
	Amazon Redshift cluster snapshot	AWS::Redshift::ClusterSnapshot
	AWS CloudFormation stack	AWS::CloudFormation::Stack
	AWS CodeBuild project	AWS::CodeBuild::Project
	AWS Elastic Beanstalk application version	AWS::ElasticBeanstalk::ApplicationVersion
	AWS CodePipeline pipeline	AWS::CodePipeline::Pipeline
	Amazon Redshift security group	AWS::Redshift::ClusterSecurityGroup
	Amazon CloudFront distribution	AWS::CloudFront::Distribution
	AWS CloudTrail trail	AWS::CloudTrail::Trail
	Amazon CloudFront streaming distribution	AWS::CloudFront::StreamingDistribution

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CMDB CI classes and generic resources (continued)

CMDB CI class	AWS resource type	AWS API action
	AWS WAF rule group	AWS::WAF::RuleGroup
	Amazon RDS DB security group	AWS::RDS::DBSecurityGroup
	Amazon RDS event subscription	AWS::RDS::EventSubscription
	AWS WAF regional rule	AWS::WAFRegional::Rule
	AWS WAF rule	AWS::WAF::Rule
	IAM role for AWS account	AWS::IAM::Role
	Amazon EC2 Auto Scaling scheduled action	AWS::AutoScaling::ScheduledAction
	AWS Elastic Beanstalk environment	AWS::ElasticBeanstalk::Environment
	AWS Redshift cluster	AWS::Redshift::Cluster
	Amazon EC2 Auto Scaling group scaling policy	AWS::AutoScaling::ScalingPolicy
	AWS Shield protected AWS resource	AWS::Shield::Protection
	Amazon CloudWatch alarm	AWS::CloudWatch::Alarm
	EncryptionConfig - AWS X-Ray	AWS::XRay::EncryptionConfig
	AWS Shield protected AWS region	AWS::ShieldRegional::Protection

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CMDB CI classes and generic resources (continued)

CMDB CI class	AWS resource type	AWS API action
	Amazon Redshift subnet group	AWS::Redshift::ClusterSubnetGroup
	AWS Elastic Beanstalk application	AWS::ElasticBeanstalk::Application
	IAM group for AWS account	AWS::IAM::Group

AWS discovery solutions comparison

ITOM Visibility applications discover a variety of AWS resources and populate the relevant configuration item (CI) classes in the Configuration Management Database (CMDB) with their attributes.

ITOM Visibility solutions

ITOM Visibility can offer you comprehensive visibility into your organization's cloud infrastructure. Each application offers unique strengths and capabilities, and by comparing them you can gain holistic insights on their capabilities and benefits.

ITOM Visibility solutions for discovering AWS

ITOM Visibility solution	Overview	Configuration
Discovery and Service Mapping Patterns and Visibility Content	Discovery patterns used by ITOM Visibility	• You must update your store apps to the latest release version. • You must provide ITOM Visibility with access permissions. For more information, see Setting up AWS service accounts
Service Graph Connector for AWS	Service Graph Connector for AWS	Configure Service Graph Connector for AWS using the guided setup

Note:

The CI class, in most cases, is applicable to both solutions. If it's not applicable to one of the solutions, the solution is marked "N/A".

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Discovery and Service Mapping Patterns vs Service Graph Connector for AWS

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
AWS::AppSync::API	Yes	No	cmdb_aws_appsync_api
AWS::Athena::WorkGroup	Yes	No	cmdb_aws_athena_workgroup
AWS::Backup::BackupPlan	Yes	No	cmdb_aws_backup_backup_plan
AWS::Backup::BackupVault	Yes	No	cmdb_aws_backup_backup_vault
AWS::CloudFront::Distribution	Yes	N/A	cmdb_aws_cloudfront_distribution
AWS::CloudFront::Distribution	N/A	Yes	cmdb_ci_cmp_resource
AWS::CloudWatch::Log	Yes	No	cmdb_aws_cloudwatch_log
AWS::CodeDeployment::Deployment	Yes	No	cmdb_aws_codedeploy_deployment
AWS::CodePipeline::Pipeline	Yes	N/A	cmdb_aws_codepipeline_pipeline
AWS::CodePipeline::Pipeline	N/A	Yes	cmdb_ci_cmp_resource
AWS::DMS::Endpoint	Yes	No	cmdb_aws_dms_endpoint
AWS::ElasticBeanstalk::Application	Yes	N/A	cmdb_aws_elastic_beanstalk_applicati
AWS::ElasticBeanstalk::Application	N/A	Yes	cmdb_ci_cmp_resource
AWS::EMR::Cluster	Yes	No	cmdb_aws_emr_cluster
AWS::EventBridge::EventBus	Yes	No	cmdb_aws_eventbridge_event_bus
AWS::FSx::Backup	Yes	No	cmdb_aws_fsx_backup
AWS::FSx::FileSystem	Yes	No	cmdb_aws_fsx_file_system
AWS::Glue::Database	Yes	No	cmdb_aws_glue_database
AWS::IAM::Policy	Yes	N/A	cmdb_aws_iam_policy
AWS::IAM::Policy	N/A	Yes	cmdb_ci_cmp_resource
AWS::IAM::Role	Yes	N/A	cmdb_aws_iam_role
AWS::IAM::Role	N/A	Yes	cmdb_ci_cmp_resource
AWS::IAM::User	Yes	N/A	cmdb_aws_iam_user
AWS::IAM::User	N/A	Yes	cmdb_ci_cmp_resource
AWS::KMS::Key	Yes	No	cmdb_aws_kms_key
AWS::MQ::Broker	Yes	No	cmdb_aws_mq_broker
AWS::MQ::Configuration	Yes	No	cmdb_aws_mq_configuration
AWS::S3::GlacierVault	Yes	No	cmdb_aws_s3_glacier_vault
AWS::SageMaker::NotebookInstance	Yes	No	cmdb_aws_sagemaker_notebook_insta
AWS::SecretsManager::Secret	Yes	No	cmdb_aws_secrets_manager_secret
AWS::SimpleEmailService::Identity	Yes	No	cmdb_aws_simple_email_service_ident
AWS::SQS::Queue	Yes	No	cmdb_aws_sqs_queue

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Discovery and Service Mapping Patterns vs Service Graph Connector for AWS (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
AWS::StepFunctions::StateMachine	Yes	No	cmdb_aws_step_functions_state_mach
AWS::StorageGateway::Gateway	Yes	No	cmdb_aws_storage_gateway_gateway
AWS::SystemsManager::Document	Yes	No	cmdb_aws_systems_manager_docume
AWS::SystemsManager::ParameterStore	Yes	No	cmdb_aws_systems_manager_parame
AWS::TransferFamily::Server	Yes	No	cmdb_aws_transfer_family_server
AWS::VPC::FlowLog	Yes	No	cmdb_aws_vpc_flow_log
AWS::VPC::ManagedPrefixList	Yes	No	cmdb_aws_vpc_managed_prefix_list
AWS::XRay::SamplingRule	Yes	No	cmdb_aws_xray_sampling_rule
ec2:DescribeAvailabilityZones	Yes	Yes	cmdb_ci_availability_zone
ec2:DescribeRegions	Yes	Yes	cmdb_ci_aws_datacenter
AWS::Kinesis::Stream	Yes	No	cmdb_ci_aws_kinesis_data
AWS::KinesisAnalytics	Yes	No	cmdb_ci_aws_kinesis_data_analytics
AWS::KinesisFirehose	Yes	No	cmdb_ci_aws_kinesis_firehose
AWS::KinesisVideo	Yes	No	cmdb_ci_aws_kinesis_video
AWS::Redshift::Cluster	Yes	N/A	cmdb_ci_aws_redshift
AWS::Redshift::Cluster	N/A	Yes	cmdb_ci_cmp_resource
AWS::CertificateManager::Certificate	Yes	No	cmdb_ci_certificate
AWS::Cognito::UserPool	Yes	No	cmdb_ci_cloud_authentication
AWS::RDS::DBInstance	Yes	Yes	cmdb_ci_cloud_database
AWS::ECS::Cluster	Yes	No	cmdb_ci_cloud_ecs_cluster
AWS::ECS::Service	Yes	No	cmdb_ci_cloud_ecs_service
AWS::ECS::TaskDefinition	Yes	No	cmdb_ci_cloud_ecs_task_definition
AWS::Lambda::Function	Yes	Yes	cmdb_ci_cloud_function
AWS::ApiGateway::RestApi	Yes	Yes	cmdb_ci_cloud_gateway
ec2:DescribeInstanceTypes	Yes	Yes	cmdb_ci_cloud_hardware_type
AWS::EC2::Host	Yes	No	cmdb_ci_cloud_host
AWS::EC2::KeyPair	Yes	No	cmdb_ci_cloud_key_pair
AWS::ElasticLoadBalancingV2::LoadBalancer	Yes	Yes	cmdb_ci_cloud_load_balancer
Amazon::S3::Bucket	Yes	Yes	cmdb_ci_cloud_object_storage
Organizations	Yes	Yes	cmdb_ci_cloud_org or cmdb_ci_cloud_service_account
Organizations::AWS accounts	Yes	Yes	cmdb_ci_cloud_service_account

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Discovery and Service Mapping Patterns vs Service Graph Connector for AWS (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
AWS::EC2::Subnet	Yes	Yes	cmdb_ci_cloud_subnet
AWS SSM agents	Yes	No	cmdb_ci_cloud_system_management_
AWS::EC2::Subnet	Yes	No	cmdb_ci_cloud_subnet
AWS::WAF::WebACL	N/A	Yes	cmdb_ci_cmp_resource
AWS::WAFRegional::WebACL	N/A	Yes	cmdb_ci_cmp_resource
AWS::ACM::Certificate	N/A	Yes	cmdb_ci_cmp_resource
AWS::Redshift::EventSubscription	N/A	Yes	cmdb_ci_cmp_resource
AWS::RDS::DBSnapshot	N/A	Yes	cmdb_ci_cmp_resource
AWS::Redshift::ClusterParameterGroup	N/A	Yes	cmdb_ci_cmp_resource
AWS::AutoScaling::LaunchConfiguration	N/A	Yes	cmdb_ci_cmp_resource
AWS::Redshift::ClusterSnapshot	N/A	Yes	cmdb_ci_cmp_resource
AWS::CloudFormation::Stack	N/A	Yes	cmdb_ci_cmp_resource
AWS::CodeBuild::Project	N/A	Yes	cmdb_ci_cmp_resource
AWS::ElasticBeanstalk::ApplicationVersion	N/A	Yes	cmdb_ci_cmp_resource
AWS::Redshift::ClusterSecurityGroup	N/A	Yes	cmdb_ci_cmp_resource
AWS::CloudTrail::Trail	N/A	Yes	cmdb_ci_cmp_resource
AWS::CloudFront::StreamingDistribution	N/A	Yes	cmdb_ci_cmp_resource
AWS::WAF::RuleGroup	N/A	Yes	cmdb_ci_cmp_resource
AWS::RDS::DBSecurityGroup	N/A	Yes	cmdb_ci_cmp_resource
AWS::RDS::EventSubscription	N/A	Yes	cmdb_ci_cmp_resource
AWS::WAF::Rule	N/A	Yes	cmdb_ci_cmp_resource
AWS::AutoScaling::ScheduledAction	N/A	Yes	cmdb_ci_cmp_resource
AWS::ElasticBeanstalk::Environment	N/A	Yes	cmdb_ci_cmp_resource
AWS::AutoScaling::ScalingPolicy	N/A	Yes	cmdb_ci_cmp_resource
AWS::Shield::Protection	N/A	Yes	cmdb_ci_cmp_resource
AWS::CloudWatch::Alarm	N/A	Yes	cmdb_ci_cmp_resource
AWS::XRay::EncryptionConfig	N/A	Yes	cmdb_ci_cmp_resource
AWS::ShieldRegional::Protection	N/A	Yes	cmdb_ci_cmp_resource
AWS::Redshift::ClusterSubnetGroup	N/A	Yes	cmdb_ci_cmp_resource
AWS::IAM::Group	N/A	Yes	cmdb_ci_cmp_resource
AWS::WAFRegional::RateBasedRule	N/A	Yes	cmdb_ci_cmp_resource
AWS::WAFRegional::RuleGroup	N/A	Yes	cmdb_ci_cmp_resource

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Discovery and Service Mapping Patterns vs Service Graph Connector for AWS (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
AWS::WAF::RateBasedRule	N/A	Yes	cmdb_ci_cmp_resource
AWS::RDS::DBSubnetGroup	N/A	Yes	cmdb_ci_cmp_resource
AWS::SSM::AssociationCompliance	N/A	Yes	cmdb_ci_cmp_resource
AWS::EC2::SecurityGroup	Yes	Yes	cmdb_ci_compute_security_group
ec2:DescribeInstanceTypes	Yes	Yes	cmdb_ci_compute_template
AWS::ECR::Repository	Yes	No	cmdb_ci_container_repository
AWS::EC2::CustomerGateway	Yes	No	cmdb_ci_customer_gateway
Docker container	Yes	Yes	cmdb_ci_docker_container
ecr:DescribeImages	Yes	No	cmdb_ci_docker_image
AWS::DynamoDB::GlobalTable	Yes	Yes	cmdb_ci_dynamodb_table
AWS::AutoScaling::AutoScalingGroup	Yes	N/A	cmdb_ci_instance_scale_set
AWS::AutoScaling::AutoScalingGroup	N/A	Yes	cmdb_ci_cmp_resource
AWS::EC2::InternetGateway	Yes	No	cmdb_ci_internet_gateway
AWS::EKS::Cluster	Yes	Yes	cmdb_ci_kubernetes_cluster
WS::ElasticLoadBalancingV2::TargetGroup	Yes	No	cmdb_ci_lb_pool
AWS::ElasticLoadBalancingV2::TargetGroup TargetDescription	Yes	No	cmdb_ci_lb_pool_member
AWS::ElasticLoadBalancingV2::Listener	Yes	No	cmdb_ci_lb_service
AWS::EC2::NatGateway	Yes	No	cmdb_ci_nat_gateway
AWS::EC2::VPC	Yes	Yes	cmdb_ci_network
AWS::EC2::NetworkAcl	Yes	No	cmdb_ci_network_acl
AWS::EC2::NetworkInterface	Yes	Yes	cmdb_ci_nic
AWS::EC2::RouteTable	Yes	No	cmdb_ci_route_table
AWS::EC2::VolumeAttachment	Yes	Yes	cmdb_ci_storage_mapping
AWS::EC2::Volume	Yes	Yes	cmdb_ci_storage_volume
AWS::EC2::VPNGateway	Yes	No	cmdb_ci_virtual_pvt_gateway
AWS::EC2::VPNConnection	Yes	No	cmdb_ci_vpn_connection
AWS::WAFv2::WebACL	Yes	N/A	cmdb_ci_web_acl
AWS::WAFv2::WebACL	N/A	Yes	cmdb_ci_cmp_resource
Tags	Yes	Yes	cmdb_key_value
Kubernetes DaemonSet	No	Yes	cmdb_ci_kubernetes_daemonset

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Discovery and Service Mapping Patterns vs Service Graph Connector for AWS (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
Kubernetes deployment	No	Yes	cmdb_ci_kubernetes_deployment
Kubernetes namespace	No	Yes	cmdb_ci_kubernetes_namespace
Amazon EKS node	No	Yes	cmdb_ci_kubernetes_node
Amazon EKS pod	No	Yes	cmdb_ci_kubernetes_pod
Amazon EKS service	No	Yes	cmdb_ci_kubernetes_service
Kubernetes Volume	No	Yes	cmdb_ci_kubernetes_volume
AWS::SSM::ManagedInstanceInventory	No	Yes	cmdb_ci_spkg
AWS::EC2::VPCPeeringConnection	Yes	No	cmdb_aws_elastic_compute_cloud_vpc
AWS::Elastic Compute Cloud::VPC Endpoint Service	Yes	No	cmdb_aws_elastic_cloud_compute_vpc
AWS::Elastic Compute Cloud::EBS Snapshot	Yes	No	cmdb_aws_elastic_cloud_compute_ebs
AWS::Elastic Compute Cloud::Reserved Instance	Yes	No	cmdb_aws_elastic_cloud_compute_res
AWS::RDS::DBSnapshot	Yes	No	cmdb_aws_relational_database_servic
AWS::SageMaker::Training Job	Yes	No	cmdb_aws_sagemaker_training_job
AWS::Elastic File System::File System	Yes	No	cmdb_aws_elastic_file_system_file_sys
AWS::Redshift Serverless::Namespace	Yes	No	cmdb_aws_redshift_serverless_names
AWS::Redshift Serverless::Workgroup	Yes	No	cmdb_aws_redshift_serverless_workgr
AWS::Redshift Serverless::Snapshot	Yes	No	cmdb_aws_redshift_serverless_snapsh
AWS::ElastiCache::Snapshot	Yes	No	cmdb_aws_elasticache_snapshot
AWS::CloudTrail::Trail	Yes	No	cmdb_aws_cloudtrail_trail
AWS::Batch::ComputeEnvironment	Yes	No	cmdb_aws_batch_compute_environme
AWS::StorageGateway::FileShare	Yes	No	cmdb_aws_storage_gateway_file_share
AWS::DataSync::Task	Yes	No	cmdb_aws_datasync_task
AWS::API Gateway::Domain Name	Yes	No	cmdb_aws_api_gateway_domain_name

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Discovery and Service Mapping Patterns vs Service Graph Connector for AWS (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
AWS DynamoDB Cluster	Yes	No	cmdb_ci_cluster_node
AWS::GlobalAccelerator::Accelerator	Yes	No	cmdb_aws_global_accelerator_accelera
AWS::Timestream::InfluxDBInstance	Yes	No	cmdb_aws_timestream_for_influxdb_da
AWS::CloudHSM::HSM	Yes	No	cmdb_aws_cloudhsm_hsm
AWS::MWAA::Environments	Yes	No	cmdb_aws_managed_workflows_for_ap
AWS::NetworkFirewall::Firewall	Yes	No	cmdb_aws_network_firewall_firewall

Life cycle management of records in Service Graph Connector for AWS

Life cycle management in the Service Graph Connector for AWS monitors and updates the statuses of AWS resources throughout their entire life cycle, from creation to deletion.

The life cycle management process helps maintain the accuracy and integrity of data in the Configuration Management Database (CMDB).

In life cycle management, the record removal process involves systematically deleting obsolete or unnecessary resources. This step ensures that outdated entries are cleared, keeping the CMDB accurate and up-to-date. See Record removal process in Service Graph Connector for AWS.

Life cycle management for CIs in Service Graph Connector for AWS

The following table lists the configuration items (CIs) in CMDB and other non-CMDB tables for which life cycle management is available in Service Graph Connector for AWS.

Supported tables for life cycle management

Data source	CMDB CI classes	Life cycle management available
SG-AWS-Organization	Cloud Organizations [cmdb_ci_cloud_org]	Yes
SG-AWS-Org-Units	AWS Organizational Unit [cmdb_ci_aws_org_unit]	Yes
SG-AWS-Service-Account	Cloud Service Account [cmdb_ci_cloud_service_account]	Yes
SG-AWS-Service-Account-Tags	Key Value [cmdb_key_value]	No
SG-AWS-Org-Unit-Accounts	None	No
SG-AWS-Datacenters	AWS Datacenter [cmdb_ci_aws_datacenter]	No
SG-AWS-VPC	Network Adapter [cmdb_ci_network_adapter]	Yes
SG-AWS-Subnets	Availability Zone [cmdb_ci_availability_zone]	No
	Cloud Subnet [cmdb_ci_cloud_subnet]	Yes

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Supported tables for life cycle management (continued)

Data source	CMDB CI classes	Life cycle management available
SG-AWS-Network-Interface	Cloud Mgmt Network Interface [cmdb_ci_nic]	Yes
SG-AWS-Security-Group	Compute Security Group [cmdb_ci_compute_security_group]	Yes
SG-AWS-Storage-Volume	Storage Volume [cmdb_ci_storage_volume]	Yes
	Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Yes
SG-AWS-Image-Private	Image [cmdb_ci_os_template]	Yes
SG-AWS-EC2	Virtual Machine Instance [cmdb_ci_vm_instance]	Yes
	Server [cmdb_ci_server]	Yes
	Block Endpoint [cmdb_ci_endpoint_block]	Yes
	VNIC Endpoint [cmdb_ci_endpoint_vnic]	Yes
	Storage Mapping [cmdb_ci_storage_mapping]	Yes
	Image [cmdb_ci_os_template]	Yes
	IP Address [cmdb_ci_ip_address]	Yes
SG-AWS-Image-Id	Image [cmdb_ci_os_template]	Yes
SG-AWS-Hardware-Type	Hardware Type [cmdb_ci_compute_template]	Yes
SG-AWS-VM-Hw-Consolidation	None	No
SG-AWS-ELB-V1	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Yes
SG-AWS-ELB-V2	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Yes
SG-AWS-RDS	Cloud DataBase [cmdb_ci_cloud_database]	Yes
SG-AWS-S3	Cloud Object Storage [cmdb_ci_cloud_object_storage]	Yes
SG-AWS-DynamoDb	DynamoDB Table [cmdb_ci_dynamodb_table]	Yes
SG-AWS-API-Gateway	Cloud Gateway [cmdb_ci_cloud_gateway]	Yes
SG-AWS-Lambda	Cloud Function [cmdb_ci_cloud_function]	Yes
SG-AWS-Software-Inventory	Software Installation [cmdb_sam_sw_install]	No
	Software [cmdb_ci_spkg]	No
	Software Instance [cmdb_software_instance]	No
SG-AWS-Software-Remove	None	No

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Supported tables for life cycle management (continued)

Data source	CMDB CI classes	Life cycle management available
SG-AWS-SSM-SendCommand	TCP Connections [cmdb_tcp]	No
	Running [cmdb_running_process]	No
	Application [cmdb_ci_appl]	No
SG-AWS-Tags	Key Value [cmdb_key_value]	No
SG-AWS-EKS-Cluster	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Yes
SG-AWS-EKS-Cluster-2	None	No
SG-AWS-EKS-FULL	Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Yes
	Kubernetes Node [cmdb_ci_kubernetes_node]	Yes
	Kubernetes Service [cmdb_ci_kubernetes_service]	Yes
	Kubernetes Pod [cmdb_ci_kubernetes_pod]	Yes
	Docker Container [cmdb_ci_docker_container]	Yes
	Kubernetes Volume [cmdb_ci_kubernetes_volume]	Yes
	Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Yes
	Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset]	Yes
	Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Yes
SG-AWS-Generic-Resources	Cloud Resource [cmdb_ci_cmp_resource]	Yes
SG-AWS-Redshift-Cluster	Amazon Redshift [cmdb_ci_aws_redshift]	Yes
SG-AWS-Generic-Tags	Key Value [cmdb_key_value]	No
SG-AWS-Get-Inventory	Server [cmdb_ci_server]	Yes

Record removal process in Service Graph Connector for AWS

The Service Graph Connector for AWS uses the optimized deletion approach to manage removal of records.

Record removal is the process of handling data that is no longer needed. For any discovered resources deleted later after pulling data, the Service Graph Connector for AWS automatically updates the **Install Status** field of the associated CMDB CI classes to indicate any retired or deleted records.

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Deletion of records in Service Graph Connector for AWS involves marking the install status of a record as **retired** rather than permanently deleting it from the system. The record remains in the database, making it possible to reference or restore it later. Deletion for Service Graph Connector for AWS relies on the Source [sys_object_source table], which can become inefficient with large datasets.

To enhance the deletion process, you can enable the optimized deletion method that leverages the SG-AWS Extension Attributes [sn_aws_extension_attributes] table. This table is regularly purged of obsolete records, improving performance and efficiency. The process still marks the install status of a record as **retired** but the streamlined data structure reduces overhead, ensuring quicker processing and better system performance. See Enable optimized deletion of retired CIs in AWS.

Optimized deletion is enabled for all tables in the Service Graph Connector for AWS, except for the following tables:

- Hardware Type [cmdb_ci_compute_template]
- Availability Zone [cmdb_ci_availability_zone]
- AWS Datacenter [cmdb_ci_aws_datacenter]
- Running Process [cmdb_running_process]
- TCP Connections [cmdb_tcp]
- Application [cmdb_ci_appl]

Service Graph Connector for AWS properties

Service Graph Connector for AWS properties control the behavior of the connector.

Connection properties

These connection properties are available for the Service Graph Connector for AWS.

Note:
To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **AWS** > **Connections**, and select the connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

Connection properties for Service Graph Connector for AWS

Property	Description
aws_lookback_time_in_days	This property is used for record removal. Time in days in which the sys_object_source records are queried for the deletion of CIs. The value is automatically updated to 15 after the initial run. Set the value of this property to empty to include all the older records populated by SG-AWS as removal candidates. **Note:** Do not modify this property if the value is empty.

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Connection properties for Service Graph Connector for AWS (continued)

Property	Description
	• Type: integer • Default value: empty
config_aggregator_name	Enter the name of the configuration aggregator. • Type: string • Default value: empty
config_aggregator_account	Enter the AWS account where the configuration aggregator is configured. • Type: string • Default value: empty
config_aggregator_region	Enter the AWS region in which the configuration aggregator is configured. • Type: string • Default value: empty
sts_role	Enter the AWS STS role name. • Type: string • Default value: empty
aws_rotate_keys	Set the property to `true` to enable the AWS key rotation process. • Type: true | false • Default value: `false`
aws_rotate_keys_status	The AWS key rotation status. • Type: string • Default value: empty
aws_rotate_keys_date	Enter the AWS key rotation date. • Type: string • Default value: empty
aws_rotate_keys_period	Enter the AWS key rotation period (in days). • Type: integer • Default value: 90

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Connection properties for Service Graph Connector for AWS (continued)

Property	Description
aws_rotate_keys_error_notify_user	Enter the comma-separated list of the email addresses of recipients to be sent notifications about AWS key rotation errors. • Type: string • Default value: empty
aws_rotate_keys_error_notify_group	Enter the comma-separated list of the ServiceNow email groups to be sent notifications about AWS key rotation errors. • Type: string • Default value: empty
org_name	Enter the name of the AWS organization. • Type: string • Default value: <ORG_NAME>
org_description	Enter the description of AWS organization. • Type: string • Default value: empty
org_account_id	Enter the AWS account ID that is used to identify the AWS organization. • Type: string • Default value: <ORG_ID>
management_account_id	Enter the AWS account ID that is used for the management account. This property is required only if the ServiceNow user is created in a designated account. • Type: string • Default value: empty
u_connection_alias_id	The ServiceNow sys_id for the connection alias. • Type: string • Default value: empty
standalone_account_id	Enter the AWS account ID for standalone setup. This property is required only if you set up AWS on a standalone account.

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Connection properties for Service Graph Connector for AWS (continued)

Property	Description
	• Type: string • Default value: empty
gov_cloud	Set the property to `true` to enable AWS GovCloud. • Type: true | false • Default value: empty
aws_account_partition_size	Enter the partition size for AWS accounts if parallel loading is enabled. The value must be a numeric value greater than zero. • Type: integer • Default value: empty
ssm_sendcommand_windows_name	Enter the SSM document name for the SendCommand for Windows. • Type: string • Default value: empty
ssm_sendcommand_linux_name	Enter the SSM document name for the SendCommand for Linux. • Type: string • Default value: empty
ssm_eks_names_document	Enter the SSM document name for the EKS data source. • Type: string • Default value: empty
ssm_eks_shell_document	Enter the SSM document name for EKS-Full data source. • Type: string • Default value: empty
regions	Enter the comma-separated list of AWS regions. • Type: string • Default value: empty
s3_account_id	Enter the numeric identifier of the AWS account that hosts the Amazon Simple Storage Service (Amazon S3) bucket.

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Connection properties for Service Graph Connector for AWS (continued)

Property	Description
	• Type: integer • Default value: empty
s3_bucket_name	Enter the name of the Amazon S3 bucket that collects the details from Amazon EC2 instances. • Type: string • Default value: empty
s3_region	Enter the region where the Amazon S3 bucket is set up. • Type: string • Default value: empty

Default system properties

These default system properties are available for the Service Graph Connector for AWS.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

Default system properties for Service Graph Connector for AWS

Property	Description
sn_aws_integ.create_server_record_even_if_SSM_disabled	This property controls server creation with or without SSM enabled on the instance. Set the property to `true` to create server records when SSM is disabled on the instance. • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table
sn_aws_integ.eks_document_processing_time	Enter the time (in milliseconds) required to process the EKS SendCommand document, during which time the data source thread waits.

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Default system properties for Service Graph Connector for AWS (continued)

Property	Description
	• Type: integer • Default value: `100` • Location: System Property [sys_properties] table
sn_aws_integ.enableOptimizedDeletion	Set the property to `true` to enable optimized deletion using the Integration Commons record removal API. During parallel data loading, delete jobs are created only for delta loads, not for full data loads. • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table
sn_aws_integ.global_generic_resource_region	Set the region that has the configuration recorder that can record global resources such as IAM user and IAM group. Global generic resources are imported only when the region is set. • Type: string • Default value: empty • Location: System Property [sys_properties] table
sn_aws_integ.is_software_inventory_enabled	**Important:** This property is not supported in Service Graph Connector for AWS version 2.10.0 and later. Set the property to `true` if SG-AWS-Software-Inventory is enabled to improve the performance of SG-AWS-SendCommand.

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Default system properties for Service Graph Connector for AWS (continued)

Property	Description
	• Type: true | false • Default value: `false` • Location: System Property [sys_properties] table
sn_aws_integ.load_all_images	Set the property to `true` to run the DescribeImages API for all images that are included in the SG-AWS-Image-Id data source. Set the property to `false` to run the DescribeImages API only for images without names. • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table
sn_aws_integ.save_payload_as_attachment	Option to save the REST responses as attachments. Set this property to `true` if the payload size is greater than 10 MB. • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table
sn_aws_integ.sgaws_config_list_discovered_resource_count	Set the number of resource IDs for the list discovered API. The default value is 20, and the maximum value is 769. • Type: integer • Default value: 20 • Location: System Property [sys_properties] table
sn_aws_integ.sgaws_config_list_discovered_retry_count	Set the retry count after a failure of the list discovered API. • Type: integer • Default value: 100 • Location: System Property [sys_properties] table

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Default system properties for Service Graph Connector for AWS (continued)

Property	Description
sn_aws_integ.sgaws_ssm_list_cmd_retry_count	Set the retry count after a failure of the SendCommand API. • Type: integer • Default value: `200` • Location: System Property [sys_properties] table
sn_aws_integ.use_aggregator_configured_accounts	Set the property to `true` to import CIs only from the aggregator configured accounts, not from all the member accounts. • Type: true | false • Default value: `true` • Location: System Property [sys_properties] table
sn_aws_integ.u_sgaws_csv_supported_db	Enter the list of database applications (such as MySQL and Postgres) that are supported for detection using the SSM SendCommand. • Type: string • Default value: {"mysql":"mysql"} • Location: System Property [sys_properties] table
sn_aws_integ.linux_TCP_Established_Status	• Type: string • Default value: ESTABLISHED | TIME_WAIT | CLOSE_WAIT • Location: System Property [sys_properties] table
sn_aws_integ.linux_TCP_Listener_Status	• Type: string • Default value: LISTEN • Location: System Property [sys_properties] table

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Default system properties for Service Graph Connector for AWS (continued)

Property	Description
sn_aws_integ.windows_TCP_Established_Status	• Type: string • Default value: ESTABLISHED|HERGESTELLT • Location: System Property [sys_properties] table
sn_aws_integ.windows_TCP_Listener_Status	• Type: string • Default value: LISTENING|ABHÖREN • Location: System Property [sys_properties] table

Custom system properties

You can create these custom system properties for the Service Graph Connector for AWS. These properties must be created in the Service Graph Connector for AWS application scope. The custom properties that you create are listed in the System Properties [sys_properties] table. For more information about creating custom system properties, see Add a system property.

Custom system properties for Service Graph Connector for AWS

Property	De
sn_aws_integ.eks_chunk_size	Er Th im • •
sn_aws_integ.ssm_managed_instance_inventory_batch_get_aggregate_resource_config_batch_size	Se BA AI In 1 • •
sn_aws_integ.ssm_managed_instance_inventory_batch_get_resource_config_batch_size	Se BA fo Sp

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Custom system properties for Service Graph Connector for AWS (continued)

Property	De
	• •
sn_aws_integ.generic_resource__batch_get_aggregate_resource_config_batch_size	Se BA AP Re 1 • •
sn_aws_integ.generic_resource_batch_get_resource_config_batch_size	Se BA fo Sp • •
sn_aws_integ.eks_cluster_batch_get_aggregate_resource_config_batch_size	Se BA AP sc • •
sn_aws_integ.eks_cluster_batch_get_resource_config_batch_size	Se BA fo Sp • •
sn_aws_integ.ec2_subnet_batch_get_aggregate_resource_config_batch_size	Se BA AP sc • •
sn_aws_integ.ec2_subnet_batch_get_resource_config_batch_size	Se BA fo va

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Custom system properties for Service Graph Connector for AWS (continued)

Property	De
	• •
sn_aws_integ.ec2_network_interface_batch_get_aggregate_resource_config_batch_size	Se BA AP da 10 • •
sn_aws_integ.ec2_network_interface_batch_get_resource_config_batch_size	Se BA fo Sp • •
sn_aws_integ.ec2_volume_batch_get_aggregate_resource_config_batch_size	Se BA AP da 10 • •
sn_aws_integ.ec2_volume_batch_get_resource_config_batch_size	Se BA fo Sp • •
sn_aws_integ.ec2_instance_batch_get_aggregate_resource_config_batch_size	Se BA AP Sp • •
sn_aws_integ.ec2_instance_batch_get_resource_config_batch_size	Se BA

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Custom system properties for Service Graph Connector for AWS (continued)

Property	De
	fo va • •
sn_aws_integ.rds_db_instance_batch_get_aggregate_resource_config_batch_size	Se BA AI Sp • •
sn_aws_integ.rds_db_instance_batch_get_resource_config_batch_size	Se BA fo va • •
sn_aws_integ.s3_bucket_batch_get_aggregate_resource_config_batch_size	Se BA AI Sp • •
sn_aws_integ.s3_bucket_batch_get_resource_config_batch_size	Se BA fo be • •
sn_aws_integ.api_gateway_v2_api_batch_get_aggregate_resource_config_batch_size	Se BA AI sc • •
sn_aws_integ.api_gateway_v2_api_batch_get_resource_config_batch_size	Se BA

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Custom system properties for Service Graph Connector for AWS (continued)

Property	De
	fo Sp • •
sn_aws_integ.ec2_security_group_batch_get_aggregate_resource_config_batch_size	Se BA AI da 1(• •
sn_aws_integ.ec2_security_group_batch_get_resource_config_batch_size	Se BA fo Sp • •
sn_aws_integ.ec2_vpc_batch_get_aggregate_resource_config_batch_size	Se BA AI Sp • •
sn_aws_integ.ec2_vpc_batch_get_resource_config_batch_size	Se BA fo va • •
sn_aws_integ.elastic_load_balancing_load_balancer_batch_get_aggregate_resource_config_batch_size	Se BA AI sc • •
sn_aws_integ.elastic_load_balancing_load_balancer_batch_get_resource_config_batch_size	Se BA

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Custom system properties for Service Graph Connector for AWS (continued)

Property	De
	fo va • •
sn_aws_integ.elastic_load_balancing_v2_load_balancer_batch_get_aggregate_resource_config_batch_size	Se BA AI sc • •
sn_aws_integ.elastic_load_balancing_v2_load_balancer_batch_get_resource_config_batch_size	Se BA fo va • •
sn_aws_integ.lambda_function_batch_get_aggregate_resource_config_batch_size	Se BA AI sc • •
sn_aws_integ.lambda_function_batch_get_resource_config_batch_size	Se BA fo va • •
sn_aws_integ.dynamo_db_table_batch_get_aggregate_resource_config_batch_size	Se BA AI sc • •
sn_aws_integ.dynamo_db_table_batch_get_resource_config_batch_size	Se BA

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Custom system properties for Service Graph Connector for AWS (continued)

Property	De
	fo a • •
sn_aws_integ.throttling_min_wait_time_in_ms	Se be th • •
sn_aws_integ.throttling_max_wait_time_in_ms	Se m or • •
sn_aws_integ.config_db_load_enabled	Er wl pe • •

Related content

Data mapping for Service Graph Connector for AWS

CMDB classes targeted in Service Graph Connector for AWS

Service Graph Connector for ExtraHop

Use the Service Graph Connector for ExtraHop to pull data from the ExtraHop application into your ServiceNow instance.

Important:
ServiceNow hosted Service Graph Connector for ExtraHop is now deprecated and no longer supported or available for new activation. ExtraHop hosted Service Graph Connector for ExtraHop provides the latest experience for this functionality. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

The Service Graph Connector for ExtraHop provides real-time network visibility across your enterprise by implementing stream processing, so that you can transform your network data into structured wire data.

The Service Graph Connector for ExtraHop pulls network visibility data into the ServiceNow® Configuration Management Database (CMDB) application. The connector enriches discovered device data and establishes relationships between devices based on network traffic flow.

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Request apps on the Store

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

System requirements and supported versions

Dependencies and requirements:

- MID Server that is installed on Linux or Windows, unless the ExtraHop appliance is publicly accessible.
- ExtraHop Discover appliance with firmware version 7.2 or later with a user account that has unlimited privileges.

- Supported versions: ExtraHop v7.9.
- Supported ServiceNow versions:
  - Tokyo
  - Utah
  - Vancouver
  - Washington DC

Use cases

The following are examples on how you can use the Service Graph Connector:

- Identification of network interactions between CIs.
- Discovery of network traffic flow data between computers or other types of hardware.
- Creation of relationships between devices. The relationships are based on network traffic flow.

Guided setup

The guided setup for the Service Graph Connector for ExtraHop provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, see Configure Service Graph Connector for ExtraHop.

CMDB Integrations Dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed Service Graph Connectors. You can see metrics for all integration runs. You can also filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring ExtraHop integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from data sources in the ExtraHop application is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from the ExtraHop application. The data is loaded into the following staging tables:

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- ExtraHop Computer [sn_extrahop_integr_computer]
- ExtraHop Network Activity [sn_extrahop_integr_activity]

The data is then inserted into the following target tables:

- CI Relationship [cmdb_rel_ci]
- Hardware [cmdb_ci_hardware]
- IP Address [cmdb_ci_ip_address]
- Network Adapter [cmdb_ci_network_adapter]

Related topics

Service Graph Connectors

Configure Service Graph Connector for ExtraHop

Set up a REST message and scheduled jobs to import ExtraHop data into your CMDB.

Before you begin

Important:
ServiceNow hosted Service Graph Connector for ExtraHop is now deprecated and no longer supported or available for new activation. ExtraHop hosted Service Graph Connector for ExtraHop provides the latest experience for this functionality. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- MID Server that is installed on Linux or Windows, unless the ExtraHop appliance is publicly accessible.
- ExtraHop Discover appliance with firmware version 7.2 or later, with a user account that has unlimited privileges.
- To connect to the ExtraHop application, configure an API key. For more information, see ExtraHop REST API Guide, specifically, see the "ExtraHop API requirements" section.

Roles required: admin

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Procedure

1. Navigate to **All** > **Service Graph Connector ExtraHop** > **Setup**.
2. On the Getting started page, click **Get Started**.
3. On the Service Graph Connector for the ExtraHop page, in the Configure REST message section, select the task **Configure ExtraHop REST message**.
4. Configure a REST message to use when sending requests to the ExtraHop API.

   a. On the next page, in the Configure ExtraHop REST message task section, click **Configure**.

   b. On the form, fill in the fields.

   REST Message form

Field	Description
Name	Descriptive name for this REST Message. This field is automatically set.
Endpoint	URL to the web service API endpoint. Set the field to a base URL. For example, `https://myextrahop.com`. **Note:** Updating the Endpoint base URL also updates the base URLs for all HTTP methods that are associated with the ExtraHop REST message. In the **HTTP Request** tab, update the Authorization header to use your API key in the **Value** field.
Description	Description for this REST Message. This field is automatically set.
Application	Application that contains this message. The field is automatically set.
Authentication type	Type of authentication to apply to HTTP requests. The field is automatically set.
Use mutual authentication	Option to use multiple authentication by authenticating HTTP requests. Mutual authentication cannot be used with a MID Server.

   c. Click **Update** if necessary.

   d. In the Configure ExtraHop REST message task section, click **Mark as Complete**.

5. Test the connection to the ExtraHop Computer API.

   a. In the Test Computer connection task section, click **Configure**.

   b. On the form, fill in the fields.

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HTTP Method form

Field	Description
Name	Unique identifier for this HTTP method. This field is automatically set.
Endpoint	URL to the web service API endpoint
Use MID Server	MID Server that sends this HTTP request. Using a MID Server is not compatible with mutual authentication.
REST Message	REST message record that this method is based on. This field is automatically set.
HTTP method	HTTP method that is implemented by this method. This field is automatically set.
Application	Application that contains this method. This field is automatically set.
Authentication type	Type of authentication to apply to HTTP requests.
Use mutual authentication	Option to use multiple authentication by authenticating HTTP requests. Mutual authentication cannot be used with a MID Server.

c. Select the **HTTP Request** tab and fill out the **Use MID Server** field.

d. Click the **Authentication** tab and then click the **Test** related link.
Testing the connection takes a few moments. When the test is complete, the page is refreshed and shows the test results.

e. Select **Mark as Complete**.

> **Note:**
> The connection is successful if the **HTTP Status** field is set to **200**. If there are any errors in the **Error Message** field, then the connection failed and further troubleshooting is required.

f. Click **Update** if necessary.

g. In the Test Computer connection task section, click **Mark as Complete**.

6. Test the connection to the ExtraHop Network Activity Create API.

a. In the Test Network Activity Create connection task section, click **Configure**.

b. On the form, fill in the fields.

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HTTP Method form

Field	Description
Name	Unique identifier for this HTTP method.
Endpoint	URL to the web service API endpoint
Use MID Server	MID Server that sends this HTTP request. Using a MID Server is not compatible with mutual authentication.
REST Message	REST message that this method is based on. This field is automatically set.
HTTP method	HTTP method that is implemented by this method. This field is automatically set.
Application	Application that contains this record. This field is automatically set.
Authentication type	Type of authentication to apply to HTTP requests. This field is automatically set.
Use mutual authentication	Option to use multiple authentication by authenticating HTTP requests. Mutual authentication cannot be used with a MID Server.

c. Click the **Authentication** tab and then click the **Test** related link.
Testing the connection takes a few moments. When the test is complete, the page is refreshed and shows the test results.

d. Select **Mark as Complete**.

Note:
The connection is successful if the **HTTP Status** field is set to **200**. If there are any errors in the **Error Message** field, then the connection failed and further troubleshooting is required.

e. Click **Update** if necessary.

f. In the Test Network Activity Create connection task section, click **Mark as Complete**.

7. Set up the scheduled import jobs.

a. On the Service Graph Connector for ExtraHop page, in the Set up scheduled import jobs section, select the task **Configure Computer scheduled job**.

b. In the Configure Computer scheduled job task section, click **Configure**.

c. On the form, fill in the fields.

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Scheduled Data Import form

Field	Description
Name	Name of the scheduled job.
Data source	Data source record that defines the data to import.
Run as	Option to run the scheduled job with the credentials of the specified user.
Active	Option to activate the scheduled job. Select this option.
Concurrent Import	Function that loads the data from multiple import sets. The function then processes and transforms the data concurrently.
Partition Method	Partition method for the concurrent import set.
Partition Size	Import set size for early scheduling.
Execute pre-import script	Option to specify a script to run before the import is performed.
Execute post-import script	Option to specify a script to run after the import is performed.
Application	Application that contains this scheduled job.
Run	Frequency of running the import.
Conditional	Conditions under which this job is executed.

d. Click **Update** if necessary.

e. In the Configure Computer scheduled job task section, click **Mark as Complete**.

8. Configure the Network Activity scheduled job.

a. On the Service Graph Connector for ExtraHop page, in the Set up scheduled import jobs section, select the task **Configure Network Activity scheduled job**.

b. In the Configure Network Activity scheduled job task section, click **Configure**.

c. On the form, fill in the fields.

Scheduled Data Import form

Field	Description
Name	Name of the scheduled job.
Data source	Data source record that defines the data to import.
Run as	Option to run the scheduled job with the credentials of the specified user.

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Field	Description
Active	Option to activate the scheduled job. Select this option.
Concurrent Import	Function that loads the data from multiple import sets. The function then processes and transforms the data concurrently.
Partition Method	Partition method for the concurrent import set.
Partition Size	Import set size for early scheduling.
Execute pre-import script	Option to specify a script to run before the import is performed.
Execute post-import script	Option to specify a script to run after the import is performed.
Application	Application that contains this scheduled job.
Run	Frequency of running the import.
Conditional	Conditions under which this job is executed.

d. Click **Update** if necessary then **Mark as Complete**.

CMDB classes targeted in Service Graph Connector for ExtraHop

When you complete setting up the connection, you can configure the integration to periodically pull data from ExtraHop. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Important:
ServiceNow hosted Service Graph Connector for ExtraHop is now deprecated and no longer supported or available for new activation. ExtraHop hosted Service Graph Connector for ExtraHop provides the latest experience for this functionality. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

The following attributes in the Hardware [cmdb_ci_hardware] table are populated by collected data:

Attribute label	Attribute name
Name	name
Manufacturer	manufacturer

Relationships created for Hardware

Parent class	Relationship type	Child class
Hardware [cmdb_ci_hardware]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Hardware [cmdb_ci_hardware]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Hardware [cmdb_ci_hardware]	Receives data from::Sends data to	Hardware [cmdb_ci_hardware]

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The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
IP version	ip_version
Name	name
Nic	nic

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
Name	name
Configuration Item	cmdb_ci
MAC Address	mac_address

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Hardware [cmdb_ci_hardware]

Service Graph Connector for GCP

Use the Service Graph Connector for GCP to ingest CMDB data from a Google Cloud Platform (GCP) project using the REST APIs.

Request apps on the Store

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

Key features

- Get started quickly with a streamlined onboarding process.
- Use only the credentials you need.
- No MID Server required.
- Get end-to-end data coverage.

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- No agents or individual scanning needed.
- Performant at scale.

Supported versions

Versions

GCP	ServiceNow
Last tested on February 26, 2026	• Yokohama • Zurich • Australia

Use cases

You can use the Service Graph Connector for GCP to get visibility into cloud resource identities, relationships, and state in real-time.

Important information for upgrading Service Graph Connector for GCP

After you've installed the latest version of the Service Graph Connector for GCP, you must synchronize the newly added data sources. Use the Advanced Setup section in the guided setup to synchronize data sources. For more information, see Configure Service Graph Connector for GCP.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the Service Graph Workspace or CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for GCP using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring GCP integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

BYOL and BYOS support

Bringing your own licenses (BYOL) or bringing your own subscriptions (BYOS) is the process of bringing previously purchased on-premises licenses or subscriptions to Google Cloud. The connector supports the BYOL and BYOS of the Image CIs for the Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) services on Google Cloud. The connector populates the Key Value [cmdb_key_value] table with the licensing information. Depending on

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the platform usage, the key is set to either `Windows_OS_License_Type_automatic` or `Linux_OS_License_Type_automatic`, and the key value is set to either BYOL or BYOS.

Related topics

- Service Graph Connectors
- Data mapping for Service Graph Connector for GCP
- CMDB classes targeted in Service Graph Connector for GCP
- GCP discovery solutions comparison
- Handling import failures for large GCP resources
- Deep discovery for Service Graph Connector for GCP
- Life cycle management of records in Service Graph Connector for GCP

Configure Service Graph Connector for GCP using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for GCP for pulling in GCP project data into the CMDB.

Before you begin

Install Service Graph Connector for GCP version 1.8.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the GCP connector type and then select **Create connection**.
4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

5. Complete the prerequisites for setting up the GCP environment.

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a. Set up the GCP environment and create a Java KeyStore (JKS) certificate to encrypt the security certificates obtained from a GCP application.

i. In the **Prerequisites** stage of the playbook, select the **Review setup instructions** activity.

ii. Select **Service Graph connector for GCP - Setup Instructions** link to view the setup instructions included in the Service Graph connector for GCP - Setup Instructions [KB1220598] article in the Now Support Knowledge Base.

iii. Make a note of the destination keystore password. You need to specify this password while importing the JKS certificate into the Service Graph Connector for GCP application.

iv. Select the **I have read the setup instructions** check box to confirm that you have set up the GCP environment according to the instructions.

v. Select **Continue**.

vi. After completing the **Review setup instructions** activity, select **Continue**.

b. Create an X.509 certificate to associate the JKS certificate for the GCP application with the Service Graph Connector for GCP.

Note:
You can skip this step if you're reusing an existing certificate by selecting **Skip**.

i. In the **Prerequisites** stage of the playbook, select the **Create X.509 certificate** activity.

ii. Select **New**.

iii. On the form, fill in the fields.

Create new X.509 Certificate form

Field	Description
Name	Name of the X.509 certificate. For example, `SG-GCP-509Certificate-Org1`.
Key store password	Password to access the JKS certificate as noted down in the step 5.a.iii.
Short description	Description of the X.509 certificate.

iv. In the Attachments section, select **Add File** to browse and upload the keystore.p12 file for the JKS certificate you created in step 5.a.

v. Select the **I have read the setup instructions** check box after you have completed the setup.

vi. After completing the **Create X.509 certificate** activity, select **Continue**.

6. **Optional:** Download the scripts that are required to enable deep discovery for the Service Graph Connector for GCP.

a. In the **Prerequisites** stage of the playbook, select the **Download GCP deep discovery scripts** activity.

b. Download the deep discovery scripts for Linux and Windows VMs.

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For more information about deep discovery for the Service Graph Connector for GCP, see the Service Graph Connector for GCP - Deep Discovery Setup Instructions [KB2213095] article in the Now Support Knowledge Base.

c. After completing the **Download GCP deep discovery scripts** activity, select **Continue**.

7. Enter connection details and test the API connection for importing GCP data.

a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

b. On the form, fill in the fields.

Create and test connection form

Field	Description
Connection Name	Name to identify the GCP connection record.
Service Account Email	ServiceNow service account associated with the GCP application.
Keystore	Name of the X.509 certificate that you created in step 5.b.
Keystore Password	Password to access the JKS certificate as noted down in the step 5.a.iii.
Organization Id	ID of the organization associated with the GCP application.
Discovery Scope	Discovery scope of the GCP application. The available options are: **Organization** Select **Organization** when the ServiceNow service account has access to data within the GCP organization. **Projects** Select **Projects** when the ServiceNow service account has access to data within GCP projects only.

c. Select **Update and test connection**.

d. Once the connection test is complete, select **Continue**.

8. **Optional:** Configure the deep discovery connection properties.

a. In the **Setup** stage of the playbook, select the **Configure connection properties** activity. If deep discovery is already configured on the connection, the values are pre-populated on the Deep Discovery properties form. For more information about the deep discovery connection properties for GCP, see Deep discovery connection properties.

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b. Review the pre-populated fields on the Deep Discovery properties form.

c. After completing the **Configure connection properties** activity, select **Continue**.

9. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Select **Configure import schedule**.

c. Expand the Parent scheduled data import within the Import schedules list to select the **SG-GCP Organization** import schedule.

d. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

e. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

f. Select **Continue**.

10. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was configured.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for GCP

Deep discovery for Service Graph Connector for GCP

Configure Service Graph Connector for GCP using the guided setup

Set up scheduled import jobs to pull in data from a GCP project into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

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Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This app must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Note:
If you have an earlier version of the Service Graph Connector for GCP, then don't migrate data from the old connector. You must uninstall the previous version and run the new integration.

Role required: SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

Procedure

1. Ensure that the application scope is set to the Service Graph Connector for GCP application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **GCP** > **Setup**.
3. On the Getting started page, select **Get Started**.
4. Configure the connection to send requests to the GCP application.

   a. In the Configure the Connection and Credentials section of the Service Graph Connector for GCP page, select **Get Started**.

   b. Set up the GCP environment and create a Java KeyStore (JKS) certificate to encrypt the security certificates obtained from a GCP application.

   Make a note of the destination keystore password. You need to specify this password while importing the JKS certificate into the Service Graph Connector for GCP application.

   For instructions, see the Service Graph Connector for GCP - Setup Instructions [KB1220598] article in the Now Support Knowledge Base.

   Note:
   After you have set up the GCP environment, return to the guided setup and set the GCP Setup Instructions task in the Configure the Connection and Credentials section to complete by selecting **Mark as Complete**.

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c. Create an X.509 certificate to associate the JKS certificate for the GCP application with the Service Graph Connector for GCP.

i. For the Create X.509 certificate task, select **Configure**.

ii. On the form that opens in a new tab, fill in the fields.

X.509 Certificate form

Field	Description
Name	Name of the X.509 certificate. For example, `SG-GCP-509Certificate-Org1`.
Notify on expiration	Users to be notified when the certificate expires. If no users are selected, the logged-in user is added by default, along with the last two logged-in users with the administrator role.
Warn in days to expire	Number of days to send a notification before the certificate expires.
Active	Option to activate the certificate.
Type	Certificate container that is automatically set to **Java Key Store**. Leave the field value set to **Java Key Store**.
Expires in days	Number of days until the certificate expires.
Key store password	Password to access the JKS certificate as noted down in the previous step.
Short description	Description of the X.509 certificate.

iii. Select the manage attachments icon ( ).

iv. Select **Choose file** to browse and upload the keystore.p12 file for the JKS certificate you created in step 4.b.

v. Close the dialog box.

vi. Select the **Validate Stores/Certificates** related link.

vii. On successful validation, select **Update** to return to the guided setup page.

viii. Set the Create X.509 certificate task to complete by selecting **Mark as Complete**.

d. Edit the default connection.

i. For the Edit Default Connection task, select **Configure**.

ii. In the Flow Designer, select **SG-GCP Default Connection**, and then select **Edit**.

iii. On the form that opens in the Edit Connection dialog box, fill in the fields.

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Edit Connection form

Field	Description
Service Account Email	Service account created in and associated with the GCP application.
Keystore	Name of the keystore that you created in step 4.b.
Key Password	Destination keystore password associated with the keystore.
Organization Id	ID of the organization associated with the GCP application.
Discovery Scope	Discovery scope of the GCP application. The available options are: **organizations** Select **organizations** when the ServiceNow service account has access to data within the GCP organization. **projects** Select **projects** when the ServiceNow service account has access to data within GCP projects only.

iv. Select **Edit and Get OAuth Token**.

v. After the OAuth token flow is completed successfully, close the dialog box and the browser tab, and return to the guided setup page.

vi. Set the Edit Default Connection task to complete by selecting **Mark as Complete**.

e. Test the GCP API connection to import data from the GCP application.

i. For the Test the Connection task, select **Configure** to open the SG-GCP Default Connection page in a new browser tab.

ii. Test the connection by selecting the **Test Connection** related link.

Testing the connection may take a few moments. The page is refreshed to show the test results.

iii. When the **Status** field is set to **Success**, close the browser tab and return to the guided setup page.

If any of the tests have an error code or message or error sign, the connection failed and further troubleshooting is required.

iv. Set the Test the Connection task to complete by selecting **Mark as Complete**.

f. Configure the scheduled jobs to import data from the GCP application.

i. For the Configure the Scheduled Imports task, select **Configure** to open the Scheduled Data Imports list in a new browser tab.

ii. Select the SG-GCP Organization scheduled job.

iii. On the Scheduled Data Import form, verify the field values for the scheduled job.

For more information, see Schedule a data import.

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iv. Select **Active** check box to activate the SG-GCP Organization scheduled job.

v. In the **Run** field, select **Periodically** to specify how often the job will run.

vi. Select **Update**.

vii. Return to the guided setup page.

viii. Set the Configure the Scheduled Imports task to complete by selecting **Mark as Complete**.

5. **Optional:** Add multiple GCP instances.

a. In the Add Multiple Instances section of the Service Graph Connector for GCP page, select **Get Started**.

b. Create data sources for the new GCP connection.

i. Ensure that you have edit permissions for the Datasource [sys_data_source] table.

ii. For the Update Data Source Access task, select **Configure**.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Data Source form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. Return to the guided setup page.

vii. From the application picker, select the **Service Graph Connector for GCP** application scope.

viii. Set the Update Data Source Access task to complete by selecting **Mark as Complete**.

c. Create a scheduled import job for the new GCP connection.

i. Ensure that you have edit permissions for the Scheduled data import [scheduled_import_set] table.

ii. For the Update Scheduled Data Import Access task, select **Configure**.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Scheduled Data Import form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. Return to the guided setup page.

vii. From the application picker, select the **Service Graph Connector for GCP** application scope.

viii. Set the Update Scheduled Data Import Access task to complete by selecting **Mark as Complete**.

d. Clear the cache on the Data Source [sys_data_source] and Scheduled Data Imports [scheduled_import_set] tables.

i. For the Clear Cache for Data Source and Scheduled Data Imports tables task, select **Configure**.

ii. In the **Run script** text box of the background script page, enter the following script:

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```
GlideTableManager.invalidateTable("sys_data_source");
GlideCacheManager.flushTable("sys_data_source");
GlideTableManager.invalidateTable("scheduled_import_set");
GlideCacheManager.flushTable("scheduled_import_set");
GlideTableManager.invalidateTable("sys_db_object");
GlideCacheManager.flushTable("sys_db_object");
```

iii. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

iv. After the script is executed, select **Close**.

v. Return to the guided setup page.

vi. From the application picker, select the **Service Graph Connector for GCP** application scope.

vii. Set the Clear Cache for Data Source and Scheduled Data Imports tables task to complete by selecting **Mark as Complete**.

e. To create an X.509 certificate for the new GCP instance, repeat the step 4.c, and then set the Create X.509 certificate task to complete by selecting **Mark as Complete**.

f. Add a new connection.

i. For the Add New Connection task, select **Configure**.

ii. In the Flow Designer, select **Add Connection**.

iii. On the form that opens in the Create Connection dialog box, fill in the fields.

Edit Connection form

Field	Description
Connection Name	Unique name for the new connection.
Service Account Email	ServiceNow service account associated with the GCP application.
Keystore	Name of the keystore that you created in step 5.e.
Key Password	Destination keystore password associated with the keystore.
Organization Id	ID of the organization associated with the GCP application.
Discovery Scope	Discovery scope of the GCP application. The available options are: **organizations** Select **organizations** when the ServiceNow service account has access to data within the GCP organization. **projects** Select **projects** when the ServiceNow service account has access to data within GCP projects only.

g. Test the new connection.

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i. For the Test New Connection task, select **Configure**.

ii. In Service Graph Connections page that opens in a new browser tab, select the new connection that you want to test from the list of available connections.

iii. Test the connection by selecting the **Test Connection** related link.

Testing the connection may take a few moments. The page is refreshed to show the test results.

iv. When the **Status** field is set to **Success**, close the browser tab and return to the guided setup page.

If any of the tests have an error code or message or error sign, the connection failed and further troubleshooting is required.

v. Set the Test New Connection task to complete by selecting **Mark as Complete**.

h. To configure the scheduled jobs to import data from the new GCP instance, repeat step 4.f, and then set the Configure the Scheduled Imports task to complete by selecting **Mark as Complete**.

6. Synchronize new data sources to import data from GCP instances.

a. In the Advanced Setup section of the Service Graph Connector for GCP page, select **Get Started**.

b. Synchronize new data sources for creating all the required credentials to make the new data sources work correctly.

i. For the Sync New Data source task, select **Configure**.

ii. Select **Synchronize Datasources**.

iii. Return to the guided setup page by closing the Sync New Data source window.

iv. Set the Sync New Data source task to complete by selecting **Mark as Complete**.

7. Set up OS Config Patch Jobs to enable deep discovery.

a. In the Setup OS Config Patch Jobs for extended discovery section of the Service Graph Connector for GCP page, select **Get Started**.

b. For the Download script files task, select **Configure**.

c. Save the Shell script and PowerShell script files.

The Shell script contains commands that run on Linux VMs. The PowerShell script contains commands that run on Windows VMs.

d. In the Shell script and PowerShell script files, specify the name of and the path in the Cloud Storage Bucket where the output of the commands are to be uploaded.

e. Upload the deep discovery scripts to the Cloud Storage Bucket.

f. Navigate back to the guided setup page, and set the Download script files task to complete by selecting **Mark as Complete**.

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g. For the Configure GCP Cloud Storage Bucket for running Patch Jobs task, select **Configure**.

h. To configure the GCP Cloud Storage Bucket to run patch jobs, follow the deep discovery setup instructions in the Service Graph Connector for GCP - Deep Discovery Setup Instructions [KB2213095] article in the Now Support Knowledge Base.

i. Navigate back to the guided setup page, and set the Configure GCP Cloud Storage Bucket for running Patch Jobs task to complete by selecting **Mark as Complete**.

j. For the Configure connection properties task, select **Configure**.

k. On the SG-GCP Configuration Properties form, select the connection for which you want to run deep discovery from the **Connection** list.

In the Properties section of the SG-GCP Configuration Properties form, the following fields are populated with the values for the connection that you selected. If required, update the field values.

Field	Description
Name of the Cloud Storage Bucket where the .sh and .ps1 files are uploaded in Google Cloud Platform	Name of the Cloud Storage Bucket where the deep discovery scripts are saved.
Path to the .sh file uploaded to Cloud Storage Bucket	Path of the deep discovery Shell script file.
Generation number of the .sh file uploaded to Cloud Storage Bucket	Number used to identify the versioning of the cloud storage object.
Path to the.ps1 file uploaded to Cloud Storage Bucket	Path of the deep discovery PowerShell script file.
Generation number of the .ps1 file uploaded to Cloud Storage Bucket	Number used to identify the versioning of the cloud storage object.
Name of the Cloud Storage Bucket provided in .sh and .ps1 files where the outputs of the commands have to be stored	Name of the output Cloud Storage Bucket.
Folder path provided in .sh and .ps1 files where the outputs are uploaded in the Storage Bucket	Path of the output storage folder in the Cloud Storage Bucket.

l. Select **Save**.

m. Navigate back to the guided setup, and set the Configure connection properties task to complete by selecting **Mark as Complete**.

Related topics

Service Graph Connector for GCP

Configure Service Graph Connector for GCP using SGC Central

Deep discovery for Service Graph Connector for GCP

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Data mapping for Service Graph Connector for GCP

Data from the GCP data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

Data mapping for GCP

When you complete setting up the connection, you can configure the integration to periodically pull data from the GCP application.

The following table lists the data sources, the staging tables, the target tables as the CMDB CI classes, and the resource types imported for a GCP project.

Data mapping for GCP

Data source	Staging table	CMDB CI classes	Resource types
SG-GCP Organization	SG-GCP Organization [sn_gcp_integ_sg_gcp_organization]	Cloud Organizations	Organization
SG-GCP Folder	SG-GCP Folder [sn_gcp_integ_sg_gcp_folder]	Google Organization Folder SG-GCP Extension Attributes	Folder
SG-GCP Project	SG-GCP Project [sn_gcp_integ_sg_gcp_project]	Google Organization Project Cloud Service Account Key Value SG-GCP Extension Attributes	Project
SG-GCP Network	SG-GCP Network [sn_gcp_integ_sg_gcp_network]	Cloud Network SG-GCP Extension Attributes	Network
SG-GCP Machine Image	SG-GCP Machine Image [sn_gcp_integ_sg_gcp_machine_image]	Image Key Value SG-GCP Extension Attributes	MachineImage

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Data mapping for GCP (continued)

Data source	Staging table	CMDB CI classes	Resource types
SG-GCP Subnet	SG-GCP Subnet [sn_gcp_integ_sg_gcp_subnet]	Cloud Subnet Google Datacenter Key Value SG-GCP Extension Attributes	Subnetwork
SG-GCP Storage Volume	SG-GCP Storage Volume [sn_gcp_integ_sg_gcp_storage_volume]	Storage Volume Google Datacenter Cloud Disk Type Availability Zone Key Value SG-GCP Extension Attributes	Disk
SG-GCP Storage Volume Snapshot	SG-GCP Storage Volume Snapshot [sn_gcp_integ_sg_gcp_storage_vol_snapshot]	Storage Volume Snapshot Key Value SG-GCP Extension Attributes	Snapshot
SG-GCP Security Group	SG-GCP Security Group [sn_gcp_integ_sg_gcp_security_group]	Compute Security Group Network ACL Network ACL Rule Key Value SG-GCP Extension Attributes	Firewall

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Data mapping for GCP (continued)

Data source	Staging table	CMDB CI classes	Resource types
SG-GCP Software Inventory	SG-GCP Software Inventory [sn_gcp_integ_sg_gcp_software_inventory]	When the Software Asset Management (SAM) application isn't installed: Software Software Instance When the SAM application is installed: Software Installation	Instance
SG-GCP VM Instance	SG-GCP VM Instance [sn_gcp_integ_sg_gcp_vm_instance]	Virtual Machine Instance Google Datacenter Hardware Type Availability Zone Cloud Mgmt Network Interface Server Storage Mapping Storage Volume VNIC Endpoint Block Endpoint IP Address Key Value	Instance

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Data mapping for GCP (continued)

Data source	Staging table	CMDB CI classes	Resource types
		SG-GCP Extension Attributes	
SG-GCP Execute Patch Job	SG-GCP Execute Patch Job [sn_gcp_integ_sg_gcp_execute_patch_job]	Not applicable	Not applicable
SG-GCP Hardware Type	SG-GCP Hardware Type [sn_gcp_integ_sg_gcp_hardware_type]	Hardware Type Google Datacenter Availability Zone	MachineType
SG-GCP VM Hw Consolidation	SG-GCP VM Hw Consolidation [sn_gcp_integ_sg_gcp_vm_hw_consolidation]	Virtual Machine Instance Server	None
SG-GCP Load Balancer Pool	SG-GCP Load Balancer Pool [sn_gcp_integ_sg_gcp_load_balancer_pool]	Load Balancer Pool Google Datacenter Cloud Service Account SG-GCP Extension Attributes Key Value	TargetPool
SG-GCP Load Balancer Pool Member	SG-GCP Load Balancer Pool Member [sn_gcp_integ_sg_gcp_load_balancer_pool_member]	Load Balancer Pool Member SG-GCP Extension Attributes	TargetPool
SG-GCP Load Balancer Health Service	SG-GCP Load Balancer Health Service[sn_gcp_integ_sg_gcp_load_balancer_health_service]	Cloud Load Balancer Health Service	HealthCheck

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Data mapping for GCP (continued)

Data source	Staging table	CMDB CI classes	Resource types
		SG-GCP Extension Attributes	
SG-GCP Load Balancer	SG-GCP Load Balancer [sn_gcp_integ_sg_gcp_load_balancer]	Cloud Load Balancer Google Datacenter Cloud Service Account SG-GCP Extension Attributes Key Value	BackendService
SG-GCP Load Balancer Service	SG-GCP Load Balancer Service [sn_gcp_integ_sg_gcp_load_balancer_service]	Load Balancer Service SG-GCP Extension Attributes	ForwardingRule
SG-GCP Cloud Database	SG-GCP Cloud Database [sn_gcp_integ_sg_gcp_cloud_database]	Cloud DataBase Google Datacenter SG-GCP Extension Attributes Key Value	Instance
SG-GCP Cloud Function	SG-GCP Cloud Function [sn_gcp_integ_sg_gcp_cloud_function]	Cloud Function Google Datacenter SG-GCP Extension Attributes Key Value	Function

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Data mapping for GCP (continued)

Data source	Staging table	CMDB CI classes	Resource types
SG-GCP Cloud Object Storage	SG-GCP Cloud Object Storage [sn_gcp_integ_sg_gcp_cloud_object_storage]	Cloud Object Storage Google Datacenter Key Value SG-GCP Extension Attributes	Buckets
SG-GCP Kubernetes Cluster	SG-GCP Kubernetes Cluster [sn_gcp_integ_sg_gcp_kubernetes_cluster]	Kubernetes Cluster Key Value SG-GCP Extension Attributes	Cluster
SG-GCP Kubernetes Node	SG-GCP Kubernetes Node [sn_gcp_integ_sg_gcp_kubernetes_node]	Kubernetes Node SG-GCP Extension Attributes	Node
SG-GCP Kubernetes Pod	SG-GCP Kubernetes Pod [sn_gcp_integ_sg_gcp_kubernetes_pod]	Kubernetes Pod Kubernetes Volume Docker Image Docker Container Key Value SG-GCP Extension Attributes	Pod
SG-GCP Kubernetes Service	SG-GCP Kubernetes Service [sn_gcp_integ_sg_gcp_kubernetes_service]	Kubernetes Service Key Value SG-GCP Extension Attributes	Service

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Data mapping for GCP (continued)

Data source	Staging table	CMDB CI classes	Resource types
SG-GCP Kubernetes Namespace	SG-GCP Kubernetes Namespace [sn_gcp_integ_sg_gcp_kubernetes_namespace]	Kubernetes Namespace Cloud Service Account Key Value SG-GCP Extension Attributes	Namespace
SG-GCP Kubernetes Deployment	SG-GCP Kubernetes Deployment [sn_gcp_integ_sg_gcp_kubernetes_deployment]	Kubernetes Deployment Key Value SG-GCP Extension Attributes	Deployment
SG-GCP Kubernetes Replicaset	SG-GCP Kubernetes Replicaset [sn_gcp_integ_sg_gcp_kubernetes_replicaset]	Kubernetes ReplicaSet Key Value SG-GCP Extension Attributes	ReplicaSet
SG-GCP Kubernetes Cluster Roles	SG-GCP Kubernetes Cluster Roles [sn_gcp_integ_sg_gcp_kubernetes_cluster_role]	Kubernetes Cluster Role Key Value SG-GCP Extension Attributes	ClusterRole
SG-GCP Kubernetes Cluster Role Binding	SG-GCP Kubernetes Cluster Role Binding [sn_gcp_integ_sg_gcp_kubernetes_cluster_role_binding]	Kubernetes Cluster Role Binding Key Value SG-GCP Extension Attributes	ClusterRoleBindi
SG-GCP Kubernetes Node Pool	SG-GCP Kubernetes Node Pool [sn_gcp_integ_sg_gcp_kubernetes_node_pool]	Kubernetes Node Pool Key Value	NodePool

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Data mapping for GCP (continued)

Data source	Staging table	CMDB CI classes	Resource types
		SG-GCP Extension Attributes	
SG-GCP Generic Resource	SG-GCP Generic Resource [sn_gcp_integ_sg_gcp_generic_resource] **Note:** The SG-GCP Generic Resource data source only works with a service account that has organization-level access.	Cloud Resource	Resource
SG-GCP Annotation	SG-GCP Annotation [sn_gcp_integ_sg_gcp_annotation]	Key Value	Annotation
SG-GCP Get Patch Job	SG-GCP Get Patch Job [sn_gcp_integ_sg_gcp_get_patch_job]	Not applicable	Not applicable
SG-GCP Generic Resource Annotation	SG-GCP Generic Resource Annotation [sn_gcp_integ_sg_gcp_generic_resource_annotation]	Key Value	Annotation

For more information on where data is saved when pulling data from a GCP project, see CMDB classes targeted in Service Graph Connector for GCP.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Additional information about GCP data sources:

- The SG-GCP Annotation data source populates all labels and tags associated with GCP supported resources to the Key Value table.
- The SG-GCP Generic Resource Annotation data source populates the tags and labels for Generic resources to the Key Value table from Service Graph Connector for GCP version 1.10.0.
- The basic information about a GCP resource is stored in the SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes] table.
- After all the data sources are executed, the Server [cmdb_ci_server] class is updated with the class entry, and then based on the Windows or Linux class, the records are created in the Windows Server [cmdb_ci_win_server] and Linux Server [cmdb_ci_linux_server] classes, respectively.
- The SG-GCP Generic Resource data source imports data for resources that are categorized as `Generic` in the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table.
- For any discovered resources that are deleted after pulling data, the Service Graph Connector for GCP automatically updates the **Install Status** field of the associated CMDB CI classes to indicate any retired or deleted records. For more information, see Life cycle management of records in Service Graph Connector for GCP and Record removal process in Service Graph Connector for GCP.

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- When the *sn_itom_pattern.use a single hardware type for cloud data centers* system property is set to `true`, hardware type data is added to the Cloud Hardware Type [cmdb_ci_cloud_hardware_type] table, instead of being added to the Hardware Type [cmdb_ci_compute_template] table from Service Graph Connector for GCP version 1.9.0. For more information, see the Service Graph Connector For GCP - Migrating to a new hardware type model [KB1899584] article in the Now Support Knowledge Base.
- When the *sn_cmdb_ci_class.use_single_cloud_os_image* system property is set to `true`, image type data is added to the Cloud Image [cmdb_ci_cloud_os_image] table, instead of being added to the Image [cmdb_ci_os_template] table from Service Graph Connector for GCP version 1.9.0. For more information, see the Service Graph Connector For GCP - Migrating to a new Cloud OS Image model [KB1983751] article in the Now Support Knowledge Base.
- The list API calls return only the information that is required to make batch calls and not the entire resource response from Service Graph Connector for GCP version 1.9.0.
- Parallel data loading is enabled for the SG-GCP Annotation, SG-GCP Generic Resource, and SG-GCP Generic Resource Annotation data sources.
- You can configure the *AppScript Folder IDs* connection property to exclude AppScript folder information from imports starting from Service Graph Connector for GCP version 1.10.0. For more information, see Service Graph Connector for GCP properties.
- The SG-GCP Software Inventory scheduled import runs before the SG-GCP VM Instance scheduled import from Service Graph Connector for GCP version 1.10.0. The SG-GCP Software Inventory scheduled job populates the operating system information for the Server records, which determines the script that needs to be run for deep discovery (Shell script for Linux VMs or PowerShell script for Windows VMs).
- The SG-GCP Get Patch Job scheduled import supports deep discovery by running commands on VMs from Service Graph Connector for GCP version 1.10.0. For information about deep discovery for the Service Graph Connector for GCP, see the Enabling deep discovery for Service Graph Connector for GCP article in the Now Support Knowledge Base.

Related content

CMDB classes targeted in Service Graph Connector for GCP

Service Graph Connector for GCP properties

CMDB classes targeted in Service Graph Connector for GCP

When you complete setting up the connection, you can configure the integration to periodically pull data from a GCP project. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Availability Zone [cmdb_ci_availability_zone]

The following attributes in the Availability Zone [cmdb_ci_availability_zone] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

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Relationship created for Availability Zone

Parent class	Relationship type	Child class
Availability Zone [cmdb_ci_availability_zone]	Contains::Contained by	Virtual Machine Instance [cmdb_ci_vm_instance]

Block Endpoint [cmdb_ci_endpoint_block]

The following attributes in the Block Endpoint [cmdb_ci_endpoint_block] table are populated by collected data:

Attribute label	Attribute name
Host	host
Name	name
Install Status	install_status
Operational status	operational_status

Cloud DataBase [cmdb_ci_cloud_database]

The following attributes in the Cloud DataBase [cmdb_ci_cloud_database] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
TCP port(s)	tcp_port
CPU Count	cpu_count
Fully qualified domain name	fqdn
Install Status	install_status
IP Address	ip_address
Memory Size (GB)	memory_size
Node Count	node_count
Operational status	operational_status
State	state
Type	type
Version	version

Relationships created for Cloud DataBase

Parent class	Relationship type	Child class
Cloud DataBase [cmdb_ci_cloud_database]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]

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Relationships created for Cloud DataBase (continued)

Parent class	Relationship type	Child class
Cloud DataBase [cmdb_ci_cloud_database]	Reference	Key Value [cmdb_key_value]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Disk Type [cmdb_ci_disk_type]

The following attributes in the Cloud Disk Type [cmdb_ci_disk_type] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

Relationships created for Cloud Disk Type

Parent class	Relationship type	Child class
Cloud Disk Type [cmdb_ci_disk_type]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Disk Type [cmdb_ci_disk_type]	Reference	Key Value [cmdb_key_value]

Cloud Function [cmdb_ci_cloud_function]

The following attributes in the Cloud Function [cmdb_ci_cloud_function] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
CodeSha256	codesha256
Function Last Modified	function_last_modified
Install Status	install_status
Language	language
Operational status	operational_status
Version	version

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Relationships created for Cloud Function

Parent class	Relationship type	Child class
Cloud Function [cmdb_ci_cloud_function]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Function [cmdb_ci_cloud_function]	Reference	Key Value [cmdb_key_value]
Cloud Function [cmdb_ci_cloud_function]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Load Balancer [cmdb_ci_cloud_load_balancer]

The following attributes in the Cloud Load Balancer [cmdb_ci_cloud_load_balancer] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status
State	state

Relationships created for Cloud Load Balancer

Parent class	Relationship type	Child class
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	Key Value [cmdb_key_value]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Load Balancer Health Service [cmdb_ci_lb_health_service]

The following attributes in the Cloud Load Balancer Health Service [cmdb_ci_lb_health_service] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Healthy threshold	healthy_threshold
Install Status	install_status
Interval in seconds	check_interval_sec

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Attribute label	Attribute name
Monitor type protocol	monitor_type
Operational status	operational_status
Port	port
Request path	request_path
Timeout in seconds	timeout_sec
Unhealthy threshold	unhealthy_threshold

Relationships created for Cloud Load Balancer Health Service

Parent class	Relationship type	Child class
Cloud Load Balancer Health Service [cmdb_ci_lb_health_service]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Cloud Load Balancer Health Service [cmdb_ci_lb_health_service]	Contains::Contained by	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
Cloud Load Balancer Health Service [cmdb_ci_lb_health_service]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Mgmt Network Interface [cmdb_ci_nic]

The following attributes in the Cloud Mgmt Network Interface [cmdb_ci_nic] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Name	name
Object ID	object_id
Public IP	public_ip
Install Status	install_status
Operational status	operational_status
Private IP	private_ip
Configuration Item	cmdb_ci

Relationships created for Cloud Mgmt Network Interface

Parent class	Relationship type	Child class
Cloud Mgmt Network Interface [cmdb_ci_nic]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	Virtual Machine Instance [cmdb_ci_vm_instance]

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Cloud Network [cmdb_ci_network]

The following attributes in the Cloud Network [cmdb_ci_network] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Description	short_description
Install Status	install_status
Operational status	operational_status
State	state

Relationships created for Cloud Network

Parent class	Relationship type	Child class
Cloud Network [cmdb_ci_network]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Cloud Network [cmdb_ci_network]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]
Cloud Network [cmdb_ci_network]	Contains::Contained by	Network ACL [cmdb_ci_network_acl]
Cloud Network [cmdb_ci_network]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Object Storage [cmdb_ci_cloud_object_storage]

The following attributes in the Cloud Object Storage [cmdb_ci_cloud_object_storage] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Cloud Provider	cloud_provider
Install Status	install_status
Operational status	operational_status
Service Name	service_name

Relationships created for Cloud Object Storage

Parent class	Relationship type	Child class
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]

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Relationships created for Cloud Object Storage (continued)

Parent class	Relationship type	Child class
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Reference	Key Value [cmdb_key_value]
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Organizations [cmdb_ci_cloud_org]

The following attributes in the Cloud Organizations [cmdb_ci_cloud_org] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Install Status	install_status
Name	name
Operational status	operational_status
Time	time

Relationships created for Cloud Organizations

Parent class	Relationship type	Child class
Cloud Organizations [cmdb_ci_cloud_org]	Contains::Contained by	Google Organization Folder [cmdb_ci_gcp_folder]
Cloud Organizations [cmdb_ci_cloud_org]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Resource [cmdb_ci_cmp_resource]

The following attributes in the Cloud Resource [cmdb_ci_cmp_resource] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Description	short_description
Install status	install_status
Operational status	operational_status
Resource type	resource_type

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Relationships created for Cloud Resource

Parent class	Relationship type	Child class
Cloud Resource [cmdb_ci_cmp_resource]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]
Cloud Resource [cmdb_ci_cmp_resource]	Reference	Key Value [cmdb_key_value]

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data:

Attribute label	Attribute name
Account Id	account_id
Name	name
Object ID	object_id
Datacenter Type	datacenter_type
Install status	install_status
Operational status	operational_status
Organization Id	organization_id

Relationships created for Cloud Service Account

Parent class	Relationship type	Child class
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	Key Value [cmdb_key_value]
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Cloud Subnet [cmdb_ci_cloud_subnet]

The following attributes in the Cloud Subnet [cmdb_ci_cloud_subnet] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Available IP Count	available_ip_count
Broadcast Address	broadcast_address
CIDR	cidr
Gateway	gateway
Install Status	install_status

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Attribute label	Attribute name
Operational status	operational_status
State	state
Subnet Mask	subnet_mask

Relationships created for Cloud Subnet

Parent class	Relationship type	Child class
Cloud Subnet [cmdb_ci_cloud_subnet]	Contains::Contained by	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Cloud Subnet [cmdb_ci_cloud_subnet]	Reference	Key Value [cmdb_key_value]
Cloud Subnet [cmdb_ci_cloud_subnet]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Compute Security Group [cmdb_ci_compute_security_group]

The following attributes in the Compute Security Group [cmdb_ci_compute_security_group] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status
State	state

Relationships created for Compute Security Group

Parent class	Relationship type	Child class
Compute Security Group [cmdb_ci_compute_security_group]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Compute Security Group [cmdb_ci_compute_security_group]	Reference	Key Value [cmdb_key_value]
Compute Security Group [cmdb_ci_compute_security_group]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Docker Container [cmdb_ci_docker_container]

The following attributes in the Docker Container [cmdb_ci_docker_container] table are populated by collected data:

Attribute label	Attribute name
Container id	container_id

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Attribute label	Attribute name
Command	command
Container created	container_created_at
Image id	image_id
Install Status	install_status
Name	name
Operational status	operational_status
Status	status

Docker Image [cmdb_ci_docker_image]

The following attributes in the Docker Image [cmdb_ci_docker_image] table are populated by collected data:

Attribute label	Attribute name
Image id	image_id
Name	name

Google Datacenter [cmdb_ci_google_datacenter]

The following attributes in the Google Datacenter [cmdb_ci_google_datacenter] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Region	region
Install Status	install_status

Relationships created for Google Datacenter

Parent class	Relationship type	Child class
Google Datacenter [cmdb_ci_google_datacenter]	Contains::Contained by	Availability Zone [cmdb_ci_availability_zone]
Google Datacenter [cmdb_ci_google_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Google Organization Folder [cmdb_ci_gcp_folder]

The following attributes in the Google Organization Folder [cmdb_ci_gcp_folder] table are populated by collected data:

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Attribute label	Attribute name
Object ID	object_id
Install Status	install_status
Name	name
Operational status	operational_status
Parent	parent_ci
Parent Id	parent_id
Parent Type	parent_type
Time	time

Relationship created for Google Organization Folder

Parent class	Relationship type	Child class
Google Organization Folder [cmdb_ci_gcp_folder]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]
Google Organization Folder [cmdb_ci_gcp_folder]	Reference	Cloud Organizations [cmdb_ci_cloud_org]
Google Organization Folder [cmdb_ci_gcp_folder]	Reference	Google Organization Folder [cmdb_ci_gcp_folder]

Google Organization Project [cmdb_ci_gcp_project]

The following attributes in the Google Organization Project [cmdb_ci_gcp_project] table are populated by collected data:

Attribute label	Attribute name
Operational status	operational_status
Discovery credentials	discovery_credentials
Name	name
Object ID	object_id
Install Status	install_status
Parent	parent_ci
Parent Id	parent_id
Parent Type	parent_type
Project Id	project_id
Project Number	project_number
Status	status
Time	time

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Relationships created for Google Organization Project

Parent class	Relationship type	Child class
Google Organization Project [cmdb_ci_gcp_project]	Reference	Google Organization Folder [cmdb_ci_gcp_folder]
Google Organization Project [cmdb_ci_gcp_project]	Reference	Cloud Organizations [cmdb_ci_cloud_org]

Hardware Type [cmdb_ci_compute_template]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Class	className
Description	short_description
Local Storage GB	local_storage_gb
Memory MB	memory_mb
vCPUs	vcpus
Zone	zone

Note:
If the *sn_itom_pattern.use a single hardware type for cloud data centers* system property is set to `true`, the *className* is set to Cloud Hardware Type [cmdb_ci_cloud_hardware_type]. If the property is set to `false`, the *className* is set to Hardware Type [cmdb_ci_compute_template].

Relationship created for Hardware Type

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]

Image [cmdb_ci_os_template]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Class	className

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Attribute label	Attribute name
Fully qualified domain name	fqdn
Install Status	install_status
Operational status	operational_status

Note:
If the *sn_cmdb_ci_class.use_single_cloud_os_image* system property is set to `true`, the *className* is set to Cloud Image [cmdb_ci_cloud_os_image]. If the property is set to `false`, the *className* is set to Image [cmdb_ci_os_template].

Relationships created for Image

Parent class	Relationship type	Child class
Image [cmdb_ci_os_template]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Image [cmdb_ci_os_template]	Reference	Key Value [cmdb_key_value]
Image [cmdb_ci_os_template]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Install Status	install_status
IP version	ip_version
Name	name
Operational status	operational_status

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Key Value [cmdb_key_value]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

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The tags and labels associated with the following CI classes are populated in the Key Value [cmdb_key_value] table.

CMDB CI classes	Label populated	Tag populated
Cloud DataBase [cmdb_ci_cloud_database]	Yes	Yes
Cloud Function [cmdb_ci_cloud_function]	Yes	Yes
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	No	Yes
Cloud Load Balancer Health Service [cmdb_ci_lb_health_service]	No	Yes
Cloud Network [cmdb_ci_network]	No	Yes
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Yes	Yes
Cloud Organizations [cmdb_ci_cloud_org]	No	Yes
Cloud Resource [cmdb_ci_cmp_resource]	Yes	Yes
Cloud Service Account [cmdb_ci_cloud_service_account]	Yes	Yes
Cloud Subnet [cmdb_ci_cloud_subnet]	No	Yes
Compute Security Group [cmdb_ci_compute_security_group]	No	Yes
Google Organization Folder [cmdb_ci_gcp_folder]	No	Yes
Google Organization Project [cmdb_ci_gcp_project]	Yes	Yes
Image [cmdb_ci_os_template]	No	Yes
IP Address [cmdb_ci_ip_address]	Yes	Yes
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Yes	Yes
Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]	Yes	Yes
Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]	Yes	Yes
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Yes	Yes

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CMDB CI classes	Label populated	Tag populated
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Yes	Yes
Kubernetes Node [cmdb_ci_kubernetes_node]	Yes	Yes
Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]	Yes	Yes
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Yes	Yes
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Yes	Yes
Kubernetes Service [cmdb_ci_kubernetes_service]	Yes	Yes
Load Balancer Pool [cmdb_ci_lb_pool]	No	Yes
Load Balancer Service [cmdb_ci_lb_service]	Yes	Yes
Storage Volume [cmdb_ci_storage_volume]	Yes	Yes
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Yes	Yes
Virtual Machine Instance [cmdb_ci_vm_instance]	Yes	Yes

Note:
Labels are not supported by Google Cloud for the following CI classes:

- Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
- Cloud Load Balancer Health Service [cmdb_ci_lb_health_service]
- Cloud Network [cmdb_ci_network]
- Cloud Organizations [cmdb_ci_cloud_org]
- Cloud Subnet [cmdb_ci_cloud_subnet]
- Compute Security Group [cmdb_ci_compute_security_group]
- Google Organization Folder [cmdb_ci_gcp_folder]
- Image [cmdb_ci_os_template]
- Load Balancer Pool [cmdb_ci_lb_pool]

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

The following attributes in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table are populated by collected data:

Attribute label	Attribute name
Cluster Resource ID	cluster_resource_id

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Attribute label	Attribute name
IP Address	ip_address
Kubernetes UID	k8s_uid
Name	name
Port	port
Cluster Version	cluster_version
Description	short_description
Install Status	install_status
Operational status	operational_status
SelfLink	self_link
Subnet Mask	subnet_mask

Relationships created for Kubernetes Cluster

Parent class	Relationship type	Child class
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Cluster of::Cluster	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Pod [cmdb_ci_kubernetes_pod]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Namespace [cmdb_ci_kubernetes_namespace]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Service [cmdb_ci_kubernetes_service]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Reference	Key Value [cmdb_key_value]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]

The following attributes in the Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Comments	comments

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Attribute label	Attribute name
Description	short_description
Install Status	install_status
Operational status	operational_status
Kubernetes Cluster	cluster
Name	name

Relationships created for Kubernetes Cluster Role

Parent class	Relationship type	Child class
Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]
Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]	Reference	Key Value [cmdb_key_value]

Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]

The following attributes in the Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Comments	comments
Description	short_description
Install Status	install_status
Name	name
Kubernetes Cluster	cluster
Operational status	operational_status

Relationships created for Kubernetes Cluster Role Binding

Parent class	Relationship type	Child class
Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]

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Relationships created for Kubernetes Cluster Role Binding (continued)

Parent class	Relationship type	Child class
Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]
Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]	Reference	Key Value [cmdb_key_value]

Kubernetes Deployment [cmdb_ci_kubernetes_deployment]

The following attributes in the Kubernetes Deployment [cmdb_ci_kubernetes_deployment] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Available Replicas	available_replicas
Description	short_description
Desired Replicas	desired_replicas
Install Status	install_status
Kubernetes Cluster	cluster
Operational status	operational_status
Total Replicas	total_replicas
Unavailable Replicas	unavailable_replicas
Updated Replicas	updated_replicas

Relationships created for Kubernetes Deployment

Parent class	Relationship type	Child class
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

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Relationships created for Kubernetes Deployment (continued)

Parent class	Relationship type	Child class
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Reference	Key Value [cmdb_key_value]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Kubernetes Namespace [cmdb_ci_kubernetes_namespace]

The following attributes in the Kubernetes Namespace [cmdb_ci_kubernetes_namespace] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Description	short_description
Install Status	install_status
Namespace	namespace
Operational status	operational_status

Relationships created for Kubernetes Namespace

Parent class	Relationship type	Child class
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Contains::Contained by	Kubernetes Service [cmdb_ci_kubernetes_service]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Contains::Contained by	Kubernetes Deployment [cmdb_ci_kubernetes_deployment]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Contains::Contained by	Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Contains::Contained by	Kubernetes Pod [cmdb_ci_kubernetes_pod]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Reference	Key Value [cmdb_key_value]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Kubernetes Node [cmdb_ci_kubernetes_node]

The following attributes in the Kubernetes Node [cmdb_ci_kubernetes_node] table are populated by collected data:

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Attribute label	Attribute name
IP Address	ip_address
Kubernetes UID	k8s_uid
Name	name
Description	short_description
Install Status	install_status
Namespace	namespace
Operational status	operational_status
Kubernetes Cluster	cluster

Relationships created for Kubernetes Node

Parent class	Relationship type	Child class
Kubernetes Node [cmdb_ci_kubernetes_node]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Kubernetes Node [cmdb_ci_kubernetes_node]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Kubernetes Node [cmdb_ci_kubernetes_node]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Node [cmdb_ci_kubernetes_node]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]
Kubernetes Node [cmdb_ci_kubernetes_node]	Reference	Key Value [cmdb_key_value]

Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]

The following attributes in the Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Disk Type	disk_type
Image Type	image_type
Install Status	install_status
Machine Type	machine_type
Operational status	operational_status
Pod CIDR Range	podIpv4CidrSize
Resource version	resource_version
Kubernetes Cluster	cluster

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Relationships created for Kubernetes Node Pool

Parent class	Relationship type	Child class
Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]	Uses::Used by	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]	Reference	Key Value [cmdb_key_value]
Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Kubernetes Pod [cmdb_ci_kubernetes_pod]

The following attributes in the Kubernetes Pod [cmdb_ci_kubernetes_pod] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Description	short_description
Host IP	host_ip
Install Status	install_status
IP Address	ip_address
Operational status	operational_status
Resource version	resource_version

Relationships created for Kubernetes Pod

Parent class	Relationship type	Child class
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Image [cmdb_ci_docker_image]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Kubernetes Volume [cmdb_ci_kubernetes_volume]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Container [cmdb_ci_docker_container]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Reference	Key Value [cmdb_key_value]

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Relationships created for Kubernetes Pod (continued)

Parent class	Relationship type	Child class
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]

The following attributes in the Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Description	short_description
Desired Replicas	desired_replicas
Install Status	install_status
Operational status	operational_status
SelfLink	self_link
Total Replicas	total_replicas
Kubernetes Cluster	cluster

Relationships created for Kubernetes ReplicaSet

Parent class	Relationship type	Child class
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Reference	Key Value [cmdb_key_value]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Kubernetes Service [cmdb_ci_kubernetes_service]

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Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Description	short_description
Install Status	install_status
IP Address	ip_address
Operational status	operational_status

Relationships created for Kubernetes Service

Parent class	Relationship type	Child class
Kubernetes Service [cmdb_ci_kubernetes_service]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Kubernetes Service [cmdb_ci_kubernetes_service]	Reference	Key Value [cmdb_key_value]
Kubernetes Service [cmdb_ci_kubernetes_service]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Kubernetes Volume [cmdb_ci_kubernetes_volume]

The following attributes in the Kubernetes Volume [cmdb_ci_kubernetes_volume] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Mount Path	mount_path
Name	name
Volume ID	volume_id
Namespace	namespace

Load Balancer Pool [cmdb_ci_lb_pool]

The following attributes in the Load Balancer Pool [cmdb_ci_lb_pool] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status

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Relationships created for Load Balancer Pool

Parent class	Relationship type	Child class
Load Balancer Pool [cmdb_ci_lb_pool]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Load Balancer Pool [cmdb_ci_lb_pool]	Owns::Owned by	Load Balancer Pool Member [cmdb_ci_lb_pool_member]
Load Balancer Pool [cmdb_ci_lb_pool]	Reference	Key Value [cmdb_key_value]
Load Balancer Pool [cmdb_ci_lb_pool]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Load Balancer Pool Member [cmdb_ci_lb_pool_member]

The following attributes in the Load Balancer Pool Member [cmdb_ci_lb_pool_member] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Install status	install_status
Operational status	operational_status

Relationship created for Load Balancer Pool Member

Parent class	Relationship type	Child class
Load Balancer Pool Member [cmdb_ci_lb_pool_member]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Load Balancer Service [cmdb_ci_lb_service]

The following attributes in the Load Balancer Service [cmdb_ci_lb_service] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Name	name
Object ID	object_id
Port	port
Install Status	install_status
Listener Protocol	listener_protocol
Operational status	operational_status
Service Type	service_type

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Relationships created for Load Balancer Service

Parent class	Relationship type	Child class
Load Balancer Service [cmdb_ci_lb_service]	Contains::Contained by	Load Balancer Pool [cmdb_ci_lb_pool]
Load Balancer Service [cmdb_ci_lb_service]	Hosted on::Hosts	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
Load Balancer Service [cmdb_ci_lb_service]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]
Load Balancer Service [cmdb_ci_lb_service]	Reference	Key Value [cmdb_key_value]

Network ACL [cmdb_ci_network_acl]

The following attributes in the Network ACL [cmdb_ci_network_acl] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Description	short_description
Install Status	install_status
Operational status	operational_status

Relationships created for Network ACL

Parent class	Relationship type	Child class
Network ACL [cmdb_ci_network_acl]	Contains::Contained by	Network ACL Rule [cmdb_ci_network_acl_rule]
Network ACL [cmdb_ci_network_acl]	Reference	Key Value [cmdb_key_value]

Network ACL Rule [cmdb_ci_network_acl_rule]

The following attributes in the Network ACL Rule [cmdb_ci_network_acl_rule] table are populated by collected data:

Attribute label	Attribute name
Name	name
Allow Deny	allow_deny
Allowed\Denied Traffic	allowed_denied_traffic
Destination Ranges	destination_ranges
Install Status	install_status

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Attribute label	Attribute name
Operational status	operational_status
Outbound	is_outbound
Source Ranges	source_ranges
Target Tags	target_tags

Relationship created for Network ACL Rule

Parent class	Relationship type	Child class
Network ACL Rule [cmdb_ci_network_acl_rule]	Reference	Key Value [cmdb_key_value]

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Class	sys_class_name
CPU count	cpu_count
Disk space (GB)	disk_space
Host name	host_name
Install Status	install_status
IP Address	ip_address
Is Virtual	virtual
Operating System	os
Operational status	operational_status
OS Version	os_version
RAM (MB)	ram

Note:
If the GCP Systems Manager (SSM) service isn't enabled, the connector populates the server records in the Server [cmdb_ci_server] class. If the GCP SSM service is enabled, then based on the platform type obtained through the SSM service, the server records are populated in either the Linux Server [cmdb_ci_linux_server] class or the Windows Server [cmdb_ci_win_server] class. The Server [cmdb_ci_server] class is the parent class of the Linux Server [cmdb_ci_linux_server] and the Windows Server [cmdb_ci_win_server] classes.

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Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]
Server [cmdb_ci_server]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Server [cmdb_ci_server]	Reference	Software Installation [cmdb_sam_sw_install]
Server [cmdb_ci_server]	Reference	Key Value [cmdb_key_value]
Server [cmdb_ci_server]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

The following attributes in the SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes] table are populated by collected data:

Attribute label	Attribute name
Resource ID	resource_id
Folder ID	folder_id
Organization ID	organization_id
Parent	parent
Project	project
Project ID	project_id
Self Link	self_link
Service Graph Connection Record	sg_connection_record
Region	region
Resource Type	resource_type
Organization-Credential Record	org_credential_record

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data when the Software Asset Management (SAM) application isn't installed:

Attribute label	Attribute name
Key	key
Discovery source	discovery_source
Name	name
Version	version
Manufacturer	manufacturer

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Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data when the SAM application is installed:

Attribute label	Attribute name
Display name	display_name
Publisher	publisher
Version	version
Discovery source	discovery_source
Last scanned	last_scanned
Installed on	installed_on

Relationship created for Software Installation

Parent class	Relationship type	Child class
Software Installation [cmdb_sam_sw_install]	Reference	Server [cmdb_ci_server]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data when the SAM application isn't installed:

Attribute label	Attribute name
Name	name
Installed on	installed_on
Install date	install_date

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Server [cmdb_ci_server]

Storage Mapping [cmdb_ci_storage_mapping]

The following attributes in the Storage Mapping [cmdb_ci_storage_mapping] table are populated by collected data:

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Attribute label	Attribute name
Name	name
Object ID	object_id
Install Status	install_status
Mapping Type	mapping_type
Operational status	operational_status

Storage Volume [cmdb_ci_storage_volume]

The following attributes in the Storage Volume [cmdb_ci_storage_volume] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Volume ID	volume_id
Install Status	install_status
Name	name
Operational status	operational_status
Size bytes	size_bytes
State	state
Storage type	storage_type

Relationships created for Storage Volume

Parent class	Relationship type	Child class
Storage Volume [cmdb_ci_storage_volume]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Storage Volume [cmdb_ci_storage_volume]	Reference	Key Value [cmdb_key_value]
Storage Volume [cmdb_ci_storage_volume]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]

The following attributes in the Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Capacity	capacity

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Attribute label	Attribute name
Install Status	install_status
Operational status	operational_status
Parent ID	parent_id
Size (GB)	size
State	state
Volume Name	volume_name

Relationships created for Storage Volume Snapshot

Parent class	Relationship type	Child class
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Provisioned From::Provisioned	Storage Volume [cmdb_ci_storage_volume]
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Reference	Key Value [cmdb_key_value]
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
CPUs	cpus
Disks	disks
Disks size (GB)	disks_size
Install Status	install_status
IP Address	ip_address
Memory (MB)	memory
Network adapters	nics
Operational status	operational_status
State	state
Termination Protection	termination_protection
VM Instance ID	vm_inst_id

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Relationships created for Virtual Machine Instance

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Hardware Type [cmdb_ci_compute_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Contains::Contained by	Cloud Mgmt Network Interface [cmdb_ci_nic]
Virtual Machine Instance [cmdb_ci_vm_instance]	Contains::Contained by	Storage Mapping [cmdb_ci_storage_mapping]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Image [cmdb_ci_os_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Use End Point To::Use End Point From	Block Endpoint [cmdb_ci_endpoint_block]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Google Organization Project [cmdb_ci_gcp_project]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	Key Value [cmdb_key_value]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes]

VNIC Endpoint [cmdb_ci_endpoint_vnic]

The following attributes in the VNIC Endpoint [cmdb_ci_endpoint_vnic] table are populated by collected data:

Attribute label	Attribute name
Host	host
Name	name
Object ID	object_id
Install Status	install_status
IP Address	ip_address
Operational status	operational_status

Relationship created for VNIC Endpoint

Parent class	Relationship type	Child class
VNIC Endpoint [cmdb_ci_endpoint_vnic]	Implement End Point To::Implement End Point From	Cloud Mgmt Network Interface [cmdb_ci_nic]

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Related content

Data mapping for Service Graph Connector for GCP

Service Graph Connector for GCP properties

Accessing the connection details of Service Graph Connector for GCP

You can access the connection details of the Service Graph Connector for GCP in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for GCP. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a GCP connection

Access the details of a GCP connection configured for the Service Graph Connector for GCP.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **GCP** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Handling import failures for large GCP resources

Manage the data source failure when importing resources from GCP.

When importing large GCP resources, the data sources in the Service Graph Connector for GCP might fail because of a Direct REST response exceeding the 1024-MB limit. For more information, see REST step.

You can use one or more of the following options to handle the REST response size limitation error in the Service Graph Connector for GCP:

- Save the response as an attachment
- Modify the batch size

Save the response as an attachment

With the save response as an attachment feature, the response of each data source is temporarily stored as an attachment and after the response is read, the attachment is deleted automatically. The save response as an attachment feature is activated by default and is triggered by the *sn_gcp_integ.save_rest_response_as_attachment* system property.

As a user with the admin role, you can deactivate the save response as an attachment feature by setting the *sn_gcp_integ.save_rest_response_as_attachment* property to

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`false`. When the feature is deactivated and the response size is within the limit, the data sources run normally.

Modify the batch size

By default, the maximum batch size of the environment variable for a data source is set to 100 records. You can reduce or increase the batch size based on the data volume. To manage the batch size of a data source, you must add a system property of integer type for the data source as described in the following table.

System properties for handling the batch size of Service Graph Connector for GCP data sources

Data source	System property
SG-GCP Cloud Database	sg_gcp_cloud_db_batch_size
SG-GCP Cloud Function	sg_gcp_cloud_function_batch_size
SG-GCP Cloud Object Storage	sg_gcp_object_storage_batch_size
SG-GCP Kubernetes Cluster	sg_gcp_kubernetes_cluster_batch_size
SG-GCP Kubernetes Cluster Role	sn_gcp_integ.sg_gcp_kubernetes_cluster_role_batch_size
SG-GCP Kubernetes Cluster Role Binding	sn_gcp_integ.sg_gcp_kubernetes_cluster_role_binding_batch_size
SG-GCP Kubernetes Deployment	sg_gcp_kubernetes_deployment_batch_size
SG-GCP Kubernetes Namespace	sg_gcp_kubernetes_namespace_batch_size
SG-GCP Kubernetes Node	sg_gcp_kubernetes_node_batch_size
SG-GCP Kubernetes Pod	sg_gcp_kubernetes_pod_batch_size
SG-GCP Kubernetes Replicaset	sg_gcp_kubernetes_replicaset_batch_size
SG-GCP Kubernetes Service	sg_gcp_kubernetes_service_batch_size
SG-GCP Load Balancer	sg_gcp_load_balancer_batch_size
SG-GCP Load Balancer Health Service	sg_gcp_lb_health_service_batch_size
SG-GCP Load Balancer Pool	sg_gcp_lb_pool_batch_size
SG-GCP Load Balancer Pool Member	sg_gcp_lb_pool_member_batch_size
SG-GCP Load Balancer Service	sn_gcp_integ.sg_gcp_lb_service_batch_size
SG-GCP Network	sg_gcp_network_batch_size

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System properties for handling the batch size of Service Graph Connector for GCP data sources (continued)

Data source	System property
SG-GCP Kubernetes Node Pool	sn_gcp_integ.sg_gcp_kubernetes_node_pool_batch_size
SG-GCP Security Group	sg_gcp_security_group_batch_size
SG-GCP Software Inventory	sg_gcp_software_inventory_batch_size
SG-GCP Storage Volume	sg_gcp_storage_volume_batch_size
SG-GCP Storage Volume Snapshot	sg_gcp_storage_vol_snapshot_batch_size
SG-GCP Subnet	sg_gcp_subnet_batch_size
SG-GCP VM Instance	sg_gcp_vm_instance_batch_size

Note:
You must add these system properties as they aren't available by default. You must have the admin role to add or modify a system property. For more information, see Add a system property.

Service Graph Connector for GCP reference

Reference topics provide additional information about Service Graph Connector for GCP components.

GCP discovery solutions comparison

ITOM Visibility applications discover a variety of Google Cloud Platform (GCP) resources and populate the relevant configuration item (CI) classes in the Configuration Management Database (CMDB) with their attributes.

ITOM Visibility solutions

ITOM Visibility can offer you comprehensive visibility into your organization's cloud infrastructure. Each application offers unique strengths and capabilities, and by comparing them you can gain holistic insights on their capabilities and benefits.

ITOM Visibility solutions for discovering GCP

ITOM Visibility solution	Overview	Configuration
Discovery and Service Mapping Patterns and Visibility Content	Discovery patterns used by ITOM Visibility	• You must update your store apps to the latest release version. • You must provide ITOM Visibility with access permissions. For more information, see Set up Google Cloud Platform service accounts

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ITOM Visibility solutions for discovering GCP (continued)

ITOM Visibility solution	Overview	Configuration
Service Graph Connector for GCP	Service Graph Connector for GCP	Configure Service Graph Connector for GCP using the guided setup

Note:

The CI class, in most cases, is applicable to both solutions. If it's not applicable to one of the solutions, the solution is marked "N/A".

If an entry is marked with one asterisk, the resource type is supported by Patterns only by utilizing the **Google Asset inventory** pattern's inclusion list. For more information, see Google Cloud Platform (GCP) resource inventory discovery with Patterns.

If an entry is marked with two asterisks, the resource type is supported by Service Graph Connecters only by utilizing the [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table.

Discovery and Service Mapping Patterns vs Service Graph Connector for GCP

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
admissionregistration.k8s.io/mutatingwebhookconfiguration	Yes*	Yes**	cmdb_ci_cmp_resource
admissionregistration.k8s.io/validatingwebhookconfiguration	Yes*	Yes**	cmdb_ci_cmp_resource
alloydb.googleapis.com/Cluster	Yes	No	cmdb_ci_cloud_db_cluster
apigateway.googleapis.com/api	Yes*	Yes**	cmdb_ci_cmp_resource
apigateway.googleapis.com/apiconfig	Yes*	Yes**	cmdb_ci_cmp_resource
apigee.googleapis.com/instance	Yes*	Yes**	cmdb_ci_cmp_resource
apigee.googleapis.com/organization	Yes*	Yes**	cmdb_ci_cmp_resource
apikeys.googleapis.com/key	Yes*	Yes**	cmdb_ci_cmp_resource
appengine.googleapis.com/application	Yes*	Yes**	cmdb_ci_cmp_resource
apps.k8s.io/daemonset	Yes*	Yes**	cmdb_ci_cmp_resource
apps.k8s.io/Deployment	Yes*	Yes	cmdb_ci_kubernetes_deployment

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Discovery and Service Mapping Patterns vs Service Graph Connector for GCP (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
apps.k8s.io/ ReplicaSet	Yes*	Yes	cmdb_ci_kubernetes_replicaset
apps.k8s.io/ statefulset	Yes*	Yes**	cmdb_ci_cmp_resource
artifactregistry.googleapis.com/ dockerimage	Yes*	Yes**	cmdb_ci_cmp_resource
artifactregistry.googleapis.com/ repository	Yes*	Yes**	cmdb_ci_cmp_resource
bigquery.googleapis.com/ bigquery-public-data/ datasets	Yes	No	cmdb_ci_cloud_public_database
bigquery.googleapis.com/ bigquery-public-data/ datasets/tables	Yes	No	cmdb_ci_database
bigquery.googleapis.com/ Dataset	Yes	N/A	cmdb_ci_cloud_database
bigquery.googleapis.com/ Dataset	N/A	Yes**	cmdb_ci_cmp_resource
bigquery.googleapis.com/ Table	Yes	No	cmdb_ci_database
bigtableadmin.googleapis.com/ Instance	Yes*	Yes	cmdb_ci_cloud_database
bigtableadmin.googleapis.com/ Table	Yes*	No	cmdb_ci_database
cloudasset.googleapis.com/ feed	Yes*	Yes**	cmdb_ci_cmp_resource
cloudbilling.googleapis.com/ billingaccount	Yes*	Yes**	cmdb_ci_cmp_resource
cloudbilling.googleapis.com/ projectbillinginfo	Yes*	Yes**	cmdb_ci_cmp_resource
cloudfunctions.googleapis.com/ CloudFunction	Yes*	Yes	cmdb_ci_cloud_function
cloudresourcemanager.googleapis.com/ Folder	Yes	Yes	cmdb_ci_gcp_folder
cloudresourcemanager.googleapis.com/ Organization	Yes	Yes	cmdb_ci_cloud_org
cloudresourcemanager.googleapis.com/ Project	Yes	Yes	cmdb_ci_gcp_project
cloudresourcemanager.googleapis.com/ tagkey	Yes*	Yes	cmdb_ci_cmp_resource

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Discovery and Service Mapping Patterns vs Service Graph Connector for GCP (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
cloudresourcemanager.googleapis.com/tagvalue	Yes*	Yes**	cmdb_ci_cmp_resource
compute.googleapis.com/Address	Yes	No	cmdb_ci_cloud_public_ipaddress
compute.googleapis.com/autoscaler	Yes*	Yes**	cmdb_ci_cmp_resource
compute.googleapis.com/BackendService	N/A	Yes	cmdb_ci_cloud_load_balancer
compute.googleapis.com/BackendService	Yes	N/A	cmdb_ci_lb_service
compute.googleapis.com/Disk	Yes	Yes	cmdb_ci_storage_volume
compute.googleapis.com/DiskTypes	Yes	No	cmdb_ci_disk_type
compute.googleapis.com/Firewall	N/A	Yes	cmdb_ci_compute_security_group
compute.googleapis.com/Firewall	Yes	Yes	cmdb_ci_network_acl_rule
compute.googleapis.com/ForwardingRule	Yes	Yes	cmdb_ci_lb_service
compute.googleapis.com/HttpHealthCheck	Yes	Yes	cmdb_ci_lb_health_service
compute.googleapis.com/Image	Yes	No	cmdb_ci_os_template
compute.googleapis.com/Instance	Yes	N,A	cmdb_ci_lb_pool_member
compute.googleapis.com/Instance	N/A	Yes	cmdb_ci_server
compute.googleapis.com/Instance	Yes	Yes	cmdb_ci_vm_instance
compute.googleapis.com/Instance/networkInterfaces	Yes	No	cmdb_ci_endpoint_vnic
compute.googleapis.com/Instance/networkInterfaces	Yes	Yes	cmdb_ci_nic
compute.googleapis.com/InstanceGroup	Yes	N/A	cmdb_ci_lb_pool
compute.googleapis.com/InstanceGroup	N/A	Yes**	cmdb_ci_cmp_resource

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Discovery and Service Mapping Patterns vs Service Graph Connector for GCP (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
compute.googleapis.com/Instancegroupmanager	Yes*	Yes**	cmdb_ci_cmp_resource
compute.googleapis.com/Instancesettings	Yes*	Yes**	cmdb_ci_cmp_resource
compute.googleapis.com/InstanceTemplate	Yes	No	cmdb_ci_instance_template
compute.googleapis.com/Instancetemplate	No	Yes**	cmdb_ci_cmp_resource
compute.googleapis.com/MachineImage	No	Yes	cmdb_ci_os_template
compute.googleapis.com/MachineTypes	Yes	No	cmdb_ci_cloud_hardware_type
compute.googleapis.com/MachineTypes	Yes	No	cmdb_ci_compute_template
compute.googleapis.com/Network	Yes	Yes	cmdb_ci_network
compute.googleapis.com/Networkendpointgroup	Yes*	Yes**	cmdb_ci_cmp_resource
compute.googleapis.com/Regions	Yes	No	cmdb_ci_google_datacenter
compute.googleapis.com/resourcepolicy	Yes*	Yes**	cmdb_ci_cmp_resource
compute.googleapis.com/router	Yes*	Yes**	cmdb_ci_cmp_resource
compute.googleapis.com/Snapshot	Yes	Yes	cmdb_ci_storage_vol_snapshot
compute.googleapis.com/ssh	Yes	No	cmdb_ci_cloud_key_pair
compute.googleapis.com/sslcertificate	Yes*	Yes**	cmdb_ci_cmp_resource
compute.googleapis.com/Subnetwork	Yes	Yes	cmdb_ci_cloud_subnet
compute.googleapis.com/targetHttpProxy	Yes	N/A	cmdb_ci_lb_service
compute.googleapis.com/targetHttpProxy	Yes	Yes**	cmdb_ci_cmp_resource
compute.googleapis.com/TargetPool	Yes	N/A	cmdb_ci_cloud_load_balancer
compute.googleapis.com/TargetPool	N/A	Yes	cmdb_ci_lb_pool

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Discovery and Service Mapping Patterns vs Service Graph Connector for GCP (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
compute.googleapis.com/targetSslProxy	Yes	No	cmdb_ci_lb_service
compute.googleapis.com/targetTcpProxy	Yes	No	cmdb_ci_lb_service
compute.googleapis.com/UrlMap	Yes	N/A	cmdb_ci_cloud_load_balancer
compute.googleapis.com/UrlMap	N/A	Yes**	cmdb_ci_cmp_resource
compute.googleapis.com/zones	Yes	No	cmdb_ci_availability_zone
container.googleapis.com/Cluster	Yes	Yes	cmdb_ci_kubernetes_cluster
container.googleapis.com/NodePool	No	Yes	cmdb_ci_kubernetes_node_pool
containerregistry.googleapis.com/image	Yes*	Yes**	cmdb_ci_cmp_resource
dataplex.googleapis.com/entrygroup	Yes*	Yes**	cmdb_ci_cmp_resource
firebase.googleapis.com/firebaseproject	Yes*	Yes**	cmdb_ci_cmp_resource
firebasedatabase.googleapis.com/instances	Yes	No	cmdb_ci_cloud_database
firebaserules.googleapis.com/release	Yes*	Yes**	cmdb_ci_cmp_resource
firebaserules.googleapis.com/ruleset	Yes*	Yes**	cmdb_ci_cmp_resource
firestore.googleapis.com/Database	Yes	Yes	cmdb_ci_cloud_database
iam.googleapis.com/role	Yes*	Yes**	cmdb_ci_cmp_resource
iam.googleapis.com/serviceaccount	Yes*	Yes**	cmdb_ci_cmp_resource
iam.googleapis.com/serviceaccountkey	Yes*	Yes**	cmdb_ci_cmp_resource
integrations.googleapis.com/integration	Yes*	Yes**	cmdb_ci_cmp_resource
integrations.googleapis.com/integrationversion	Yes*	Yes**	cmdb_ci_cmp_resource
K8s.io/endpoints	Yes*	Yes**	cmdb_ci_cmp_resource

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Discovery and Service Mapping Patterns vs Service Graph Connector for GCP (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
K8s.io/Namespace	Yes*	Yes	cmdb_ci_kubernetes_namespace
k8s.io/Node	Yes*	Yes	cmdb_ci_kubernetes_node
K8s.io/ persistentvolume	Yes*	Yes**	cmdb_ci_cmp_resource
k8s.io/ persistentvolumeclaim	Yes*	Yes**	cmdb_ci_cmp_resource
K8s.io/Pod	Yes*	Yes	cmdb_ci_docker_container
K8s.io/Pod	N/A	Yes	cmdb_ci_docker_image
K8s.io/Pod	N/A	Yes	cmdb_ci_kubernetes_pod
K8s.io/Pod	N/A	Yes	cmdb_ci_kubernetes_volume
K8s.io/resourcequota	Yes*	Yes**	cmdb_ci_cmp_resource
k8s.io/Service	Yes*	Yes	cmdb_ci_kubernetes_service
K8s.io/serviceaccount	Yes*	Yes**	cmdb_ci_cmp_resource
labels	Yes	No	cmdb_key_value
logging.googleapis.com/ logbucket	Yes*	Yes**	cmdb_ci_cmp_resource
logging.googleapis.com/ logmetric	Yes*	Yes**	cmdb_ci_cmp_resource
logging.googleapis.com/ logsink	Yes*	Yes**	cmdb_ci_cmp_resource
logging.googleapis.com/ recentquery	Yes*	Yes**	cmdb_ci_cmp_resource
memcache.googleapis.com/ Instance	Yes*	Yes	cmdb_ci_cloud_database
monitoring.googleapis.com/ alertpolicy	Yes*	Yes**	cmdb_ci_cmp_resource
monitoring.googleapis.com/ dashboard	Yes*	Yes**	cmdb_ci_cmp_resource
monitoring.googleapis.com/ notificationchannel	Yes*	Yes**	cmdb_ci_cmp_resource
networkmanagement.googleapis.com/ connectivitytest	Yes*	Yes**	cmdb_ci_cmp_resource
orgpolicy.googleapis.com/ policy	Yes*	Yes**	cmdb_ci_cmp_resource
policy.k8s.io/ poddisruptionbudget	Yes*	Yes**	cmdb_ci_cmp_resource

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Discovery and Service Mapping Patterns vs Service Graph Connector for GCP (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
pubsub.googleapis.com/subscription	Yes*	Yes**	cmdb_ci_cmp_resource
pubsub.googleapis.com/topic	Yes*	Yes**	cmdb_ci_cmp_resource
rbac.authorization.k8s.io/ClusterRole	No	Yes	cmdb_ci_kubernetes_cluster_role
rbac.authorization.k8s.io/ClusterRoleBinding	No	Yes	cmdb_ci_kubernetes_cluster_role_binc
rbac.authorization.k8s.io/role	Yes*	Yes**	cmdb_ci_cmp_resource
rbac.authorization.k8s.io/rolebinding	Yes*	Yes**	cmdb_ci_cmp_resource
redis.googleapis.com/clusters	Yes	No	cmdb_ci_cloud_db_cluster
redis.googleapis.com/Instance	No	Yes	cmdb_ci_cloud_database
run.googleapis.com/revision	Yes*	Yes**	cmdb_ci_cmp_resource
run.googleapis.com/service	Yes*	Yes**	cmdb_ci_cmp_resource
servicedirectory.googleapis.com/endpoint	Yes*	Yes**	cmdb_ci_cmp_resource
servicedirectory.googleapis.com/namespace	Yes*	Yes**	cmdb_ci_cmp_resource
servicedirectory.googleapis.com/service	Yes*	Yes**	cmdb_ci_cmp_resource
servicemanagement.googleapis.com/managedservice	Yes*	Yes**	cmdb_ci_cmp_resource
servicenetworking.googleapis.com/connection	Yes*	Yes**	cmdb_ci_cmp_resource
serviceusage.googleapis.com/service	Yes*	Yes**	cmdb_ci_cmp_resource
spanner.googleapis.com/Database	Yes	No	cmdb_ci_database
spanner.googleapis.com/Instance	Yes	Yes	cmdb_ci_cloud_database
sqladmin.googleapis.com/backup	Yes*	Yes**	cmdb_ci_cmp_resource
sqladmin.googleapis.com/backuprun	Yes*	Yes**	cmdb_ci_cmp_resource

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Discovery and Service Mapping Patterns vs Service Graph Connector for GCP (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
sqladmin.googleapis.com/Instance	Yes*	Yes	cmdb_ci_cloud_database
sqladmin.googleapis.com/Instances/databases	Yes*	No	cmdb_ci_database
storage.googleapis.com/Bucket	N/A	Yes	cmdb_ci_cloud_object_storage
storage.googleapis.com/Bucket	Yes	N/A	cmdb_ci_cmp_resource
storage.k8s.io/storageclass	Yes*	Yes**	cmdb_ci_cmp_resource

Deep discovery for Service Graph Connector for GCP

The SG-GCP Execute Patch Job and SG-GCP Get Patch Job scheduled import jobs enable deep discovery by running patch jobs at the GCP project level.

Deep discovery involves fetching server data. The deep discovery data populates host name, serial number, CPU data, TCP connections, and running processes data into the CMDB.

The Service Graph Connector for GCP uses OS Config Patch jobs on GCP projects to execute the deep discovery commands on the VMs. These patch jobs run independently on Linux and Windows VMs.

The following scheduled imports execute the OS Config Patch jobs, and then read and delete the output:

- SG-GCP Execute Patch Job
- SG-GCP Get Patch Job

Deep discovery connection properties

Deep discovery connection properties

Connection property name	Connection property value
Scripts Bucket Name	Name of the Cloud Storage Bucket where the deep discovery scripts are saved.
Outputs Bucket Name	Name of the output Cloud Storage Bucket.
Outputs Storage Path	Path of the output Cloud Storage Bucket.
Shell Script Object Path	Path of the deep discovery Shell script file.
Shell Script Generation Number	Number that is used to identify the versioning of the cloud storage object.
PowerShell Script Object Path	Path of the deep discovery PowerShell script file.
PowerShell Script Generation Number	Number that is used to identify the versioning of the cloud storage object.

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SG-GCP Execute Patch Job

The SG-GCP Execute Patch Job scheduled import reads the path of the Shell and PowerShell scripts uploaded to the Cloud Storage Bucket and the generation numbers from the deep discovery connection properties. The scheduled import then runs the commands on Linux and Windows VMs separately.

In the Import Set table for the SG-GCP Execute Patch Job import schedule, each project will have two rows, one for Linux VMs and the other for Windows VMs. The **Import Set** rows remain in `Pending` state because no transformations are required for these rows. The **Import Set** rows include the patch job ID and the list of instances on which the deep discovery script is run. The output is stored in the Cloud Storage Bucket with the Object ID of the VMs on which the deep discovery commands are run.

SG-GCP Get Patch Job

The SG-GCP Get Patch Job scheduled import reads the output of the commands that are run on the Linux and Windows VMs. The scheduled import reads the output from the output bucket and folder path that are specified in the deep discovery connection properties. The SG-GCP Get Patch Job scheduled import then deletes the output from the Cloud Storage Bucket. The **Import Set** rows are processed using Application Dependency Mapping (ADM) to populate the Server records with the data of the VMs on which deep discovery was run. The **Import Set** rows include VM data such as running processes, TCP connections, and CPU information.

Application Dependency Mapping

Using the deep discovery information, Application Dependency Mapping (ADM) creates and classifies the following applications from the imported middleware information:

- Apache Web Server
- MongoDB Instance
- MSFT SQL Instance
- MySQL Instance
- Nginx Web Server
- Oracle Database Listener
- Oracle Instance
- PostgreSQL Instance
- Tomcat

Additional resource

Service Graph Connector for GCP - Deep Discovery Setup Instructions [KB2213095] article in the Now Support Knowledge Base

Related topics

Service Graph Connector for GCP properties

Life cycle management of records in Service Graph Connector for GCP

Life cycle management in the in the Service Graph Connector for GCP monitors and updates the statuses of GCP resources throughout their entire life cycle, from creation to deletion.

The life cycle management process helps maintain the accuracy and integrity of data in the Configuration Management Database (CMDB).

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In life cycle management, the record removal process involves systematically deleting obsolete or unnecessary resources. This step ensures that outdated entries are cleared, keeping the CMDB accurate and up-to-date. See Record removal process in Service Graph Connector for GCP.

Life cycle management for CIs in Service Graph Connector for GCP

The following table lists the configuration items (CIs) for which life cycle management is available in Service Graph Connector for GCP.

Supported CIs for life cycle management

Data source	CMDB CI classes	Life cycle management available
SG-GCP Organization	Cloud Organizations [cmdb_ci_cloud_org]	Yes
SG-GCP Folder	Google Organization Folder [cmdb_ci_gcp_folder]	Yes
SG-GCP Project	Google Organization Project [cmdb_ci_gcp_project]	Yes
	Cloud Service Account [cmdb_ci_cloud_service_account]	Yes
SG-GCP Network	Cloud Network [cmdb_ci_network]	Yes
SG-GCP Machine Image	Image [cmdb_ci_os_template]	Not applicable
SG-GCP Subnet	Cloud Subnet [cmdb_ci_cloud_subnet]	Yes
	Google Datacenter [cmdb_ci_google_datacenter]	Not applicable
SG-GCP Storage Volume	Storage Volume [cmdb_ci_storage_volume]	Yes
SG-GCP Storage Volume Snapshot	Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Yes
SG-GCP Security Group	Compute Security Group [cmdb_ci_compute_security_group]	Yes
	Network ACL [cmdb_ci_network_acl]	Yes
	Network ACL Rule [cmdb_ci_network_acl_rule]	Yes
SG-GCP Software Inventory	Software [cmdb_ci_spkg] Software Instance [cmdb_software_instance] Software Installation [cmdb_sam_sw_install]	Yes
SG-GCP VM Instance	Virtual Machine Instance [cmdb_ci_vm_instance]	Yes
	Server [cmdb_ci_server]	Yes
	Storage Mapping [cmdb_ci_storage_mapping]	Yes
	VNIC Endpoint [cmdb_ci_endpoint_vnic]	Yes
	Block Endpoint [cmdb_ci_endpoint_block]	Yes

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Supported CIs for life cycle management (continued)

Data source	CMDB CI classes	Life cycle management available
	IP Address [cmdb_ci_ip_address]	Yes
	Cloud Mgmt Network Interface [cmdb_ci_nic]	Yes
	Hardware Type [cmdb_ci_compute_template]	Not applicable
	Image [cmdb_ci_os_template]	Yes
	Availability Zone [cmdb_ci_availability_zone]	Not applicable
SG-GCP Execute Patch Job	Not applicable	Not applicable
SG-GCP Hardware Type	Hardware Type [cmdb_ci_compute_template]	Not applicable
	Google Datacenter [cmdb_ci_google_datacenter]	Not applicable
	Availability Zone [cmdb_ci_availability_zone]	Not applicable
SG-GCP VM Hw Consolidation	Virtual Machine Instance [cmdb_ci_vm_instance]	Not applicable
SG-GCP Load Balancer Pool	Load Balancer Pool [cmdb_ci_lb_pool]	Yes
SG-GCP load Balancer Pool Member	Load Balancer Pool Member [cmdb_ci_lb_pool_member]	Yes
SG-GCP Load Balancer Health Service	Cloud Load Balancer Health Service [cmdb_ci_lb_health_service]	Yes
SG-GCP Load Balancer	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Yes
SG-GCP Load Balancer Service	Load Balancer Service [cmdb_ci_lb_service]	Yes
SG-GCP Cloud Database	Cloud DataBase [cmdb_ci_cloud_database]	Yes
SG-GCP Cloud Function	Cloud Function [cmdb_ci_cloud_function]	Yes
SG-GCP Cloud Object Storage	Cloud Object Storage [cmdb_ci_cloud_object_storage]	Yes
SG-GCP Kubernetes Cluster	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Yes
SG-GCP Kubernetes Node	Kubernetes Node [cmdb_ci_kubernetes_node]	Yes
SG-GCP Kubernetes Pod	Kubernetes Pod [cmdb_ci_kubernetes_pod]	Yes
	Kubernetes Volume [cmdb_ci_kubernetes_volume]	No
	Docker Image [cmdb_ci_docker_image]	No
	Docker Container [cmdb_ci_docker_container]	Yes

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Supported CIs for life cycle management (continued)

Data source	CMDB CI classes	Life cycle management available
SG-GCP Kubernetes Service	Kubernetes Service [cmdb_ci_kubernetes_service]	Yes
SG-GCP Kubernetes Namespace	Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Yes
SG-GCP Kubernetes Deployment	Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Yes
SG-GCP Kubernetes Replicaset	Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Yes
SG-GCP Kubernetes Cluster Roles	Kubernetes Cluster Role [cmdb_ci_kubernetes_cluster_role]	Yes
SG-GCP Kubernetes Cluster Role Binding	Kubernetes Cluster Role Binding [cmdb_ci_kubernetes_cluster_role_binding]	Yes
SG-GCP Kubernetes Node Pool	Kubernetes Node Pool [cmdb_ci_kubernetes_node_pool]	Yes
SG-GCP Generic Resource	Cloud Resource [cmdb_ci_cmp_resource]	Yes
SG-GCP Annotation	Key Value [cmdb_key_value]	Not applicable
SG-GCP Get Patch Job	Not applicable	Not applicable
SG-GCP Generic Resource Annotation	Key Value [cmdb_key_value]	Not applicable

Record removal process in Service Graph Connector for GCP

The Service Graph Connector for GCP uses soft deletion and hard deletion to manage the removal of records.

Record removal is the process of handling data that is no longer needed. For any discovered resources that are deleted later after pulling data, the Service Graph Connector for GCP automatically updates the **Install Status** field of the associated CMDB CI classes to indicate any retired or deleted records.

- Soft deletion
- Hard deletion

Soft deletion

Soft deletion involves marking the install status of a record as **retired** rather than permanently deleting it from the system. The record remains in the database, making it possible to reference or restore it later.

Integration Commons Record Removal is implemented from Service Graph Connector for GCP version 1.11.0 to mark the Install Status and Operational Status of configuration items (CIs) as retired if they aren't discovered during the latest pull. This implementation verifies the Last Scan attribute of the CIs in the Source [sys_object_source] table to identify CIs that aren't discovered during the latest pull. Additionally, the source native keys (SNKs) for all CIs are modified to include the connection alias ID to identify the connection that discovered specific CIs.

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Soft deletion for the Service Graph Connector for GCP 1.11.0 version relies on the Source [sys_object_source] table and the *Use Record Removal* and *lookback_time_in_days* connection properties. Soft deletion for the Service Graph Connector for GCP 1.10 version and earlier relied on the SG-GCP Extension Attributes [sn_gcp_integ_extension_attributes] table.

After upgrading to version 1.11.0, the value of the *Use Record Removal* connection property is set to `true` when the import is run for the first time. Consequently, the latest SNKs for the CIs are included in the Source [sys_object_source] table. Record removal is implemented from the subsequent run.

After upgrading to version 1.11.0, the value of the *lookback_time_in_days* connection property is set to null by default. During the initial run after the upgrade, the Source [sys_object_source] table is queried for all records that the connection discovered. By default, the value is set to 15 after the initial run. Two weeks after the initial run, the Source [sys_object_source] table is queried for all records that weren't discovered in the past 15 days. All records that weren't discovered in the past 15 days are marked as retired.

Soft deletion is enabled for the following data sources in Service Graph Connector for GCP:

- SG-GCP Folder
- SG-GCP Project
- SG-GCP Network
- SG-GCP Subnet
- SG-GCP Storage Volume
- SG-GCP Storage Volume Snapshot
- SG-GCP Security Group
- SG-GCP VM Instance
- SG-GCP Load Balancer Pool
- SG-GCP Load Balancer Pool Member
- SG-GCP Load Balancer Health Service
- SG-GCP Load Balancer
- SG-GCP Load Balancer Service
- SG-GCP Cloud Database
- SG-GCP Cloud Function
- SG-GCP Cloud Object Storage
- SG-GCP Kubernetes Cluster
- SG-GCP Kubernetes Node
- SG-GCP Kubernetes Pod
- SG-GCP Kubernetes Service
- SG-GCP Kubernetes Namespace
- SG-GCP Kubernetes Deployment
- SG-GCP Kubernetes Replicaset
- SG-GCP Kubernetes Cluster Roles
- SG-GCP Kubernetes Cluster Role Binding
- SG-GCP Kubernetes Node Pool

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From Service Graph Connector for GCP version 1.10.0, the SG-GCP Generic Resource data source uses the post-script method for soft deletion, which relies on the Source [sys_object_source] table. For more information about the post-script method, see Post-script method.

Hard deletion

Hard deletion involves permanently deleting a record from the system. The record is removed from the CMDB and can't be referenced or restored later. The SG-GCP Software Inventory data source uses the hard deletion method for the deletion of records.

Related topics

Service Graph Connector for GCP properties

Service Graph Connector for GCP properties

Service Graph Connector for GCP properties control the behavior of the connector.

Connection properties

These connection properties are available for the Service Graph Connector for GCP.

Note:
To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **GCP** > **Connections**, and select the connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

Connection properties for Service Graph Connector for GCP

Property	Description
Organization Id	Enter the organization ID of the SG-GCP account. • Type: integer • Default value: empty
Service Account	Service principal used by the Service Graph Connector for GCP to access the GCP organization, projects, and resources.
Discovery Scope	Enter the discovery scope of the SG-GCP account. • Type: choice list • Default value: empty • Choices: organizations | projects
JWT Provider	The JWT Provider sys_id created for the SG-GCP connection. The value is automatically populated after the connection details are added. • Type: string • Default value: empty

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Connection properties for Service Graph Connector for GCP (continued)

Property	Description
AppScript Folder IDs	Enter the GCP AppScript folder IDs as a comma-separated list to exclude the AppScript folders and projects information from being added to the CMDB during import. Automations are run on AppScript folders, which contain multiple projects that include meta information. AppScript folders don't contain any resources such as networks, subnets, and VMs. • Type: string • Default value: empty
Properties used for soft deletion	
Use Record Removal	This property is used for soft deletion and life cycle handling using the Integration Commons record removal API. The value is automatically updated to `true` after the initial run. **Note:** Do not modify this property. • Type: true | false • Default value: true For more information about soft deletion for the Service Graph Connector for GCP, see Soft deletion.
lookback_time_in_days	This property is used for soft deletion. Time in days in which the sys_object_source records are queried for the soft deletion of CIs. The value is automatically updated to 15 after the initial run. Set the value of this property to empty to include all the older records populated by SG-GCP as removal candidates for soft deletion. **Note:** Do not modify this property if the value is empty. • Type: integer • Default value: empty For more information about soft deletion for the Service Graph Connector for GCP, see Soft deletion.
Properties used for deep discovery	
Shell Script Object Path	Enter the path to the `.sh` file uploaded to the cloud storage bucket. This property is required only when deep discovery is enabled. For more information, see Deep discovery for Service Graph Connector for GCP.

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Connection properties for Service Graph Connector for GCP (continued)

Property	Description
	• Type: string • Default value: empty
PowerShell Script Object Path	Enter the path to the `.ps1` file uploaded to the cloud storage bucket. This property is required only when deep discovery is enabled. For more information, see Deep discovery for Service Graph Connector for GCP. • Type: string • Default value: empty
PowerShell Script Generation Number	Enter the generation number for the `.ps1` file uploaded to the cloud storage bucket. This property is required only when deep discovery is enabled. For more information, see Deep discovery for Service Graph Connector for GCP. • Type: integer • Default value: empty
Shell Script Generation Number	Enter the generation number for the `.sh` file uploaded to the cloud storage bucket. This property is required only when deep discovery is enabled. For more information, see Deep discovery for Service Graph Connector for GCP. • Type: integer • Default value: empty
Scripts Bucket Name	Enter the name of the cloud storage bucket where the `.sh` and `.ps1` files are uploaded in Google Cloud Platform. This property is required only when deep discovery is enabled. For more information, see Deep discovery for Service Graph Connector for GCP. • Type: string • Default value: empty
Outputs Bucket Name	Enter the name of the cloudsn_itom_pattern.use a single hardware type for cloud data centers storage bucket provided in the `.sh` and `.ps1` files where the output of the commands are to be stored.

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Connection properties for Service Graph Connector for GCP (continued)

Property	Description
	This property is required only when deep discovery is enabled. For more information, see Deep discovery for Service Graph Connector for GCP. • Type: string • Default value: empty
Outputs Storage Path	Enter the folder path provided in the `.sh` and `.ps1` files where the output is uploaded in the cloud storage bucket. This property is required only when deep discovery is enabled. For more information, see Deep discovery for Service Graph Connector for GCP. • Type: string • Default value: empty

Default system properties

These default system properties are available for the Service Graph Connector for GCP.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

Default system properties for Service Graph Connector for GCP

Property	Description
sn_gcp_integ.save_rest_response_as_attachment	Set this property to `true` to save the REST resp attachments. Set this property to `false` if the p less than 10 MB. • Type: true | false • Default value: `true` • Location: System Property [sys_properties] ta
sn_gcp_integ.sggcp_config_list_discovered_retry_count	Set the retry count after a failure of the list APIs. • Type: integer • Default value: `100` • Location: System Property [sys_properties] ta
sn_gcp_integ.sg_gcp_list_folder_page_size	Set the page size for the list folder API response

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Default system properties for Service Graph Connector for GCP (continued)

Property	Description
	• Type: integer • Default value: `100` • Location: System Property [sys_properties] ta
sn_gcp_integ.sg_gcp_list_project_page_size	Set the page size for the list project API respons • Type: integer • Default value: `100` • Location: System Property [sys_properties] ta
sn_gcp_integ.sg_gcp_list_resources_page_size	Set the page size for the list resources API respo • Type: integer • Default value: `1000` • Location: System Property [sys_properties] ta
sn_gcp_integ.sg_gcp_generic_resource_type_dynamic_create	Set the value to `true` to add new resource type to the Service Graph Resource Inclusion Whiteli [sn_cmdb_int_util_service_graph_resource_incl table. • Type: true | false • Default value: `false` • Location: System Property [sys_properties] ta

Custom system properties

You can create these custom system properties for the Service Graph Connector for GCP. These properties must be created in the Service Graph Connector for GCP application scope. The custom properties that you create are listed in the System Properties [sys_properties] table.

For more information about creating custom system properties, see Add a system property.

Custom system properties for Service Graph Connector for GCP

Property	Description
sn_gcp_integ.add_inherited_tags	Option to populate the inherited tags of the parent resource. • Type: true | false • Default value: `true`
sn_gcp_integ.software_chunk_size	Enter the number of software records per

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Custom system properties for Service Graph Connector for GCP (continued)

Property	Description
	computer batch. The value of this property can be reduced if the import row size leads to transformation errors. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_software_inventory_batch_size	Set the batch size of the API response for the SG-GCP Software Inventory data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_cloud_db_batch_size	Set the batch size of the API response for the SG-GCP Cloud Database data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_cloud_function_batch_size	Set the batch size of the API response for the SG-GCP Cloud Function data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_kubernetes_cluster_batch_size	Set the batch size of the API response for the SG-GCP Kubernetes Cluster data source. Specify a value between 1 and 100. • Type: integer • Default value: 100

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Custom system properties for Service Graph Connector for GCP (continued)

Property	Description
sn_gcp_integ.sg_gcp_kubernetes_deployment_batch_size	Set the batch size of the API response for the SG-GCP Kubernetes Deployment data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_kubernetes_namespace_batch_size	Set the batch size of the API response for the SG-GCP Kubernetes Namespace data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_kubernetes_node_batch_size	Set the batch size of the API response for the SG-GCP Kubernetes Node data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_kubernetes_node_pool_batch_size	Set the batch size of the API response for the SG-GCP Kubernetes Node Pool data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_kubernetes_cluster_role_batch_size	Set the batch size of the API response for the SG-GCP Kubernetes Cluster Roles data source. Specify a value between 1 and 100. • Type: integer • Default value: 100

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Custom system properties for Service Graph Connector for GCP (continued)

Property	Description
sn_gcp_integ.sg_gcp_kubernetes_cluster_role_binding_batch_size	Set the batch size of the API response for the SG-GCP Kubernetes Cluster Role Binding data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_kubernetes_pod_batch_size	Set the batch size of the API response for the SG-GCP Kubernetes Pod data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_kubernetes_replicaset_batch_size	Set the batch size of the API response for the SG-GCP Kubernetes Replicaset data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_kubernetes_service_batch_size	Set the batch size of the API response for the SG-GCP Kubernetes Service data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_lb_health_service_batch_size	Set the batch size of the API response for the SG-GCP Load Balancer Health Service data source. Specify a value between 1 and 100. • Type: integer • Default value: 100

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Custom system properties for Service Graph Connector for GCP (continued)

Property	Description
sn_gcp_integ.sg_gcp_lb_pool_batch_size	Set the batch size of the API response for the SG-GCP Load Balancer Pool data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_lb_pool_member_batch_size	Set the batch size of the API response for the SG-GCP Load Balancer Pool Member data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_lb_service_batch_size	Set the batch size of the API response for the SG-GCP Load Balancer Service data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_load_balancer_batch_size	Set the batch size of the API response for the SG-GCP Load Balancer data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_network_batch_size	Set the batch size of the API response for the SG-GCP Network data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_object_storage_batch_size	Set the batch size of the API response for the

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Custom system properties for Service Graph Connector for GCP (continued)

Property	Description
	SG-GCP Cloud Object Storage data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_security_group_batch_size	Set the batch size of the API response for the SG-GCP Security Group data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_storage_volume_batch_size	Set the batch size of the API response for the SG-GCP Storage Volume data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_storage_vol_snapshot_batch_size	Set the batch size of the API response for the SG-GCP Storage Volume Snapshot data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_subnet_batch_size	Set the batch size of the API response for the SG-GCP Subnet data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_vm_instance_batch_size	Set the batch size of the API response for the SG-GCP VM Instance data source. Specify a value between 1 and 100.

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Custom system properties for Service Graph Connector for GCP (continued)

Property	Description
	• Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_machine_image_batch_size	Set the batch size of the API response for the SG-GCP Machine Image data source. Specify a value between 1 and 100. • Type: integer • Default value: 100
sn_gcp_integ.sg_gcp_list_generic_resource_page_size	Set the page size for the list generic resource API response. Specify a value between 1 and 1000. • Type: integer • Default value: 1000
sn_gcp_integ.sg_gcp_list_annotation_resource_page_size	Set the page size for the list annotation resource API response. Specify a value between 1 and 1000. • Type: integer • Default value: 1000
sn_sg_gcp_integ.min_retry_wait_time	Set the minimum wait time (in milliseconds) before retrying after an API failure due to throttling or rate limiting issues. • Type: integer • Default value: 10,000
sn_sg_gcp_integ.max_retry_wait_time	Set the maximum waiting period (in milliseconds) after an API failure due to throttling or rate limiting issues. • Type: integer • Default value: 160,000

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Related topics

- Data mapping for Service Graph Connector for GCP
- CMDB classes targeted in Service Graph Connector for GCP
- Deep discovery for Service Graph Connector for GCP
- Record removal process in Service Graph Connector for GCP

Service Graph Connector for Google Console

Use the Service Graph Connector for Google Console to import device details from Chromebooks into the Configuration Management Database (CMDB).

Request apps on the Store

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

Key features

- Get visibility across Chromebook devices.
- Get started quickly with a streamlined onboarding process.
- Use only the credentials you need.

Supported versions

Versions

Google Console	ServiceNow
Last tested on July 05, 2024	• Xanadu • Washington DC • Vancouver • Utah

Use cases

You can use the Service Graph Connector for Google Console to get visibility into Google ChromeOS devices, enabling administrators to centrally manage enrollment, configuration, and monitoring these devices.

Guided setup

The guided setup for the Service Graph Connector for Google Console provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, see Configure Service Graph Connector for Google Console.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific

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time duration, or a specific integration run. For more details about monitoring Google Console integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Google Console data source is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from the Google Console application.

Note:
For any discovered resources that were deleted later, the Service Graph Connector for Google Console automatically marks the corresponding records as no longer active or valid in CMDB.

The following table lists the data sources, the staging tables, and the target tables as CMDB CI classes as where data is stored for a Chromebook device within Google Console.

Data mapping for Google Console

Data source	Staging table	CMDB CI classes	Resource type
SG-GoogleConsole-ChromeDevices	SG-GoogleConsole-ChromeDevices [sn_googleconsole_i_sg_googleconsole_chromedevices]	Computer IP Address Network Adapter When the Software Asset Management (SAM) and SAM Foundation applications are not installed: Software Software Instance When the SAM application, the SAM Foundation application, or both are installed:	Chrome OS devices

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Data mapping for Google Console (continued)

Data source	Staging table	CMDB CI classes	Resource type
		Software Installation	

For more information on where data is saved when pulling data from a Chromebook device, see CMDB classes targeted in Service Graph Connector for Google Console.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Related topics

Service Graph Connectors

Configure Service Graph Connector for Google Console

Set up scheduled import jobs to pull in Chromebook device data from the Google Console into your CMDB.

Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed. See Integration Commons for CMDB.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- ITOM Licensing plugin (com.snc.itom.license). See Request Discovery.

Role required: admin

Procedure

1. Verify that the application scope is set to the Service Graph Connector for Google Console application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Google Console** > **Setup**.
3. On the Service Graph Connector for Google Console page, verify that the **Quick Start** option is selected and then select **Continue**.
4. Configure the authentication credentials to send requests to the Google Console API.

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a. In the Configure the Connection and Credentials section of the Service Graph Connector for Google Console page, select **Start**.

b. Set up the Google Console environment.

i. Select the Google Console Setup Instructions task.

ii. Select the link to the Service Graph connector for Google Console - Setup Instructions [KB1516892] article in the Now Support Knowledge Base and follow the instructions to set up the Google Console environment.

> **Note:**
> Make a note of the destination keystore password. You need to specify this password while importing the Java Keystore (JKS) certificate into the Service Graph Connector for Google Console application.

iii. Set the Google Console Setup Instructions task to complete by selecting the **Mark as complete** check box and then select **Continue**.

c. Create an X.509 certificate to associate the JKS certificate for the Google Console application with the Service Graph Connector for Google Console.

i. Select the Create X.509 certificate task.

ii. In the X.509 Certificates list, select **New**.

iii. On the form, fill in the fields.

X.509 Certificate form

Field	Description
Name	Name of the X.509 certificate. For example, `SG-GoogleConsole-509Certificate`.
Type	Certificate container. Select **Java Key Store**.
Key store password	Password to access the JKS certificate as noted down in the previous step.

> **Note:**
> You can leave the value of other fields as-is.

iv. Select the manage attachments icon ( ).

v. Select **Choose file** to browse and upload the keystore.p12 file for the JKS certificate you created in the previous step.

vi. Close the dialog box.

vii. Select the **Validate Stores/Certificates** related link.

viii. On successful validation, select **Update** to return to the guided setup page.

ix. Set the Create X.509 certificate task to complete by selecting the **Mark as complete** check box and then select **Continue**.

d. Configure the connection.

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i. Verify that the application scope is set to the Service Graph Connector for Google Console application by using the application picker.

ii. Select the Configure the Connection task and then select **Click Here**.

iii. On the Connections page that opens in another browser tab, select **Edit** for the **SG-GoogleConsole** connection that is available by default.

iv. On the form, fill in the fields.

Edit Connection form

Field	Description
Connection Name	Name to identify the connection record. For example, `SG-GoogleConsole`. Don't modify the name for the default connection alias `SG-GoogleConsole`.
Service Account Email	Email address of the service account in Google Console.
Keystore Password	The password that you used when you created the JKS file in the previous step.
Keystore	Select the name of the JKS file you created in the previous step.

v. Select **Edit and Get OAuth Token**.

vi. After the OAuth token is generated, return to the guided setup.

vii. Set the Configure the Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

e. Set up the configuration properties.

i. Select the Add configuration properties task.

ii. In the Service Graph Connections section, review and modify the property details by selecting a property from the **Property** column in the Service Graph Connection Properties related list.

You can configure the *`Customer ID`* property to pull Chromebook devices for the specified customer ID.

iii. Select **Update** in the Service Graph Connection Properties section.

iv. Set the Add connection properties task to complete by selecting the **Mark as complete** check box and then select **Continue**.

f. Test the Google Console API connection to import data from the Google Console application.

i. Select the Test Connection task.

ii. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

iii. When the **Status** field is set to **Success**, select **Update**.

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If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

5. **Optional:** Integrate with multiple Google Console instances.

a. Follow the instructions in the Service Graph connector for Google Console - Setup Instructions [KB1516892] article in the Now Support Knowledge Base to set up the Google Console environment.

> **Note:**
> Make a note of the destination keystore password.

b. In the Add Multiple Instances section of the Service Graph Connector for Google Console page, select **Start**.

c. Create data sources for the new Google Console connection.

i. Ensure that you have edit permissions for the Datasource [sys_data_source] table.

ii. Select the Update Data Source Access task.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Data Source form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. From the application picker, select the Service Graph Connector for Google Console application scope.

vii. Set the Update Data Source Access task to complete by selecting the **Mark as complete** check box and then select **Continue**.

d. Create a scheduled import job for the new Google Console connection.

i. Ensure that you have edit permissions for the Scheduled data import [scheduled_import_set] table.

ii. Select the Update Scheduled Data Import task.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Scheduled Data Import form, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. From the application picker, select the Service Graph Connector for Google Console application scope.

vii. Set the Update Scheduled Data Import task to complete by selecting the **Mark as complete** check box and then select **Continue**.

e. Create an X.509 certificate for the new Google Console instance by repeating the step 4.c, and then mark the Create X.509 certificate task to complete by selecting the **Mark as complete** check box and then select **Continue**.

f. Add another connection for the new Google Console instance.

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i. Verify that the application scope is set to the Service Graph Connector for Google Console application by using the application picker.

ii. Select the Add Another Connection task and then select **Click Here**.

iii. On the Connections page that opens in another browser tab, select **Add Connection**.

iv. On the form, fill in the fields.

Create Connection form

Field	Description
Connection Name	Name to identify the connection record.
Service Account Email	Email address of the service account in Google Console.
Keystore Password	The password that you used when you created the JKS file in the previous step.
Keystore	Select the name of the JKS file you created in the previous step.

v. Select **Create and Get OAuth Token**.

vi. After the OAuth token is generated, return to the guided setup.

vii. Set the Add Another Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

g. Add the configuration properties for the new Google Console instance.

i. Select the Add configuration properties task.

ii. Select the connection record you created in the previous step.

iii. In the Service Graph Connections section, review and modify the property details by selecting a property from the **Property** column in the Service Graph Connection Properties related list.

You can configure the *Customer ID* property to pull Chromebook devices for the specified customer ID.

iv. Select **Update** in the Service Graph Connection Properties section.

v. Set the Add connection properties task to complete by selecting the **Mark as complete** check box and then select **Continue**.

h. Test the Google Console API connection to import data from new Google Console instance.

i. Select the Test New Connections task.

ii. Select the connection record you created in the previous step.

iii. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

iv. When the **Status** field is set to **Success**, select **Update**.

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If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test New Connections task to complete by selecting the **Mark as complete** check box and then select **Continue**.

6. Configure the scheduled job for the import of Google Console data.

a. In the Configure the scheduled jobs section of the Service Graph Connector for Google Console page, select **Start**.

b. Select the **SG-GoogleConsole-ChromeDevices** scheduled job.
For a multiple instance setup, select the scheduled job created with the scheduled import in step 5.d for the new connection.

c. On the Scheduled Data Import form, verify the field values.

For more information, see Schedule a data import.

d. Select the **Active** check box to activate the scheduled job.

e. In the **Run** field, select **Periodically** to specify how often the job will run.

f. Select **Update**.

g. Set the Configure the scheduled jobs task to complete by selecting the **Mark as complete** check box and then select **Continue**.

7. On the Service Graph Connector for Google Console page, select **Complete** to save your changes.
8. In the Complete setup dialog box, select **Complete** to complete the setup.
9. In the message box that appears, select **Done**.

CMDB classes targeted in Service Graph Connector for Google Console

When you complete setting up the connection, you can configure the integration to periodically pull Google Console data from Chromebook devices. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name	Google Console attribute
Install Status	install_status	status
Model number	model_number	model
Model ID	model_id	model
Manufacturer	manufacturer	model
Name	name	serialNumber

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Attribute label	Attribute name	Google Console attribute
Serial number	serial_number	serialNumber
Assigned	assigned	lastEnrollmentTime
Operating System	os	os
Operational status	operational_status	status
OS Version	os_version	osVersion
Assigned to	assigned_to	annotatedUser

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Reference	When the Software Asset Management (SAM) and SAM Foundation applications aren't installed: Software [cmdb_ci_spkg] Software Instance [cmdb_software_instance] When the SAM or SAM Foundation application is installed: Software Installation [cmdb_sam_sw_install]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name	Google Console attribute
IP Address	ip_address	lastKnownNetwork.ipAddress
Name	name	lastKnownNetwork.ipAddress
Nic	nic	macAddress

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Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name	Google Console attribute
Configuration Item	cmdb_ci	serialNumber
MAC Address	mac_address	macAddress
Name	name	macAddress

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Computer [cmdb_ci_computer]

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data when the Software Asset Management (SAM) and SAM Foundation applications are not installed:

Attribute label	Attribute name	Google Console attribute
Key	key	name-version
Name	name	name
Version	version	version

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data when the SAM application, the SAM Foundation application, or both are installed:

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Attribute label	Attribute name	Google Console attribute
Discovery source	discovery_source	None
Display name	display_name	Name
Installed on	installed_on	serialNumber
Version	version	Version

Relationship created for Software Installation

Parent class	Relationship type	Child class
Software Installation [cmdb_sam_sw_install]	Reference	Computer [cmdb_ci_computer]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data when the SAM and SAM Foundation applications are not installed:

Attribute label	Attribute name	Google Console attribute
Installed on	installed_on	serialNumber
Name	name	name, version, serialNumber

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]

Service Graph Connector for Infoblox

Use the Service Graph Connector for Infoblox to pull data from an Infoblox instance into your ServiceNow instance.

Request apps on the Store

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

Supported versions

- Supported versions: Infoblox API v2.11.2
- Supported ServiceNow versions:
  - Yokohama
  - Zurich
  - Australia

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Use cases

The following example use cases describe how you can use the Service Graph Connector for Infoblox for different ServiceNow® applications:

- Configure the Infoblox connection for connecting to an Infoblox instance.
- Create IP address management (IPAM) tasks when subnets are added or deleted.
- Schedule periodic synchronization of IPAM CIs by configuring scheduled data imports jobs.
- View imported IPAM CIs and IPAM tasks.

Important information for upgrading Service Graph Connector for Infoblox

You must run a full data load after upgrading to Service Graph Connector for Infoblox version 1.5.0. After the full data load, all CIs from Service Graph Connector for Infoblox version 1.4.0 and earlier are marked as `retired`. You can decide whether to delete or retain the retired CIs.

You can create table cleanup jobs to automate the cleanup of retired CIs based on your organization's data retention requirements and integration dependencies. For more information, see Create table cleanup jobs for Service Graph Connector for Infoblox.

The source native keys (SNKs) for all CIs in Service Graph Connector for Infoblox version 1.5.0 and later include the Managed Network information to identify the connection that discovered specific CIs and to prevent duplicate records. All new CIs that are created after the initial full data load have updated SNKs.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the Service Graph Workspace or CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Infoblox using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Infoblox integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Additional resource

Infoblox 1.5: What's New and Post-Upgrade Configuration [KB2779014] article in the Now Support Knowledge Base

Related topics

- Service Graph Connectors
- Data mapping for Service Graph Connector for Infoblox
- CMDB classes targeted in Service Graph Connector for Infoblox

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Handling parallel data loading in Service Graph Connector for Infoblox

Life cycle management of records in Service Graph Connector for Infoblox

Service Graph Connector for Infoblox properties

Configure Service Graph Connector for Infoblox using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Infoblox for pulling in Infoblox data into the CMDB.

Before you begin

Install Service Graph Connector for Infoblox version 1.2.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the Infoblox connector type and then select **Configure connection**.
   A default connection, SG_Infoblox_Connection, for Infoblox is available within the application. As the Service Graph Connector for Infoblox supports only a single instance, you can configure the default connection for the first time or resume editing it thereafter.
4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

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Note:
This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

5. Enter connection details and test the API connection for importing Infoblox data.

   a. In the **Setup** stage of the playbook, select the **Configure and test connection** activity.

   b. On the form, fill in the fields.

Configure and test connection form

Field	Description
Connection name	Name to identify the Infoblox connection record.
Connection URL	Infoblox base URL in the following format: `<base-URL>`.
User name	User name for authenticating the HTTP request.
Password	Password for the user name used for authenticating the HTTP request.
Use MID Server	Option to use the MID Server for connecting to the Infoblox instance. **Note:** A MID Server is required only if a direct connection between the ServiceNow and Infoblox instances isn't possible.
Mid Selection	MID Server for the connection. This field appears only when you select the **Use MID Server** check box.

   c. Select **Update and test connection**.

   d. Once the connection test is complete, select **Continue**.

6. **Optional:** Specify network views and the API version for connecting to the Infoblox instance by setting the configuration properties.

Note:
To skip this step, select **Continue** for the **Set configuration properties** activity. If you skip this step, the default values of the *Network view* and *API version* properties are considered.

   a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

   b. In the **Network view** field, enter the network views for which data is to be imported. For multiple views, separate them with commas. For example: `view1,view2`.

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If you leave this field empty or set it to `Default`, the data sources within the connector import data from all the network views.

c. In the **API version** field, enter the version of WAPI you're using.

(Optional) For more information about the Infoblox API, see the Infoblox Developer documentation.

d. Select **Save properties**.

e. Select **Continue**.

7. **Optional:** Opt for task creation on network insertion or deletion.

Note:
To skip this step, select **Continue** for the **Configure task preferences** activity.

a. In the **Setup** stage of the playbook, select the **Configure task preferences** activity.

b. Select the **Create task on network insertion** check box to enable creating a task when a network is inserted.

c. Select the **Create task on network deletion** to enable creating a task when a network is deleted.

d. In the Task user group list, select the user group assigned to tasks created on network insertion or deletion.

e. Select **Save preferences**.

f. Select **Continue**.

8. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Select **Configure import schedule**.

c. Expand the Parent scheduled data import within the Import schedules list to select the **SG-Infoblox IP Pool** import schedule.

d. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

e. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

f. Select **Continue**.

9. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to verify whether the connection was configured.

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What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

- Service Graph Connector for Infoblox
- CMDB classes targeted in Service Graph Connector for Infoblox
- Accessing the connection details of Service Graph Connector for Infoblox

Configure Service Graph Connector for Infoblox using the guided setup

Pull in data from Infoblox into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Note:
If you have an earlier version of the Service Graph Connector for Infoblox, then don't migrate data from the old connector. You must uninstall the previous version and run the new integration.

Role required: SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

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Procedure

1. Ensure that the application scope is set to the Service Graph Connector for Infoblox application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Infoblox** > **Setup**.
3. On the Getting started page, select **Get Started**.
4. Configure the authentication credentials and HTTP connection details for sending requests to the Infoblox API.

   a. Configure your Infoblox authentication credentials.

      i. In the Configure the connection section of the Service Graph Connector for Infoblox page, select **Get Started**.

      ii. For the Configure Infoblox authentication credentials task, select **Configure** to open the Basic Auth Credentials page opens in a new browser tab.

      iii. In the **Name** field, enter a name for the authentication.

      For example, `Infoblox Credential`.

      iv. In the **User name** field, enter the user name that is used to authenticate the HTTP request when this authentication profile is enabled.

      v. In the **Password** field, enter the password for the user name that is used to authenticate the HTTP request.

      vi. Select **Update** to return to the guided setup page.

      vii. Set the Configure Infoblox authentication credentials task to complete by selecting **Mark as Complete**.

   b. Configure the Infoblox connection settings.

      i. For the Configure Infoblox HTTP connection task, select **Configure** to open the HTTP(s) Connection page in a new browser tab.

      ii. Review the fields and in the **Name** field and enter the Infoblox instance name.

      iii. Use the URL builder to build the connection string or in the **Connection URL** field, enter the Infoblox base URL in the following format: `https://<base-URL>`.

      iv. In the **api_version** field of the Attributes section, enter the version of WAPI you're using.

      v. In the **network_view** field of the Attributes section, enter the network views for which data is to be imported.

      For multiple views, separate the views with commas. For example: `view1,view2`. If you leave this field empty, the data sources import data from all the network views.

      vi. Select **Update** to return to the guided setup page.

      vii. Set the Configure Infoblox HTTP connection task to complete by selecting **Mark as Complete**.

      For more information about the Infoblox API, see the Infoblox Developer documentation.

   c. Configure the connection properties.

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i. For the Configure connection properties task, select **Configure** to open the Service Graph Connections page in a new browser tab.

ii. To review and modify the property details, select a property from the **Property** column in the Service Graph Connection Properties related list.

iii. Select **Update** on the Service Graph Connection Properties page.

iv. Select **Update** on the Service Graph Connections page to return to the guided setup page.

v. Set the Configure connection properties task to complete by selecting **Mark as Complete**.

d. Test the Infoblox API connection to import data from the Infoblox application.

i. In the Configure the connection section of the Service Graph Connector for Infoblox page, select **Continue**.

ii. For the Test the connection task, select **Configure** to open the Service Graph Connections page in a new browser tab.

iii. Select **Test Connection**.

iv. When the **Status** field is set to **Success**, select **Update** to close the Test the connection dialog box and return to the guided setup page.

If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test the connection task to complete by selecting **Mark as Complete**.

5. **Optional:** Add multiple instances.

Note:
If you don't need to add multiple instances, you can skip this step.

a. In the Add Multiple Instances section of the Service Graph Connector for Infoblox page, select **Get Started**.

b. For the Update Data Source Access task, select **Configure**.

c. Select the Data Source [sys_data_source] table.

d. Select the **Global** application scope by using the application picker.

e. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

f. Select **Update** to close the tab and return to the guided setup.

g. Modify the application scope again to **Service Graph Connector for Infoblox** by using the application picker.

h. Set the Update Data Source Access task to complete by selecting **Mark as Complete**.

i. For the Update Scheduled Data Import Access task, select **Configure**.

j. Select the Scheduled data import [scheduled_import_set] table.

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k. Repeat steps 5.d to 5.g.

l. Set the Update Scheduled Data Import Access task to complete by selecting **Mark as Complete**.

m. Clear the cache for the new connection.

i. For the Clear Cache for Data Source and Scheduled Data Imports tables task, select **Configure**.

ii. Select the **Global** application scope by using the application picker.

iii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
GlideCacheManager.flushTable("sys_data_source");

GlideTableManager.invalidateTable("scheduled_import_set");
GlideCacheManager.flushTable("scheduled_import_set");

GlideTableManager.invalidateTable("sys_db_object");
GlideCacheManager.flushTable("sys_db_object");
```

iv. Select **Run Script** to run the background script.

The script may take several minutes to execute.

v. After the script is executed, select **Close**.

vi. Modify the application scope again to **Service Graph Connector for Infoblox** by using the application picker.

vii. Set the Clear Cache for Data Source and Scheduled Data Imports tables task to complete by selecting **Mark as complete**.

n. Add a basic authentication connection to the new Infoblox instance.

i. For the Add Another Basic Auth Connection task, select **Configure**.

ii. To create a new connection, select **Add Connection**.

iii. In the Connection Information section of the Create Connection window, fill in the fields.

Connection Information

Field	Description
Connection name	Name to identify the Infoblox connection record.
Connection URL	Infoblox base URL in the following format: *<base-URL>*.
Use MID Server	Option to use a MID Server. **Note:** Use of a MID Server is optional.
MID Selection	Name of the MID Server used by the connector.

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Field	Description
	(Optional) This field appears only when the **Use MID server** check box is selected.
MID Application	Name of the MID application used by the connector. (Optional) This field appears only when the **Use MID server** check box is selected.

iv. In the Credential Information section of the Create Connection window, fill in the fields.

Credential Information

Field	Description
Username	Infoblox account user name that is used to authenticate the connection request.
Password	Password that is used to authenticate the connection request.

v. Select **Create Connection**.

vi. Navigate back to the guided setup, and set the Add Another Basic Auth Connection task to complete by selecting **Mark as Complete**.

o. Test the newly added connections.

i. For the Test connections task, select **Configure**.

ii. From the **Name** column, select the new connection.

iii. Select the **Test Connection** related link to start the testing process.

iv. When the **Status** field is set to **Success**, return to the guided setup page.

> **Note:**
> If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test connections task to complete by selecting **Mark as Complete**.

6. Configure the IP address management tasks and user groups.

a. Enable properties to create an IP address management task when deleting or inserting a network.

i. In the Configure IP address management tasks section of the Service Graph Connector for Infoblox page, select **Get Started**.

ii. For Enable creating a task, select **Configure** to open the Enable create Task page in a new browser tab.

iii. Select the **Create a task when a network is deleted** and **Create a task when a network is inserted** check boxes to enable properties for creating IP address management tasks when deleting and inserting a network, respectively.

iv. Select **Save**.

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v. Close the Enable create Task page tab and return to the guided setup page.

vi. Set Enable creating a task to complete by selecting **Mark as Complete**.

b. Configure the user group for IP address management tasks.

i. For the Configure the user group for IP address management tasks task, select **Configure** to open the SG Infoblox Connection page in a new browser tab.

ii. In the **Connection alias** field, review and change the connection alias.

iii. In the **Task user group** field, change the assignment group for the connection alias.

> **Note:**
> By default, the user group for the IP address management tasks is assigned to the IP Address Management user group. To change the default assignment group, change the task user group for the connection alias.

iv. Select **Update** to return to the guided setup page.

v. Set the Configure the user group for IP address management tasks task to complete by selecting **Mark as Complete**.

7. Configure the scheduled jobs to import data from the Infoblox application.

a. In the Set up scheduled import jobs section of the Service Graph Connector for Infoblox page, select **Get started**.

b. For the Configure the scheduled jobs task, select **Configure** to open the Scheduled Data Imports page in a new browser tab.

c. From the **Name** column, select the scheduled job that you want to activate.

d. On the Scheduled Data Import form, verify the field values for the scheduled job.
For more information, see Schedule a data import.

e. Select **Update**.

f. Repeat the steps 7.c to 7.e for each scheduled job for data import.

g. Close the Scheduled Data Imports page tab and return to the guided setup page.

h. Set the Configure the scheduled jobs task to complete by selecting **Mark as Complete** in the guided setup.

Data mapping for Service Graph Connector for Infoblox

Data from the Infoblox data source is mapped and transformed into the ServiceNow CMDB configuration item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to pull data periodically from Infoblox. The data is loaded into staging tables and then inserted into the target tables.

The following table lists the data sources, the staging tables, and the target tables as CMDB CI and non-CMDB classes for Infoblox.

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Data mapping for Infoblox

Data source	Description	Staging table	Target tables
SG-Infoblox IP Pool	Imports all the network containers from the Infoblox instance. **Note:** The SG-Infoblox IP Pool data source runs before the SG-Infoblox Network data source does.	SG-Infoblox IP Pool [sn_infoblox_integ_sg_infoblox_ip_pool]	Managed IP Pool [cmdb_ci_ip_pool]
SG-Infoblox Network	Imports the IPv4 and IPv6 networks and subnets data from the Infoblox instance. **Note:** The SG-Infoblox Network data source runs after the SG-Infoblox IP Pool data source does.	SG-Infoblox Detailed Subnetwork [sn_infoblox_integ_sg_infoblox_detailed_subnetwork]	Managed IP Network Subnet [cmdb_ci_ip_network_subnet] Managed Network [cmdb_ci_managed_network]
SG-Infoblox IP Address	Imports the IPv4 and IPv6 IP addresses from the	SG-Infoblox IP Address [sn_infoblox_integ_sg_infoblox_ip_address]	Allocated IP Address [cmdb_ci_allocated_ip_addres Managed IP Network Subnet [cmdb_ci_ip_network_subnet]

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Data mapping for Infoblox (continued)

Data source	Description	Staging table	Target tables
	Infoblox instance. **Note:** The SG-Infoblox IP Address data source runs after the SG-Infoblox Network data source does.		Managed Network [cmdb_ci_managed_network]
SG-Infoblox DNS Alias	Imports all the canonical name (CNAME) records from the Infoblox instance.	SG-Infoblox DNS Alias [sn_infoblox_integ_sg_infoblox_dns_alias]	DNS Alias [cmdb_ci_dns_alias]

For the SG-Infoblox IP Address data source, the Detailed Subnetwork [sn_infoblox_integ_sg_infoblox_detailed_subnetwork] table determines which IP addresses are imported based on the value of the *`Get Ip Address`* field.

A global default value can be set for the *`Get Ip Address`* option by setting the value of the *`sn_infoblox_integ.default_get_ip_address`* system property in Service Graph Connector for Infoblox version 1.5.0 and later. Alternatively, you can update either the *`sn_infoblox_integ.included_network_regex`* system property to specify the list of IP addresses to be imported or the *`sn_infoblox_integ.excluded_network_regex`* system property to specify the list of IP addresses to be excluded from the import. For more information, see Service Graph Connector for Infoblox properties.

For more information on where data is saved when pulling data from Infoblox, see CMDB classes targeted in Service Graph Connector for Infoblox.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Related content

CMDB classes targeted in Service Graph Connector for Infoblox

Service Graph Connector for Infoblox properties

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CMDB classes targeted in Service Graph Connector for Infoblox

When you complete setting up the connection, you can configure the integration to pull data periodically from Infoblox. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Allocated IP Address [cmdb_ci_allocated_ip_address]

The following attributes in the Allocated IP Address [cmdb_ci_allocated_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Managed Network	managed_network
IP Version	ip_version
Is Broadcast	is_broadcast
Is Conflict	is_conflict
Is DHCP	is_dhcp
Is DNS	is_dns
Is Reserved	is_reserved
Name	name
Operational status	operational_status
Subnet	subnet

Relationship created for Allocated IP Address

Parent class	Relationship type	Child class
Allocated IP Address [cmdb_ci_allocated_ip_address]	Reference	Key Value [cmdb_key_value]

DNS Alias [cmdb_ci_dns_alias]

The following attribute in the DNS Alias [cmdb_ci_dns_alias] table is populated by collected data:

Attribute label	Attribute name
Name	name

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

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The Key Value table is populated with Infoblox extensible attributes for all IPAM tables.

Managed IP Network Subnet [cmdb_ci_ip_network_subnet]

The following attributes in the Managed IP Network Subnet [cmdb_ci_ip_network_subnet] table are populated by collected data:

Attribute label	Attribute name
Managed Network	managed_network
Name	name
Parent Pool	parent_pool
CIDR	cidr
Correlation ID	correlation_id
IP Version	ip_version
Operational status	operational_status

Relationships created for Managed IP Network Subnet

Parent class	Relationship type	Child class
Managed IP Network Subnet [cmdb_ci_ip_network_subnet]	Reference	SG-Infoblox Detailed Subnetwork [sn_infoblox_integ_sg_infoblox_detailed_subne
Managed IP Network Subnet [cmdb_ci_ip_network_subnet]	Reference	Key Value [cmdb_key_value]

Note:
The IP Network Subnet table is renamed as Managed IP Network Subnet in Service Graph Connector for Infoblox version 1.5.0. The table is renamed to differentiate managed entities from discovered entities (network subnets).

Managed IP Pool [cmdb_ci_ip_pool]

The following attributes in the Managed IP Pool [cmdb_ci_ip_pool] table are populated by collected data:

Attribute label	Attribute name
Managed Network	managed_network
Name	name
Parent Pool	parent_pool
CIDR	cidr
Correlation ID	correlation_id
IP Version	ip_version
Operational status	operational_status

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Relationship created for Managed IP Pool

Parent class	Relationship type	Child class
Managed IP Pool [cmdb_ci_ip_pool]	Reference	Key Value [cmdb_key_value]

Note:
The IP Pool table is renamed as Managed IP Pool in Service Graph Connector for Infoblox version 1.5.0. The table is renamed to differentiate managed entities from discovered entities (IP pools).

Managed Network [cmdb_ci_managed_network]

The following attributes in the Managed Network [cmdb_ci_managed_network] table are populated by collected data:

Attribute label	Attribute name
Correlation ID	correlation_id
Name	name
Operational status	operational_status

Relationship created for Managed Network

Parent class	Relationship type	Child class
Managed Network [cmdb_ci_managed_network]	Reference	Key Value [cmdb_key_value]

Note:
In Service Graph Connector for Infoblox version 1.5.0 and later, the Managed Network [cmdb_ci_managed_network] table imports Infoblox Network View data.

SG-Infoblox Detailed Subnetwork [sn_infoblox_integ_sg_infoblox_detailed_subnetwork]

The following attributes in the SG-Infoblox Detailed Subnetwork [sn_infoblox_integ_sg_infoblox_detailed_subnetwork] table are populated by collected data:

Attribute label	Attribute name
Network	network
Get Ip Address	list_ip_address
Network Type	network_type
Network View	network_view
Operational status	operational_status
Connection ID	connection_id

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Accessing the connection details of Service Graph Connector for Infoblox

You can access the connection details of the Service Graph Connector for Infoblox in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Infoblox. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of an Infoblox connection

Access the details of an Infoblox connection configured for the Service Graph Connector for Infoblox.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Infoblox** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Handling parallel data loading in Service Graph Connector for Infoblox

Parallel data loading in the Service Graph Connector for Infoblox optimizes performance.

Parallel data loading is supported in Service Graph Connector for Infoblox version 1.3.0 and later. Parallel data loading can be enabled for the SG-Infoblox Network and SG-Infoblox IP Address data sources by setting the partition size in the *sn_infoblox_integ.parallel_loading_partition_size* system property. This system property determines the maximum number of networks that each partition processes. The maximum value that you can set for the partition size is `150`.

- For the SG-Infoblox Network data source, the partition size is based on network views.
- For the SG-Infoblox IP Address data source, the partition size is based on the number of networks.

Related content

Service Graph Connector for Infoblox properties

Create table cleanup jobs for Service Graph Connector for Infoblox

Create table cleanup jobs to automate the cleanup of retired CIs from Service Graph Connector for Infoblox version 1.4.0 and earlier based on your organization's data retention requirements and integration dependencies.

Before you begin

Note:
Creating table cleanup jobs for deleting outdated data is an optional procedure.

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Dependencies and requirements:

- Upgrade to Service Graph Connector for Infoblox version 1.5.0.
- Verify that the initial full data load is complete after upgrading to Service Graph Connector for Infoblox version 1.5.0.
- Verify that active integrations do not use any of the old data and that the retired CIs can be safely deleted.

Role required: admin

Procedure

1. Set the application scope to **CMDB CI Class Models** by using the application picker.
   The IPAM tables (Managed Network, IP Pool, Subnet, and Allocated IP Address) belong to the CMDB CI Class Models scope. For more information, see Application picker.
2. Navigate to **All** > **System Maintenance** > **Table Cleanup**.
3. Select **New** to create a new table cleanup job.
4. Configure a table cleanup job for the IPAM tables.

Field	Description
Table name	Enter the name of the IPAM table from which outdated data is to be cleaned up. You can create table cleanup jobs for the following IPAM tables: ○ cmdb_ci_managed_network ○ cmdb_ci_ip_pool ○ cmdb_ci_ip_network_subnet ○ cmdb_ci_allocated_ip_address
Age in seconds	Set the value to either `0` or `86400` (24 hours). ○ `0`: All records updated from now are deleted (immediate cleanup). ○ `86400`: Records older than 24 hours are cleaned up (recommended). **Note:** Setting this value to less than 24 hours (86400 seconds) could result in missing session statistics data.

5. Add filters for the table cleanup job.
   a. Select **Discovery source** is **SG-Infoblox**.
   b. Select **AND**.
   c. Select **Operational status** is **retired**.

Important: Incorrect configuration of these filters might delete operational CIs or CIs from other discovery sources.

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6. Select **Submit**.

   The job runs automatically in the next available maintenance window.

7. Repeat step 4 to step 6 for the remaining IPAM tables.

8. Configure a table cleanup job for the Detailed Network [sn_infoblox_integ_sg_infoblox_detailed_subnetwork] table.

   a. Switch the application scope to **Service Graph Connector for Infoblox** by using the application picker.

   b. Navigate to **All** > **System Maintenance** > **Table Cleanup**.

   c. Select **New**.

   d. Configure a table cleanup job for the Detailed Network [sn_infoblox_integ_sg_infoblox_detailed_subnetwork] table.

Field	Description
Table name	Enter `sn_infoblox_integ_sg_infoblox_detailed_sub` as the table name.
Age in seconds	Set the value to either `0` or `86400` (24 hours). ▪ `0`: All records updated from now are deleted (immediate cleanup). ▪ `86400`: Records older than 24 hours are cleaned up (recommended). **Note:** Setting this value to less than 24 hours (86400 seconds) could result in missing session statistics data.

   e. Select **Operational status** is **retired**.

   Important: Incorrect configuration of this filter might delete operational CIs or CIs from other discovery sources.

   f. Select **Submit**.

Service Graph Connector for Infoblox reference

Reference topics provide additional information about Service Graph Connector for Infoblox components.

Life cycle management of records in Service Graph Connector for Infoblox

Life cycle management in the Service Graph Connector for Infoblox monitors and updates the statuses of Infoblox resources throughout their life cycle, from creation to deletion.

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The life cycle management process helps maintain the accuracy and integrity of data in the Configuration Management Database (CMDB).

Soft deletion of Infoblox configuration items (CIs) is implemented in Service Graph Connector for Infoblox version 1.5.0 and later. The *operational_status* attribute of CIs is updated from `operational` to `retired` for CIs that aren't discovered during the latest pull. You can decide whether to delete or retain the retired CIs.

Life cycle management is supported for the following tables:

- Managed Network [cmdb_ci_managed_network]
- IP Pool [cmdb_ci_ip_pool]
- Subnet [cmdb_ci_ip_network_subnet]
- Detailed Network [sn_infoblox_integ_sg_infoblox_detailed_subnetwork]
- Allocated IP Address [cmdb_ci_allocated_ip_address]

Service Graph Connector for Infoblox properties

Service Graph Connector for Infoblox properties control the behavior of the connector.

Connection properties

These connection properties are available for the Service Graph Connector for Infoblox.

Note:
To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **Infoblox** > **Connections**, and select the connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

Connection properties for Service Graph Connector for Infoblox

Property	Description
api_version	Version of the Infoblox API.
network_view	Enter the names (as a comma-separated list) of the Infoblox Network Views from which data is to be imported. **Note:** If a value isn't specified for this property, data is imported from all Infoblox network views. • Type: string • Default value: empty

System properties

These system properties are available for the Service Graph Connector for Infoblox.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

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System properties for Service Graph Connector for Infoblox

Property	Description
sn_infoblox_integ.parallel_loading_partition_size	Set the maximum number of networks that each partition processes. The maximum value that can be set for this property is `150`. • Type: integer • Default value: empty • Location: System Property [sys_properties] table
sn_infoblox_integ.default_get_ip_address	Set a global default value for the *`Get IP Address`* option. When the value is set to `true`, all newly imported networks automatically retrieve IP address details. You can specify which IP addresses are to be excluded from the import by using the *`sn_infoblox_integ.excluded_network_regex`* system property. When the value is set to `false`, networks don't retrieve IP addresses by default. You can specify which IP addresses are to be imported by using the *`sn_infoblox_integ.included_network_regex`* system property. • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table
sn_infoblox_integ.included_network_regex	Enter the list of IP addresses to be imported. Specify the list in pipe-delimited string format. For information about configuring this property to prevent system property cache invalidation, see the Configure Service Graph Connector for Infoblox [KB2523896] article in the Now Support Knowledge Base. • Type: string • Default value: empty • Location: System Property [sys_properties] table
sn_infoblox_integ.excluded_network_regex	Enter the list of IP addresses to be excluded from the import. Specify the list in pipe-delimited string format. For information about configuring this property to prevent system property cache invalidation, see the Configure Service Graph Connector for Infoblox [KB2523896] article in the Now Support Knowledge Base.

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System properties for Service Graph Connector for Infoblox (continued)

Property	Description
	• Type: string • Default value: empty • Location: System Property [sys_properties] table

Related content

Data mapping for Service Graph Connector for Infoblox

CMDB classes targeted in Service Graph Connector for Infoblox

Service Graph Connector for Jamf

Use the Service Graph Connector for Jamf to pull data from Jamf into your ServiceNow instance.

The Service Graph Connector for Jamf pulls data from computers, disks, networks, and software applications into the ServiceNow® Configuration Management Database (CMDB) application.

Request apps on the Store

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

Supported versions

Supported ServiceNow versions:

- Xanadu
- Yokohama
- Zurich

Use cases

The following are examples on how you can use the Service Graph Connector for different ServiceNow® applications:

- IT Operations Management (ITOM) Visibility
  - Detailed hardware and software inventory tracking for macOS hardware and apps. The tracking can be done with or without Software Asset Management (SAM).
  - Detailed hardware and software inventory tracking for hardware and apps for both iPhones and iPads. The tracking can be done with or without Software Asset Management (SAM).
  - Compliance tracking for mobile devices and end-user computers.
  - Duplicate data detection on imports to improve performance of nightly imports.
- Software Asset Management (SAM) and IT Asset Management (ITAM)
  - Software package and installation tracking.
  - License reclamation by detecting removed software.
  - Software Usage tracking.

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- IT Service Management (ITSM)
  - Incidents, problems, and changes on discovered configuration items (CI).
  - Automatic ownership assignment based on top users.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the Service Graph Workspace or CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Jamf using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Jamf integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Jamf data source is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from Jamf.

The delta data synchronization feature is available in Jamf version 2.14 and higher. You can configure the *is_delta_enabled_for_computers* and *is_delta_enabled_for_mobiles* connection properties for synchronizing only delta data from a Jamf instance. See Configuring data synchronization in Service Graph Connector for Jamf.

The following data sources are included for the Jamf application:

SG-Jamf Computers

Imports data from computers and loads the imported data in the SG-Jamf Computers [sn_jamf_integrate_sg_jamf_computers] staging table.

SG-Jamf Lookup Mac Software Bundle Ids

Imports data from software applications installed on macOS devices and loads the imported data in the SG-Jamf Lookup Mac Software Bundle Ids [sn_cmdb_int_util_mac_software_bundleid_lookup] staging table.

Note:
To view the publisher information for applications installed on macOS devices, run the SG-Jamf Lookup Mac Software Bundle Ids data source before running the SG-Jamf Computers or SG-Jamf Mobile Devices data sources.

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SG-Jamf Mobile Devices

Imports data from mobile devices and loads the imported data in the SG-Jamf Mobile Devices [sn_jamf_integrate_sg_jamf_mobile_devices] staging table.

SG-Jamf Remove Computers Software

Removes the imported computer software data that were later deleted from the source and updates the information in the SG-Jamf Remove Computers Software [sn_jamf_integrate_jamf_remove_software] staging table.

SG-Jamf Remove Mobile Software

Removes the imported mobile software data that were later deleted from the source and updates the information in the SG-Jamf Remove Mobile Software [sn_jamf_integrate_remove_mobile_software] staging table.

SG-Jamf Software Usage

Imports the software usage details from the Jamf environment to track which software data is being used infrequently, hasn't been used recently enough, or isn't being used at all and loads the imported data in the SG-Jamf Software Usage [sn_jamf_integrate_jamf_software_usage] staging table. Based on the software usage information, you can add a reclamation rule to aggregate usage records and to identify unused software devices. See Software reclamation rules.

Note:
The SG-Jamf Software Usage data source is available only when the Software Asset Management Professional plugin (com.snc.samp) is activated on your ServiceNow instance. See Request Software Asset Management.

The imported data is then inserted into the following target tables:

- CI Relationship [cmdb_rel_ci]
- Computer [cmdb_ci_computer]
- Disk [cmdb_ci_disk]
- Handheld Computing device [cmdb_ci_handheld_computing]
- IP Address [cmdb_ci_ip_address]
- Network Adapter [cmdb_ci_network_adapter]
- Printer [cmdb_ci_printer]
- Serial Number [cmdb_serial_number]
- Software Installation [cmdb_sam_sw_install] (If the SAM application is installed.)
- Software Instance [cmdb_software_instance] (If the SAM application is not installed.)
- Software [cmdb_ci_spkg] (If the SAM application is not installed.)
- Software Usage [samp_sw_usage]

Note:
For the Computer [cmdb_ci_computer] and Handheld Computing device [cmdb_ci_handheld_computing] data sources, if you created multiple Jamf instances and want to know where the CIs originated from, you can identify the origins from the **Key** and **Value** columns. Additionally, you can view the Jamf Extension Attributes [sn_jamf_integrate_extension_attribute] and Most recent discovery [last_discovered] fields in both data sources. If you want to configure multiple instances, follow the steps in Configure Service Graph Connector for Jamf using the guided setup in step 4.

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For more information on where data is saved when pulling data from a Jamf application, see CMDB classes targeted in Service Graph Connector for Jamf.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Related topics

Service Graph Connectors

Configure Service Graph Connector for Jamf using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Jamf for pulling in Jamf data into the CMDB.

Before you begin

Install Service Graph Connector for Jamf version 2.13.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

When using client credentials for authentication, obtain the OAuth credentials from your Jamf administrator. Make a note of the following details:

- Application (client) ID
- Client Secret

If using Client Credentials authentication in Jamf Pro, you need to use the API Roles and Clients functionality. For more details, refer to the API Roles and Clients section in the Jamf documentation. When creating a new API client in the Jamf environment, the **Access token lifetime** field on the form for creating a client enables setting how long the token remains valid. The default is `60` seconds, but due to ServiceNow AI Platform limitations, the value must be set to more than `60` seconds. Setting the token lifetime to `3600` seconds (1 hour) helps prevent potential issues.

Role required: admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the Jamf connector type and then select **Create connection**.
4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

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Note:
This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

5. Determine the type of authentication for the Jamf connection.

   a. In the **Setup** stage of the playbook, select the **Select alias template** activity.
   If needed, expand the **Setup** stage to select an activity.

   b. Select an alias template for the connection.

   - **SG-Jamf OAuth Connection**: Select when using OAuth or client credentials for authentication.
   - **SG-Jamf Basic Connection**: Select when using Basic authentication or Bearer token.

   c. Select **Continue**.

6. Enter connection details and test the API connection for importing data.

   a. In the **Setup** stage of the playbook, select the **Configure and test connection** activity.

   b. On the form, fill in the fields.

   - When the **SG-Jamf OAuth Connection** template is selected, fill in the details as shown in the following table.

OAuth connection information

Field	Description
Connection Name	Name to identify the Jamf connection record.
Connection URL	Base URL to connect to the Jamf API. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.
OAuth Client ID	Application (client) ID of your Jamf client application as noted in the Before you begin section. **Note:** Verify that the Jamf client has read privileges for the **Computers** and **Mobile Devices** categories in Jamf.
OAuth Client Secret	Client Secret of your Jamf client application as noted in the Before you begin section.
Use MID Server	Option to use a MID Server.

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Field	Description
	Note: Use of a MID Server is optional.
Mid Selection	Name of the MID Server used by the connector. This field appears only when the **Use MID Server** check box is selected.

- When the **SG-Jamf Basic Connection** template is selected, fill in the details as shown in the following table.

Basic connection information

Field	Description
Connection Name	Name to identify the Jamf connection record.
Connection Host	Target host value used by the connection. **Note:** Update the **Host** field with your Jamf base URL or IP address. For example, `demojamfhost.com` or `127.0.0.1`.
User Name	User name that is used to authenticate the HTTP or HTTPS request when this Basic authentication profile is enabled. **Note:** Verify that the Jamf user has read privileges for the **Computers** and **Mobile Devices** categories in Jamf.
Password	Password that is used to authenticate the HTTP or HTTPS request when this Basic authentication profile is enabled.
Use MID Server	Option to use a MID Server. **Note:** Use of a MID Server is optional.
Mid Selection	Name of the MID Server used by the connector. This field appears only when the **Use MID Server** check box is selected.

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c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

7. **Optional:** Set configuration properties for the connection to access Jamf resources.

> **Note:**
> To skip this step, select **Continue** for the **Set configuration properties** activity. If you skip this step, the default values of the properties are considered.

a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. Set the fields for configuration properties as described in the following table.

Configuration properties

Field	Description
Import managed application records only	Option to limit the import to managed application records only. **Note:** If the **Import managed application records only** check box is cleared, the default behavior is to import all application records.
Use JAMF Pro API	Option to enable the use of the Jamf Pro API for querying computer records. **Note:** When the **Use JAMF Pro API** check box is selected, the connector uses the Jamf Pro API, which offers pagination of response data and improved performance over the Jamf Classic API.

c. Select **Continue**.

8. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Select **Configure import schedule**.

c. Select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

d. Select **Save**.

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e. Repeat steps from 8.b to 8.d for each job displayed on the page.

f. Select **Continue**.

9. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for Jamf

CMDB classes targeted in Service Graph Connector for Jamf

Accessing the connection details of Service Graph Connector for Jamf

Configure Service Graph Connector for Jamf using the guided setup

Set up authentication credentials and scheduled jobs to import Jamf data into your Configuration Management Database (CMDB).

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- ITOM Licensing plugin (com.snc.itom.license). An unlicensed plugin that contains computation logic for SU consumption as necessary. For more information, see Request Discovery.
- Jamf Classic API version 10.x.

When using client credentials for authentication, obtain the OAuth credentials from your Jamf administrator. Make a note of the following details:

- Application (client) ID
- Client Secret

If using Client Credentials authentication in Jamf Pro, you need to utilize the API Roles and Clients functionality. For more details, refer to the API Roles and Clients section in the Jamf documentation. When creating a new API client in the Jamf environment, the **Access token**

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lifetime field on the form for creating a client enables setting how long the token remains valid. The default is `60` seconds, but due to ServiceNow AI Platform limitations, the value must be set to more than `60` seconds. Setting the token lifetime to `3600` seconds (1 hour) helps prevent potential issues.

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Jamf** > **Setup**.
2. On the Getting Started page, select **Get started**.
3. Set configuration properties.
   a. On the Service Graph Connector for Jamf page, in the Set configuration properties section, select **Configure JSON data size limit**.
   b. For the Configure JSON data size limit task, select **Configure**.
   c. Select the **Global** application scope from the application picker.
   d. Set the `com.glide.transform.json.max-partial-length` system property value.
      - To create a system property, select **New** and enter `com.glide.transform.json.max-partial-length` as the name and `65536` as the value of the property.
      - If the *`com.glide.transform.json.max-partial-length`* property already exists, verify that its value is set to `65536`.
   e. Set the Configure JSON data size limit task to complete by selecting **Mark as Complete**.
4. Configure the authentication credentials and HTTP connection for sending requests to the Jamf API.
   a. Enter Basic or Bearer token authentication details.

      Important:
      Skip this step if using Client credentials for authentication, and instead go to step 4.c.

      i. For the Configure Jamf authentication: Basic or Bearer token authentication task, select **Configure**.
      ii. On the form, fill in the fields.

Basic Auth Credentials form

Field	Description
Name	Descriptive name of this authentication configuration.
User name	User name that is used to authenticate the HTTP or HTTPS request when this Basic authentication profile is enabled.

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Field	Description
	Note: Verify that the Jamf user has read privileges for the **Computers** and **Mobile Devices** categories in Jamf.
Password	Password that is used to authenticate the HTTP or HTTPS request when this Basic authentication profile is enabled.

iii. Select **Update**.

iv. Set the Configure Jamf authentication: Basic or Bearer token authentication task to complete by selecting **Mark as Complete**.

b. Configure the Jamf HTTP connection.

Important: Skip this step if using Client credentials for authentication, and instead go to step 4.c.

i. For the Configure Jamf HTTP connection task, select **Configure**.

ii. On the form, fill in the fields.

HTTP(s) Connection form

Field	Description
Name	Name of the connection.
Credential	Credential value used by this connection.
Connection alias	Connection value that is used to refer to the connection.
Active	Option to activate the HTTP connection.
Domain	Domain that contains the connection.
URL builder	Option to enable the system to build the connection URL.
Connection URL	Connection URL for the connection. You can either manually enter a URL or use the URL builder to build the connection string. **Note:** You can't modify the **Connection URL** field if you select the **URL builder** check box.
Mutual authentication	Option to set the connection with mutual authentication. This field appears only when the **URL builder** check box is selected.

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Field	Description
Protocol	Underlying protocol used by the connection. This field appears only when the **URL builder** check box is selected. **Note:** Update the **Protocol** field if you are using anything other than `https`.
Use MID server	Option to select a MID Server that sends this HTTP connection. Using a MID Server is not compatible with mutual authentication.
Connection timeout	Number of milliseconds the system waits for a successful host connection. If a successful connection doesn't occur during this time, the connection request times out. Leave this field empty to use the system default connection timeout value.
Host	Target host value used by the connection. This field appears only when the **URL builder** check box is selected. **Note:** Update the **Host** field with your Jamf base URL or IP address. For example, `demojamfhost.com` or `127.0.0.1`.
Override default port	Target value port that is used by the connection. This field appears only when the **URL builder** check box is selected.
Base path	Base path for HTTPS connection. This field appears only when the **URL builder** check box is selected. **Note:** To use the Jamf Pro API, the **Base path** field must be empty. Therefore, clear any value in the **Base path** field.

iii. Select **Update**.

iv. Set the Configure Jamf HTTP connection task to complete by selecting **Mark as Complete**.

c. Configure the client authentication credentials.

Important:
Skip this step if using basic token for authentication, and instead go to step 4.a.

i. For the Configure Jamf authentication: Client credentials task, select **Configure**.

ii. Select **Edit** for the SG-Jamf OAuth Connection, the default connection.

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iii. In the Connection Information section of the Edit Connection window, fill in the fields.

Connection Information

Field	Description
Connection Name	Name to identify the Jamf connection record. `SG-Jamf OAuth Connection` is the default credential alias name and is read-only.
Connection URL	Base URL to connect to the Jamf API. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.

iv. (Optional) If a MID Server is required for the Jamf server connection, select the **Use MID Server** check box. Then, select the MID Server-related fields accordingly.

v. In the Credential Information section of the Edit Connection window, fill in the fields.

Credential Information

Field	Description
OAuth Client ID	Application (client) ID of your Jamf client application as noted in the Before you begin section. **Note:** Verify that the Jamf client has read privileges for the **Computers** and **Mobile Devices** categories in Jamf.
OAuth Client Secret	Client Secret of your Jamf client application as noted in the Before you begin section.

d. Test the connection.

i. For the Test connection task, select **Configure**.

ii. Review the properties in the Service Graph Connection Properties related list.

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Note:
The properties in the Service Graph Connection Properties related list of the connection record are modifiable. Be sure to complete the guided setup, review the property descriptions, and follow the instructions carefully before making any changes to them.

- For Basic authentication, set the *auth_type* property value to `basic` (applicable only for Jamf versions lower than 10.35. Note that Jamf no longer supports Basic authentication, and it will be disabled for all instances starting with Jamf version 11.5).
- For Bearer token authentication, set the *auth_type* property value to `bearer` (available in Jamf version 10.35 or higher).
- For Client credentials (OAuth 2.0) authentication, set the *auth_type* property value to `oauth` (available in Jamf version 10.49 or higher).
- If no authentication type is selected, the connector defaults to Bearer token authentication.

iii. Test the connection by selecting the **Test Load 20 Records** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

Note:
The connection is successful if the **HTTP Status** is **200**. If there is anything displayed in the **Error Code** and **Error Message** fields, then the connection failed and further troubleshooting is required. Do not select **Load All Records** during this setup.

iv. Set the Test the connection task to complete by selecting **Mark as Complete**.

5. Optional: Add multiple instances.

Note:
If you don't need to add multiple instances, you can skip this step.

a. In the Add Multiple Instances section of the Service Graph Connector for Jamf page, select **Get Started**.

b. Enable creating data sources for the new Jamf connection.

i. Ensure that you have edit permissions for the Datasource [sys_data_source] table.

ii. For the Update data source Access task, select **Configure**.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Data Source form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. Select the back icon (<) to return to the guided setup page.

vii. From the application picker, select the **Service Graph Connector for Jamf** application scope.

viii. Set the Update data source Access task to complete by selecting **Mark as Complete**

c. Enable creating a scheduled data import job for the new Jamf connection.

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i. Ensure that you have edit permissions for the Scheduled data import [scheduled_import_set] table.

ii. For the Update scheduled data import access task, select **Configure**.

iii. To edit the record, select the **Global** application scope from the application picker.

iv. In the Application Access related list of the Scheduled Data Import form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.

v. Select **Update**.

vi. Select the back icon (<) to return to the guided setup page.

vii. From the application picker, select the **Service Graph Connector for Jamf** application scope.

viii. Set the Update scheduled data import access task to complete by selecting **Mark as Complete**.

d. Select authentication type for new connection.

> **Note:**
> From the application picker, select the **Service Graph Connector for Jamf** application scope.

i. For the Select authentication type for new connection task, select **Configure**.

ii. Select **sn_jamf_integrate.auth_type** from the **Name** column.

iii. Set the *sn_jamf_integrate.auth_type* property to one of the following values:

- `basic`: Basic authentication that uses a user name and password.
- `bearer`: Bearer token authentication that uses a user name and password to retrieve a bearer token.
- `oauth`: Client credentials authentication that uses a client ID and client secret to authenticate via OAuth 2.0.

iv. Navigate back to the guided setup.

v. Set the Select authentication type for new connection task to complete by selecting **Mark as Complete**.

e. Add another connection.

> **Note:**
> Verify that the **Service Graph Connector for Jamf** application scope is selected in the application picker.

i. For the Add another connection task, select **Configure**.

ii. In the Workflow Studio, select **Add Connection**.

iii. On the form, based on the authentication type fill in the fields.

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Note:

- For Basic or Bearer token authentication-based connection, don't include `https://` in the **Connection Host** field. Example connection host value: `test.jamfcloud.com`.
- For Client credentials authentication-based connection, include `https://` in the **Connection URL** field. Example connection URL value: `https://test.jamfcloud.com`.

iv. Depending on the authentication type, select the button to create the connection.

v. Navigate back to the guided setup.

vi. Set the Add another connection task to complete by selecting **Mark as Complete**.

f. When using the Jamf Pro API, the Jamf Pro 10.35 or higher version, or both, specify the Jamf Pro version and API.

i. For the Select JAMF Pro version and API task, select **Configure**.

ii. In the **Use JAMF Pro API** column, for the connection you created, modify the value from **false** to **true** to use the Jamf Pro API instead of the Classic API.

iii. Update the **Jamf Pro 10.35 or higher** column value to **true** when using the Jamf Pro 10.35 or higher version.

Note:
With the **Jamf Pro 10.35 or higher** column value set to **true**, the Bearer Token authentication is used to authenticate the Jamf API. Else, the basic authentication is used.

iv. Set the Select JAMF Pro version and API task to complete by selecting **Mark as Complete**.

g. Test the new connections.

i. For the Test new connections task, select **Configure**.

ii. Select the name of the connection you want to test.

iii. To validate the data source configuration, select **Test Load 20 Records**.

Note:
If any of the tests have an error code or message or error sign, the connection failed and further troubleshooting is required.

iv. Set the Test new connections task to complete by selecting **Mark as Complete**.

6. Set up the scheduled import jobs.

a. For the Configure scheduled jobs task in the Set up scheduled import jobs section, select **Configure**.

b. Select the scheduled job that you want to activate.

Note:
By default, the SG-Jamf Mobile Devices scheduled job is automatically set as **Active** and runs the SG-Jamf Computer scheduled job as a parent.

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c. On the Scheduled Data Import form, verify the field values for the scheduled job and select the **Active** check box to activate the scheduled job.

   For more information, see Schedule a data import.

d. Select **Update**.

e. Repeat the steps 6.b to 6.d for each scheduled job for data import.

f. Set the Configure scheduled jobs task to complete by selecting **Mark as Complete** in the guided setup.

CMDB classes targeted in Service Graph Connector for Jamf

When you complete setting up the connection, you can configure the integration to periodically pull data from Jamf. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name
MAC Address	mac_address
Name	name
Serial number	serial_number
CPU core count	cpu_core_count
CPU count	cpu_count
CPU name	cpu_name
CPU speed (MHz)	cpu_speed
CPU type	cpu_type
DNS Domain	dns_domain
Fully qualified domain name	fqdn
Most recent discovery	last_discovered
OS Service Pack	os_service_pack
OS Version	os_version
RAM (MB)	ram
Model ID	model_id
Assigned to	assigned_to
Manufacturer	manufacturer
Operating System	os

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Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Contains::Contained by	Disk [cmdb_ci_disk]
Computer [cmdb_ci_computer]	Reference	Key Value [cmdb_key_value]
Computer [cmdb_ci_computer]	Reference	SG-Jamf Extension Attributes [sn_jamf_integrate_extension_attributes]

Disk [cmdb_ci_disk]

The following attributes in the Disk [cmdb_ci_disk] table are populated by collected data:

Attribute label	Attribute name
Manufacturer	manufacturer
Computer	computer
Model ID	model_id
Name	name
Serial number	serial_number
Most recent discovery	last_discovered
Size bytes	size_bytes

Relationship created for Disk

Parent class	Relationship type	Child class
Disk [cmdb_ci_disk]	Reference	Computer [cmdb_ci_computer]

Handheld Computing Device [cmdb_ci_handheld_computing]

The following attributes in the Handheld Computing Device [cmdb_ci_handheld_computing] table are populated by collected data:

Attribute label	Attribute name
Description	short_description
Carrier	carrier
Name	name
Serial number	serial_number

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Attribute label	Attribute name
Disk spae (GB)	disk_space
ICCID	iccid
IMEI	imei
MEID	meid
Operating System	os
OS Version	os_version
Phone Number	phone_number
Root Access	root_access
Manufacturer	manufacturer
Assigned to	assigned_to
Model ID	model_id

Relationships created for Handheld Computing Device

Parent class	Relationship type	Child class
Handheld Computing Device [cmdb_ci_handheld_computing]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Handheld Computing Device [cmdb_ci_handheld_computing]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Handheld Computing Device [cmdb_ci_handheld_computing]	Reference	Key Value [cmdb_key_value]
Handheld Computing Device [cmdb_ci_handheld_computing]	Reference	SG-Jamf Extension Attributes [sn_jamf_integrate_extension_attributes]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
IP version	ip_version
Most recent discovery	last_discovered
Name	name
Nic	nic

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

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Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
MAC Address	mac_address
Name	name
Discovery Source	discovery_source
Most recent discovery	last_discovered

Relationships created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Computer [cmdb_ci_computer]
Network Adapter [cmdb_ci_network_adapter]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]

Printer [cmdb_ci_printer]

The following attributes in the Printer [cmdb_ci_printer] table are populated by collected data:

Attribute label	Attribute name
Name	name
IP Address	ip_address
Most recent discovery	last_discovered

Serial Number [cmdb_serial_number]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data:

Attribute label	Attribute name
Serial Number	serial_number
Serial Number Type	serial_number_type

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Attribute label	Attribute name
Valid	valid

Relationships created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Computer [cmdb_ci_computer]
Serial Number [cmdb_serial_number]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]

SG-Jamf Extension Attributes [sn_jamf_integrate_extension_attributes]

The following attributes in the SG-Jamf Extension Attributes [sn_jamf_integrate_extension_attributes] table are populated by collected data:

Attribute label	Attribute name
Id	id
Extension Attributes	extension_attributes

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data Software Asset Management (SAM) application isn't installed:

Attribute label	Attribute name
Version	version
Manufacturer	manufacturer
Key	key
Name	name

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data when the SAM application is installed:

Attribute label	Attribute name
Discovery source	discovery_source
Display name	display_name

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Attribute label	Attribute name
Installed on	installed_on
Last scanned	last_scanned
Publisher	publisher
Version	version

Relationship created for Software Installation

Parent class	Relationship type	Child class
Software Installation [cmdb_sam_sw_install]	Reference	Server [cmdb_ci_server]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data when the SAM application isn't installed:

Attribute label	Attribute name
Name	name
Installed on	installed_on

Relationships created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]

Accessing the connection details of Service Graph Connector for Jamf

You can access the connection details of the Service Graph Connector for Jamf in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Jamf. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Jamf connection

Access the details of a Jamf connection configured for the Service Graph Connector for Jamf.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Jamf** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Configuring data synchronization in Service Graph Connector for Jamf

You can configure the connection properties for synchronizing only delta data from a Jamf instance.

The delta data synchronization feature is available in Jamf version 2.14 and higher. The connector provides the ability to import only delta data from a Jamf instance. With delta synchronization enabled, the importing process of Jamf data is quicker because the connector imports only the changes in Jamf data. The **Last success import time** field of a data source displays the timestamp of the most recent successful pull run. The delta pull period is calculated by subtracting the last successful run date and time from the current date and time that is Delta period = Current date timestamp - Last success import date timestamp.

The application includes the *is_delta_enabled_for_computers* and *is_delta_enabled_for_mobiles* connection properties to enable delta synchronization for computers and mobile devices, respectively. By default, the *is_delta_enabled_for_computers* and *is_delta_enabled_for_mobiles* properties are set to `false`. To enable delta data synchronization, set these properties to `true`.

Note:

- The *is_delta_enabled_for_computers* connection property is available only if the *use_jamf_pro_api* property is set to `true`.
- The *is_delta_enabled_for_mobiles* connection property is available only if the *use_jamf_mobile_pro_api* property is set to `true`.

See Service Graph Connector for Jamf properties.

When you want to import full data from your Jamf instance, you must disable the *is_delta_enabled_for_computers* and *is_delta_enabled_for_mobiles* properties by setting these properties to `false`. See Disable delta synchronization.

Note:
When the full import of data is completed, set the *is_delta_enabled_for_computers* and *is_delta_enabled_for_mobiles* properties back to `true` to pull delta data later. If you leave the properties set to `false`, full data is imported with every pull, which takes considerable time.

Disable delta synchronization

Disable delta synchronization to import all the Jamf data.

Before you begin
Role required: admin

About this task
The delta data synchronization feature is available in Jamf version 2.14 and higher.

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Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Jamf** > **Connections**.
2. From the list of connections, open the connection for which you want to disable delta synchronization.

   The connection properties are displayed in the Service Graph Connection Properties related list.

   - To disable delta synchronization for computers, open the *is_delta_enabled_for_computers* property.
   - To disable delta synchronization for mobile devices, open the *is_delta_enabled_for_mobiles* property.
3. In the **Value** field, enter `false`.
4. Select **Update**.

Service Graph Connector for Jamf properties

Service Graph Connector for Jamf properties control the behavior of the connector.

Connection properties

These connection properties are available for the Service Graph Connector for Jamf.

> **Note:**
> To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **Jamf** > **Connections**, and select the connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

Connection properties for Service Graph Connector for Jamf

Property	Description
auth_type	Set the property to `basic` to use Basic authentication for the connection. This authentication type uses a user name and password. Set the property to `oauth` to use Client credentials (OAuth 2.0) authentication for the connection. This authentication type uses a client ID and client secret. The default Bearer token authentication type uses a user name and password to retrieve a token for subsequent connection requests. • Type: basic | bearer | oauth • Default value: `bearer`

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Connection properties for Service Graph Connector for Jamf (continued)

Property	Description
	Note: • For an OOB default connection, any of the three authentication types can be used. • For additional connections (multi-instance), only the Basic and Bearer authentication types can be used. To use the Client credentials (OAuth 2.0) authentication type, follow the guided setup to configure client authentication credentials for the connection. See Configure Service Graph Connector for Jamf using the guided setup.
import_managed_apps_only	Set the property to `true` to import only managed application records. When the property is set to `false`, all application records are imported. • Type: true | false • Default value: `false`
is_delta_enabled_for_computers	Set the property to `true` to enable the SG-Jamf Computers data source to pull only the changes (delta) between consecutive imports. When the property is set to `false`, a full import is performed with every pull. **Note:** This property is available only if the *`use_jamf_pro_api`* property is set to `true`. • Type: true | false • Default value: `false` See Configuring data synchronization in Service Graph Connector for Jamf.
is_delta_enabled_for_mobiles	Set the property to `true` to enable the SG-Jamf Mobile Devices data source to pull only the changes (delta) between consecutive imports. When the property is set to `false`, a full import is performed with every pull. **Note:** This property is available only if the *`use_jamf_mobile_pro_api`* property is set to `true`.

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Connection properties for Service Graph Connector for Jamf (continued)

Property	Description
	• Type: true | false • Default value: `false` See Configuring data synchronization in Service Graph Connector for Jamf.
use_jamf_mobile_pro_api	Set the property to `true` to use the Jamf Pro API for querying Jamf mobile device records. Set the property to `false` to use the Jamf Classic API. **Note:** The Jamf Pro API is supported by Jamf version 11.4 and higher. The Jamf Pro API supports pagination of response data and provides performance improvement compared to the Jamf Classic API. • Type: true | false • Default value: null
use_jamf_pro_api	Set the property to `false` to use the Jamf Classic API instead of the Jamf Pro API for querying Jamf mobile device records. When the property is set to `true`, the Jamf Pro API is used for querying Jamf mobile device records. **Note:** The Jamf Pro API is supported by Jamf version 11.4 and higher. The Jamf Pro API supports pagination of response data and provides performance improvement compared to the Jamf Classic API. • Type: true | false • Default value: `true`

Service Graph Connector for Microsoft Azure

Use the Service Graph Connector for Microsoft Azure to pull data from Microsoft Azure into your CMDB.

Request apps on the Store

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

Supported versions

Supported ServiceNow versions:

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- Yokohama
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- Australia

Use cases

The following are examples on how you can use the Service Graph Connector:

- Visibility into cloud resources, relationships, and state.
- Service ITAM/SAM outcomes through deep discovery of applications.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the Service Graph Workspace or CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Microsoft Azure using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

Important information for upgrading Service Graph Connector for Microsoft Azure

After you upgrade to the latest version of the Service Graph Connector for Microsoft Azure, you must run a full data load.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Microsoft Azure integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Event-based discovery

The Service Graph Connector for Microsoft Azure works with event-based discovery. Events that are pulled from Azure can create and update CIs that were brought by the Service Graph Connector for Microsoft Azure.

Additional resource

How do I configure the Azure Service Graph Connector?

Related topics

- Service Graph Connectors
- Configure Service Graph Connector for Microsoft Azure using the guided setup
- Data mapping for Service Graph Connector for Microsoft Azure
- CMDB classes targeted in Service Graph Connector for Microsoft Azure

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- Service Graph Connector for Microsoft Azure properties
- Configuring data synchronization in Service Graph Connector for Microsoft Azure
- Enabling VM insights for collecting Azure data
- Setting up multiple connections in Service Graph Connector for Microsoft Azure

Configure Service Graph Connector for Microsoft Azure using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Microsoft Azure for pulling in Microsoft Azure data into the CMDB.

Before you begin

Install Service Graph Connector for Microsoft Azure version 1.9.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Important:
After the initial import of Azure data, the application performs a delta import of data. However, you can perform a full pull of data anytime later by disabling the delta synchronization and setting the *sn_sg_azure_integ.is_delta_sync_enabled* property to `false`. For more information, see Configuring data synchronization in Service Graph Connector for Microsoft Azure.

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

The connector uses the Azure Management APIs for the complete pull of data from Azure. However, to pull delta changes from Azure, the Azure Resource Graph APIs are used. The domain name system (DNS) is Microsoft Azure Management, but the path is a resource graph.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select **Create connection**.

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Tip:
Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the Microsoft Azure connector type and then select **Create connection**.
4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

Note:
This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

5. Complete the prerequisites for setting up the Azure environment.

   a. Complete the instructions required for setting up the Azure environment.

      i. In the **Prerequisites** stage of the playbook, select the **Review setup instructions** activity.

      ii. Obtain the OAuth credentials including client ID, client secret, and token URL from your Microsoft Azure administrator.

      iii. For importing hardware data, grant the `User.Read` permission on the *`Microsoft Graph`* API in the Azure environment. Also, ensure that the IAM policy for the Azure subscription has the Reader role. See Assign a user as an administrator of an Azure subscription with conditions on the Microsoft Azure documentation site.

      iv. For importing software data, grant the `Data.Read` permission on the *`Log Analytics`* API in the Azure environment. In addition, set up a Log Analytics workspace in the Azure environment.

      v. After completing the **Review setup instructions** activity, select **Continue**.

6. Determine whether to import only hardware data or both hardware and software data.

   a. In the **Setup** stage of the playbook, select the **Select services** activity.
   If needed, expand the **Setup** stage to select an activity.

   b. **Optional:** To import both hardware and software data, select the **Hardware and software** check box.

   Note:
   Importing software data requires a hardware connection.

   (Optional) If you need to import only hardware data, the **Hardware only** check box is already selected by default.

   c. Select **Continue**.

7. Enter the connection details and test the API connection for importing hardware data.

   a. In the **Setup** stage of the playbook, select the **Create and test hardware connection** activity.

   b. On the form, fill in the fields.

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Create and test hardware connection form

Field	Description
Connection name	Name to identify the hardware connection record. For example, `SG-Azure hardware connection`.
Connection URL	Base URL to connect to your Azure client application. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.
OAuth client ID	Application (client) ID of your Azure client application as noted in step 5.a.
OAuth client secret	Client secret of your Azure client application as noted in step 5.a.

OAuth token URL	Callback URL for the Azure client application.
	
	Based on the region of your Azure client application, enter the token URL in one of the following formats:
	▪ Global
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	▪ China
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`
	Where *<tenantid>* is the tenant ID of your Azure client application as noted in step 5.a.

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c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

8. Configure the import schedule to import hardware data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure hardware import schedule** activity.

b. Select **Configure import schedule**.

c. Expand the Parent scheduled data import within the Import schedules list to select the *`Connection name`*-**SG-Azure Subscriptions** import schedule.

d. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

e. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

f. Select **Continue**.

9. Enter the connection details and test the API connection for importing software data.

The **Create and test software connection** activity for importing software data appears only when the **Hardware and software** check box is selected in step 6.b.

a. In the **Setup** stage of the playbook, select the **Create and test software connection** activity.

b. On the form, fill in the fields.

Create and test software connection form

Field	Description
Software connection name	Name to identify the software connection record. For example, `SG-Azure software connection`.
Hardware connection name	Name of the hardware connection record. **Note:** This field is automatically set to the hardware connection name specified in step 7.b.
Connection URL	Base URL to connect to the Log Analytics workspace in the following format:

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Field	Description
	`https://api.loganalytics.io/v1/workspaces/<workspace_id>` Where `<workspace_id>` is the ID of the Log Analytics workspace as noted in step 5.a. **Note:** This field is automatically set to the URL to connect to the Log Analytics workspace. Replace the `<workspace_id>` variable in the auto-generated URL with the workspace ID of your Log Analytics workspace.
OAuth client ID	Application (client) ID of your Azure client application as noted in step 5.a.
OAuth client secret	Client secret of your Azure client application as noted in step 5.a.

OAuth token URL	Token URL of your Azure client application.
	
	Based on the region of your Azure client application, enter the token URL in one of the following formats:
	
	▪ Global
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	
	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	
	▪ China
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`
	
	Where *<tenantid>* is the tenant ID of your Azure client application as noted in step 5.a.

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c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

10. Configure the import schedule to import software data at regular intervals.

    The **Configure software import schedule** activity for importing software data appears only when the **Hardware and software** check box is selected in step 6.b.

    a. In the **Setup** stage of the playbook, select the **Configure software import schedule** activity.

    b. Expand the Parent scheduled data import within the Import schedules list to select the *`Connection name`*-**SG-Azure TCP** import schedule.

    c. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

    For more information, see Schedule a data import.

    d. Select **Save**.
    Alternatively, select **Execute Now** to execute the import schedule immediately.

    e. Repeat steps 10.b to 10.d for any other parent import schedule if not already set to active.

    f. Select **Continue**.

11. In the **Setup** stage of the playbook, select the **Connection setup complete** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The created connection appears in the Installed connections list.

Related topics

- Service Graph Connector for Microsoft Azure
- CMDB classes targeted in Service Graph Connector for Microsoft Azure
- Data mapping for Service Graph Connector for Microsoft Azure
- Supported Microsoft Azure resource types
- Service Graph Connector for Microsoft Azure properties
- Accessing the connection details of Service Graph Connector for Microsoft Azure
- Additional features within the Service Graph Connector for Microsoft Azure

Configure Service Graph Connector for Microsoft Azure using the guided setup

Set up data sources and scheduled import jobs to pull in data from Azure into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

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To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- Discovery Core plugin (com.snc.discovery.core), which is automatically installed by Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.

Important:
After the initial import of Azure data, the application performs a delta import of data. However, you can perform a full pull of data anytime later by disabling the delta synchronization and setting the *sn_sg_azure_integ.is_delta_sync_enabled* property to `false`. For more information, see Configuring data synchronization in Service Graph Connector for Microsoft Azure.

Role required: SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The connector uses the Azure Management APIs for the complete pull of data from Azure. However, to pull delta changes from Azure, the Azure Resource Graph APIs are used. The domain name system (DNS) is Microsoft Azure Management, but the path is a resource graph.

For more information on the Azure setup instructions, see the Service Graph Connector for Azure - Overview and How do I configure the Azure Service Graph Connector? articles on the ServiceNow Community site.

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Azure** > **Setup**.
2. On the Getting started page, select **Get Started**.
3. Create data sources and scheduled imports for the new connection.

   a. On the Service Graph Connector for Microsoft Azure page, in the Update Data Sources and Scheduled Imports Access, select the task **Update Scheduled Data Import Access**.

   b. In the Update Scheduled Data Import Access section, select **Configure** and do the following:

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i. For the Update Scheduled Data Import access task, select **Configure**.

ii. Select the **Global** application scope by using the application picker.

iii. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

iv. Select **Update** to close the tab and return to the guided setup.

v. Modify the application scope again to **Service Graph Connector for Microsoft Azure** by using the application picker.

vi. Set the Update Scheduled Data Import access task to complete by selecting **Mark as Complete**.

vii. Repeat the steps 3.b.ii to 3.b.v for the Update Data Source Access task with the Data Source [sys_data_source] table and set the task to complete by selecting **Mark as Complete**.

c. Clear the cache for the new connection.

i. In the Clear Cache for Datasource and Import set section, select **Configure**.

ii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
      GlideCacheManager.flushTable("sys_data_source");


 GlideTableManager.invalidateTable("scheduled_import_set");
      GlideCacheManager.flushTable("scheduled_import_set");

      GlideTableManager.invalidateTable("sys_db_object");
      GlideCacheManager.flushTable("sys_db_object");
```

iii. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

iv. After the script is executed, select **Close**.

v. From the application picker, select the **Service Graph Connector for Microsoft Azure** application.

vi. Select **Mark as Complete**.

4. Create a connection to import hardware configuration items (CIs) from the Azure client application.

Note:
Ensure that you have the `User.Read` permission on the *`Microsoft Graph`* API for the hardware import. Also, ensure that the IAM policy for the Azure subscription has the Reader role. See Assign a user as an administrator of an Azure subscription with conditions on the Microsoft Azure documentation site.

a. Obtain the OAuth credentials from your Azure administrator.
Make a note of the following details:

- Application (client) ID
- Client Secret

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- Directory (tenant) ID
- Connection URL

Note:
After getting the OAuth credentials, in the guided setup for Service Graph Connector for Microsoft Azure, go to the Create connection for the hardware import section of the Service Graph Connector for Microsoft Azure page and set the Get the OAuth credentials task to complete by selecting **Mark as Complete**.

b. Configure your Azure hardware connection and credentials.

i. In the Create connection for the hardware import section of the Service Graph Connector for Microsoft Azure page, select **Continue**.

ii. For the Create or Edit connection task, select **Configure**.

iii. On the Connections page of the Workflow Studio, select **Configure** for the **SG-Azure Hardware Connection** connection that is available by default for the hardware import.

You can create multiple connections by selecting **Add Connection**.

iv. On the form, review and modify the fields.

Configure Connection form

Field	Description
Connection Information	
Connection Name	Name to uniquely identify the hardware connection record. For example, `SG-Azure Hardware Connection`.
Connection URL	Base URL to connect to your Azure client application. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.
Credential Information	
OAuth Client ID	Application (client) ID of your Azure client application as described in step 4.a.
OAuth Client Secret	Client Secret of your Azure client application as described in step 4.a.
OAuth Token URL	Token URL of your Azure client application. Based on the region of your Azure client application, enter the token URL in one of the following formats: ▪ Global `https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`

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Field	Description

	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	▪ China
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`
	Where *<tenantid>* is the tenant ID of your Azure client application as described in step 4.a.

v. Select **Configure and Get OAuth Token**.

vi. When the OAuth token flow is successfully completed, return to the Create connection for the hardware import task page using the back button for your browser.

vii. Set the Create or Edit connection task to complete by selecting **Mark as Complete**.

c. Test the *Microsoft Graph* API connection to import hardware data from the Azure client application.

i. For the Test Connection task, select **Configure**.

ii. Select the data source associated with the newly created connection in the **Name** column of the Data Sources list.

iii. Select the **Test Load 20 Records** related link.

iv. When the state changes to **Complete**, return to the setup by selecting **Back to Guided Setup** in the Help panel.

v. Set the Test Connection task to complete by selecting **Mark as Complete**.

d. Review the scheduled data imports configuration.

i. For the Set up scheduled import jobs task, select **Configure**.

ii. Select the *SG-Azure Subscriptions* scheduled job.

iii. On the Scheduled Data Import form, verify the field values for the scheduled job and select the **Active** check box.

For more information, see Schedule a data import.

iv. Select **Update**.

v. Set the Set up scheduled import jobs task to complete by selecting **Mark as Complete** in the Help panel.

5. Create a connection to import software information from the Azure client application.

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Note:
Ensure that you have the `Data.Read` permission on the *`Log Analytics`* API for the software import.

a. Obtain the OAuth credentials and set up the Log Analytics workspace in the Azure.

i. Ensure that you have the OAuth credentials from step 4.a.

ii. Configure the Log Analytics workspace in the Azure client application.

- Use an existing workspace, if available.
- Create another workspace.

For more information, see Create Log Analytics workspace in the Azure documentation.

Note:
Make a note of the Workspace ID.

iii. Deploy Azure Monitor Agent (AMA), and then enable change tracking and inventory using AMA.

For more information, see Enable Change Tracking and Inventory using Azure Monitoring Agent in the Azure documentation and the Configuring Azure for monitoring your Azure VMs section of the How do I configure the Azure Service Graph Connector? [KB2226163] article in the Now Support Knowledge Base.

Note:
After obtaining the OAuth credentials, in the guided setup for Service Graph Connector for Microsoft Azure, go to the Create connection for the software import section of the Service Graph Connector for Microsoft Azure page and set the Get the OAuth credentials task to complete by selecting **Mark as Complete**.

b. Configure your Azure software connection and credentials.

i. In the Create connection for the software import section of the Service Graph Connector for Microsoft Azure page, select **Continue**.

ii. For the Create or Edit connection task, select **Configure**.

iii. On the Connections page of the Workflow Studio, select **Configure** for the **SG-Azure log analytics connection** connection that is available by default for the software import.

You can create multiple connections by selecting **Add Connection**.

iv. On the form, review and modify the fields.

Configure Connection form

Field	Description
Connection Information	
Software Connection Name	Name to uniquely identify the software connection record. For example, `SG-Azure log analytics connection`.

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Field	Description
Hardware Connection Name	Name of the hardware connection associated with the software as described in step 4.b.iv. You add a hardware connection name to associate the software connection with the respective hardware.
Connection URL	Base URL to connect to the Log Analytics workspace in the following format: `https://api.loganalytics.io/v1/workspaces/<workspace_id>` Where `<workspace_id>` is the ID of the Log Analytics workspace as described in step 5.a.ii. **Note:** This field is automatically set to the URL to connect to the Log Analytics workspace. Replace the `<workspace_id>` variable in the auto-generated URL with the workspace ID of your Log Analytics workspace.
Credential Information	
OAuth Client ID	Application (client) ID of your Azure client application as described in step 4.a.
OAuth Client Secret	Client Secret of your Azure client application as described in step 4.a.

OAuth Token URL	Token URL of your Azure client application.
	
	Based on the region of your Azure client application, enter the token URL in one of the following formats:
	
	▪ Global
	
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	
	▪ US Government
	
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	
	▪ China
	
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`

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Field	Description
	▪ Germany `https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token` Where *<tenantid>* is the tenant ID of your Azure client application as described in step 4.a.

v. Select **Configure and Get OAuth Token**.

vi. When the OAuth token flow is successfully completed, return to the Create connection for the software import task page using the back button for your browser.

vii. Set the Create or Edit connection task to complete by selecting **Mark as Complete**.

c. Test the *Log Analytics* API connection to import software data from the Azure client application.

i. For the Test Connection task, select **Configure**.

ii. Select the data source associated with the newly created connection in the **Name** column of the Data Sources list.

iii. Select the **Test Load 20 Records** related link.

iv. When the state changes to **Complete**, return to the setup by selecting **Back to Guided Setup** in the Help panel.

v. Set the Test Connection task to complete by selecting **Mark as Complete**.

d. Review the scheduled data imports configuration.

i. For the Set up scheduled import jobs task, select **Configure**.

ii. Select the *SG-Azure Software* scheduled data import.

iii. On the Scheduled Data Import form, verify the field values for the scheduled job and select the **Active** check box.

For more information, see Schedule a data import.

iv. Select **Update**.

v. Set the Set up scheduled import jobs task to complete by selecting **Mark as Complete** in the Help panel.

6. **Optional:** Enable extended discovery using the `run` command.

(Optional) The `run` command is used to run a set of commands on the VMs to fetch server information such as CPU count, cores, model, and manufacturer. For information about extended discovery using the `run` command, see the Extended discovery with Run Command on Service Graph connector for Microsoft Azure [KB2210811] article in the Now Support Knowledge Base.

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a. Download the scripts that are required to enable extended discovery.
   i. For the Download the scripts task, select **Configure**.
   ii. After the scripts are downloaded, select **Mark as Complete** to set the Download the scripts task to complete.

b. Configure an Azure storage account for extended discovery.
   i. For the Configure Azure Storage account for Run Command task, select **Configure**.

      For information about configuring an Azure storage account for extended discovery, see the Instructions for setting up Run Command in Service Graph Connector for Azure [KB2001668] article in the Now Support Knowledge Base.

   ii. Set up a new Azure storage account.
   iii. Set up a container to upload the script files.
   iv. Set up another container to store the results.
   v. Provide `run` command access to the service principal.
   vi. Select **Mark as Complete** to set the Configure Azure Storage account for Run Command task to complete.

c. Configure the connection properties for the new instance that you created for Service Graph Connector for Microsoft Azure.
   i. For the Configure connection properties task, select **Configure**.
   ii. In the **Connection*** field of the SG-Azure Configuration Properties section, select the new instance that you created.

      The fields in the Properties section are populated with the details of the instance.

   iii. In the Properties section, provide the following details for the instance that you created:
      - Name of the storage account where the containers are created
      - Subscription ID where the storage account is created
      - Resource group of the storage account
      - Name of the container where the `sh` and `ps1` files are uploaded in Azure
      - Name of the container where the results of the commands are to be stored
      - URI of the `sh` file that has to be run on Linux machines
      - URI of the `ps1` file that has to be run on Windows machines

   iv. Select **Save**.
   v. Select **Mark as Complete** to set the Configure connection properties task to complete.

Result
The data from Azure is pulled into your CMDB.

Data mapping for Service Graph Connector for Microsoft Azure

Data from the Azure data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow® CMDB using the Identification and Reconciliation Engine (IRE).

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Data mapping for Azure

When you complete setting up the connection, you can configure the integration to periodically pull data from Azure. The data is loaded into staging tables and then inserted into the target tables.

The following table lists the data sources, the staging tables, and the target tables as CMDB CI and non-CMDB classes for Azure.

Data mapping for Azure

Data source	Staging table	Target tables
SG-Azure Subscriptions	SG Azure Subscriptions [sn_sg_azure_integ_subscriptions]	Cloud Service Account Key Value
SG-Azure Datacenter Updation	SG-Azure Datacenter Updation [sn_sg_azure_integ_datacenter_updation]	Azure Datacenter
SG-Azure Resource Group	SG-Azure Resource Group [sn_sg_azure_integ_resource_groups]	Resource Group Key Value
SG-Azure Availability Zone	SG-Azure Availability Sets [sn_sg_azure_integ_availability_sets]	Availability Zone Key Value
SG-Azure Storage Volume	SG-Azure Storage Volume [sn_sg_azure_integ_storage_volume]	Storage Volume Key Value
SG-Azure Load Balancers	SG-Azure Load Balancers [sn_sg_azure_integ_load_balancers]	Cloud Load Balancer Cloud LB IPAddress Key Value
SG-Azure Network	SG-Azure Network [sn_sg_azure_integ_network]	Cloud Network Cloud Service Account

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Data mapping for Azure (continued)

Data source	Staging table	Target tables
		Cloud Subnet Key Value
SG-Azure Public IP Address	SG-Azure Public IP Address [sn_sg_azure_integ_public_ip_address]	Cloud Public IP Address Cloud Mgmt Network Interface Cloud Load Balancer Cloud LB IPAddress Key Value
SG-Azure Security Group	SG-Azure Security Group [sn_sg_azure_integ_security_group]	Compute Security Group Key Value
SG-Azure Storage Accounts	SG-Azure Storage Accounts [sn_sg_azure_integ_storage_accounts]	Cloud Storage Account Key Value
SG-Azure Virtual Machines	SG-Azure Virtual Machine [sn_sg_azure_integ_virtual_machine]	Virtual Machine Instance Image Computer Linux Server Server Windows Server Key Value
SG-Azure Network Interface	SG-Azure Network Interface [sn_sg_azure_integ_network_interface]	Cloud Mgmt Network Interface

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Data mapping for Azure (continued)

Data source	Staging table	Target tables
		IP Address Virtual Machine Instance Key Value
SG-Azure SQL	SG-Azure SQL [sn_sg_azure_integ_sql]	Cloud DataBase Key Value
SG-Azure Functions	SG-Azure Functions [sn_sg_azure_integ_functions]	Cloud Function
SG-Azure Generic Resources	SG-Azure Generic Resources [sn_sg_azure_integ_generic_resources] **Note:** The SG-Azure Generic Resources data source imports data for resources that are categorized as `Generic` in the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table.	Cloud Resource Key Value
SG-Azure Scale Sets	SG-Azure Scale Sets [sn_sg_azure_integ_scale_sets]	Instance Scale Set
SG-Azure Scale Sets VMs	SG-Azure Scale Sets VMs [sn_sg_azure_integ_scale_sets_vms]	Virtual Machine Instance Storage Volume Image Cloud Mgmt Network Interface Hardware Type Azure Datacenter Linux Server Server

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Data mapping for Azure (continued)

Data source	Staging table	Target tables
		Windows Server Key Value
SG-Azure Software	SG-Azure Software [sn_sg_azure_integ_software] **Note:** The SG-Azure Software data source imports the software data from the ConfigurationData table in the Log Analytics workspace of Azure. The SG-Azure Software import is set to inactive by default.	When the Software Asset Management (SAM) application isn't installed: Software Software Instance When the SAM application is installed: Software Installation
SG-Azure Software Remove	SG-Azure Software Remove [sn_sg_azure_integ_software_remove] The SG-Azure Software Remove import is set to inactive by default.	When the SAM application isn't installed: Software Software Instance When the SAM application is installed: Software Installation
SG-Azure TCP	SG-Azure TCP [sn_sg_azure_integ_tcp]	TCP Connection

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Data mapping for Azure (continued)

Data source	Staging table	Target tables
	Note: The SG-Azure TCP data source imports the TCP and processes data from the VMConnection and VMProcess tables in the Log Analytics workspace of Azure. To populate the tables, you must first enable the VM insights feature in the Azure portal. For more information, see Enabling VM insights for collecting Azure data.	Running Process
SG-Azure Hardware Template Updation	Hardware templates [sn_sg_azure_integ_hardware_templates]	Hardware Type
SG-Azure HW Consolidation	SG-Azure HW Consolidation [sn_sg_azure_integ_hw_consolidation]	Virtual Machine Instance Computer
SG-Azure Run Command	SG-Azure Run Command [sn_sg_azure_integ_run_command]	No data created
SG-Azure Get Run Command	SG-Azure Get Run Command [sn_sg_azure_integ_get_run_command]	Application TCP Connection Running Process
SG-Azure Kubernetes Cluster	SG-Azure Kubernetes Cluster [sn_sg_azure_integ_kubernetes_cluster]	Kubernetes Cluster

For more information on where data is saved when pulling data from Azure, see CMDB classes targeted in Service Graph Connector for Microsoft Azure and Supported Microsoft Azure resource types.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Additional information about Azure data sources:

- The Service Graph Connector for Microsoft Azure utilizes the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table to differentiate between generic resources and other supported resource types.

  Any resource that is not populated in the Service Graph Resource Inclusion Whitelist [sn_cmdb_int_util_service_graph_resource_inclusion_whitelist] table is populated in the Cloud Inventory Resource Inclusion Lists [sa_cloud_inventory_resource_whitelist_list] table.

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- The SG-Azure Hardware Template Updation and SG-Azure HW Consolidation import schedules replace the SG-Azure Hardware Template import schedule from the Service Graph Connector for Microsoft Azure 1.12.0 version. The SG-Azure Hardware Template Updation and SG-Azure HW Consolidation data sources fetch only the data of the hardware templates that are used for VMs in Azure, instead of fetching all hardware templates.
- The SG-Azure SQL data source populates the `microsoft.dbformysql/flexibleservers` and `microsoft.dbforpostgresql/flexibleservers` resource types in the Cloud Database [cmdb_ci_cloud_database] table instead of the Cloud Resource [cmdb_ci_cmp_resource] table from the Service Graph Connector for Microsoft Azure 1.14.0 version.

  After upgrading to version 1.14.0, run a full data load to migrate all active flexible servers from the Cloud Resource [cmdb_ci_cmp_resource] table to the Cloud Database [cmdb_ci_cloud_database] table.
- All data sources except SG-Azure Scale Sets VMs are migrated from Azure Resource Manager (ARM) APIs to Resource Graph APIs for a full data load from the Service Graph Connector for Microsoft Azure 1.14.0 version. Microsoft Azure doesn't support uniform orchestration-type Scale Set VMs on Resource Graph APIs.
- The import set rows for the SG-Azure Run Command scheduled import job [sn_sg_azure_integ_run_command] remain in Pending state even after the import set is processed.

Related content

CMDB classes targeted in Service Graph Connector for Microsoft Azure

Service Graph Connector for Microsoft Azure properties

CMDB classes targeted in Service Graph Connector for Microsoft Azure

When you complete setting up the connection, you can configure the integration to periodically pull data from Microsoft Azure. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Application [cmdb_ci_appl]

The following attributes in the Application [cmdb_ci_appl] table are populated by collected data:

Attribute label	Attribute name
Class	sys_class_name
Version	version
TCP port(s)	tcp_port
Running Process	running_process
Running process key parameters	running_process_key_parameters
Name	name
Running process command	running_process_command

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Relationship created for Application

Parent class	Relationship type	Child class
Application [cmdb_ci_appl]	Runs on::Runs	Computer [cmdb_ci_computer]

Availability Zone [cmdb_ci_availability_zone]

The following attributes in the Availability Zone [cmdb_ci_availability_zone] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
State	state

Relationship created for Availability Zone

Parent class	Relationship type	Child class
Availability Zone [cmdb_ci_availability_zone]	Reference	Key Value [cmdb_key_value]

Azure Datacenter [cmdb_ci_azure_datacenter]

The following attributes in the Azure Datacenter [cmdb_ci_azure_datacenter] table are populated by collected data.

Attribute label	Attribute name
Comments	comments
Name	name
Object ID	object_id
Region	region
Status	install_status

Relationships created for Azure Datacenter

Parent class	Relationship type	Child class
Azure Datacenter [cmdb_ci_azure_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Azure Datacenter [cmdb_ci_azure_datacenter]	Contains::Contained by	Resource Group [cmdb_ci_resource_group]

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Relationships created for Azure Datacenter (continued)

Parent class	Relationship type	Child class
Azure Datacenter [cmdb_ci_azure_datacenter]	Contains::Contained by	Availability Zone [cmdb_ci_availability_zone]

Cloud DataBase [cmdb_ci_cloud_database]

The following attributes in the Cloud DataBase [cmdb_ci_cloud_database] table are populated by collected data.

Attribute label	Attribute name
Fully qualified domain name	fqdn
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
State	state
Type	type
Version	version

Relationships created for Cloud DataBase

Parent class	Relationship type	Child class
Cloud DataBase [cmdb_ci_cloud_database]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	Key Value [cmdb_key_value]

Cloud Function [cmdb_ci_cloud_function]

The following attributes in the Cloud Function [cmdb_ci_cloud_function] table are populated by collected data.

Attribute label	Attribute name
App Function state	app_function_state
Code Location URL	code_location_url
Fully qualified domain name	fqdn
Function Last Modified	function_last_modified
Install Status	install_status
IP Address	ip_address
Name	name

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Attribute label	Attribute name
Object ID	object_id
Operational status	operational_status

Relationship created for Cloud Function

Parent class	Relationship type	Child class
Cloud Function [cmdb_ci_cloud_function]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]

The following attributes in the Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress] table are populated by collected data.

Attribute label	Attribute name
Fully qualified domain name	fqdn
Install Status	install_status
IP Address	ip_address
IPAddress Type	ipaddress_type
Name	name
Object ID	object_id
Operational status	operational_status

Cloud Load Balancer [cmdb_ci_cloud_load_balancer]

The following attributes in the Cloud Load Balancer [cmdb_ci_cloud_load_balancer] table are populated by collected data.

Attribute label	Attribute name
Canonical Hosted Zone Name	canonical_hosted_zone_name
DNS Name	dns_name
Fully qualified domain name	fqdn
Install Status	install_status
IP Address	ip_address
Name	name
Object ID	object_id
Operational status	operational_status
State	state

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Relationships created for Cloud Load Balancer

Parent class	Relationship type	Child class
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Owns::Owned by	Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	Key Value [cmdb_key_value]

Cloud Mgmt Network Interface [cmdb_ci_nic]

The following attributes in the Cloud Mgmt Network Interface [cmdb_ci_nic] table are populated by collected data.

Attribute label	Attribute name
Configuration Item	cmdb_ci
Install Status	install_status
IP Address	ip_address
MAC Address	mac_address
Name	name
Object ID	object_id
Operational status	operational_status
Primary	primary
Private IP	private_ip
Public DNS	public_dns
Public IP	public_ip
State	state
Static	is_static

Relationships created for Cloud Mgmt Network Interface

Parent class	Relationship type	Child class
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Contains::Contained by	Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	Key Value [cmdb_key_value]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	Virtual Machine Instance [cmdb_ci_vm_instance]

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Cloud Network [cmdb_ci_network]

The following attributes in the Cloud Network [cmdb_ci_network] table are populated by collected data.

Attribute label	Attribute name
Cidr	cidr
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
State	state

Relationships created for Cloud Network

Parent class	Relationship type	Child class
Cloud Network [cmdb_ci_network]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Network [cmdb_ci_network]	Contains::Contained by	Compute Security Group [cmdb_ci_compute_security_group]
Cloud Network [cmdb_ci_network]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]
Cloud Network [cmdb_ci_network]	Reference	Key Value [cmdb_key_value]

Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]

The following attributes in the Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
Public DNS	public_dns
Public IP Address	public_ip_address
State	state

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Relationships created for Cloud Public IP Address

Parent class	Relationship type	Child class
Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Reference	Key Value [cmdb_key_value]

Cloud Resource [cmdb_ci_cmp_resource]

The following attributes in the Cloud Resource [cmdb_ci_cmp_resource] table are populated by collected data.

Attribute label	Attribute name
Description	short_description
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
Resource type	resource_type
State	state

Relationships created for Cloud Resource

Parent class	Relationship type	Child class
Cloud Resource [cmdb_ci_cmp_resource]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Resource [cmdb_ci_cmp_resource]	Reference	Key Value [cmdb_key_value]

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data.

Attribute label	Attribute name
Account Id	account_id
Name	name
Object ID	object_id
Datacenter Type	datacenter_type

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Relationship created for Cloud Service Account

Parent class	Relationship type	Child class
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	Key Value [cmdb_key_value]

Cloud Storage Account [cmdb_ci_cloud_storage_account]

The following attributes in the Cloud Storage Account [cmdb_ci_cloud_storage_account] table are populated by collected data.

Attribute label	Attribute name
Blob Service	blob_service
File Service	file_service
Install Status	install_status
Name	name
Object ID	object_id
Queue Service	queue_service
Sku Name	sku_name
State	state
Table Service	table_service

Relationships created for Cloud Storage Account

Parent class	Relationship type	Child class
Cloud Storage Account [cmdb_ci_cloud_storage_account]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Storage Account [cmdb_ci_cloud_storage_account]	Reference	Key Value [cmdb_key_value]

Cloud Subnet [cmdb_ci_cloud_subnet]

The following attributes in the Cloud Subnet [cmdb_ci_cloud_subnet] table are populated by collected data.

Attribute label	Attribute name
CIDR	cidr
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
State	state

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Relationship created for Cloud Subnet

Parent class	Relationship type	Child class
Cloud Subnet [cmdb_ci_cloud_subnet]	Reference	Key Value [cmdb_key_value]

Compute Security Group [cmdb_ci_compute_security_group]

The following attributes in the Compute Security Group [cmdb_ci_compute_security_group] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
State	state

Relationships created for Compute Security Group

Parent class	Relationship type	Child class
Compute Security Group [cmdb_ci_compute_security_group]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Compute Security Group [cmdb_ci_compute_security_group]	Reference	Key Value [cmdb_key_value]

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data.

Attribute label	Attribute name
Name	name
CPU core count	cpu_core_count
CPU count	cpu_count
Disk space (GB)	disk_space
IP Address	ip_address
Is Virtual	virtual
Object ID	object_id
Operating System	os
Operational status	operational_status
OS Version	os_version

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Attribute label	Attribute name
RAM (MB)	ram
Serial number	serial_number

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]

For information about the classification of VDIs into the Computer [cmdb_ci_computer] CI class, see the Classification of VDIs into computer class using Service graph connector for Azure [KB2184443] article in the Now Support Knowledge Base.

Hardware Type [cmdb_ci_compute_template]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id
Class	sys_class_name
Cores	cores
Logical Storage GB	local_storage_gb
Memory MB	memory_mb
vCPUs	vcpus

Relationship created for Hardware Type

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

Note:
When the Cloud Hardware Type class extension is enabled, the **Class** attribute is set to `Cloud Hardware Type`. Else, the attribute is set to `Hardware Type`.

As a user with the admin role, you can enable the Cloud Hardware Type class extension by setting the **use a single hardware type for cloud data centers** property (*`sn_itom_pattern.use a single hardware type for cloud data centers`*) to `true`. For more information, see the Service Graph Connector For Microsoft Azure - Migrating to a new hardware type model [KB1288455] article in the Now Support Knowledge Base.

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Relationship created for Hardware Type

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

Image [cmdb_ci_os_template]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data.

Attribute label	Attribute name
Guest OS	guest_os
Image Source	image_source
Install Status	install_status
Name	name
Object ID	object_id
Offer	offer
Operational status	operational_status
Version	version
Vendor	vendor

Relationship created for Image

Parent class	Relationship type	Child class
Image [cmdb_ci_os_template]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

Instance Scale Set [cmdb_ci_instance_scale_set]

The following attributes in the Instance Scale Set [cmdb_ci_instance_scale_set] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
State	state

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Relationship created for Instance Scale Set

Parent class	Relationship type	Child class
Instance Scale Set [cmdb_ci_instance_scale_set]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data.

Attribute label	Attribute name
Owned By Configuration Item	owned_by_cmdb_ci
IP Address	ip_address
Name	name
Nic	nic

Relationships created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Cloud Mgmt Network Interface [cmdb_ci_nic]
IP Address [cmdb_ci_ip_address]	Reference	Computer [cmdb_ci_computer]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data.

Attribute label	Attribute name
Key	key
Value	value

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

The following attributes in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table are populated by collected data.

Attribute label	Attribute name
Cluster Resource ID	cluster_resource_id
Cluster Version	cluster_version
Fully qualified domain name	fqdn
Install Status	install_status
Name	name

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Attribute label	Attribute name
State	state

Relationship created for Kubernetes Cluster

Parent class	Relationship type	Child class
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

Linux Server [cmdb_ci_linux_server]

The following attributes in the Linux Server [cmdb_ci_linux_server] table are populated by collected data.

Attribute label	Attribute name
CPU core count	cpu_core_count
Disk space (GB)	disk_space
Install Status	install_status
Is Virtual	virtual
Name	name
Object ID	object_id
Operating System	os
Operational status	operational_status
OS Version	os_version
RAM (MB)	ram
Serial number	serial_number

Relationship created for Linux Server

Parent class	Relationship type	Child class
Linux Server [cmdb_ci_linux_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]

Resource Group [cmdb_ci_resource_group]

The following attributes in the Resource Group [cmdb_ci_resource_group] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id
Operational status	operational_status

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Attribute label	Attribute name
Install Status	install_status
State	state

Relationships created for Resource Group

Parent class	Relationship type	Child class
Resource Group [cmdb_ci_resource_group]	Contains::Contained by	Virtual Machine Instance [cmdb_ci_vm_instance]
Resource Group [cmdb_ci_resource_group]	Contains::Contained by	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
Resource Group [cmdb_ci_resource_group]	Contains::Contained by	Instance Scale Set [cmdb_ci_instance_scale_set]
Resource Group [cmdb_ci_resource_group]	Contains::Contained by	Image [cmdb_ci_os_template]
Resource Group [cmdb_ci_resource_group]	Contains::Contained by	Storage Volume [cmdb_ci_storage_volume]
Resource Group [cmdb_ci_resource_group]	Reference	Key Value [cmdb_key_value]

Serial Number [cmdb_serial_number]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data.

Attribute label	Attribute name
Serial Number	serial_number
Serial Number Type	serial_number_type
Valid	valid

Relationships created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Server [cmdb_ci_server]
Serial Number [cmdb_serial_number]	Reference	Windows Server [cmdb_ci_win_server]
Serial Number [cmdb_serial_number]	Reference	Linux Server [cmdb_ci_linux_server]

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data.

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Attribute label	Attribute name
CPU core count	cpu_core_count
CPU count	cpu_count
Disk space (GB)	disk_space
Install Status	install_status
Is Virtual	virtual
Name	name
Object ID	object_id
Operating System	os
Operational status	operational_status
OS Version	os_version
RAM (MB)	ram
Serial number	serial_number
Comments	comments

Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Owns::Owned by	Cloud Mgmt Network Interface [cmdb_ci_nic]
Server [cmdb_ci_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data.

Attribute label	Attribute name
Key	key
Name	name
Version	version

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

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Attribute label	Attribute name
Display name	display_name
Publisher	publisher
Version	version
Discovery source	discovery_source

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data.

Attribute label	Attribute name
Installed on	installed_on
Name	name

Relationships created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]

Storage Volume [cmdb_ci_storage_volume]

The following attributes in the Storage Volume [cmdb_ci_storage_volume] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status
Size	size
Size bytes	size_bytes
State	state
Volume ID	volume_id

Relationships created for Storage Volume

Parent class	Relationship type	Child class
Storage Volume [cmdb_ci_storage_volume]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

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Relationships created for Storage Volume (continued)

Parent class	Relationship type	Child class
Storage Volume [cmdb_ci_storage_volume]	Reference	Key Value [cmdb_key_value]

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data.

Attribute label	Attribute name
CPUs	cpus
Disks size (GB)	disks_size
Install Status	install_status
IP Address	ip_address
Memory (MB)	memory
Name	name
Object ID	object_id
Operational status	operational_status
State	state
VM Instance ID	vm_inst_id

Relationships created for Virtual Machine Instance

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Managed by::Manages	Instance Scale Set [cmdb_ci_instance_scale_set]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Image [cmdb_ci_os_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Hardware Type [cmdb_ci_compute_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Contains::Contained by	Cloud Mgmt Network Interface [cmdb_ci_nic]
Virtual Machine Instance [cmdb_ci_vm_instance]	Uses:Used by	Storage Volume [cmdb_ci_storage_volume]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	Key Value [cmdb_key_value]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	Computer [cmdb_ci_computer]

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Windows Server [cmdb_ci_win_server]

The following attributes in the Windows Server [cmdb_ci_win_server] table are populated by collected data.

Attribute label	Attribute name
CPU core count	cpu_core_count
Disk space (GB)	disk_space
Install Status	install_status
Is Virtual	virtual
Name	name
Object ID	object_id
Operating System	os
Operational status	operational_status
OS Version	os_version
RAM (MB)	ram
Serial number	serial_number

Relationship created for Windows Server

Parent class	Relationship type	Child class
Windows Server [cmdb_ci_win_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]

Related content

Data mapping for Service Graph Connector for Microsoft Azure

Service Graph Connector for Microsoft Azure properties

Quick start tests for Service Graph Connector for Microsoft Azure

Validate that Service Graph Connector for Microsoft Azure still works after you make any configuration change such as applying an upgrade or developing an application. Copy and customize these quick start tests to pass when using your instance-specific data.

Danger:
By default, the system property that is used to run automated tests is disabled to prevent you from accidentally running these tests on a production system. To avoid data corruption or an outage, run tests only on development, test, and other non-production instances. See Enable or disable executing Automated Test Framework tests.

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Service Graph Connector for Microsoft Azure

SG-Azure: Service Graph Connector for Microsoft Azure Validation test suite

Test suite to verify the integrity of an integration using multiple tests.

Test	Description	Release version
SG-Azure Availability Zone	Validate the successful ingestion of the record in the Availability Zone table with the prerequisite parent ingestion.	Utah
SG-Azure Data Center	Validate the successful ingestion of multiple records in the Azure Data Center table with the prerequisite parent ingestion.	Utah
SG-Azure Functions	Validate the successful ingestion of multiple records in the Cloud Service Account, Data Center, Cloud Database, and Cloud Function.	Utah
SG-Azure Generic Resources	Validate the successful ingestion of multiple records in the Cloud Resource and Relations table.	Utah
SG-Azure Hardware Template	Validate the successful ingesion of multiple records in the Hardware Template and Compute Template tables.	Utah
SG-Azure Load Balancers	Validate the successful ingestion of multiple records in the Load Balancer, Computer Security Group and Relations table with the prerequisite parent ingestion.	Utah
SG-Azure Network	Validate the successful ingestion of multiple records in the Network table with the prerequisite parent ingestion.	Utah
SG-Azure Network Interface	Validate the successful ingestion of multiple records in the Networks, Public IP Address and Relations table.	Utah
SG-Azure Public IP Address	Validate the successful ingestion of multiple records in the Public IP Address, Networks, and Load Balancer tables.	Utah

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SG-Azure: Service Graph Connector for Microsoft Azure Validation test suite
Test suite to verify the integrity of an integration using multiple tests.

(continued)

Test	Description	Release version
SG-Azure Resource Group	Validate the successful ingestion of records in the Resource Group table.	Utah
SG-Azure Scale Sets	Validate the successful ingestion of records in the Scale Sets and Relations tables.	Utah
SG-Azure Scale Sets VMs	Validate the successful ingestion of multiple records in the Servers, Virtual Machine Instance, Scale Sets, and Relations tables with the prerequisite parent ingestion.	Utah
SG-Azure Security Groups	Validate the successful ingestion of multiple records in the Cloud Service Account, Computer Security Group, and Relations tables with the prerequisite parent ingestion.	Utah
SG-Azure Server Config Data	Validate the successful ingestion of multiple records in the Virtual Machine Instance, Linux Server, and Relations tables with the prerequisite parent ingestion.	Utah
SG-Azure Software	Validate the successful ingestion of multiple records in the Virtual Machine Instance, Software Records, and Relations tables with the prerequisite parent ingestion.	Utah
SG-Azure SQL	Validate the successful ingestion of multiple records in the Data Center, Cloud Database, and Relations tables with the prerequisite parent ingestion.	Utah
SG-Azure Storage Account	Validate the successful ingestion of multiple records in the Storage Account, Computer Security Group and Relations tables with the prerequisite parent ingestion.	Utah
SG-Azure Storage Volume	Validate the successful ingestion of multiple records in the Storage Volume,	Utah

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SG-Azure: Service Graph Connector for Microsoft Azure Validation test suite
Test suite to verify the integrity of an integration using multiple tests.

(continued)

Test	Description	Release version
	Computer Security Group and Relations tables with the prerequisite parent ingestion.	
SG-Azure Subscription	Validate the successful ingestion of records in the Cloud Service Account table.	Utah
SG-Azure VMs	Validate the successful ingestion of multiple records in the Virtual Machines, Virtual Machine Instance and Relations tables with prerequisite parent ingestion.	Utah

To learn more about Service Graph Connector for Microsoft Azure, see Service Graph Connector for Microsoft Azure.

Related topics

Quick start tests

Accessing the connection details of Service Graph Connector for Microsoft Azure

You can access the connection details of the Service Graph Connector for Microsoft Azure in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Microsoft Azure. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of an Azure connection

Access the details of an Azure connection configured for the Service Graph Connector for Microsoft Azure.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Azure** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

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Additional features within the Service Graph Connector for Microsoft Azure

Use the additional features available within the Service Graph Connector for Microsoft Azure to maximize its use for importing data.

The following features are available within the Service Graph Connector for Microsoft Azure:

Configure multiple Azure connections

Follow the guided setup to establish a hardware or software connection, or configure a workspace when adding a software connection.

Set partition size for parallel loading-enabled Azure accounts

Optimize the performance of data sources by enabling parallel data loading.

Disable delta synchronization

Import full data from your Azure instance when needed.

Enabling VM insights for collecting Azure data

Enable the VM insights feature for all the VMs in your Log Analytics workspace to populate the VMConnection and VMProcess tables in Azure.

Setting up multiple connections in Service Graph Connector for Microsoft Azure

The Service Graph Connector for Microsoft Azure supports multiple Azure connections.

Important:
Add multiple connections by selecting **Add connection** on the Connections page of the Workflow Studio in the guided setup. For more information, see Configure Service Graph Connector for Microsoft Azure.

Setting up multiple connections

You can set up a hardware or software connection by using the guided setup. The Service Graph Connector for Microsoft Azure supports only one-to-one mapping between hardware and software connections. Therefore, when configuring multiple software connections, you must also configure an equivalent number of hardware connections. You can differentiate multiple connections using their respective connection aliases.

For example, if you add 10 software connections for 10 different workspaces, you must also add 10 hardware connections for each corresponding software connection.

Setting up multiple workspaces

You can set up a workspace when adding a software connection using the guided setup. To set up multiple workspaces, you must configure that many different software connections in the Service Graph Connector for Microsoft Azure as there are workspaces and an equivalent number of hardware connections.

For example, if you have 10 workspaces, you must add 10 software connections for each workspace and 10 hardware connections for each corresponding software connection.

Set partition size for parallel loading-enabled Azure accounts

Optimize the performance of data sources by setting the partition size in the *azure_full_pull_partition_size* system property.

Before you begin
Set the application scope to Service Graph Connector for Microsoft Azure using the application picker. For more information, see Application picker.

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Role required: admin

About this task

The parallel loading feature is available for the following data sources:

- Starting with the Service Graph Connector for Microsoft Azure 1.13.0 version:
  - SG-Azure Functions
  - SG-Azure Generic Resources
  - SG-Azure Get Run Command
  - SG-Azure Hardware Template Updation
  - SG-Azure HW Consolidation
  - SG-Azure Kubernetes Cluster
  - SG-Azure Load Balancers
  - SG-Azure Network Interface
  - SG-Azure Public IP Address
  - SG-Azure Run Command
  - SG-Azure Scale Sets VMs
- Starting with the Service Graph Connector for Microsoft Azure 1.11.0 version:
  - SG-Azure Network
  - SG-Azure Virtual Machines
  - SG-Azure Storage Volume

For a full data pull, the *azure_full_pull_partition_size* property determines the number of Azure subscriptions that can be executed as parallel jobs to retrieve configuration item (CI) data. Partition size determines how many Azure subscriptions a single parallel-thread evaluates for data retrieval. If you set the *azure_full_pull_partition_size* property to 100, the partition size is 100 subscriptions.

Note:
If the *azure_full_pull_partition_size* property isn't configured, the partition size computation feature of the Integration Commons for CMDB application automatically determines the partition size for parallel loading at runtime. See Partition size computation for parallel loading in Integration Commons for CMDB.

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Azure** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. From the **Property** column of the Service Graph Connection Properties related list, select **azure_full_pull_partition_size**.
   The *azure_full_pull_partition_size* system property determines the number of subscriptions that each partition processes for a full pull. For more information, see Service Graph Connector for Microsoft Azure properties.
4. In the **Value** field, enter a numeric value greater than 0 for the partition size.

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5. Select **Update**.

> **Note:**
> After you enable parallel data loading for a data source, the **Test Load 20 Records** and **Load All Records** options don't work for executing the data source. You must select **Execute Now** from **Scheduled Data Import** to execute the data source for which parallel loading is enabled.

Configuring data synchronization in Service Graph Connector for Microsoft Azure

You can configure the system property for synchronizing only delta data from an Azure instance.

The connector provides the ability to import only delta data from an Azure instance. With delta synchronization enabled, the importing process of Azure data is quicker because the connector imports the changes in Azure data only.

For data sources discovered by a software connection, the **Last Run Datetime** field displays the timestamp of the most recent delta pull run. The **Last Run Datetime** field is updated only when the last delta pull run was a success. An empty **Last Run Datetime** field indicates no previous delta pull run for the data source, but either a full pull run or no run at all. The delta pull period is calculated by subtracting the last run date and time from the current date and time; that is, Delta period = Current date timestamp - Last run date timestamp.

For data sources discovered by a hardware connection, the **Last Success Import Time** field displays the timestamp of the most recent delta pull run. The **Last Success Import Time** field is updated only when the last delta pull run was a success. An empty **Last Success Import Time** field indicates no previous delta pull run for the data source, but either a full pull run or no run at all. The delta pull period is calculated by subtracting the last successful import date and time from the current date and time; that is, Delta period = Current date timestamp - Last success import date timestamp.

The application includes the *sn_sg_azure_integ.is_delta_sync_enabled* system property to enable delta synchronization. By default, the property is set to `true`. To import full data from your Azure instance, disable the *sn_sg_azure_integ.is_delta_sync_enabled* property. See Disable delta synchronization.

For a delta pull, you can also configure the grace time, page size, preceding time period, and API call duration using system properties. For more information, see Service Graph Connector for Microsoft Azure properties.

Disable delta synchronization

Disable delta synchronization to import all Microsoft Azure data.

Before you begin

Set the application scope to Service Graph Connector for Microsoft Azure using the application picker. For more information, see Application picker.

Role required: admin

Procedure

1. Enter `sys_properties.list` in the navigation filter, and then open the *sn_sg_azure_integ.is_delta_sync_enabled* property.
2. In the **Value** field, enter `false`.
3. Select **Update**.

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Enabling VM insights for collecting Azure data

You must enable the VM insights feature in the Azure portal for collecting TCP and processes data using the Service Graph Connector for Microsoft Azure.

Requirements for enabling the VM insights feature

- Ensure that you've created the Log Analytics workspace to push the logs from virtual machines (VMs) via insights in Azure Monitor. See Insights in Azure Monitor on the Microsoft Azure documentation site.
- Note down the subscription name associated with your Log Analytics workspace.

Collecting the TCP and processes data

The SG-Azure TCP and SG-Azure VM Config Data data sources in the Service Graph Connector for Microsoft Azure import data from the VMConnection and VMProcess tables in Azure, respectively. To fetch data correctly from the VMConnection and VMProcess tables in Azure, you must enable the VM insights feature for all the VMs in your Log Analytics workspace. To learn how to populate these tables via insights, see Enable VM insights in the Azure portal on the Microsoft Azure documentation site.

There are several methods available for enabling VM insights. For more information, see Enable VM insights overview on the Microsoft Azure documentation site.

Note:
In the data collection rule, ensure that you've selected the **Enable guest performance** and **Enable processes and dependencies (Maps)** check boxes on the rule form.

Service Graph Connector for Microsoft Azure reference

Reference topics provide additional information about Service Graph Connector for Microsoft Azure components.

Supported Microsoft Azure resource types

Several Microsoft Azure resource types are imported as CMDB data.

Microsoft Azure resource types refer to the names included in delta queries used for filtering data using the Azure Resource Graph API for a specific data source.

Note:
Delta pulls include data from a specific time period that is defined by the condition within a delta query.

The following table lists the Service Graph Connector for Microsoft Azure data sources, Microsoft Azure resource types they import, and indicates whether they support both full pull and delta pull of data during import. ✓ indicates supported and # indicates not supported.

Resource types supported in Service Graph Connector for Microsoft Azure

Data source	CMDB CI classes	Microsoft Azure resource type	Full pull	Delta pull
SG-Azure Subscriptions	Cloud Service Account [cmdb_ci_cloud_service_account]	Microsoft.Resources/ subscriptions	#	#
	Key Value [cmdb_key_value]	Tags	#	#

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Resource types supported in Service Graph Connector for Microsoft Azure (continued)

Data source	CMDB CI classes	Microsoft Azure resource type	Full pull	Delta pull
SG-Azure Datacenter Updation	Azure Datacenter [cmdb_ci_azure_datacenter]	None	#	#
SG-Azure Resource Group	Resource Group [cmdb_ci_resource_group]	Microsoft.Resources/subscriptions/resourcegroups	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Availability Zone	Availability Zone [cmdb_ci_availability_zone]	Microsoft.Compute/availabilitySets	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Storage Volume	Storage Volume [cmdb_ci_storage_volume]	Microsoft.Compute/disks	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Load Balancers	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Microsoft.Network/loadBalancers	#	#
	Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]	Microsoft.Network/loadBalancers	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Network	Cloud Network [cmdb_ci_network]	Microsoft.Network/virtualnetworks	#	#
	Cloud Service Account [cmdb_ci_cloud_service_account]	Microsoft.Network/virtualnetworks	#	#
	Cloud Subnet [cmdb_ci_cloud_subnet]	Microsoft.Network/virtualnetworks	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Network Interface	Cloud Mgmt Network Interface [cmdb_ci_nic]	Microsoft.Network/networkInterfaces	#	#
	IP Address [cmdb_ci_ip_address]	Microsoft.Network/networkInterfaces	#	#
	Hardware [cmdb_ci_hardware]	Microsoft.Network/networkInterfaces	#	#
	Virtual Machine Instance [cmdb_ci_vm_instance]	Microsoft.Network/networkInterfaces	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Public IP Address	Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Microsoft.Network/publicIPAddresses	#	#
	Cloud Mgmt Network Interface [cmdb_ci_nic]	Microsoft.Network/publicIPAddresses	#	#

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Resource types supported in Service Graph Connector for Microsoft Azure (continued)

Data source	CMDB CI classes	Microsoft Azure resource type	Full pull	Delta pull
	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Microsoft.Network/publicIPAddresses	#	#
	Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]	Microsoft.Network/publicIPAddresses	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Security Group	Compute Security Group [cmdb_ci_compute_security_group]	Microsoft.Network/networkSecurityGroups	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Storage Accounts	Cloud Storage Account [cmdb_ci_cloud_storage_account]	Microsoft.Storage/storageAccounts	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Virtual Machines	Virtual Machine Instance [cmdb_ci_vm_instance]	Microsoft.Compute/virtualMachines	#	#
	Image [cmdb_ci_os_template]	Microsoft.Compute/virtualMachines	#	#
	Linux Server [cmdb_ci_linux_server]	Microsoft.Compute/virtualMachines	#	#
	Server [cmdb_ci_server]	Microsoft.Compute/virtualMachines	#	#
	Windows Server [cmdb_ci_win_server]	Microsoft.Compute/virtualMachines	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Software	When the Software Asset Management (SAM) application isn't installed: Software [cmdb_ci_spkg] Software Installation [cmdb_sam_sw_install]	None	#	#
	When the SAM application is installed: Software Instance [cmdb_software_instance]	None	#	#
SG-Azure SQL	Cloud DataBase [cmdb_ci_cloud_database]	Microsoft.Sql/servers Microsoft.DBforPostgreSQL/servers microsoft.dbformysql/flexibleservers	#	#

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Resource types supported in Service Graph Connector for Microsoft Azure (continued)

Data source	CMDB CI classes	Microsoft Azure resource type	Full pull	Delta pull
		microsoft.dbforpostgresql/flexibleservers		
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure TCP	TCP Connection [cmdb_tcp]	None	#	#
	Running Process [cmdb_running_process]	None	#	#
SG-Azure Functions	Cloud Function [cmdb_ci_cloud_function]	Microsoft.Web/sites	#	#
SG-Azure Generic Resources	Cloud Resource [cmdb_ci_cmp_resource]	Microsoft.ResourceGraph/resources - Generic	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Scale Sets	Instance Scale Set [cmdb_ci_instance_scale_set]	Microsoft.Compute/virtualmachinescalesets	#	#
SG-Azure Scale Sets VMs **Note:** Imports uniform orchestration scale sets VMs.	Virtual Machine Instance [cmdb_ci_vm_instance]	None	#	#
	Storage Volume [cmdb_ci_storage_volume]	None	#	#
	Image [cmdb_ci_os_template]	None	#	#
	Cloud Mgmt Network Interface [cmdb_ci_nic]	None	#	#
	Hardware Type [cmdb_ci_compute_template]	None	#	#
	Azure Datacenter [cmdb_ci_azure_datacenter]	None	#	#
	Linux Server [cmdb_ci_linux_server]	None	#	#
	Server [cmdb_ci_server]	None	#	#
	Windows Server [cmdb_ci_win_server]	None	#	#
	Key Value [cmdb_key_value]	Tags	#	#
SG-Azure Software Remove	When the SAM application isn't installed: Software [cmdb_ci_spkg] Software Installation [cmdb_sam_sw_install]	None	#	#
	When the SAM application is installed: Software Instance [cmdb_software_instance]	None	#	#

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Resource types supported in Service Graph Connector for Microsoft Azure (continued)

Data source	CMDB CI classes	Microsoft Azure resource type	Full pull	Delta pull
SG-Azure Hardware Template Updation	Hardware Type [cmdb_ci_compute_template]	None	#	#
SG-Azure HW Consolidation	Virtual Machine Instance [cmdb_ci_vm_instance]	None	#	#
	Computer [cmdb_ci_computer]	None	#	#
SG-Azure Run Command	None	None	#	#
SG-Azure Get Run Command	Application [cmdb_ci_appl]	None	#	#
	TCP Connection [cmdb_tcp]	None	#	#
	Running Process [cmdb_running_process]	None	#	#
SG-Azure Kubernetes Cluster	SG-Azure Kubernetes Cluster [sn_sg_azure_integ_kubernetes_cluster]	microsoft.containerservice/managedclusters	#	#

Microsoft Azure discovery solutions comparison

ITOM Visibility applications discover a variety of Microsoft Azure resources and populate the relevant configuration item (CI) classes in the Configuration Management Database (CMDB) with their attributes.

ITOM Visibility solutions

ITOM Visibility can offer you comprehensive visibility into your organization's cloud infrastructure. Each application offers unique strengths and capabilities, and by comparing them you can gain holistic insights on their capabilities and benefits.

ITOM Visibility solutions for discovering Azure

ITOM Visibility solution	Overview	Configuration
Discovery and Service Mapping Patterns and Visibility Content	Discovery patterns used by ITOM Visibility	• You must update your store apps to the latest release version. • You must provide ITOM Visibility with access permissions. For more information, see Set up Azure service accounts
Service Graph Connector for Microsoft Azure	Service Graph Connector for Microsoft Azure	Configure Service Graph Connector for Microsoft Azure using the guided setup

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Note:

The CI class, in most cases, is applicable to both solutions. If it's not applicable to one of the solutions, the solution is marked "N/A".

Discovery and Service Mapping Patterns vs Service Graph Connector for Microsoft Azure

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
microsoft.compute/availabilitysets	Yes	N/A	cmdb_ci_availability_set
microsoft.compute/availabilitysets	Yes	Yes	cmdb_ci_availability_zone
Microsoft.Management/managementGroups	Yes	No	cmdb_ci_azure_management_group
microsoft.KeyVault/vaults	Yes	No	cmdb_ci_certificate
• Microsoft.Sql/servers/databases • Microsoft.DBforMySQL/servers • Microsoft.DocumentDB/databaseAccounts • Microsoft.Cache/Redis	Yes	No	cmdb_ci_cloud_database
• Microsoft.Sql/servers • Microsoft.DBforPostgreSQL/servers	Yes	Yes	cmdb_ci_cloud_database
microsoft.network/expressroutecircuits	Yes	No	cmdb_ci_cloud_direct_connect
Microsoft.Storage/storageAccounts/fileServices	Yes	No	cmdb_ci_cloud_file_service
Microsoft.Storage/storageAccounts/fileServices/shares	Yes	No	cmdb_ci_cloud_file_share
Microsoft.Web/sites/functions	Yes	Yes	cmdb_ci_cloud_function
VM Size	Yes	No	cmdb_ci_cloud_hardware_type
microsoft.compute/hostgroups/hosts	Yes	No	cmdb_ci_cloud_host

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Discovery and Service Mapping Patterns vs Service Graph Connector for Microsoft Azure (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
microsoft.network/applicationgateways	Yes	No	cmdb_ci_cloud_load_balancer
microsoft.network/loadbalancers	Yes	Yes	cmdb_ci_cloud_load_balancer
Microsoft.Storage/storageAccounts/blobService	Yes	No	cmdb_ci_cloud_object_service
Tenant	Yes	No	cmdb_ci_cloud_org
microsoft.network/publicipaddresses	Yes	Yes	cmdb_ci_cloud_public_ipaddress
Microsoft.Storage/storageAccounts/queueServices	Yes	No	cmdb_ci_cloud_queue_service
Microsoft.Resources/subscriptions	Yes	Yes	cmdb_ci_cloud_service_account
Microsoft.Management/managementGroup	Yes	No	cmdb_ci_cloud_service_account
microsoft.storage/storageaccounts	Yes	Yes	cmdb_ci_cloud_storage_account
Microsoft.Network/virtualNetworks/subnets	Yes	No	cmdb_ci_cloud_subnet
Microsoft.Storage/storageAccounts/tableServices	Yes	No	cmdb_ci_cloud_table_service
microsoft.web/sites	Yes	No	cmdb_ci_cloud_webserver
microsoft.network/networksecuritygroups	Yes	Yes	cmdb_ci_compute_security_group
microsoft.network/privatednszones	Yes	No	cmdb_ci_dns_zone
microsoft.compute/virtualmachinescalesets	Yes	Yes	cmdb_ci_instance_scale_set
microsoft.containerservices/managedclusters	Yes	Yes	cmdb_ci_kubernetes_cluster
Microsoft.Network/loadBalancers/backendAddressPools	Yes	No	cmdb_ci_lb_pool
Microsoft.Network/loadBalancers/inboundNatRules	Yes	No	cmdb_ci_lb_service

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Discovery and Service Mapping Patterns vs Service Graph Connector for Microsoft Azure (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
microsoft.network/natgateways	Yes	No	cmdb_ci_nat_gateway
microsoft.network/virtualnetworks	Yes	Yes	cmdb_ci_network
microsoft.network/networkinterfaces	Yes	Yes	cmdb_ci_nic
microsoft.compute/images	Yes	No	cmdb_ci_os_template
Microsoft.Resources/resourceGroups	Yes	Yes	cmdb_ci_resource_group
Microsoft.Network/routeTables/routes	Yes	No	cmdb_ci_route_table
microsoft.network/routetables	Yes	No	cmdb_ci_route_table
microsoft.compute/disks	Yes	Yes	cmdb_ci_storage_volume
microsoft.network/localnetworkgateways	Yes	No	cmdb_ci_virtual_pvt_gateway
microsoft.network/virtualnetworkgateways	Yes	No	cmdb_ci_virtual_pvt_gateway
microsoft.compute/virtualmachines	Yes	Yes	cmdb_ci_vm_instance
microsoft.sqlvirtualmachines/sqlvirtualmachines	Yes	No	cmdb_ci_vm_instance
Microsoft.Network/virtualNetworks/virtualNetworkPeerings	Yes	No	cmdb_ci_vnet_peering
microsoft.network/connections	Yes	No	cmdb_ci_vpc_gateway_connection
Microsoft.Resources/tags	Yes	Yes	cmdb_key_value
Microsoft.Compute/virtualMachines	No	Yes	cmdb_ci_server
Microsoft.Compute/virtualMachines	No	Yes	cmdb_ci_win_server
Microsoft.Network/networkInterfaces	No	Yes	cmdb_ci_hardware
Microsoft.Compute/virtualMachines	No	Yes	cmdb_ci_linux_server

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Discovery and Service Mapping Patterns vs Service Graph Connector for Microsoft Azure (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
microsoft.containerservices/managedclusters	Yes	Yes	cmdb_ci_kubernetes_cluster
Microsoft.Compute/virtualmachinescalesets	No	Yes	cmdb_ci_vm_instance
Microsoft.ServiceBus/namespaces/queues	Yes	No	cmdb_azure_service_bus_queue
Microsoft.ServiceBus/namespaces/topics	Yes	No	cmdb_azure_service_bus_topic
microsoft.appconfiguration/configurationstores	Yes	No	cmdb_azure_app_configuration_config
microsoft.automation/automationaccounts	Yes	No	cmdb_azure_automation_automation_a
microsoft.compute/diskencryptionsets	Yes	No	cmdb_azure_disk_encryption_set_disk
microsoft.compute/galleries/images	Yes	No	cmdb_azure_compute_gallery_image_c
microsoft.compute/snapshots	Yes	No	cmdb_azure_compute_snapshot
microsoft.containerregistry/registries	Yes	No	cmdb_azure_container_registry_registry
microsoft.databricks/workspaces	Yes	No	cmdb_azure_databricks_workspace
microsoft.datafactory/factories	Yes	No	cmdb_azure_data_factory_data_factory
microsoft.dataprotection/backupvaults	Yes	No	cmdb_azure_data_protection_backup_
microsoft.eventgrid/systemtopics	Yes	No	cmdb_azure_event_grid_system_topic
microsoft.eventhub/namespaces	Yes	No	cmdb_azure_event_hub_namespace
microsoft.insights/components	Yes	No	cmdb_azure_application_insight_comp
microsoft.network/applicationgatewaywebapplicationfirewallpolicies	Yes	No	cmdb_azure_web_application_firewall_
microsoft.operationalinsights/workspaces	Yes	No	cmdb_azure_log_analytics_workspace
microsoft.network/azurefirewalls	Yes	No	cmdb_azure_network_security_azure_fi

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Discovery and Service Mapping Patterns vs Service Graph Connector for Microsoft Azure (continued)

Resource type	Supported by Cloud Discovery and Service Mapping Patterns	Supported by Cloud Service Graph Connectors	CI Class
microsoft.devcenter/devcenters	Yes	No	cmdb_azure_dev_centers_dev_center
microsoft.kusto/clusters	Yes	No	cmdb_azure_data_explorer_clusters_da
microsoft.recoveryservices/vaults	Yes	No	cmdb_azure_recovery_services_vault
microsoft.recoveryservices/vaults/backupfabrics/protectioncontainers/protecteditems	Yes	No	cmdb_azure_recovery_services_vault_b
microsoft.dbforpostgresql/servergroupsv2	Yes	No	cmdb_azure_cosmos_db_for_postgresc
microsoft.insights/datacollectionrules	Yes	No	cmdb_azure_application_insight_data_
microsoft.network/serviceendpointpolicies	Yes	No	cmdb_azure_service_endpoint_policy_

Life cycle management of records in Service Graph Connector for Microsoft Azure

Life cycle management in the Service Graph Connector for Microsoft Azure monitors and updates the statuses of Azure resources throughout their entire life cycle, from creation to deletion.

The life cycle management process helps maintain the accuracy and integrity of data in the Configuration Management Database (CMDB).

Life cycle management for CIs in Service Graph Connector for Microsoft Azure

The following table lists the configuration items (CIs) in CMDB and other non-CMDB tables for which life cycle management is available in Service Graph Connector for Microsoft Azure.

Supported tables for life cycle management

Data source	CMDB CI classes	Life cycle management available
SG-Azure Availability Zone	Availability Zone [cmdb_ci_availability_zone]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Datacenter Updation	Azure Datacenter [cmdb_ci_azure_datacenter]	Not applicable
SG-Azure Functions	Cloud Function [cmdb_ci_cloud_function]	Yes
SG-Azure Generic Resources	Cloud Resource [cmdb_ci_cmp_resource]	Yes
	Key Value [cmdb_key_value]	No

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Supported tables for life cycle management (continued)

Data source	CMDB CI classes	Life cycle management available
SG-Azure Get Run Command	Application [cmdb_ci_appl]	Not applicable
	TCP Connection [cmdb_tcp]	Not applicable
	Running Process [cmdb_running_process]	Not applicable
SG-Azure Hardware Template Updation	Hardware Type [cmdb_ci_compute_template]	Not applicable
SG-Azure HW Consolidation	Virtual Machine Instance [cmdb_ci_vm_instance]	Not applicable
	Computer [cmdb_ci_computer]	Not applicable
SG-Azure Kubernetes Cluster	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Yes
SG-Azure Load Balancers	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Yes
	Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Network	Cloud Network [cmdb_ci_network]	Yes
	Cloud Subnet [cmdb_ci_cloud_subnet]	Yes
	Cloud Service Account [cmdb_ci_cloud_service_account]	No
	Key Value [cmdb_key_value]	No
SG-Azure Network Interface	Cloud Mgmt Network Interface [cmdb_ci_nic]	Yes
	IP Address [cmdb_ci_ip_address]	No
	Hardware [cmdb_ci_hardware]	Not applicable
	Virtual Machine Instance [cmdb_ci_vm_instance]	Not applicable
	Key Value [cmdb_key_value]	No
SG-Azure Public IP Address	Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Yes
	Cloud Mgmt Network Interface [cmdb_ci_nic]	Yes
	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Yes
	Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Resource Group	Resource Group [cmdb_ci_resource_group]	Yes
	Key Value [cmdb_key_value]	No

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Supported tables for life cycle management (continued)

Data source	CMDB CI classes	Life cycle management available
SG-Azure Scale Sets	Instance Scale Set [cmdb_ci_instance_scale_set]	Yes
SG-Azure Scale Sets VMs	Virtual Machine Instance [cmdb_ci_vm_instance]	Yes
	Storage Volume [cmdb_ci_storage_volume]	Yes
	Image [cmdb_ci_os_template]	Not applicable
	Cloud Mgmt Network Interface [cmdb_ci_nic]	Yes
	Hardware Type [cmdb_ci_compute_template]	Not applicable
	Linux Server [cmdb_ci_linux_server]	Yes
	Server [cmdb_ci_server]	Yes
	Windows Server [cmdb_ci_win_server]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Security Group	Compute Security Group [cmdb_ci_compute_security_group]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Software	When the Software Asset Management (SAM) application isn't installed: Software [cmdb_ci_spkg] Software Instance [cmdb_software_instance] When the SAM application is installed: Software Installation [cmdb_sam_sw_install]	Yes
SG-Azure Software Remove	When the SAM application isn't installed: Software [cmdb_ci_spkg] Software Instance [cmdb_software_instance] When the SAM application is installed: Software Installation [cmdb_sam_sw_install]	Yes
SG-Azure SQL	Cloud DataBase [cmdb_ci_cloud_database]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Storage Accounts	Cloud Storage Account [cmdb_ci_cloud_storage_account]	Yes
	Key Value [cmdb_key_value]	No

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Supported tables for life cycle management (continued)

Data source	CMDB CI classes	Life cycle management available
SG-Azure Storage Volume	Storage Volume [cmdb_ci_storage_volume]	Yes
	Key Value [cmdb_key_value]	No
SG-Azure Subscriptions	Cloud Service Account [cmdb_ci_cloud_service_account]	No
	Key Value [cmdb_key_value]	No
SG-Azure TCP	TCP Connection [cmdb_tcp]	No
	Running Process [cmdb_running_process]	No
SG-Azure Virtual Machines	Linux Server [cmdb_ci_linux_server]	Yes
	Server [cmdb_ci_server]	Yes
	Windows Server [cmdb_ci_win_server]	Yes
	Image [cmdb_ci_os_template]	Yes
	Key Value [cmdb_key_value]	No
	Virtual Machine Instance [cmdb_ci_vm_instance]	Yes

Record removal process in Service Graph Connector for Microsoft Azure

The Service Graph Connector for Microsoft Azure uses the Integration Commons record removal process for life cycle management during full data loads. For delta loads, life cycle management of records is based on updates from Microsoft Azure.

Record removal is the process of handling data that is no longer needed. For any discovered resources deleted later after pulling data, the Service Graph Connector for Microsoft Azure automatically updates the **Install Status** field of the associated CMDB CI classes to indicate any retired or deleted records.

The record removal process in the Service Graph Connector for Microsoft Azure involves marking the **Install Status** of a record as **retired** rather than permanently deleting it from the system. The record remains in the database, making it possible to reference or restore it later. Record removal for Service Graph Connector for Microsoft Azure relies on the Source [sys_object_source table].

Starting with the Service Graph Connector for Microsoft Azure 1.14.0 version, life cycle management is supported for the following data sources in full data load and delta load:

- SG-Azure Kubernetes Cluster
- SG-Azure Scale Sets
- SG-Azure Generic Resources
- SG-Azure Functions
- SG-Azure SQL
- SG-Azure Network Interface
- SG-Azure Virtual Machines
- SG-Azure Storage Accounts

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- SG-Azure Security Group
- SG-Azure Public IP Address
- SG-Azure Network
- SG-Azure Load Balancers
- SG-Azure Storage Volume
- SG-Azure Availability Zone
- SG-Azure Resource Group
- SG-Azure Subscriptions

When you run a full data load for the first time after upgrading to version 1.14.0, the Install Status of all the records that aren't discovered is set to retired.

Service Graph Connector for Microsoft Azure properties

Service Graph Connector for Microsoft Azure properties control the behavior of the connector.

Connection properties

These connection properties are available for the Service Graph Connector for Microsoft Azure hardware connections.

Note:
To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **Azure** > **Connections**, and select the hardware connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

Connection properties for Service Graph Connector for Microsoft Azure

Property	Description
vmGraphQuery	Specify the resource graph query on which the Run command should be executed. By default, the Run command is executed on all running VMs. • Type: string • Default value: empty
filter_databricks	This property is used to filter Azure Databricks CIs using the Vendor tag provided by Azure. Azure Databricks virtual machines (VMs), Network Interface Controllers (NICs), and storage volumes (collectively called Azure Databricks CIs) have the value of the Vendor tag set to `Databricks`. Starting with the Service Graph Connector for Microsoft Azure 1.14.0 version, all Azure Databricks CIs that have the value of the Vendor tag set to `Databricks` are filtered out from discovery during a full data load. During delta loads, set the value of the *`insert_short_lived_vms`* custom system property to `false` to filter Azure Databricks CIs that are marked as retired during discovery

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Connection properties for Service Graph Connector for Microsoft Azure (continued)

Property	Description
	(see Custom system properties). Additionally, for each Hardware connection, set the *filter_databricks* connection property to `true`. • Type: true | false • Default value: false
Properties used for the Run command	
scriptsContainerName	Enter the name of the container where the `.sh` and `.ps1` files are uploaded in Azure. • Type: string • Default value: empty
storageAccountName	Enter the name of the storage account where the containers are created. • Type: string • Default value: empty
storageSubsription	Enter the subscription ID where the storage account is created. • Type: string • Default value: empty
storageContainerName	Enter the name of the container where the results of the commands are to be stored. • Type: string • Default value: empty
storageResourceGroup	Enter the resource group of the storage account. • Type: string • Default value: empty
powershellScriptURI	Enter the URI of the `.ps1` file that is to be run on Windows machines. • Type: URI • Default value: empty
shellScriptURI	Enter the URI of the `.sh` file that is to be run on Linux machines. • Type: URI • Default value: empty

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Connection properties for Service Graph Connector for Microsoft Azure (continued)

Property	Description
lookback_time_in_days	This property is used for record removal. Time in days in which the sys_object_source records are queried for the deletion of CIs. The value is automatically updated to 15 after the initial run. Set the value of this property to empty to include all the older records populated by SG-Azure as removal candidates for the Integration Commons record removal API. **Note:** Do not modify this property if the value is empty. • Type: integer • Default value: empty

For more information about the Run command for the Service Graph Connector for Microsoft Azure, see Instructions for setting up Run Command in Service Graph Connector for Azure [KB2001668]

Default system properties

These default system properties are available for Service Graph Connector for Microsoft Azure.

Note: To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

Default system properties for Service Graph Connector for Microsoft Azure

Property	Description
api_retry_max	Enter the maximum retry limit for a Microsoft Azure API call made from the data sources within the connector. • Type: integer • Default value: 3 • Location: System Property [sys_properties] table
api_retry_max_without_backoff	Enter the maximum retry limit for a Microsoft Azure API call made from the data sources within the connector, without using exponential backoff to increase the waiting time between consecutive retries. • Type: integer • Default value: 3 • Location: System Property [sys_properties] table
azure_full_pull_partition_size	Set the partition size for Azure full data pull. This property determines the number of subscriptions that each

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Default system properties for Service Graph Connector for Microsoft Azure (continued)

Property	Description
	partition processes. The value must be set to a numeric value greater than 0. • Type: integer • Default value: null • Location: System Property [sys_properties] table **Note:** If no value is specified, the property value is determined based on the number of active threads in the instance. See Set partition size for parallel loading-enabled Azure accounts.
delta_grace_time	Enter the additional time period in hours added to the current delta pull period when fetching incremental changes. • Type: integer • Default value: 0 • Location: System Property [sys_properties] table
delta_page_size	Enter the page size, that is, the maximum number of records fetched per page in a data pull for the data sources within the connector. • Type: integer • Default value: 500 • Location: System Property [sys_properties] table
is_delta_sync_enabled	Set the property to `false` to deactivate delta synchronization. • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table See Configuring data synchronization in Service Graph Connector for Microsoft Azure.
LDC_status	Set the property to `true` to enable populating the passive status of an Azure datacenter (also known as a logical datacenter) in the Comments attribute of the Azure Datacenter [cmdb_ci_azure_datacenter] CI class when the `regionType` attribute is `Logical` or the service account for the datacenter is deactivated .

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Default system properties for Service Graph Connector for Microsoft Azure (continued)

Property	Description
	• Type: true | false • Default value: `false` • Location: System Property [sys_properties] table
load_balancer_page_limit	Enter the maximum number of records per page to be fetched in a delta pull for the SG-Azure Load Balancers data source. • Type: integer • Default value: `500` • Location: System Property [sys_properties] table
maximum_delta_total_period	Enter the maximum time period in days preceding the current run time during delta pull. • Type: integer • Default value: `7` • Location: System Property [sys_properties] table
maximum_delta_window_period	Enter the maximum time duration in hours for each API call to repeat within the total delta period during delta pull. • Type: integer • Default value: `24` • Location: System Property [sys_properties] table
network_interface_page_limit	Enter the maximum number of records per page to be fetched in a delta pull for the SG-Azure Network Interface data source. • Type: integer • Default value: `500` • Location: System Property [sys_properties] table
pull_disabled_subscriptions	Set the property to `false` to deactivate the import of resources associated with deactivated Azure subscriptions. • Type: true | false • Default value: `true` • Location: System Property [sys_properties] table
save_rest_response_as_attachment	Set the property to `true` to save the response from Azure Resource Graph API calls as an attachment and

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Default system properties for Service Graph Connector for Microsoft Azure (continued)

Property	Description
	read the data. Set this value to `true` if more than 10MB data is returned from Resource Graph API calls. • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table
security_group_page_limit	Enter the maximum number of records per page to be fetched in a delta pull for the SG-Azure Security Group data source. • Type: integer • Default value: `500` • Location: System Property [sys_properties] table
software_page_limit	Enter the maximum number of records fetched per page when importing software data through the SG-Azure Software data source. • Type: integer • Default value: `5000` • Location: System Property [sys_properties] table
tcp_and_process_page_limit	Enter the maximum number of records fetched per page when importing TCP and running process data through the SG-Azure TCP data source. • Type: integer • Default value: `1000` • Location: System Property [sys_properties] table
tcp_time_period	Enter the time period in hours during which TCP and running process data is imported through the SG-Azure TCP data source. • Type: integer • Default value: `1` • Location: System Property [sys_properties] table
vm_power_state_page_limit	Enter the maximum number of records fetched per page when importing the power state of VMs through the SG-Azure VM Config Data data source. • Type: integer • Default value: `1000` • Location: System Property [sys_properties] table

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Custom system properties

You can create these custom system properties for the Service Graph Connector for Microsoft Azure. These properties must be created in the Service Graph Connector for Microsoft Azure application scope. The custom properties that you create are listed in the System Properties [sys_properties] table.

For more information about creating custom system properties, see Add a system property.

Custom system properties for Service Graph Connector for Microsoft Azure

Property	Description
sn_sg_azure_integ.network_page_limit	Set the maximum number of records per the SG-Azure Network data source. • Type: integer • Default value: `100`
sn_sg_azure_integ.insert_short_lived_vms	Set the property to `false` to filter out Az during delta loads. • Type: true | false • Default value: `true` • Location: System Property [sys_proper
sn_sg_azure_integ.sg_azure_generic_resource_type_dynamic_create	Set the value to `true` to add new resourc to the Service Graph Resource Inclusion [sn_cmdb_int_util_service_graph_resour table. • Type: true | false • Default value: `false` • Location: System Property [sys_proper

Related content

Data mapping for Service Graph Connector for Microsoft Azure

CMDB classes targeted in Service Graph Connector for Microsoft Azure

Service Graph Connector for Microsoft Defender Endpoint

Use the Service Graph Connector for Microsoft Defender Endpoint to pull data from machines protected by the Microsoft Defender for Endpoint security solution into your ServiceNow instance.

Request apps on the Store

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

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Supported versions

- Supported Microsoft Defender for Endpoint versions:
  - Microsoft Defender for Endpoint Plan 1
  - Microsoft Defender for Endpoint Plan 2
- Supported ServiceNow versions:
  - Washington DC
  - Xanadu
  - Yokohama

Use cases

The ServiceNow Security Operations applications have features that interact with the Service Graph Connector to gain insights into machines utilizing the Microsoft Defender for Endpoint security solution.

Important Information for upgrading Service Graph Connector for Microsoft Defender Endpoint

After you upgrade to Service Graph Connector for Microsoft Defender Endpoint 1.2.0, migrate data from the Server [cmdb_ci_server] CI class to the Computer [cmdb_ci_computer] CI class. For more information, see the Service Graph Connector for Microsoft Defender Endpoint - Data migration after upgrade to version 1.2.0 [KB2096769] article in the Now Support Knowledge Base.

Configuring a connection for the connector

Use the SGC Central view in the Service Graph Workspace or CMDB Workspace to install the connector and configure the connection. The view enables you to install and discover connectors and to manage the full life cycle of creating, editing, monitoring, and debugging connections. For instructions, see Configure Service Graph Connector for Microsoft Defender Endpoint using SGC Central.

Important:
Unless there are configuration issues, use SGC Central to configure the connection. The guided setup method for configuration is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Microsoft Defender for Endpoint integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Microsoft Defender for Endpoint data source is mapped and transformed into the ServiceNow CMDB configuration item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

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When you complete setting up the connection, you can configure the integration to pull data periodically from the machines utilizing the Microsoft Defender for Endpoint security solution.

The following data source is included for the Microsoft Defender for Endpoint security solution:

SG-Defender Machines

Imports all the machine-related data from the machines utilizing the Microsoft Defender for Endpoint security solution, loads the imported data in the SG-Defender Machines [sn_defender_integ_sg_defender_machines] staging table, and then populates the following target tables:

- IP Address [cmdb_ci_ip_address]
- Software Installation [cmdb_sam_sw_install] (If the Software Asset Management (SAM) application is installed.)
- Software Instance [cmdb_software_instance] (If the SAM application is not installed.)
- Software [cmdb_ci_spkg] (If the SAM application is not installed.)
- SG-Defender Machines Related [sn_defender_integ_sg_defender_machines_related]
- Network Adapter [cmdb_ci_network_adapter]
- Computer [cmdb_ci_computer]
- Windows Server [cmdb_ci_win_server]

Note:
Only operating system details are populated in the Software Installation [cmdb_sam_sw_install], Software Instance [cmdb_software_instance], and Software [cmdb_ci_spkg] tables.

For more information on where data is saved when pulling data from the Microsoft Defender for Endpoint security solution, see CMDB classes targeted in Service Graph Connector for Microsoft Defender Endpoint.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Related topics

Service Graph Connectors

Configure Service Graph Connector for Microsoft Defender Endpoint using SGC Central

Set up scheduled import jobs to pull in Microsoft Defender for Endpoint data into your Configuration Management Database (CMDB).

Before you begin

Complete the following tasks:

- Install Service Graph Connector for Microsoft Defender Endpoint version 1.1.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.
- Verify that you have an active subscription to Microsoft Defender for Endpoint.
- Verify that you have created an Azure application to get programmatic access to Microsoft Defender for Endpoint. See Create an app to access Microsoft Defender for Endpoint without a user in the Microsoft 365 documentation.

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- Obtain the tenant ID, client ID, and client secret details for the Microsoft Defender for Endpoint administrator account.
- Enable the Machine.Read.All and Machine.ReadWrite.All permissions in Microsoft Defender for Endpoint. See Permissions for the `List machines` API in the Microsoft 365 documentation.

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the Microsoft Defender connector type, and then select **Configure connection**.
   A default connection, SG Defender OAuth2.0 connection, for Microsoft Defender for Endpoint is available within the application. As the Service Graph Connector for Microsoft Defender Endpoint supports only a single instance, you can configure the default connection for the first time or resume editing it thereafter.
4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

5. Enter connection details and test the API connection for importing Microsoft Defender for Endpoint data.

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a. In the **Setup** stage of the playbook, select the **Configure and test connection** activity.

b. On the form, fill in the fields.

Configure and test connection form

Field	Description
Connection Name	Name to identify the Microsoft Defender for Endpoint connection record. **Note:** This field is automatically set to `SG Defender OAuth2.0 connection`. Leave the field value as is.
OAuth Client ID	Application (client) ID of your Microsoft Defender for Endpoint as described in the Before you begin section.
OAuth Client Secret	Client Secret of your Microsoft Defender for Endpoint as described in the Before you begin section.
OAuth token URL	Token URL of your Microsoft Defender for Endpoint. Enter the token URL in the following format: `https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token` Where *<tenantid>* is the tenant ID of your Microsoft Defender for Endpoint as described in the Before you begin section.
Use MID Server	Option to use a MID Server. **Note:** Use of a MID Server is optional.
Mid Selection	Name of the MID Server used by the connector. This field appears only when the **Use MID Server** check box is selected.

c. Select **Update and test connection**.

d. Once the connection test is complete, select **Continue**.

6. Configure the import schedule to import data at regular intervals.

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a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Select **Configure import schedule**.

c. Expand the Parent scheduled data import within the Import schedules list to select the **SG-Defender Machines** import schedule.

d. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

   For more information, see Schedule a data import.

e. Select **Save**.
   Alternatively, select **Execute Now** to execute the import schedule immediately.

f. Select **Continue**.

7. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to verify whether the connection was configured.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for Microsoft Defender Endpoint

CMDB classes targeted in Service Graph Connector for Microsoft Defender Endpoint

Accessing the connection details of Service Graph Connector for Microsoft Defender Endpoint

Configure Service Graph Connector for Microsoft Defender Endpoint using the guided setup

Pull in data from machines using the Microsoft Defender for Endpoint security solution into your Configuration Management Database (CMDB).

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.

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- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. For Event Management to work, the Observability Commons for CMDB (sn_observability) app must be installed prior to installing the connector. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Complete the following tasks:

- Install the Service Graph Connector for Microsoft Defender Endpoint application (sn_defender_integ). For more information, see Install a ServiceNow Store application.
- Ensure that you have an active subscription to Microsoft Defender for Endpoint.
- Ensure that you have created an Azure application to get programmatic access to Microsoft Defender for Endpoint. See Create an app to access Microsoft Defender for Endpoint without a user in the Microsoft 365 documentation.
- Obtain the tenant ID, client ID, and client secret details for the Microsoft Defender for Endpoint administrator account.
- Enable the Machine.Read.All and Machine.ReadWrite.All permissions in Microsoft Defender for Endpoint. See Permissions for the `List machines` API in the Microsoft 365 documentation.

Role required: SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

Procedure

1. Ensure that the application scope is set to the Service Graph Connector for Microsoft Defender Endpoint application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Microsoft Defender** > **Setup**.
3. On the Getting started page, select **Get Started**.
4. Configure the authentication credentials details for sending requests to the `List machines` API in Microsoft Defender for Endpoint.

   a. Configure your Microsoft Defender for Endpoint authentication credentials.

      i. In the Configure the connection section of the Service Graph Connector for Microsoft Defender page, select **Get Started**.

      ii. For the Configure the credentials task, select **Configure**.

      iii. On the form, review and modify the fields.

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Application Registries form

Field	Description
Connection Name	Name to identify the connection record. **Note:** This field is automatically set to the `SG Defender OAuth` connection record. Leave the field value as is.
Client ID	Application (client) ID of your Microsoft Defender for Endpoint as described in the Before you begin section.
Client Secret	Client Secret of your Microsoft Defender for Endpoint as described in the Before you begin section.
OAuth Token URL	Token URL of your Microsoft Defender for Endpoint. Enter the token URL in the following format: `https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token` Where *<tenantid>* is the tenant ID of your Microsoft Defender for Endpoint as described in the Before you begin section.

iv. Select **Update** to return to the guided setup page.

v. Set the Configure the credentials task to complete by selecting **Mark as Complete**.

b. Test the *`List machines`* API connection to import machine-related data from Microsoft Defender for Endpoint.

i. For the Test the connection task, select **Configure**.

ii. On the Service Graph Connections page, select **Test Connection**.

iii. When the **Status** field is set to **Success**, select **Update** to close the Test the connection dialog box and return to the guided setup page.

If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test the connection task to complete by selecting **Mark as Complete**.

5. Configure the scheduled jobs to import machine-related data from Microsoft Defender for Endpoint.

a. In the Set up scheduled import jobs section of the Service Graph Connector for Microsoft Defender page, select **Get Started**.

b. For the Configure scheduled jobs task, select **Configure**.

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c. From the **Name** column, select the scheduled job that you want to activate.
By default, the SG-Defender Machines scheduled job is available to run the SG-Defender Machines data source.

d. On the Scheduled Data Import form, verify the field values for the scheduled job.
For more information, see Schedule a data import.

e. Select **Update**.

f. Select the back button of your browser to return to the guided setup page.

g. Set the Configure the scheduled jobs task to complete by selecting **Mark as Complete** in the guided setup.

Related topics

Accessing the connection details of Service Graph Connector for Microsoft Defender Endpoint

CMDB classes targeted in Service Graph Connector for Microsoft Defender Endpoint

When you complete setting up the connection, you can configure the integration to pull data periodically from machines utilizing the Microsoft Defender for Endpoint security solution. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name
Class	sys_class_name
Discovery source	discovery_source
Install Status	install_status
Name	name
Operating System	os
OS Version	os_version

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Computer [cmdb_ci_computer]	Reference	SG-Defender Machines Related [sn_defender_integ_sg_defender_machines_re

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Relationships created for Computer (continued)

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Reference	Software Installation [cmdb_sam_sw_install]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
Install Status	install_status
IP Address	ip_address
IP version	ip_version
Name	name
Nic	nic

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

SG-Defender Machines Related [sn_defender_integ_sg_defender_machines_related]

The following attributes in the SG-Defender Machines Related [sn_defender_integ_sg_defender_machines_related] table are populated by collected data:

Attribute label	Attribute name
Agent Version	agent_version
Device Id	device_id
Exposure Level	exposure_level
First Seen	first_seen_date
Health Status	health_status
IsAadJoined	isaadjoined
Last Reported	last_reported
Managed by	managed_by
Onboarding Status	onboarding_status

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Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
Discovery source	discovery_source
Install Status	install_status
MAC Address	mac_address
Name	name

Relationships created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Server [cmdb_ci_server]
Network Adapter [cmdb_ci_network_adapter]	Reference	Computer [cmdb_ci_computer]

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data when the Software Asset Management (SAM) application isn't installed:

Attribute label	Attribute name
Key	key
Name	name
Version	version

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data when the SAM application is installed:

Attribute label	Attribute name
Discovery source	discovery_source
Display name	display_name
Version	version

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Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data when the SAM application isn't installed:

Attribute label	Attribute name
Installed on	installed_on
Name	name

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Server [cmdb_ci_server]

Windows Server [cmdb_ci_win_server]

The following attributes in the Windows Server [cmdb_ci_win_server] table are populated by collected data when the SAM application isn't installed:

Attribute label	Attribute name
Class	sys_class_name
Discovery source	discovery_source
Install Status	install_status
Name	name
Operating System	os
OS Version	os_version

Relationships created for Windows Server

Parent class	Relationship type	Child class
Windows Server [cmdb_ci_win_server]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Windows Server [cmdb_ci_win_server]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Windows Server [cmdb_ci_win_server]	Reference	SG-Defender Machines Related [sn_defender_integ_sg_defender_machines_re
Windows Server [cmdb_ci_win_server]	Reference	Software Installation [cmdb_sam_sw_install]

Service Graph Connector for Microsoft Defender Endpoint properties

Service Graph Connector for Microsoft Defender Endpoint properties control the behavior of the connector.

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System properties

These system properties are available for Service Graph Connector for Microsoft Defender Endpoint.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

System properties for Service Graph Connector for Microsoft Defender Endpoint

Property	Description
sn_defender_integ.pagination_record_count	Enter the maximum number of rows fetched in the *`List machines`* API response from the machine resource type. • Type: integer • Default value: `500` • Location: System Property [sys_properties] table

Accessing the connection details of Service Graph Connector for Microsoft Defender Endpoint

You can access the connection details of the Service Graph Connector for Microsoft Defender Endpoint in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Microsoft Defender Endpoint. The connection details include the connection alias, data sources, and scheduled data imports associated with a connection. You can also test the connection.

Access the details of a Microsoft Defender for Endpoint connection

Access the details of a Microsoft Defender for Endpoint connection configured for the Service Graph Connector for Microsoft Defender Endpoint.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Microsoft Defender** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Related topics

Accessing the connection details of Service Graph Connectors

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Life cycle management of records in Service Graph Connector for Microsoft Defender Endpoint

Life cycle management in the Service Graph Connector for Microsoft Defender Endpoint monitors and updates the statuses of Microsoft Defender for Endpoint resources throughout their entire life cycle, from creation to deletion.

The life cycle management process helps maintain the accuracy and integrity of data in the Configuration Management Database (CMDB).

Life cycle management for CIs in Service Graph Connector for Microsoft Defender Endpoint

The following table lists the configuration items (CIs) in CMDB and other non-CMDB tables for which life cycle management is available in the Service Graph Connector for Microsoft Defender Endpoint. The Install Status [install_status] attribute of the CIs is updated to installed or retired according to the state of the CI.

Supported tables for life cycle management

Data source	CIs	Life cycle management available
SG-Defender Machines	Windows Server [cmdb_ci_win_server]	Yes
SG-Defender Machines	IP Address [cmdb_ci_ip_address]	Yes
SG-Defender Machines	Network Adapter [cmdb_ci_network_adapter]	Yes
SG-Defender Machines	Computer [cmdb_ci_computer]	Yes

Service Graph Connector for Microsoft Intune

Use the Service Graph Connector for Microsoft Intune to pull data from the Microsoft Intune application into your ServiceNow instance.

The Service Graph Connector for Microsoft Intune pulls data from mobile devices, computers and software applications into the ServiceNow® Configuration Management Database (CMDB) application. The integration provides greater visibility into mobile devices, computers and related software applications that run on them.

Request apps on the Store

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

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Supported versions

Versions

Microsoft Intune	ServiceNow
• Microsoft Intune Graph API v1.0 • Microsoft Intune Graph API Beta	• Yokohama • Zurich • Australia

Use cases

The following are examples on how you can use the Service Graph Connector for different ServiceNow® applications:

- IT Operations Management (ITOM) Visibility
  - Detailed hardware and application inventory for Android, Apple, and Windows mobile devices. The inventory can be used with or without Software Asset Management (SAM).
  - Compliance tracking for mobile devices. You can build your own device (BYOD) or use corporate-owned devices.
- IT Service Management (ITSM)
  - Incidents, problems, and changes on discovered configuration items (CI).
  - Ownership tracking and assignment for mobile devices.

You can also do the following types of administrative actions:

- Device Management: You can report on various aspects of the device.
- Integration with Azure Monitor: Delta notification.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the Service Graph Workspace or CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Microsoft Intune using SGC Central.

Important:
The guided setup method is deprecated from version 2.7.0 of the Service Graph Connector for Microsoft Intune. Use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector.

CMDB integration dashboards

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Microsoft Intune integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

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Data mapping

Data from data sources in the Microsoft Intune application is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

The following table describes the data sources, the staging tables, and the target tables as CMDB CI classes, and the resource types imported for a Microsoft Intune application.

Data mapping for Microsoft Intune

Data source	Staging table	CMDB CI classes	Resource types	Data source type
SG-Intune Computer	SG-Intune Computer [sn_intune_integrat_computer]	Computer SG-Intune Computer Related IP Address Serial Number When the Software Asset Management (SAM) application isn't installed: Software Software Instance When the SAM application is installed: Software Installation	Computers	Regular
SG-Intune Devices	SG-Intune Devices [sn_intune_integrat_devices]	Handheld Computing Device Serial Number Network Adapter SG-Intune Device Related IP Address When the Software Asset Management (SAM) application isn't installed:	Mobile devices	Regular

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Data mapping for Microsoft Intune (continued)

Data source	Staging table	CMDB CI classes	Resource types	Data source type
		Software Software Instance When the SAM application is installed: Software Installation		
SG-Intune Software	SG-Intune Software [sn_intune_integrat_software]	Software	Discovered apps	Regular
SG-Intune Device Reports	SG-Intune Device Reports [sn_intune_integrat_device_reports]	Computer or Handheld Computing Device Serial Number Network adapter SG-Intune Computer Related SG-Intune Device Related IP Address **Note:** Imports Wireless (Wi-Fi) IPv4 Address of a device only. When the Software Asset Management (SAM) application isn't installed: Software Software Instance When the SAM application is installed: Software Installation	Computers and mobile devices	Advanced

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Data mapping for Microsoft Intune (continued)

Data source	Staging table	CMDB CI classes	Resource types	Data source type
SG-Intune Software Reports	SG-Intune Software Reports [sn_intune_integrat_software_reports]	When the Software Asset Management (SAM) application isn't installed: Software Software Instance When the SAM application is installed: Software Installation	Discovered apps	Advanced

Starting with the Service Graph Connector for Microsoft Intune 2.7.0 version, the SG-Intune Device Reports and SG-Intune Software Reports advanced data sources are not available by default. To use these advanced data sources, you must select the **Advanced data sources** option while configuring the connection using SGC Central. See Configure Service Graph Connector for Microsoft Intune using SGC Central.

Configure the SG-Intune Device Reports and SG-Intune Software Reports advanced data sources for faster data import, better performance, and inclusion of software publisher details. Compared to the regular data sources (SG-Intune Computer, SG-Intune Devices, and SG-Intune Software), the advanced data sources help resolve server errors and performance issues caused by having a large number of Microsoft Intune devices.

For more information, see Service Graph Connector For Microsoft Intune - Advanced (Configure advanced Data sources) [KB1641546] .

Note:
The SG-Intune Device Reports advanced data source is an alternative to the SG-Intune Computer and SG-Intune Devices regular data sources. The SG-Intune Software Reports advanced data source is an alternative to the SG-Intune Software data source. The data imported by the advanced data sources is similar to the data imported by the corresponding regular data sources.

After you complete setting up the connection, you can configure the integration to periodically pull data from the Microsoft Intune application.

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Note:

- For any discovered software applications that were deleted later in the Microsoft Intune application, the Service Graph Connector automatically deletes the corresponding records in CMDB.
- To view more details about a handheld computing device or computer in the Computer [cmdb_ci_computer] class, enable the related lists SG-Intune Device Related and SG-Intune Computer Related.

  You can add these related lists by configuring the Related Lists view on the form that opens when you select a handheld computing device or computer configuration item (CI) in the Computer [cmdb_ci_computer] class. Computer CIs are displayed in the Computers list, accessed by navigating to **All** > **Configuration** > **Base Items** > **Computers**. For more information about adding related lists to a form, see Configuring the form layout.

For more information on where data is saved when pulling data from a Microsoft Intune application, see CMDB classes targeted in Service Graph Connector for Microsoft Intune.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Additional resources

- Service Graph Connector for Microsoft Intune - Troubleshooting connection issues article on the ServiceNow Community site
- Service Graph Connector For Microsoft Intune - Advanced (Configure advanced Data sources) [KB1641546] article in the Now Support Knowledge Base

Related topics

Service Graph Connectors

Configure Service Graph Connector for Microsoft Intune using SGC Central

Configure Service Graph Connector for Microsoft Intune using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Microsoft Intune for pulling in Microsoft Intune data into the CMDB.

Before you begin

Install Service Graph Connector for Microsoft Intune version 2.5.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Obtain the following information from your Microsoft Intune administrator:

- Client ID
- Client Secret
- Token URL

For the connector to access the data in Microsoft Intune, the credential information is required to use the Microsoft Graph API. Therefore, you must grant the following Graph API permissions from the App registrations page in the Microsoft portal:

- DeviceManagementManagedDevices.Read.All (Type: Application)
- DeviceManagementApps.Read.All (Type: Application)
- User.Read.All (Type: Application)

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Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- ServiceNow IntegrationHub Zip step (com.glide.hub.action_step.zip), which is automatically installed.
- ServiceNow IntegrationHub JSON Parser step (com.glide.hub.action_step.jsonparser), which is automatically installed.
- The SGC Central application (sn_sgc_central), which is automatically installed.

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts, to provide access to global tables to the SGC-Admin user, and to configure advanced data sources. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

For more details on permissions, see Service Graph Connector for Microsoft Intune - Troubleshooting connection issues on ServiceNow Community and Microsoft Graph permissions reference on the Microsoft documentation site.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the Microsoft Intune connector type and then select **Create connection**.

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4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

5. Select the data source type.

   a. In the **Setup** stage of the playbook, select the **Select data source type** activity.

   b. Select a data source type:

   - **Advanced data sources**: Advanced data sources offer faster data import and better performance, and include software publisher details. Select this option if you have a large number of Microsoft Intune devices.

     Note:

     - The admin role is required to configure advanced data sources.
     - To enable the creation of attachments, the *`glide.attachment.extensions`* system property must be set to either null or `zip, json`.

       For more information, see the Service Graph Connector For Microsoft Intune – Advanced [KB1641546] article in the Now Support Knowledge Base.

   - **Regular data sources**: The standard option, which doesn't include software publisher details.

   c. Select **Continue**.

6. Enter connection details and test the API connection for importing Microsoft Intune data.

   a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

   b. On the form, fill in the fields.

Create and test connection form

Field	Description
Connection Name	Name to identify the Microsoft Intune connection record. For example, `SG-Intune connection`.
Connection URL	Base URL to connect to your Microsoft Intune application. Based on the region of your Microsoft Intune application, enter the connection URL in one of the following formats: ▪ Global `https://graph.microsoft.com`

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Field	Description

	▪ US Government
	`https://graph.microsoft.us`
	▪ China
	`https://microsoftgraph.chinacloudapi.cn`
	▪ Germany
	`https://graph.cloudapi.de/`

OAuth Client ID	Client ID of the Microsoft Intune application as noted in the Before you begin section.
OAuth Client Secret	Client secret of the Microsoft Intune application as noted in the Before you begin section.

OAuth Token URL	Callback URL for the Microsoft Intune application.
	Based on the region of your Microsoft Intune application, enter the token URL in one of the following formats:
	▪ Global
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	▪ China
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`
	Where *<tenantid>* is the tenant ID of your Microsoft Intune application.

Use MID server	Option to use the MID Server for connecting to the Microsoft Intune instance.

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Field	Description
	Note: A MID Server is required only if a direct connection between the ServiceNow and Microsoft Intune instances isn't possible.
Mid Selection	MID Server for the connection. This field appears only when you select the **Use MID Server** check box.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

7. Configure the connection properties to enable the connector to access resources.
   a. In the **Setup** stage of the playbook, select the **Configure properties** activity.
   b. In the **Configure properties** section, update the connection properties for advanced and regular data sources if required.
   c. Select **Continue**.
8. Configure the report trigger job for advanced data sources.
   The **Activate report trigger job** activity appears only if you selected **Advanced data sources** in step 5.b. The advanced data sources require device reports and software reports to be triggered in the Microsoft environment before related jobs and scheduled imports are run.

   a. In the **Setup** stage of the playbook, select the **Activate report trigger job** activity.

   b. Fill in the fields on the **Scheduled Script Execution** form.

Scheduled Script Execution form

Field	Description
Name	Specify a name for the report trigger job.
Active	Select this check box to activate the report trigger job.
Run	Specify the schedule for the job to be run.
Time	Specify the time when the job should run.
Run as	Specify the user role required to run the report trigger job.

Note:
After you configure the report trigger job, all related jobs and the device and software reports scheduled imports are automatically scheduled to run in a specific sequence a few hours later (typically 3–4 hours). You can review the scheduled imports that are already activated and their scheduled time in step 9.

c. Select **Continue**.

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9. Configure the import schedule to import data at regular intervals.

   a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

   b. Expand the Parent scheduled data import within the Import schedules list to select the *Connection Name*-**SG-Intune Devices** import schedule.

   c. Select the **Active** check box, and then fill in the run schedule and time details.

      For more information, see Schedule a data import.

   d. Select **Save**.
   Alternatively, select **Execute Now** to execute the import schedule immediately.

   e. Select **Continue**.

10. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to verify whether the connection was configured.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for Microsoft Intune

CMDB classes targeted in Service Graph Connector for Microsoft Intune

Accessing the connection details of Service Graph Connector for Microsoft Intune

Configure Service Graph Connector for Microsoft Intune using the guided setup

Set up authentication credentials and a scheduled job to import Microsoft Intune data into your CMDB.

Before you begin

Important:
The guided setup method is deprecated from version 2.7.0 of the Service Graph Connector for Microsoft Intune. Use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Obtain the following information from your Microsoft Intune administrator:

- Client ID
- Client Secret
- Token URL

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For the connector to access the data in Microsoft Intune, the credential information is required to use the Microsoft Graph API. Therefore, you must grant the following Graph API permissions from the App registrations page in the Microsoft portal:

- DeviceManagementManagedDevices.Read.All (Type: Application)
- DeviceManagementApps.Read.All (Type: Application)
- User.Read.All (Type: Application)

For more details on permissions, see Service Graph Connector for Microsoft Intune - Troubleshooting connection issues on ServiceNow Community and Microsoft Graph permissions reference on the Microsoft documentation site.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- ServiceNow IntegrationHub Zip step (com.glide.hub.action_step.zip), which is automatically installed.
- ServiceNow IntegrationHub JSON Parser step (com.glide.hub.action_step.jsonparser), which is automatically installed.

Multi-instance is supported for importing data from multiple Microsoft Intune instances in Service Graph Connector for Microsoft Intune version 2.1.1 and later. This feature involves dynamically creating data sources and scheduled imports, which requires the granting of additional permissions. The guided setup includes additional steps for this feature.

Role required: SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Intune** > **Setup**.
2. On the Getting Started page, select **Get started**.
3. Configure the credentials.
   a. On the Service Graph Connector for Microsoft Intune page, in the Configure the connection section, select the task **Configure credentials**.
   b. On the next page, in the Configure credentials task section, select **Configure**.
   c. On the form, fill in the fields.

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Edit Connection form

Field	Description
Connection Name	Name of the Microsoft Intune application. This field is automatically set.

Connection URL	Connection URL for the connection.
	
	Based on the region of your Microsoft Intune application, enter the connection URL in one of the following formats:
	▪ Global
	`https://graph.microsoft.com`
	▪ US Government
	`https://graph.microsoft.us`
	▪ China
	`https://microsoftgraph.chinacloudapi.cn`
	▪ Germany
	`https://graph.cloudapi.de/`

OAuth Client ID	The client ID of the Microsoft Intune application.
OAuth Client Secret	The client secret of the Microsoft Intune application.

OAuth Token URL	Callback URL for the Microsoft Intune application.
	
	Based on the region of your Microsoft Intune application, enter the token URL in one of the following formats:
	▪ Global
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	▪ China
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`

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Field	Description
	▪ Germany `https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token` Where *<tenantid>* is the tenant ID of your Microsoft Intune application.

d. Select **Edit and Get OAuth Token**.

e. Go back to the guided setup page and for the Configure credentials task, select **Mark as Complete**.

4. **Optional:** If needed, configure the MID Server.
   a. In the Configure MID Server section, select **Configure**.
   b. Select the **Use MID server** check box.
   c. Select **Update** to save the record.

   Note:
   You do not need to update the other fields.

5. Test the connection to the Microsoft Intune API.
   a. In the Test the connection section, select **Configure**.
   b. On the form, review the fields.

Data Source form

Field	Description
Name	Unique name for this data source.
Import set table label	Label of the table that will be created for this data source.
Import set table name	Name of the table that will be created for this data source.
Data in single column	Option to set to data in single column.
Type	Data storage type of the data to be imported.
Application	Application containing this record.

c. Optional: Modify the properties in the Service Graph Connection Properties related list of the connection record.

Note:
Try to retain the default value of the *software_path* property to ensure the proper retrieval of software details.

d. Select the **Test Connection** related link to start the testing process.

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e. When the **Status** field is set to **Success**, return to the guided setup page.
If any of the tests have errors, follow the suggestions for remediation.

f. In the Test the connection task section, select **Mark as Complete**.

6. Add multiple instances.

a. On the left sidebar, select the Add Multiple Instances icon ( ).

b. On the Service Graph Connector for Microsoft Intune page, in the Add Multiple Instances section, select the Update Data Source Access task.

c. Select the **Global** application scope by using the application picker.

d. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

e. Select **Update** to close the tab and return to the guided setup.

f. Modify the application scope again to **Service Graph Connector for Microsoft Intune** by using the application picker.

g. Set the Update Data Source Access task to complete by selecting **Mark as Complete**.

h. Repeat the steps 6.c to 6.f for the Update Scheduled data import access task with the Scheduled data import [scheduled_data_set] table and set the task to complete by selecting **Mark as Complete**.

7. Clear the cache for the new connection.

a. In the Clear Cache for Datasource and Import set section, select **Configure**.

b. In the **Run script** text box of the background script page, enter the following script:

```
     GlideTableManager.invalidateTable("sys_data_source");
     GlideCacheManager.flushTable("sys_data_source");


GlideTableManager.invalidateTable("scheduled_import_set");
     GlideCacheManager.flushTable("scheduled_import_set");

     GlideTableManager.invalidateTable("sys_db_object");
     GlideCacheManager.flushTable("sys_db_object");
```

c. Select **Run Script** to run the background script in the **global** scope.
The script may take several minutes to execute.

d. After the script is executed, select **Close**.

e. From the application picker, select the **Service Graph Connector for Microsoft Intune** application.

f. Select **Mark as Complete**.

8. To either add or save the connection, select **Configure** for the Create or Edit connection task.

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- To add a connection, select **Add Connection**.
- To save the edits for the existing connection, select **Edit**.

Note:
Obtain the following information from your Microsoft Intune administrator:

- Client ID
- Client Secret
- Token URL

When a Microsoft Intune administrator registers an application, the Client ID, Client Secret, and Token URL will be available. To get more information about how to register an application, see the Microsoft Intune documentation site.

a. On the form, fill in the fields or edit as needed.

Create Connection form

Field	Description
Connection Name	Display name for the connection.

Connection URL	Connection URL for the new connection.
	
	Based on the region of your Microsoft Intune application, enter the connection URL in one of the following formats:
	▪ Global
	`https://graph.microsoft.com`
	▪ US Government
	`https://graph.microsoft.us`
	▪ China
	`https://microsoftgraph.chinacloudapi.cn`
	▪ Germany
	`https://graph.cloudapi.de/`

OAuth Client ID	Client ID for the Microsoft Intune application.
OAuth Client Secret	Client Secret for the Microsoft Intune application.
OAuth Token URL	Callback URL for the Microsoft Intune application. Based on the region of your Microsoft Intune application, enter the token URL in one of the following formats:

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Field	Description

	▪ Global
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	▪ China
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`
	Where *<tenantid>* is the tenant ID of your Microsoft Intune application.

b. Either add or save the connection.

- To create the new connection, select **Create and Get OAuth Tokens**.
- To save the edits for the existing connection, select **Edit and Get OAuth Token**.

c. Navigate back to the guided setup and select **Mark as Complete**.

d. Optional: Set up the MID Server for the connection you created.

i. In the Configure Mid Servers section, select **Configure**.

ii. Select the name of the connection you created.

iii. Select the **Use MID server** check box.

iv. Select **Update**.

v. When you're finished with the task, select **Mark as Complete**

9. Test the API connection to import data from the Microsoft Intune application.

a. Test the connection, in the Test New Connections section, by selecting **Configure**.

i. Select the name of the data source associated with the newly created connection.

ii. Select the **Test Connection** related link to start the process.

iii. Optionally modify the properties in the Service Graph Connection Properties related list.

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Microsoft Intune connection properties

Property	Description
api_version	The version of the Microsoft Intune Graph API.
software_path	The path of the software code for finding apps and associated devices or vice versa. Leave the property value as is.
include_primary_user_details	Enable retrieving the details of the primary user during import and populating the **assigned_to** attribute in the records of the cmdb_ci table by setting the property value to `true`. For retrieving the enrolled user details, set the property value to `false`. Retrieving primary user details increases the time for importing data because of additional API calls. **Note:** When a user is assigned to a device initially, the enrolled and primary users are the same. If the device is reassigned to another user, the primary user name is reassigned to the new user, but the enrolled user is still the original enrolled user name.
include_ip_address_details	Enable retrieving the IP addresses of devices during import and populate the records in the cmdb_ci_ip_address table by setting the property value to `true`. To skip retrieving IP addresses, set the property to `false`. Retrieving IP addresses increases the time for importing data because of additional API calls.

Note:
The properties in the Service Graph Connection Properties related list of the connection record are modifiable. However, try to retain the default value of the *`software_path`* property to ensure the proper retrieval of software details.

iv. When the **Status** field is set to **Success**, return to the guided setup page.

Note:
If any of the tests have errors, follow the suggestions for remediation.

v. Return to the guided setup and select **Mark as Complete** for the Test New Connections task.

10. Set up the scheduled import jobs.

a. For the Configure scheduled jobs task in the Set up scheduled import jobs section, select **Configure**.

b. Select the name of the scheduled import you want to run.

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c. On the Scheduled Data Import form, verify the field values for the scheduled job and select the **Active** check box.

   For more information, see Schedule a data import.

d. Select **Update**.

e. Set the Configure scheduled jobs task to complete by selecting **Mark as Complete**.

11. Use advanced options to resolve server errors and improve performance with the SG-Intune Computer, SG-Intune Devices, and SG-Intune Software data sources while importing a large number of devices into the Microsoft Intune portal.

Note:

- The SG-Intune Device Reports data source serves as an alternative to the SG-Intune Computer and SG-Intune Devices data sources, importing the same information while optimizing the data retrieval process by minimizing API calls and reducing import time.
- The SG-Intune Software Reports data source serves as an alternative to the SG-Intune Software data source.
- Both the SG-Intune Device Reports and SG-Intune Software Reports data sources require the paid ServiceNow IntegrationHub Professional Pack Installer (com.glide.hub.integrations.professional) plugin.
- To enable the creation of attachments, the *`glide.attachment.extensions`* system property must be set to either null or `zip, json`.

  For more information, see the Service Graph Connector For Microsoft Intune – Advanced [KB1641546] article in the Now Support Knowledge Base.

a. Configure the scheduled jobs to import data using the SG-Intune Device Reports and SG-Intune Software Reports data sources.

   i. In the Advanced [Beta] section, for the Configure scheduled jobs for advanced data sources task, select **Configure**.

   ii. In the Scheduled jobs list, select **SG-Intune Trigger Device Reports** job.

   iii. On the Scheduled Script Execution form, verify the field values for the scheduled job and select the **Active** check box.

   For more information, see Schedule script execution form.

   iv. Select **Update**.

   v. To activate the scheduled job for the SG-Intune Software Reports data source, repeat steps 11.a.ii to 11.a.iv by selecting the **SG-Intune Trigger Software Reports** scheduled job.

   vi. Return to the guided setup page and set the Configure scheduled jobs for advanced data sources task to complete by selecting **Mark as Complete**.

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Important:

- Deactivate the SG-Intune Computer and SG-Intune Devices scheduled imports after setting up the SG-Intune Trigger Device Reports scheduled job for the SG-Intune Device Reports data source.
- Deactivate the SG-Intune Software scheduled import after setting up the SG-Intune Trigger Software Reports scheduled job.
- Activate the ServiceNow IntegrationHub Professional Pack Installer (com.glide.hub.integrations.professional) plugin on your instance.

For more information, see the Service Graph Connector For Microsoft Intune – Advanced [KB1641546] article in the Now Support Knowledge Base.

b. Configure the scheduled import for the SG-Intune Device Reports and SG-Intune Software Reports data sources.

i. In the Advanced [Beta] section, for the Configure the scheduled import for advanced data sources task, select **Configure**.

ii. In the Scheduled Data Imports list, select the **SG-Intune Device Reports** scheduled import.

iii. On the Scheduled Data Import form, verify the field values for the scheduled data import and select the **Active** check box.

For more information, see Schedule a data import.

iv. Select **Update**.

v. Return to the guided setup page and set the Configure the scheduled import for advanced data sources task to complete by selecting **Mark as Complete**.

Important:
Verify that the SG-Intune Device Reports scheduled import is configured to run 3 hours after the SG-Intune Trigger Device Reports and SG-Intune Trigger Software Reports scheduled jobs.

Example: If the SG-Intune Trigger Device Reports job is set for 9 a.m. and SG-Intune Trigger Software Reports for 10 a.m. daily, schedule the SG-Intune Device Reports scheduled import for 1 p.m. daily.

c. When using multiple instances, update the permissions on the Scheduled Script Execution [sys_autoscript] table so that you can add scheduled jobs for the new connections.

i. For the Update scheduled job access task, select **Configure**.

ii. Select the **Global** application scope from the application picker.

iii. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes.

iv. Select#**Update**.

v. Switch back to the Service Graph Connector for Microsoft Intune application scope using the application picker.

vi. Return to the guided setup page and set the Update scheduled job access task to complete by selecting **Mark as Complete**.

d. When using multiple instances, clear the Scheduled Script Execution (sysauto_script) table cache to configure scheduled jobs for the new connections.

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i. For the Clear cache for scheduled job task, select **Configure**.

ii. Select the **Global** application scope from the application picker.

iii. In the **Run script** field, enter the following code:

```
GlideTableManager.invalidateTable("sysauto_script");
GlideCacheManager.flushTable("sysauto_script");
GlideTableManager.invalidateTable("sys_db_object");
GlideCacheManager.flushTable("sys_db_object");
```

iv. Select#**Run Script**.

v. Switch back to the Service Graph Connector for Microsoft Intune application scope using the application picker.

vi. Return to the guided setup page and set the Clear cache for scheduled job task to complete by selecting **Mark as Complete**.

e. When using multiple instances, create advanced data sources, scheduled jobs, and scheduled imports for the new connections.

> **Tip:**
> You can create additional connections for multiple instances by following the instructions in the Add Multiple Instances section of the guided setup.

i. For the Set up advanced data sources for multiple instances task, select **Configure**.

ii. On the form, fill in the fields to configure your scheduled job details for the new connection.

Field	Description
Instance Prefix to Data source and Scheduled data import sets	Identifier that is used in all of the data source and scheduled import names for this distinct SG-Intune connection. In a multiple instance deployment, keep prefix short, meaningful identifier that enables you to identify a set of related data sources. **Note:** Try to keep the prefix the same as your connection name.
Connection and Credentials Alias	Connection alias that was created in the previous step.
Run Scheduled Import as User	User to populate the field on the scheduled data import.

iii. Select **Submit** to create scheduled imports for your new connection.

iv. To activate any newly created scheduled jobs, repeat steps 11.a.ii to 11.a.iv.

v. To activate any newly created parent scheduled import, repeat steps 11.b.ii to 11.b.iv.

vi. Return to the guided setup page and set the Set up advanced data sources for multiple instances task to complete by selecting **Mark as Complete**.

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CMDB classes targeted in Service Graph Connector for Microsoft Intune

When you complete setting up the connection, you can configure the integration to periodically pull data from Microsoft Intune. The data from the regular data sources (SG-Intune Computer, SG-Intune Devices, and SG-Intune Software) and the advanced data sources (SG-Intune Device Reports and SG-Intune Software Reports) is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name
Name	name
Serial number	serial_number
Description	short_description
Disk space (GB)	disk_space
Manufacturer	manufacturer
Operating System	os
OS Version	os_version
Model ID	model_id
Assigned to	assigned_to
Chassis type	chassis_type

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Reference	SG-Intune Computer Related [sn_intune_integrat_computer_related]
Computer [cmdb_ci_computer]	Reference	Software Installation [cmdb_sam_sw_install]

Handheld Computing Device [cmdb_ci_handheld_computing]

The following attributes in the Handheld Computing Device [cmdb_ci_handheld_computing] table are populated by collected data:

Attribute label	Attribute name
Name	name
Serial number	serial_number

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Attribute label	Attribute name
Description	short_description
Disk space (GB)	disk_space
IMEI	imei
MEID	meid
Operating System	os
OS Version	os_version
Phone Number	phone_number
Root Access	root_access
Model ID	model_id
Carrier	carrier
Assigned to	assigned_to
Manufacturer	manufacturer

Relationships created for Handheld Computing Device

Parent class	Relationship type	Child class
Handheld Computing Device [cmdb_ci_handheld_computing]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Handheld Computing Device [cmdb_ci_handheld_computing]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Handheld Computing Device [cmdb_ci_handheld_computing]	Reference	SG-Intune Device Related [sn_intune_integrat_device_related]
Handheld Computing Device [cmdb_ci_handheld_computing]	Reference	Software Installation [cmdb_sam_sw_install]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data:

Attribute label	Attribute name
Display name	display_name
Version	version
Discovery source	discovery_source
Publisher	publisher
Installed on	installed_on

Note:
The Publisher attribute is populated by the SG-Intune Software Reports data source only.

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Relationships created for Software Installation

Parent class	Relationship type	Child class
Software Installation [cmdb_sam_sw_install]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing] Computer [cmdb_ci_computer]

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
MAC Address	mac_address
Name	name
Configuration Item	cmdb_ci

Relationships created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]
Network Adapter [cmdb_ci_network_adapter]	Reference	Computer [cmdb_ci_computer]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP version	ip_version
Owned By Configuration Item	owned_by_cmdb_ci
IP Address	ip_address
Name	name

Relationships created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]
IP Address [cmdb_ci_ip_address]	Reference	Computer [cmdb_ci_computer]

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Serial Number [cmdb_serial_number]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data:

Attribute label	Attribute name
Serial Number	serial_number
Serial Number Type	serial_number_type
Valid	valid

Relationships created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]
Serial number [cmdb_serial_number]	Reference	Computer [cmdb_ci_computer]

SG-Intune Computer Related [sn_intune_integrat_computer_related]

The following attributes in the SG-Intune Computer Related [sn_intune_integrat_computer_related] table are populated by collected data:

Attribute label	Attribute name
Device ID	device_id
Azure AD Registered	azure_ad_registered
Compliance State	compliance_state
Device Enrollment Type	device_enrollment_type
Email Address	email_address
Encrypted	is_encrypted
Managed Device Owner Type	managed_device_owner_type
Management Agent	management_agent
Supervised	is_supervised

SG-Intune Device Related [sn_intune_integrat_device_related]

The following attributes in the SG-Intune Device Related [sn_intune_integrat_device_related] table are populated by collected data:

Attribute label	Attribute name
Device ID	device_id
Azure AD Registered	azure_ad_registered
Compliance State	compliance_state

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Attribute label	Attribute name
Device Category	device_category
Device Enrollment Type	device_enrollment_type
Device State	device_state
Email Address	email_address
Encrypted	is_encrypted
Managed Device Owner Type	managed_device_owner_type
Management Agent	management_agent
Security Patch Level	security_patch_level
Supervised	is_supervised
System Management Bios Version	system_management_bios_version
Wifi Subnet ID	wifi_subnet_id

Note:
The attributes Device Category, Device State, Security Patch Level, System Management Bios Version, and Wifi Subnet ID are populated by the SG-Intune Device Reports data source only.

The attributes Azure AD Registered, Device Enrollment Type, and Management Agent aren't populated by the SG-Intune Device Reports data source.

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data:

Attribute label	Attribute name
Key	key
Name	name
Version	version

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data:

Attribute label	Attribute name
Name	name
Installed on	installed_on

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Relationships created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]

Accessing the connection details of Service Graph Connector for Microsoft Intune

You can access the connection details of the Service Graph Connector for Microsoft Intune in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Microsoft Intune. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Microsoft Intune connection

Access the details of a Microsoft Intune connection configured for the Service Graph Connector for Microsoft Intune.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Intune** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Service Graph Connector for Microsoft Intune properties

Service Graph Connector for Microsoft Intune properties control the behavior of the connector.

Connection properties

These connection properties are available for Service Graph Connector for Microsoft Intune.

Note:
To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **Intune** > **Connections** and select the connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

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Connection properties for Service Graph Connector for Microsoft Intune

Property	Description	Data source type
include_primary_user_details	Set the property to `true` to retrieve primary user details during import and add the assigned_to attribute to the Configuration item [cmdb_ci] table. Set the property to `false` to retrieve the enrolled user details. Retrieving primary user details increases the time for importing data because of additional API calls. **Note:** When a user is assigned to a device initially, the enrolled and primary users are the same. If the device is reassigned to another user, the primary user name is reassigned to the new user, but the enrolled user is still the original enrolled user name. • Type: true | false • Default value: `true`	Regular data sources (SG-Intune Computer, SG-Intune Devices, and SG-Intune Software)
include_ip_address_details	Set the property to `true` to retrieve IP address details during import and add the records to the IP Address [cmdb_ci_ip_address] table. Set the property to `false` to skip retrieving IP addresses. Retrieving IP addresses increases the time for importing data because of additional API calls. • Type: true | false • Default value: `true`	Regular data sources (SG-Intune Computer, SG-Intune Devices, and SG-Intune Software)
api_version	Enter the version of the Microsoft Intune Graph API. **Note:** This property is specific to the regular data sources (SG-Intune Computer, SG-Intune Devices, and SG-Intune Software).	Regular data sources (SG-Intune Computer, SG-Intune Devices, and SG-Intune Software)

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Connection properties for Service Graph Connector for Microsoft Intune (continued)

Property	Description	Data source type
	• Type: string • Default value: `v1.0`	
software_path	Set the path of the software code for finding apps and associated devices for regular data sources (SG-Intune Computer, SG-Intune Devices, and SG-Intune Software). Set the property to null value to enable the logic to determine the path of the software code. • Type: device | app • Default value: `device`	Regular data sources (SG-Intune Computer, SG-Intune Devices, and SG-Intune Software)
device_report_chunks_count	Set the number of device report chunks. The value must be a power of 16 (1, 16, or 256). • Type: integer • Default value: `1`	Advanced data sources (SG-Intune Device Reports and SG-Intune Software Reports)
software_report_chunks_count	Set the number of software report chunks. The value must be a power of 16 (1, 16, or 256). • Type: integer • Default value: `16`	Advanced data sources (SG-Intune Device Reports and SG-Intune Software Reports)
export_apis_max_calls_before_wait	Set the maximum number of API calls that can be made consecutively before a waiting period is enforced. • Type: integer • Default value: `8`	Advanced data sources (SG-Intune Device Reports and SG-Intune Software Reports)
export_apis_wait_time_in_ms	Set the duration (in milliseconds) for the waiting period after the specified number of consecutive API calls is reached. • Type: integer • Default value: `120000`	Advanced data sources (SG-Intune Device Reports and SG-Intune

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Connection properties for Service Graph Connector for Microsoft Intune (continued)

Property	Description	Data source type
		Software Reports)

Service Graph Connector for Microsoft SCCM

Use the Service Graph Connector for Microsoft SCCM to pull data from Microsoft System Center Configuration Manager (SCCM) into your ServiceNow instance.

The Service Graph Connector for Microsoft SCCM (SG-SCCM) imports SCCM data into the ServiceNow® Configuration Management Database (CMDB) application. The integration does not write to the SCCM database and supports the Microsoft Endpoint Configuration Manager (MECM). The integration pulls data from computers, processors, operating systems, disks, networks, and software.

Request apps on the Store

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

Supported versions

- Supported Microsoft SCCM/MECM versions:
  - 2503
  - 2409
- Supported ServiceNow versions:
  - Xanadu
  - Yokohama
  - Zurich

Use cases

The following ServiceNow applications have features that interact with the Service Graph Connector:

- IT Operations Management (ITOM) Visibility
  - Ability to get visibility into your infrastructure.
  - Detailed hardware and software inventory tracking. The tracking can be done with or without Software Asset Management (SAM).
  - Ability to detect delta changes for efficient incremental imports from SCCM to the ServiceNow AI Platform.
- IT Service Management (ITSM)
  - Incidents, problems, and changes on discovered configuration items (CI).
  - Automatic device ownership assignment.
- Software Asset Management (SAM) and IT Asset Management (ITAM)

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- Tight integration with Software Asset Management Professional and client software distribution workflows.
- Inventory Software package and installation tracking.
- Software Usage tracking.
- License reclamation by detecting removed software.
- Support for software editions, normalizing publisher information, and normalizing product Information.
- Support for SCCM Asset Intelligence.

Important information for upgrading Service Graph Connector for Microsoft SCCM

After you've installed the latest version of the Service Graph Connector for Microsoft SCCM, ensure that you have removed the **last_run_datetime** field value from the Data Source [sys_data_source] table for the SCCM data sources.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the Service Graph Workspace or CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Microsoft SCCM using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Microsoft SCCM integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the SCCM data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow® CMDB using the Identification and Reconciliation Engine (IRE).

The SCCM data sources include the following:

- SG-SCCM Computer Identity

  You can see the following data if it is available in SCCM:

  - Asset Tag. If the Asset Tag data is available, the mapping can be optionally enabled via the guided setup.
  - Assigned
  - DNS Domain

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- SG-SCCM Computer OU. This data source imports data about the Organizational Unit (OU) name. The data is stored in the SG-SCCM Computer Related [sn_sccm_integrate_sccm_2019_computer_related] table. To add the view, open the computer record, click the top header, and select **View** > **SG-SCCM Computer Related**.
- SG-SCCM Disk
- SG-SCCM Last Discovered Update. This data source will run at the end of the import schedules to update the last_discovered date on the Computer CI. The source will conduct a full pull of all the computers and bring in only the ResourceID and the LastHWScan columns to update the CMDB Computer table.
- SG-SCCM Network
- SG-SCCM Operating System
- SG-SCCM Processor
- SG-SCCM Removed Software. Ensure the **Use last run datetime** option is cleared for every run.
- SG-SCCM Removed Software AI. Ensure the **Use last run datetime** option is cleared for every run.
- SG-SCCM Software
- SG-SCCM Software AI

Note:
If you have Asset Intelligence on your Microsoft SCCM instance, you have to run SG-SCCM Removed Software AI and SG-SCCM Software AI. If you do not have Asset Intelligence on your instance, you have to run SG-SCCM Removed Software and SG-SCCM Software.

When you complete setting up the connection, you can configure the integration to periodically pull data from SCCM. The data is loaded into staging tables and then inserted into the following target tables:

- CI Relationship [cmdb_rel_ci]
- Computer [cmdb_ci_computer] (required)
- Disk [cmdb_ci_disk]
- IP address [cmdb_ci_ip_address]
- Network Adapter [cmdb_ci_network_adapter]
- Serial Number [cmdb_serial_number]
- Software Installation [cmdb_sam_sw_install] (If the SAM application is installed.)
- Software Instance [cmdb_software_instance] (If the SAM application is not installed.)
- Software [cmdb_ci_spkg] (If the SAM application is not installed.)
- Software Usage [samp_sw_usage]

For more information on where data is saved when pulling data from a Microsoft SCCM application, see CMDB classes targeted in Service Graph Connector for Microsoft SCCM.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Resolving the missing IP address or MAC address issue

By default, network adapters that are missing an IP address or MAC address are not imported. To include these network adapters in the import, do the following:

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1. Navigate to **Service Graph Connector for Microsoft SCCM** > **Data Sources**.
2. Select **SG-SCCM Network**.
3. Remove the where clause from the **SQL statement** field.

Additional resources

- How do I configure the SG-SCCM Service Graph Connector? article on the ServiceNow Community site
- Service Graph Connector for Microsoft SCCM - FAQ and Troubleshooting blog post on the ServiceNow Community site
- Service Graph Connector for Microsoft SCCM 3.0 Setup Guidelines [KB1001248] article in the Now Support Knowledge Base
- Support for Removed Software functionality in Service Graph Connector for SCCM integration blog post on the ServiceNow Community site

Related topics

Service Graph Connectors

Configure Service Graph Connector for Microsoft SCCM using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Microsoft SCCM for pulling in Microsoft SCCM data into the CMDB.

Before you begin

Install Service Graph Connector for Microsoft SCCM version 3.5.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

To access Microsoft SCCM data, you must have appropriate access to the Microsoft SCCM database. You must have sufficient credentials to query the SQL Server that contains the Microsoft SCCM database. You must do the following:

1. Create a SQL Server account to connect to the Microsoft SCCM database on the MID Server to use the data sources.
2. Connect to your Microsoft SCCM SQL Server and configure the following:
   a. Add a new login user name and password for SQL authentication.
   b. Choose the Microsoft SCCM database that ServiceNow data sources will connect to.
   c. Assign the db_datareader role membership to the Microsoft SCCM user.

Air gap connections are available from version 3.7.0 of the Service Graph Connector for Microsoft SCCM. You can add either standard data sources or air gap data sources. Before you set up air gap data sources, you must configure the air gap solution for the Service Graph Connector for Microsoft SCCM in your high-secure server and low-secure server. See Configuring air gap connections for Microsoft SCCM.

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

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Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the Microsoft SCCM connector type, and then select **Create connection**.
4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

5. Select an air gap template or a template that matches the credentials for establishing a Java Database Connectivity (JDBC) connection to the SCCM database.

   a. In the **Setup** stage of the playbook, select the **Select alias template** activity.

   b. Select one of the following templates.
   - **SCCM JDBC Connection Credentials**: Select this option to use a user name and password to establish a JDBC connection to the SCCM database.

     Note:
     The new user must be assigned the db_datareader role membership. For more information, see Create a database user.

   - **SCCM Air Gap**: Select this option to use an air gap connection if you're working with restricted environments that don't have direct internet access (see Configuring air gap connections for Microsoft SCCM).

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- **SCCM JDBC Conn Cred (Integrated Auth)**: Select this option to use Windows JDBC-integrated authentication, which uses domain credentials, for authenticating a JDBC connection to the SCCM database.

  Note:
  The account that runs the MID Server agent must have the db_datareader role to access the SCCM DB.

c. Select **Continue**.

- If you selected **SCCM Air Gap** in step 5.b, proceed to step 6.
- If you selected either **SCCM JDBC Connection Credentials** or **SCCM JDBC Conn Cred (Integrated Auth)** in step 5.b, proceed to step 7.

6. Download and run the PowerShell scripts to set up an air gap connection.

The **PowerShell Script Download** activity appears only when you select **SCCM Air Gap** as the template in step 5.b.

Note:
Before you add an air gap connection, you must configure the air gap solution for the Service Graph Connector for Microsoft SCCM in your high-secure and low-secure servers. See Configuring air gap connections for Microsoft SCCM.

a. In the **Setup** stage of the playbook, select the **PowerShell Script Download** activity.

b. Select **Download Airgap Scripts**.

c. Run the PowerShell scripts.

d. After configuring the air gap connection, select the **I have read the instructions and executed the scripts accordingly** check box.

e. Select **Continue**.

7. Enter connection details and test the API connection for importing Microsoft SCCM data.

a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

b. On the form, fill in the fields on the form depending on the template you selected in step 5.b: SCCM JDBC Connection Credentials, SCCM JDBC Conn Cred (Integrated Auth), or SCCM Air Gap.

- For the SCCM JDBC Connection Credentials and SCCM JDBC Conn Cred (Integrated Auth) templates:

Create and test connection form

Field	Description
Connection name	Name to identify the Microsoft SCCM connection record. For example, `SG-SCCM connection`.
Query timeout	Number of seconds the JDBC driver waits for a query to complete.

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Field	Description
	0 indicates no timeout. If the timeout is exceeded, the integration considers the JDBC result inaccessible and marks the result as an error.
Connection timeout	Number of seconds before the MID Server connection cache pool closes the connection and removes the connection. 0 indicates no timeout.
Host	Network address of the server where the Microsoft SQL Server database is located.
Database name	Name of the Microsoft SQL Server database that SCCM uses.
Override default port	Custom port of the Microsoft SQL Server instance. The default port for Microsoft SQL Server is 1433
Instance name	Microsoft SQL Server instance.
MID Server	MID Server for the connection. Mandatory for an Integrated Authentication connection; recommended for all JDBC connections.
Note: The following fields appear only when you select the **SCCM JDBC Connection Credentials** template in step 5.	
Format	JDBC driver used for connecting to the SCCM database. SCCM uses Microsoft SQL Server as its database backend. This field is automatically set to **com.microsoft.sqlserver.jdbc.SQLServerDriver**. Leave the field value as is.
Username	User name for connecting to the JDBC server.
Password	Password for the JDBC server.
Use MID Server	Option to use the MID Server for accessing the JDBC server.

- For the SCCM Air Gap template:

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Create and test connection form

Field	Description
Connection name	Display name for the connection.
Parent directory	Path of the Microsoft SCCM directory where the data is stored in your low-secure server.
Archive data after retrieval	Option to archive data after retrieval.
Archive path [Optional]	Folder where the data is to be archived if the **Archive data after retrieval** check box is selected.
MID server	Name of the MID Server that you deployed in your low-secure server. See Configure air gap solution for Microsoft SCCM in a low-secure server.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

8. **Optional:** Configure the connection and connector properties to map attributes and manage data imports.

   Note:
   To skip this step, select **Continue** for the **Configure properties** activity.

   a. In the **Setup** stage of the playbook, select the **Configure properties** activity.

   b. To map the asset tags from Microsoft SCCM to the asset tag attribute in the Computer [cmdb_ci_computer] class, in the Connection properties section of the Configure properties page, select the **Map asset tags** check box.

   c. To avoid creating duplicate records in the CMDB Disks [cmdb_ci_disk] table when the Discovery application is running, in the Connector properties section of the Configure properties page, select the **Avoid creating duplicate records** check box.

   d. To set the import disk name to the format starting with Disk #[*disknumber*], in the Connector properties section of the Configure properties page, select the **Transform disk name to disk number** check box.
   Where the *disknumber* is the number extracted from the disk name

   e. Select **Continue**.

9. **Optional:** Modify the SQL statement for a data source.

   Note:
   To skip this step, select **Skip** for the **Customize data source SQL statement** activity.

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a. In the **Setup** stage of the playbook, select the **Customize data source SQL statement** activity.

b. Double-click (or use the keyboard shortcut) the **Custom SQL statement** column value for a data source and enter the custom SQL statement.

c. Repeat the step 9.b for each data source where you want to modify the SQL statement.

d. Select **Mark Complete**.

10. Configure the import schedules to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Expand the Parent scheduled data import within the Import schedules list to select the *`Connection Name`*-**SCCM Computer Identity** import schedule.

c. Select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

d. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

e. Select **Continue**.

11. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The created connection appears in the Installed connections list.

Related topics

Service Graph Connector for Microsoft SCCM

CMDB classes targeted in Service Graph Connector for Microsoft SCCM

Enable Software Editions in Service Graph Connector for Microsoft SCCM

Accessing the connection details of Service Graph Connector for Microsoft SCCM

Configuring air gap connections for Microsoft SCCM

Configure Service Graph Connector for Microsoft SCCM using the guided setup

Set up and validate data source connection credentials to import Microsoft SCCM data into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

Confirm that you are in the Service Graph Connector for Microsoft SCCM application scope by using the application picker.

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Note:
If you're currently using a version of the Microsoft SCCM plugin, see .

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- Integration - JDBC (com.snc.integration.jdbc)
- Windows MID Server required for access to the SCCM environment.

To access Microsoft SCCM data, you must have appropriate access to the Microsoft SCCM database. You must have sufficient credentials to query the SQL Server that contains the Microsoft SCCM database. You must do the following:

1. Create a SQL Server account to connect to the Microsoft SCCM database on the MID Server to use the data sources.
2. Connect to your Microsoft SCCM SQL Server and configure the following:
   a. Add a new login user name and password for SQL authentication.
   b. Choose the Microsoft SCCM database that ServiceNow data sources will connect to.
   c. Assign the db_datareader role membership to the Microsoft SCCM user.

Note:
If you have the Service Graph Connector for Microsoft SCCM version 2.1.6 or earlier versions installed in your production environment, contact Customer Service and Support for additional steps to remove the SCCM Discovery Source from being included when calculating the subscription unit consumption.

Starting with Service Graph Connector for Microsoft SCCM version 3.0.4, support for multi-instance is introduced, enabling Service Graph Connector for Microsoft SCCM to connect to and import data from multiple Microsoft SCCM instances. This feature involves dynamically creating data sources and scheduled imports, requiring the granting of additional permissions. For more information about how to complete these steps, see Service Graph Connector for Microsoft 3.0 Setup Guidelines [KB1001248] in Now Support .

Air gap connections are available from version 3.7.0 of the Service Graph Connector for Microsoft SCCM. You can add either standard data sources or air gap data sources by using SGC Central. See Configure Service Graph Connector for Microsoft SCCM using SGC Central.

Role required: SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **SCCM** > **Setup**.
2. On the Getting Started page, select **Get Started**.
3. On the Service Graph Connector for Microsoft SCCM page, in the Configure Data source and Scheduled data import access section, select the task **Configure Data source access**.
4. Update the data source access to enable creating data sources and scheduled data imports for a new connection in the Service Graph Connector for Microsoft SCCM.

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a. For the Configure Data source access task, select **Configure**.

b. Select the **Global** application scope by using the application picker.

c. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

d. Select **Update** to close the tab and return to the guided setup.

e. Modify the application scope again to **Service Graph Connector for Microsoft SCCM** by using the application picker.

f. Set the **Update Data Source Access** task to complete by selecting **Mark as Complete**.

g. Repeat the steps 4.b to 4.e for the Update Scheduled data import access task with the Scheduled data import [scheduled_data_set] table and set the task to complete by selecting **Mark as Complete**.

5. Configure the authentication credentials and configuration used for connecting to the Microsoft SCCM database.
   - To establish a JDBC connection to the SCCM database, proceed to step 5.a.
   - To use Windows JDBC-integrated authentication, proceed to step 5.b.

a. Use a user name and password to establish a JDBC connection to the SCCM database.

> **Note:**
> Perform this step only when you want to use a user name and password to establish a JDBC connection. Otherwise, select **Skip** to skip the step.

i. For the Configure connection task in the Configure the connection section, select **Configure**.

ii. Configure the connection.

- To configure the connection available by default, select **Configure** for the SCCM JDBC Connection Credentials connection.
- To create another connection, select **Add Connection**.

> **Note:**
> You can create multiple connections by selecting **Add Connection**. If not redirected to the connection setup, on the Workflow Studio Integrations page search for SCCM JDBC Connection Credentials to modify the default connection or add another connection.

iii. On the form, fill in the fields.

Configure Connection or Create Connection form

Field	Description
Connection Information	
Connection name	Name to identify the Microsoft SCCM connection record. For example, `SG-SCCM connection`.
Query timeout	Number of seconds the JDBC driver waits for a query to complete.

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Field	Description
	0 indicates no timeout. If the timeout is exceeded, the integration considers the JDBC result inaccessible and marks the result as an error.
Connection timeout	Number of seconds before the MID Server connection cache pool closes the connection and removes the connection. 0 indicates no timeout.
Format	JDBC driver used for connecting to the Microsoft SCCM database. Microsoft SCCM uses Microsoft SQL Server as its database backend. This field is automatically set to **com.microsoft.sqlserver.jdbc.SQLServerDriver**. Leave the field value as is.
Host	Network address of the server where the Microsoft SQL Server database is located.
Database name	Name of the Microsoft SQL Server database that Microsoft SCCM uses.
Override default port	Custom port of the Microsoft SQL Server instance. The default port for Microsoft SQL Server is 1433
Instance name	Microsoft SQL Server instance.
Use MID Server	Option to use the MID Server for accessing the JDBC server.
MID Server	MID Server for the connection. **Note:** It's required to select a MID Server for an Integrated Authentication connection. For the **SCCM JDBC Connection Credentials** option.
Credential Information	
Username	User name for connecting to the JDBC server.
Password	Password for the JDBC server.

Note:
The new user must be assigned the db_datareader role membership. For more information, see Create a database user.

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iv. Save your changes.

- For the default connection, select **Configure Connection**.
- For a new connection, select **Create Connection**.

v. Navigate back to the guided setup and set the Configure connection task to complete by selecting **Mark as Complete**.

b. Use Windows JDBC-integrated authentication, which uses domain credentials, for authenticating a JDBC connection to the SCCM database.

> **Note:**
> Perform this step if you need the JDBC connection with integrated authentication. Otherwise, select **Skip** to skip the step.

i. For the Configure connection (Integrated authentication) task in the Configure the connection section, select **Configure**.

ii. Configure the connection.

- To configure the connection available by default, select **Configure** for the SCCM JDBC Conn Cred (Integrated Auth) connection.
- To create another connection, select **Add Connection**.

> **Note:**
> You can create multiple connections by selecting **Add Connection**. If not redirected to the connection setup, on the Workflow Studio Integrations page section search for SCCM JDBC Conn Cred (Integrated Auth) to modify the default connection or add another connection.

iii. On the form, fill in the fields.

Configure Connection or Create Connection form

Field	Description
Connection name	Name to identify the Microsoft SCCM connection record.
Query timeout	Number of seconds the JDBC driver waits for a query to complete. 0 indicates no timeout. If the timeout is exceeded, the integration considers the JDBC result inaccessible and marks the result as an error.
Connection timeout	Number of seconds before the MID Server connection cache pool closes the connection and removes the connection. 0 indicates no timeout.
Host	Network address of the server where the Microsoft SQL Server database is located.

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Field	Description
Database name	Name of the Microsoft SQL Server database that Microsoft SCCM uses.
Override default port	Custom port of the Microsoft SQL Server instance. The default port for Microsoft SQL Server is 1433
Instance name	Microsoft SQL Server instance.
MID Server	MID Server for the connection.

Note:
The account that runs the MID Server agent must have the db_datareader role to access the SCCM DB.

iv. Save your changes.
- For the default connection, select **Configure Connection**.
- For a new connection, select **Create Connection**.

v. Navigate back to the guided setup and set the Configure connection (Integrated authentication) task to complete by selecting **Mark as Complete**.

6. Configure the connection and connector properties to map attributes and manage data imports.

a. **Optional:** Enable mapping asset tags from Microsoft SCCM to the asset tag attribute in the Computer [cmdb_ci_computer] class.

i. For the Configure Connection Properties task in the Configure Data Source and Scheduled Data Import section, select **Configure**.

ii. In the Name column, select the connection.

iii. In the Service Graph Connection Properties related list, select **asset_tag** in the Property column.

iv. In the **Value** field, enter `true` to enable mapping asset tags.

v. Select **Update**.

vi. Navigate back to guided setup and set the Configure Connection Properties task to complete by selecting **Mark as Complete**.

b. Test the Computer Identity data source to verify that all data sources are properly connected.

i. For the Validate Data Sources task in the Configure Data Source and Scheduled Data Import section, select **Configure**.

ii. In the Name column, select the Computer Identity data source associated with the connection.

iii. Select **Test Load 20 Records**.

iv. When the **State** field is set to **Complete** and the **Completion code** field is set to **Success**, select the **Return to data source** link.

v. Navigate back to guided setup and set the Validate Data Sources task to complete by selecting **Mark as Complete**.

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c. Ensure that all data from the Computer Identity source is imported without the date time filtering during the next test load.

i. For the Reset 'Last run datetime' in test load data source task in the Configure Data Source and Scheduled Data Import section, select **Configure**.

ii. In the Name column, select the Computer Identity data source associated with the connection.

iii. Clear the **Use last run datetime** check box.

iv. Select **Update**.

v. Navigate back to guided setup and set the Reset 'Last run datetime' in test load data source task to complete by selecting **Mark as Complete**.

7. **Optional:** Configure the process for importing disk data when the Discovery application is running.

a. Avoid creating duplicate records in the CMDB Disks [cmdb_ci_disk] table.

Note:
You can avoid creating duplicate records in the CMDB Disks [cmdb_ci_disk] table when the Discovery application is running by configuring the *sn_sccm_integrate.sccm_disks_managed* property and setting its value to `true`. By default, the property value is set to `false`.

i. For the Configure Disk Data Imports task in the Configure Disk Data Imports section, select **Configure**.

ii. On the System Property page, set the value of the *sn_sccm_integrate.sccm_disks_managed* property to `true`.

iii. Select **Update**.

iv. Set the Configure Disk Data Imports task to complete by selecting **Mark as Complete**.

Note:
Any existing disk records are updated only after the next hardware scan is executed in the Microsoft SCCM instance.

b. **Optional:** Transform imported disk name to disk number format.

Note:
You can set the imported disk name to the format `Disk #<disknumber>`. Where *<disknumber>* is the number extracted from the imported disk name.

i. Select the **Integration Commons for CMDB** application scope from the application picker.

ii. For the Configure Disk Name Transformation task in the Configure Disk Data Imports section, select **Configure**.

iii. On the System Property page, set the value of the *sn_cmdb_int_util.transform_disk_name_to_discovery_format* property to `true`.

iv. Select **Update**.

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v. From the application picker, select the Service Graph Connector for Microsoft SCCM application scope.

vi. Set the Configure Disk Name Transformation task to complete by selecting **Mark as Complete**.

8. Configure the scheduled data imports.

> **Note:**
> If the **Use Integrated Authentication** check box is selected for the data source, the run as user for the scheduled data import job must have the import_admin role. For more information, see the "Use Integrated Authentication" is being unchecked when you run the scheduled import related to SG-SCCM or SG-SCCM Computer Identity Data Source [KB1312810] article in the Now Support Knowledge Base.

a. For the Configure scheduled jobs task in the Configure scheduled jobs task section, select **Configure**.

b. On the Scheduled Data Import form, verify the field values for the scheduled job.
For more information, see Schedule a data import.

All other Service Graph Connector for Microsoft SCCM scheduled jobs that are active will run in their specified order after the Computer Identity scheduled job is finished running.
Select the **Active** check box for a scheduled job to activate the job.

> **Important:**
> If you are upgrading to the Service Graph Connector for Microsoft SCCM, deactivate the existing 'SG-SCCM Computer Identity scheduled data import'. Additionally, you cannot use the baseline scheduled data import or data sources that have a name starting with 'SG-SCCM' because they are used as templates for creating an instance of data sources and scheduled data imports.

c. Select **Update**.

d. Set the Configure Scheduled data imports task to complete by selecting **Mark as Complete**.

e. **Optional:** When upgrading the Service Graph Connector for Microsoft SCCM, deactivate the existing SG-SCCM Computer Identity scheduled data import.
For the Deactivate Legacy Scheduled Data Imports task, select **Configure**.

f. In the Name column, select the SG-SCCM Computer Identity scheduled data import and clear the **Active** check box.

g. Set the Deactivate Legacy Scheduled Data Imports task to complete by selecting **Mark as Complete**.

9. **Optional:** Customize the Instance Data source SQL statement.

a. For the Customizing Data source SQL statement task in the Customize Instance Data source SQL statement section, select **Configure**.

b. Select the name of the instance in which you want to customize the SQL statement.

c. Select **Update**.

d. Set the Customizing Data source SQL statement task to complete by selecting **Mark as Complete**.

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Trouble?

To resolve issues when configuring the connector, you can view the following additional resources:

- How to identify and delete duplicate CMDB CI Relationship records or ones that have orphan or missing parent/child relationships [KB0780988] in the Now Support Knowledge Base
- How to delete sys_object_source records [KB0746309] in the Now Support Knowledge Base
- Duplicate software installs with different Discovery Source [KB0958768] in the Now Support Knowledge Base
- Assigned To Field Doesn't Get Updated For Computer CIs in Service Graph Connector for SCCM [KB1277555] in the Now Support Knowledge Base
- Service Graph connector for Microsoft SCCM software usages data import blog post on the ServiceNow Community site

Related topics

Service Graph Connector for Microsoft SCCM

CMDB classes targeted in Service Graph Connector for Microsoft SCCM

Configure Service Graph Connector for Microsoft SCCM using SGC Central

Enable Software Editions in Service Graph Connector for Microsoft SCCM

Accessing the connection details of Service Graph Connector for Microsoft SCCM

Configuring air gap connections for Microsoft SCCM

CMDB classes targeted in Service Graph Connector for Microsoft SCCM

When you complete setting up the connection, you can configure the integration to periodically pull data from Microsoft SCCM. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name
Serial number	serial_number
CPU core count	cpu_core_count
CPU speed (MHz)	cpu_speed
CPU type	cpu_type
CPU manufacturer	cpu_manufacturer
Name	name
Asset tag	asset_tag
Assigned	assigned
Chassis type	chassis_type
Class	sys_class_name

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Attribute label	Attribute name
CPU core thread	cpu_core_thread
CPU count	cpu_count
CPU name	cpu_name
Default Gateway	default_gateway
DNS Domain	dns_domain
Most recent discovery	last_discovered
Operating System	os
OS Address Width (bits)	os_address_width
OS Domain	os_domain
OS Service Pack	os_service_pack
OS Version	os_version
RAM (MB)	ram
Model ID	model_id
Manufacturer	manufacturer
Assigned to	assigned_to

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Contains::Contained by	Disk [cmdb_ci_disk]
Computer [cmdb_ci_computer]	Reference	Key Value [cmdb_key_value]
Computer [cmdb_ci_computer]	Reference	Software Installation [cmdb_sam_sw_install]
Computer [cmdb_ci_computer]	Reference	SG-SCCM Computer Related [sn_sccm_integrate_sccm_2019_computer_rela

Disk [cmdb_ci_disk]

The following attributes in the Disk [cmdb_ci_disk] table are populated by collected data:

Attribute label	Attribute name
Disk space (GB)	disk_space
Size bytes	size_bytes
Computer	computer

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Attribute label	Attribute name
Device ID	device_id
Name	name
Description	short_description
Drive type	drive_type
Manufacturer	manufacturer
Model ID	model_id

Relationship created for Disk

Parent class	Relationship type	Child class
Disk [cmdb_ci_disk]	Reference	Computer [cmdb_ci_computer]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
IP version	ip_version
Name	name
Nic	nic

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

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Attribute label	Attribute name
MAC Address	mac_address
Name	name
DHCP Enabled	dhcp_enabled
Netmask	netmask
Configuration Item	cmdb_ci

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Computer [cmdb_ci_computer]

Serial Number [cmdb_serial_number]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data:

Attribute label	Attribute name
Serial Number	serial_number
Serial Number Type	serial_number_type
Valid	valid

Relationship created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Computer [cmdb_ci_computer]

SG-SCCM Computer Related [sn_sccm_integrate_sccm_2019_computer_related]

The following attributes in the SG-SCCM Computer Related [sn_sccm_integrate_sccm_2019_computer_related] table are populated by collected data:

Attribute label	Attribute name
Resource ID	resource_id
OU Name	ou_name

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data:

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Attribute label	Attribute name
Key	key
Name	name
Version	version
Vendor	vendor
Manufacturer	manufacturer

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data when the SAM application is installed:

Attribute label	Attribute name
Publisher	publisher
Last scanned	last_scanned
Installed on	installed_on
Display name	display_name
Discovery source	discovery_source
Install date	install_date
Prod id	prod_id
Version	version
Revision	revision
Sccm group ID	sccm_group_id
SCCM TimeStamp	sccm_timestamp
Assigned to	assigned_to

Relationship created for Software Installation

Parent class	Relationship type	Child class
Software Installation [cmdb_sam_sw_install]	Reference	Computer [cmdb_ci_computer]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data:

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Attribute label	Attribute name
Name	name
Installed on	installed_on
Install date	install_date
Sccm group ID	sccm_group_id
SCCM TimeStamp	sccm_timestamp

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]

Upgrade to the latest version of Service Graph Connector for Microsoft SCCM

Upgrade your Service Graph Connector for Microsoft SCCM. When you upgrade versions, you can select the files that you want to transfer from the earlier version to the later version of the Service Graph Connector for Microsoft SCCM.

Before you begin

To avoid any serious upgrade issues, perform the upgrade in a test or development instance prior to upgrading in a production environment.
Role required: admin

About this task

When you upgrade from an earlier version to the latest version of the Service Graph Connector for Microsoft SCCM, there are Skipped Updates. The original SCCM data source files that were installed have the last run date updated as part of the data source runs. The files will be treated as custom files by the platform. When the newer version is installed, the newer data sources will not be automatically upgraded.

After you have upgraded to the newer version, you can check the upgrade status.

Procedure

1. Review all the updates from the upgrade center and select the data source files from the newer version.
   You can access the upgrade history and review the updates from the Skipped Changes to Review related list. See Review skipped records using related lists.
2. If you have customized the earlier version, select the changes that you need from the older file and migrate them to the new file.

> **Note:**
> Repeat this migration process for all the other skipped update files.

What to do next

After the upgrade, if there are changes to the SQL in the data source files or mapping, then do the following:

1. Clear the **Use last run datetime** check box in all the data sources.
2. Perform a full pull of data from all the data sources.

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Note:
Upgrading from Service Graph Connector for Microsoft SCCM v2.3 to v2.3.1 requires a minimum pull of Computer and Software, because the Source Native Key for the software within the SQL was changed in the SG-SCCM Removed Software data source. Without the correct Source Native Keys, it will not be able find the software in the CMDB.

For more information on resolving any conflicts, see the following topics:

- Revert a customization
- Resolve a skipped update and set a resolution status
- Skipped Changes to Review related list

Enable Software Editions in Service Graph Connector for Microsoft SCCM

Enable software editions so that you can gather edition information for products such as Adobe Acrobat, Microsoft SQL Server, and Windows Exchange Server into the Service Graph Connector for Microsoft SCCM.

Before you begin

Note:
There are two types of setup that are required, one on the SCCM Manager and the other on the ServiceNow Instance. For more information on how to set up the SCCM Manager, see the SCCM Manager Setup section of the Custom solution to gather editions in SCCM [KB0721360] article on the HI Knowledge Base. When you're finished setting up the SCCM Manager, refer back to this task and complete the steps.

Role required: admin

About this task

You can set up the ServiceNow Instance on the Service Graph Connector for Microsoft SCCM.

Procedure

1. Navigate to **All** > **Service Graph Connector Microsoft SCCM** > **Import Schedules**.
2. Select the Software Edition scheduled import you created to edit this import record.
3. Select the **Active** check box.
4. Click **Update**.
5. Navigate to **Service Graph Connector Microsoft SCCM** > **Data Sources**.
6. Select the Software Edition data source you created.
7. Under the Transforms list, select **Update software install with edition**.
8. Edit the data source and select the **Active** check box.
9. Click **Update**.

What to do next

You can verify that the edition information has been gathered by doing the following:

1. Navigate to **Service Graph Connector Microsoft SCCM** > **Data Sources** and the Software Edition data source you want to verify.
2. Select **Load All Records**.

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Note:
If the displayed completion code is `Success`, then the software edition data source was executed successfully. If the displayed completion code is `Error`, then there is an error that must be fixed.

Accessing the connection details of Service Graph Connector for Microsoft SCCM

You can access the connection details of the Service Graph Connector for Microsoft SCCM in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Microsoft SCCM. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Microsoft SCCM connection

Access the details of a Microsoft SCCM connection configured for the Service Graph Connector for Microsoft SCCM.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **SCCM** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Configuring air gap connections for Microsoft SCCM

The Service Graph Connector for Microsoft SCCM supports an air gap solution for networks that are configured in a manner that doesn't support a MID agent.

An air gap is a security measure that involves isolating a computer or network and preventing it from establishing an external connection. Air-gapped networks keep critical systems secure by isolating them from external connections to protect the systems from cyber threats. Air gap connections for the Service Graph Connector for Microsoft SCCM enable controlled data transfer for Microsoft SCCM instances that are deployed to a subnet that neither has internet access nor is reachable by a MID Server agent.

Air gap connections are available from version 3.7.0 of the Service Graph Connector for Microsoft SCCM. You can add either standard data sources or air gap data sources by using SGC Central. To access the SGC Central setup, see Configure Service Graph Connector for Microsoft SCCM using SGC Central.

The air gap solution for the Service Graph Connector for Microsoft SCCM is presented in the architecture diagram.

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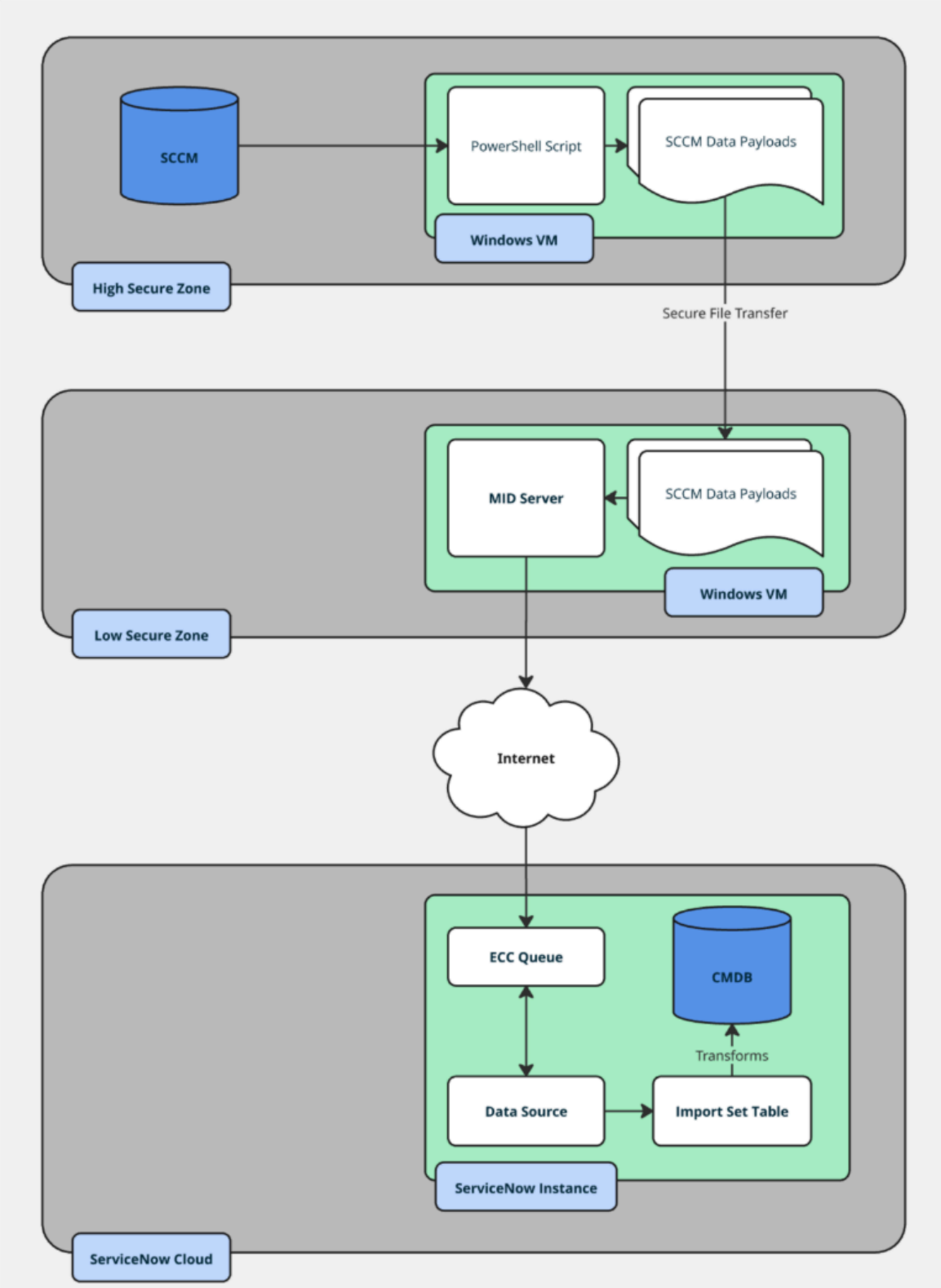

Perform the following sequence of tasks to configure the air gap solution before you add air gap data sources:

1. Configure air gap solution for Microsoft SCCM in a high-secure server
2. Configure air gap solution for Microsoft SCCM in a low-secure server
3. Configure air gap solution for Microsoft SCCM in a ServiceNow instance

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4. Perform a test data load for the air gap solution for Microsoft SCCM
5. Perform a full data load for the air gap solution for Microsoft SCCM

Configure air gap solution for Microsoft SCCM in a high-secure server

Configure the air gap solution for the Service Graph Connector for Microsoft SCCM in your high-secure server.

Before you begin

Role required: admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central** > **Create connection**.
2. Select the air gap template.
   a. In the **Setup** stage of the playbook, select the **Select alias template** activity.
   b. Select **SCCM Air Gap**.
   c. Select **Continue**.
3. Download and run the PowerShell scripts to set up an air gap connection.
   a. In the **Setup** stage of the playbook, select the **PowerShell Script Download** activity.
   b. Select **Download Airgap Scripts**.
   c. Download the `SgSCCMHighSecureSetup.ps1` and `GetSCCMData.ps1` PowerShell scripts from the link provided in the Download Airgap Scripts section.
4. Log on to your high-secure server.
5. Create a Microsoft SCCM directory.

   All the configurations required for the air gap solution are created in the Microsoft SCCM directory.

6. Copy the `GetSCCMData.ps1` and `SgSCCMHighSecureSetup.ps1` PowerShell scripts that you downloaded in step 3.c to the Microsoft SCCM directory.
7. Start a PowerShell session, and run the `SgSCCMHighSecureSetup.ps1` script to generate the JSON configuration file that is used by the `GetSCCMData.ps1` script.

   a. At the prompt, enter the path for the Microsoft SCCM data directory that you created in step 5.

   b. Enter a name for the configuration file, or press the Return key to accept the default value.

   c. Enter the values for the global properties, or press the Return key to accept the default values.
      - *`logDirectory`*: Specify the location to store the log file from the `GetSCCMData.ps1` script.
      - *`host`*: Specify the host name for your Microsoft SCCM instance.
      - *`dbname`*: Specify the SCCM database name.
      - *`port`*: Specify the port on which the Microsoft SCCM instance allows API calls.

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- *pageSize*: Specify the number of records to be fetched in a Microsoft SCCM API call.
- *credentialsPath*: Specify the location to store the Microsoft SCCM credentials XML file.

d. Specify names for the data source data directories, or press the Return key to accept the default values.

The directories are created if they don't already exist.

e. Enter the Microsoft SCCM credentials in the **Windows PowerShell credential request** pop-up window.

f. Exit the PowerShell session.

8. Provide write and delete permissions for the Microsoft SCCM data directory and the child directories (created in step 5) to the account that will run the `GetSCCMData.ps1` script.

Delete permissions are required for old records to be cleaned up.

Related topics

Configure air gap solution for Microsoft SCCM in a low-secure server

Configure air gap solution for Microsoft SCCM in a low-secure server

Configure the air gap solution for the Service Graph Connector for Microsoft SCCM in your low-secure server after you finish the configuration in your high-secure server.

Before you begin

Role required: admin

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central** > **Create connection**.

2. Select the air gap template.

a. In the **Setup** stage of the playbook, select the **Select alias template** activity.

b. Select **SCCM Air Gap**.

c. Select **Continue**.

3. Download and run the PowerShell scripts to set up an air gap connection.

a. In the **Setup** stage of the playbook, select the **PowerShell Script Download** activity.

b. Select **Download Airgap Scripts**.

c. Download the `SgSCCMLowSecureSetup.ps1` PowerShell script from the link provided in the Download Airgap Scripts section.

4. Log on to your low-secure server.

5. Create a Microsoft SCCM directory.

All the configurations required for the air gap solution are created in the Microsoft SCCM directory.

6. Copy the `SgSCCMLowSecureSetup.ps1` PowerShell script that you downloaded in step 3.c to the Microsoft SCCM directory.

7. Start a PowerShell session, and run the `SgSCCMLowSecureSetup.ps1` script.

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a. At the prompt, enter the path for the Microsoft SCCM directory that you created in step 5.

b. Specify names for the data source data directories, or press the Return key to accept the default values.

   The directories are created if they don't already exist.

c. Exit the PowerShell session.

8. Provide read and delete permissions for the Microsoft SCCM directory.

Related topics

Configure air gap solution for Microsoft SCCM in a ServiceNow instance

Configure air gap solution for Microsoft SCCM in a ServiceNow instance

Configure the air gap solution for the Service Graph Connector for Microsoft SCCM in your ServiceNow instance after you finish the configuration in your high-secure and low-secure servers.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Plugins**, and download the `ServiceNow IntegrationHub Action Step – PowerShell` plugin.
2. Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central** > **Create connection**.
3. Download and run the PowerShell scripts to set up an air gap connection.
   a. In the **Setup** stage of the playbook, select the **Select alias template** activity.
   b. Select **SCCM Air Gap**, and then select **Continue**.
   c. In the **Setup** stage of the playbook, select the **PowerShell Script Download** activity.
   d. Download the scripts and configure the air gap connection.
   e. Select the **I have read the instructions and executed the scripts accordingly** check box, and then select **Continue**.
4. In the **Setup** stage of the playbook, select the **Create and test connection** activity.
5. Fill in the fields on the Create Connection form.

Create Connection form

Field	Description
Connection Name	Display name for the connection.
MID Server	Name of the MID Server that you deployed in your low-secure server. You can obtain the *sys_id* of the MID Server from the ecc_agent table.
Parent Directory	Path of the Microsoft SCCM directory where the data is stored in your low-secure server.

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Field	Description
	See Configure air gap solution for Microsoft SCCM in a low-secure server.
Archive Data After Retrieval	Option to archive data after retrieval.
Archive Path [Optional]	Folder where the data is to be archived if the **Archive Data After Retrieval** check box is selected.

6. Select **Create and test connection**.

Related topics

Perform a test data load for the air gap solution for Microsoft SCCM

Perform a test data load for the air gap solution for Microsoft SCCM

After you configure the air gap solution for the Service Graph Connector for Microsoft SCCM, test whether the Microsoft SCCM endpoint is accessible from the high-secure server.

Before you begin

Role required: admin

Procedure

1. Navigate to the Microsoft SCCM directory in your high-secure server.
2. Run the `.\GetSCCMData.ps1 -configFilePath` *`CONFIG_PATH`* script, where *`CONFIG_PATH`* is the location of the JSON configuration file that is generated by the setup script.
   The script accesses the Microsoft SCCM API, and creates a sample file in the ComputerIdentity directory and a log file in the Logs directory.
   - If the test data load is successful, the log file contains the `Test Load status` SUCCESS! message.
   - If the test data load fails, the log file contains the `Error occurred while processing ComputerIdentity StatusCode 403` message.

     If the test data load fails, verify the Microsoft SCCM user credentials and ensure that the user has the required permissions to pull the data from Microsoft SCCM. If the credentials need to be updated, you must run the `SgSCCMHighSecureSetup.ps1` PowerShell script again. See Configure air gap solution for Microsoft SCCM in a high-secure server.

Related topics

Perform a full data load for the air gap solution for Microsoft SCCM

Perform a full data load for the air gap solution for Microsoft SCCM

After you verify that the test data load for the air gap solution for the Service Graph Connector for Microsoft SCCM is successful, you can perform a full data load.

Before you begin

Role required: admin

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Procedure

1. Navigate to the Microsoft SCCM directory in your high-secure server.
2. Run the `.\GetSCCMData.ps1 -completeLoad $true -configFilePath` *`CONFIG_PATH`* script, where *`CONFIG_PATH`* is the location of the JSON configuration file that is generated by the setup script.

   By default, the existing files in the data source data directories are deleted each time the `.\GetSCCMData.ps1 -completeLoad $true -configFilePath` *`CONFIG_PATH`* script is run. You can add the *`-clean $false`* parameter to the script if you want to retain the existing files.

   The script fetches data from the Microsoft SCCM DB, and stores the data in the respective `data_source` directories, as defined in the `SgSCCMConfigFile.json` file.
3. After the data is loaded in your high-secure server, transfer the `data_source` directories and contents to the corresponding directories in your low-secure server using a method of your choice (such as SFTP or SCP).
4. Verify that the data is loaded in your low-secure server.
5. Set the full data load job (using the `.\GetSCCMData.ps1 -completeLoad $true -configFilePath` *`CONFIG_PATH`* script) to run on a schedule based on that of the Scheduled Import Job on your Service Graph Connector for Microsoft SCCM instance.
6. Set the data transfer job (from your high-secure server to your low-secure server) on a schedule based on that of the Scheduled Import Job on your Service Graph Connector for Microsoft SCCM instance.
7. Test the air gap connection in your ServiceNow instance.

   a. Navigate to **All** > **Service Graph Connectors** > **SCCM** > **Connections**.

   b. Select the air gap connection that you created.

   c. Select the **Test Connection** related link.
   When the connection is successful, the **Status** field is set to `Success`. If the connection fails, follow the suggestions for remediation.

Service Graph Connector for Netskope

The Service Graph Connector for Netskope pulls in asset inventory data (hardware and software) from the Netskope database into the Configuration Management Database (CMDB) application in your ServiceNow AI Platform® instance.

Request apps on the Store

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

Supported versions

- Netskope API version: Get Client Data v1.
- Netskope client version: 112.
- Washington, Xanadu, Yokohama ServiceNow® family releases.

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Use cases

- Import Netskope Client information and store it in appropriate configuration item (CI) classes in your CMDB.
- Configure multiple instances of Netskope in the Service Graph Connector.

Guided setup

Use the guided setup feature to help you configure your integration in an organized sequence of tasks.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring SentinelOne integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Configure the Service Graph Connector for Netskope

The guided setup for the Service Graph Connector for Netskope provides an organized sequence of tasks to configure the integration on your ServiceNow AI Platform instance.

Before you begin
To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI Class Models store app store app, which is automatically installed.
- Discovery Core plugin (com.snc.discovery.core), which is automatically installed by Discovery.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- Guided Setup (com.sn.ads.setup).
- Data Stream (com.glide.hub.action_type.datastream).
- ITOM Patterns.

Roles required:

- Netskope Role - Viewer
- ServiceNow AI Platform® Role - admin

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Procedure

1. Navigate to **Service Graph Connectors** > **Netskope** > **Setup**.
2. On the Home page, select **Continue**.
3. On the Experience page, select the **Best Experience** from it.
4. On the Service Graph Connector for Netskope page in the Configure the connection page, select the **Configure Netskope Authentication Credentials** task and follow these steps:
   a. In the API Key field, enter your Netskope API Key and update the credential record.
   b. Select the **Mark as Complete** checkbox and select **Continue**.
5. In the **Configure** *Netskope* **HTTP Connection** task follow these steps:
   a. Add the Netskope base URL (Uniform Resource Locator).
   b. Select the **Mark as Complete** checkbox and select **Continue**.
6. In the **Test Connection** task follow these steps:
   a. Select the **Test Connection** link.

      The Status code field displays 200 if the connection is successful.

   b. Select the **Mark as Complete** checkbox and select **Continue**.
7. **Optional:** To create another connection, select the **Update Data Source Access** section and follow these steps:
   a. Give permission to create and update the data source.
   b. Select the **Mark as Complete** checkbox and select **Continue**.
   c. Give permission to create and update the Scheduled Import Sets.
   d. Select the **Mark as Complete** checkbox and select **Continue**.
   e. Clear the cache with the code snippet mentioned previously using Scripts-Background.
   f. Select the **Mark as Complete** checkbox and select **Continue**.
   g. Add a new connection by clicking the link.
   h. After you add a new connection, select the **Mark as Complete** checkbox and select **Continue**.
   i. Select the new connection record and select the **Test Connection link**.

      The Status code field displays 200 if the connection is successful.

   j. Select the **Mark as Complete** checkbox and select **Continue**.
8. Fill out the fields on the Scheduled Data Import form:

Field	Description
Name	Name of the scheduled job.
Data source	Data source record that defines the data to import, for example, SG-Netskope-Client.
Run as	Option to run the scheduled job with the credentials of the specified user.
Active	Option to activate the scheduled job. Select this option.

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Field	Description
Concurrent Import	Function that loads the data from multiple import sets. The function then processes and transforms the data concurrently.
Partition Method	Partition method for the concurrent import set. Select **Custom Size**.
Partition Size	Import set size for early scheduling. Set 1000 as a value.
Execute pre-import script	Option to specify a script to run before the import is performed. Leave this field with its default setting.
Execute post-import script	Option to specify a script to run after the import is performed. Leave this field with its default setting.
Application	Application that contains this scheduled job.
Run	Frequency of running the import.
Conditional	Conditions under which this job is executed.

9. Click **Execute Now**.
10. In the Help task bar, select **Mark as Complete** and select **Continue**.

Service Graph Connector for Observability - AppDynamics

Use the Service Graph Connector for Observability - AppDynamics to ingest CMDB data from an AppDynamics installation using REST APIs. Push events from AppDynamics into ServiceNow with Event Management.

Request apps on the Store

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

Supported versions

- Supported versions: AppDynamics version 20.3
- Supported ServiceNow versions:
  - Xanadu
  - Yokohama
  - Zurich

Configuring a connection for the connector

Use the SGC Central view in the Service Graph Workspace or CMDB Workspace to install the connector and configure the connection. The view enables you to install and discover connectors and to manage the full life cycle of creating, editing, monitoring, and debugging connections. For instructions, see Configure Service Graph Connector for Observability - AppDynamics using SGC Central.

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Important:
Unless there are configuration issues, use SGC Central to configure the connection. The guided setup method for configuration is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring AppDynamics integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the AppDynamics data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

The AppDynamics data sources include the following:

- SG-AppDynamics Application Services
- SG-AppDynamics Servers and Applications
- SG-AppDynamics Server Tags
- SG-AppDynamics Tier to Tier Relationship

For more information on where data is saved when pulling data from AppDynamics, see CMDB classes targeted in Service Graph Connector for Observability - AppDynamics.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Additional resources

- Service Graph Connector for Observability AppDynamics article on the ServiceNow Community site
- How do I configure the AppDynamics Service Graph Connector? article on the ServiceNow Community site

Related topics

Service Graph Connectors

Configure Service Graph Connector for Observability - AppDynamics using SGC Central

Set up scheduled import jobs to pull in AppDynamics data into your Configuration Management Database (CMDB).

Before you begin

- Install Service Graph Connector for Observability - AppDynamics version 1.4.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.
- Install Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This application must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

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Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the AppDynamics connector type, and then select **Configure connection**.
   A default connection for AppDynamics is available within the application. As the Service Graph Connector for Observability - AppDynamics supports only a single instance, you can configure the default connection for the first time or resume editing it thereafter.
4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

5. Enter connection details and test the API connection for importing AppDynamics data.

   a. In the **Setup** stage of the playbook, select the **Configure and test connection** activity.

   b. On the form, fill in the fields.

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Configure and test connection form

Field	Description
Connection name	Name to identify the AppDynamics connection record.
Connection URL	Base URL of your AppDynamics controller.
OAuth Client ID	Application (client) ID of your AppDynamics client application. **Note:** Verify that Server Visibility is active for the AppDynamics account and the AppDynamics user has the Applications and Dashboards Viewer (Default) and Server Monitoring User (Default) roles.
OAuth Client Secret	Client secret of your AppDynamics client application.
Use MID server	Option to use a MID Server. **Note:** Use of a MID Server is optional.
MID selection	Name of the MID Server used by the connector. This field appears only when the **Use MID server** check box is selected.

c. Select **Update and test connection**.

d. Once the connection test is complete, select **Continue**.

6. **Optional:** Enable real-time event integration by creating an HTTP request template to receive real-time health-check alerts and events from AppDynamics to your ServiceNow instance.

   Note:
   To skip this step, select **Skip** for the **Enable real-time event integration** activity.

   a. In the **Setup** stage of the playbook, select the **Enable real-time event integration** activity.

   b. Select **Continue** to create an HTTP request template automatically.

   (Optional) After you enable real-time event integration, multiple API calls are executed to start the event ingestion service in AppDynamics. For more information, see the Service Graph Connector for Observability AppDynamics article on the ServiceNow Community site.

7. Configure duplicate detection rules.

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AppDynamics uses duplicate detection rules to insert only new or updated rows into the CMDB. To insert all rows, deactivate the rule and run the **Clean AppDynamics Duplicate Row Hashes** scheduled job for a full data import.

a. In the **Setup** stage of the playbook, select the **Configure duplicate detection rules** activity.

b. In the Duplicate detection rules list, select the rule from the **Name** column.

c. On the Edit duplicate detection rule window, select the **Active** check box to activate the rule.

> **Note:**
> To remove fields from being evaluated, add the field names in the **Ignore Fields** field for a rule. To ignore multiple fields, separate the fields with commas.

d. Select **Save**.

e. Repeat steps from 7.b to 7.d for each rule you want to activate.

f. Select **Continue**.

8. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Expand the Parent scheduled data import within the Import schedules list to select the **SG-AppDynamics Servers and Applications** import schedule.

c. Select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

d. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

e. Select **Continue**.

9. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to verify whether the connection was configured.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for Observability - AppDynamics

CMDB classes targeted in Service Graph Connector for Observability - AppDynamics

Accessing the connection details of Service Graph Connector for Observability - AppDynamics

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Configure Service Graph Connector for Observability - AppDynamics using the guided setup

Set up scheduled import jobs to pull in data from AppDynamics into your Configuration Management Database (CMDB).

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

When using client credentials for authentication, obtain the OAuth credentials from your AppDynamics administrator. Make a note of the following details:

- Application (client) ID
- Client Secret

Note:
If you have an earlier version of the Service Graph Connector for Observability - AppDynamics, then do not migrate data from the old connector. You must uninstall the previous version and run the new integration.

Role required: SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

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Procedure

1. Ensure that the application scope is set to the Service Graph Connector for Observability - AppDynamics application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **AppDynamics** > **Setup**.
3. On the Getting started page, select **Get Started**.
4. Configure the authentication credentials and establish an HTTP connection to send requests to the AppDynamics API.

   a. In the Configure API authentication section of the Service Graph Connector for Observability - AppDynamics page, select **Get Started**.

   b. Configure the connection for AppDynamics by editing the default connection.

   You can configure either a Basic Auth connection or an OAuth connection.

   Note:
   As the connector supports only single instance, edit the **AppDynamicsConnectionAlias** connection, available by default.

   - Configure a Basic Auth connection.

     i. For the Configure Basic Auth Connection task, select **Configure**.

     ii. Select **Edit** for AppDynamicsConnectionAlias.

     Note:
     If not redirected to the connection setup, search for **AppDynamicsConnectionAlias** on the Integrations page, and then select **View Details** to edit the default connection.

     iii. In the Connection Information section of the Edit Connection window, fill in the fields.

     Connection Information

Field	Description
Connection name	Name to identify the AppDynamics connection record. `AppDynamicsConnectionAlias` is the default credential alias name and is read-only.
Host name	Host name of your AppDynamics controller.

     iv. (Optional) If a MID Server is required for the AppDynamics server connection, select the **Use MID server** check box. Then, select the MID Server-related fields accordingly.

     v. In the Credential Information section of the Edit Connection window, fill in the fields.

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Credential Information

Field	Description
Username	AppDynamics account user name that is used to authenticate the connection request. **Note:** Verify that Server Visibility is active for the AppDynamics account and the AppDynamics user has the Applications and Dashboards Viewer (Default) and Server Monitoring User (Default) roles.
Password	Password that is used to authenticate the connection request.

vi. Select **Edit Connection**.

vii. Return to the guided setup page.

viii. Set the Configure Basic Auth Connection task to complete by selecting **Mark as Complete**.

- Configure an OAuth connection.

i. For the Configure OAuth Authentication: Client Credentials task, select **Configure**.

ii. Select **Edit** for AppDynamicsConnectionAlias.

Note:
If not redirected to the connection setup, search for **AppDynamicsConnectionAlias** on the Integrations page, and then select **View Details** to edit the default connection.

iii. In the Connection Information section of the Edit Connection window, fill in the fields.

Connection Information

Field	Description
Connection name	Name to identify the AppDynamics connection record. `AppDynamicsConnectionAlias` is the default credential alias name and is read-only.
Connection URL	Base URL of your AppDynamics controller.

iv. (Optional) If a MID Server is required for the AppDynamics server connection, select the **Use MID server** check box. Then, select the MID Server-related fields accordingly.

v. In the Credential Information section of the Edit Connection window, fill in the fields.

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Credential Information

Field	Description
OAuth Client ID	Application (client) ID of your AppDynamics client application as noted in the Before you begin section. **Note:** Verify that the API client has a role with the required privileges and sufficient Token Expiration Time.
OAuth Client Secret	Client secret of your AppDynamics client application as noted in the Before you begin section.

vi. Select **Edit Connection**.

vii. Return to the guided setup page.

viii. Set the Configure OAuth Authentication: Client Credentials task to complete by selecting **Mark as Complete**.

c. Test the connection.

i. For the Test connection task, select **Configure**.

ii. Select the **Test Connection** related link to start the testing process.

iii. When the **Status** field is set to **Success**, return to the guided setup page.

Note:
If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test the connection task to complete by selecting **Mark as Complete**.

d. Enable AppDynamics event integration with your ServiceNow instance by pushing a default HTTP Request Template to AppDynamics.

Note:
To push HTTP requests, verify that the Observability Commons for CMDB application (sn_observability) is installed for events ingestion on your ServiceNow instance. Also, on your AppDynamics instance, as the ServiceNow user, you must have the account-level Configure HTTP Request Templates permission to create or modify HTTP Request Templates.

i. For the Push HTTP Request Template task, select **Configure**.

ii. Select the **Push HTTP Request Template** related link.

iii. Return to the guided setup page.

iv. Set the Push HTTP Request Template task to complete by selecting **Mark as Complete**.

After you push the HTTP request template, multiple API calls are executed to start the event ingestion service in AppDynamics. For more information, see the Service Graph Connector for Observability AppDynamics article on the ServiceNow Community site.

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5. Configure duplicate detection rules.

   a. For the Configure duplicate detection rules task in the Duplicate detection rules section, select **Configure**.

   b. In the CMDB Duplicate Row Rules list, set the **Active** column value for a rule to **true** to activate the rule.

      Note:
      To remove fields from being evaluated, add the field names in the **Ignore Fields** column for a rule. To ignore multiple fields, separate the fields with commas.

   c. Return to the guided setup page.

   d. Set the Configure duplicate detection rules task to complete by selecting **Mark as Complete**.

6. Configure advanced settings.

   a. For the Advanced Settings task in the Advanced section, select **Configure**.

   b. Review and modify the advanced properties.

      Advanced properties

Property	Description
Toggle to populate relationships between tiers	Option to enable the import of relationships between AppDynamics tiers in the CI Relationship [cmdb_rel_ci] table.
The number of minutes of metrics to fetch in order to generate tier to tier relationships	Number of minutes of metrics to fetch for generating tier-to-tier relationships. For example, 60 retrieves the last hour's relationships.
Toggle to import business transactions from AppDynamics	Option to enable the import of business transactions into the Calculated Application Service [cmdb_ci_service_calculated] table.
Toggle to populate tags for imported servers	Option to enable the import of server tags into the Key Value [cmdb_key_value] table.
Toggle to import node data from AppDynamics and map to the cmdb_ci_appl hierarchy	Option to enable the import of nodes into the Application [cmdb_ci_appl] table hierarchy.

   c. Select **Save**.

   d. Set the Advanced Settings task to complete by selecting **Mark as Complete**.

7. Set up the SG-AppDynamics Servers and Applications scheduled job available by default.

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a. For the Configure scheduled job task in the Set up scheduled import jobs section, select **Configure**.

b. On the Scheduled Data Import form, verify the field values for the SG-AppDynamics Servers and Applications scheduled job and select the **Active** check box.

   For more information, see Schedule a data import.

c. Select **Update**.

d. Set the Configure scheduled job task to complete by selecting **Mark as Complete**.

CMDB classes targeted in Service Graph Connector for Observability - AppDynamics

When you complete setting up the connection, you can configure the integration to periodically pull data from AppDynamics. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

AppDynamics Extension [sn_sg_appd_extension]

The following attributes in the AppDynamics Extension [sn_sg_appd_extension] table are populated by collected data:

Attribute label	Attribute name
AppDynamics ID	appdynamics_id
Controller Name	controller_name
Agent Type	agent_type
Type	type

Application [cmdb_ci_appl]

The following attributes in the Application [cmdb_ci_appl] table are populated by collected data:

Attribute label	Attribute name
Class	sys_class_name
Name	name
Running process command	running_process_command

Relationships created for Application

Parent class	Relationship type	Child class
Application [cmdb_ci_appl]	Runs on::Runs	Server [cmdb_ci_server]
Application [cmdb_ci_appl]	Reference	AppDynamics Extension [sn_sg_appd_extension]

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Calculated Application Service [cmdb_ci_service_calculated]

The following attributes in the Calculated Application Service [cmdb_ci_service_calculated] table are populated by collected data:

Attribute label	Attribute name
Name	name
Hide from dashboard	hide_from_dashboard
Metadata	metadata
Operational status	operational_status
Service Populator Status	populator_status
Service Populator	service_populator
Service Type	type
Short Description	short_description

Relationships created for Calculated Application Service

Parent class	Relationship type	Child class
Calculated Application Service [cmdb_ci_service_calculated]	Depends on::Used by	Application [cmdb_ci_appl]
Calculated Application Service [cmdb_ci_service_calculated]	Depends on::Used by	Server [cmdb_ci_server]
Calculated Application Service [cmdb_ci_service_calculated]	Depends on::Used by	Calculated Application Service [cmdb_ci_service_calculated]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Nic	nic
IP version	ip_version
Name	name

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

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Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
MAC Address	mac_address
Name	name
Discovery source	discovery_source

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Server [cmdb_ci_server]

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data:

Attribute label	Attribute name
Name	name

Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Server [cmdb_ci_server]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Server [cmdb_ci_server]	Reference	Key Value [cmdb_key_value]

Accessing the connection details of Service Graph Connector for Observability - AppDynamics

You can access the connection details of the Service Graph Connector for Observability - AppDynamics in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

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With the CCF, you can access all the connections used by the Service Graph Connector for Observability - AppDynamics. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of an AppDynamics connection

Access the details of an AppDynamics connection configured for the Service Graph Connector for Observability - AppDynamics.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **AppDynamics** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Service Graph Connector for Observability - Datadog

Use the Service Graph Connector for Observability - Datadog to ingest CMDB data from a Datadog installation using REST APIs. Push events from Datadog into ServiceNow with Event Management.

Request apps on the Store

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

Supported versions

Supported ServiceNow versions:

- Yokohama
- Zurich
- Australia

Guided setup

The guided setup for the Service Graph Connector for Observability - Datadog provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, see Configure Service Graph Connector for Observability - Datadog.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Observability Datadog integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

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Data mapping

Data from the Datadog data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

The Datadog data source includes SGO-Datadog Hosts [sn_datadog_integra_datadog_hosts].

For more information on where data is saved when pulling data from Datadog, see CMDB classes targeted in Service Graph Connector for Observability - Datadog.

When you complete setting up the connection, the data from Datadog is automatically loaded into staging tables and then inserted into the following target tables:

- Cloud DataBase [cmdb_ci_cloud_database]
- Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
- Cloud Service Account [cmdb_ci_cloud_service_account]
- IP Address [cmdb_ci_ip_address]
- Key Value [cmdb_key_value]
- Logical Datacenter [cmdb_ci_logical_datacenter]
- Network Adapter [cmdb_ci_network_adapter]
- Server [cmdb_ci_server]

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Related topics

Service Graph Connectors

Configure Service Graph Connector for Observability - Datadog

CMDB classes targeted in Service Graph Connector for Observability - Datadog

Accessing the connection details of Service Graph Connector for Observability - Datadog

Configure Service Graph Connector for Observability - Datadog

Pull in data from Datadog into your Configuration Management Database (CMDB).

Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.

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- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Note:
If you have an earlier version of the Service Graph Connector for Observability - Datadog, then don't migrate data from the old connector. You must uninstall the previous version and run the new integration.

Role required: SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Observability Datadog** > **Setup**.
2. On the Getting started page, select **Get Started**.
3. Configure the authentication credentials and the host name to send requests to the Datadog API.

   a. Configure your Datadog credentials.

      i. In the Configure the Connection section of the Datadog Integration with CMDB page, select **Get Started**.

      ii. For the Configure the Credentials task, select **Configure**.

      iii. In the **Connection name** field, enter a name for the connection.

      Note:
      Do not modify the name of the default connection.

      iv. In the **Connection URL** field, enter the base URL or IP address for Datadog.

      v. In the **API key** field, enter the Datadog API token.

      vi. In the **Application key** field, enter the application key used for connecting to the Datadog API.

      vii. Select **Update**.

      viii. Set the Configure the Credentials task to complete by selecting **Mark as Complete**.

   b. Test the connection.

      i. For the Test Connection task, select **Configure**.

      ii. Test the connection by selecting the **Test Connection** related link.

      Testing the connection might take a few moments. The page is refreshed to show the test results.

      iii. When the **Status** field is set to **Success**, select **Update**.

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If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test Connection task to complete by selecting **Mark as complete**.

c. **Optional:** Add a filter for the SGO-Datadog Hosts [sn_datadog_integra_datadog_hosts] data source.

i. For the Create Hosts Filter task, select **Configure**.

ii. Enter a comma-separated list of host tags in `key:value` format in the **Value** field to define a filter for pulling host data from Datadog.

For example, `datadog:monitored,env:production`.

iii. Select **Update**.

iv. Set the Create Hosts Filter task to complete by selecting **Mark as complete**.

4. Configure the webhook and monitors for Observability Datadog.

a. In the Configure Observability section of the Datadog Integration with CMDB page, select **Get started**.

b. For the Configure the Webhooks and Monitors task, select **Configure**.

c. In the Datadog Webhooks list, select **New** to add a Datadog webhook.

d. Fill in the fields.

New record form

Field	Description
Name	Name of the Datadog webhook.
Connection Alias	Search for and select the connection and credential alias that you created in step 3.

e. Select **Submit**.

f. Populate the Datadog Webhooks list by selecting the **Synchronize Monitors** related link on the Datadog Webhook page.

Note:
In the Datadog Webhooks list, don't select **New** to add a monitor as this option is not used in this scenario.

g. In the **Name** column of the Datadog Webhooks list, select a monitor.

h. On the Datadog Monitors page, select the **Webhook Active** check box, and then select **Update**.

i. Repeat steps 4.g and 4.h for all the monitors in the Datadog Webhooks list.

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j. On the Datadog Webhook page, select **Update** to save your changes.

k. Set the Configure the Webhooks and Monitors task to complete by selecting **Mark as Complete**.

5. Set up scheduled import jobs.

a. Navigate to **All** > **Service Graph Connectors** > **Observability Datadog** > **Import Schedules**.

b. Select the name of the scheduled import that you want to activate.

c. On the Scheduled Data Import form, verify the field values for the scheduled job and select the **Active** check box.

For more information, see Schedule a data import.

d. Select **Update**.

Related topics

Service Graph Connector for Observability - Datadog

CMDB classes targeted in Service Graph Connector for Observability - Datadog

Accessing the connection details of Service Graph Connector for Observability - Datadog

CMDB classes targeted in Service Graph Connector for Observability - Datadog

When you complete setting up the connection, the data is automatically pulled from Datadog. The data is saved in target tables.

Cloud DataBase [cmdb_ci_cloud_database]

The following attributes in the Cloud DataBase [cmdb_ci_cloud_database] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Fully qualified domain name	fqdn
Name	name
Type	type
Version	version

Relationships created for Cloud DataBase

Parent class	Relationship type	Child class
Cloud DataBase [cmdb_ci_cloud_database]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	Key Value [cmdb_key_value]

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Cloud Load Balancer [cmdb_ci_cloud_load_balancer]

The following attributes in the Cloud Load Balancer [cmdb_ci_cloud_load_balancer] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

Relationships created for Cloud Load Balancer

Parent class	Relationship type	Child class
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	Key Value [cmdb_key_value]

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data:

Attribute label	Attribute name
Account Id	account_id
Name	name
Object ID	object_id
Datacenter Type	datacenter_type

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Nic	nic
Name	name

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

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Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

Logical Datacenter [cmdb_ci_logical_datacenter]

The following attributes in the Logical Datacenter [cmdb_ci_logical_datacenter] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Region	region

Relationship created for Logical Datacenter

Parent class	Relationship type	Child class
Logical Datacenter [cmdb_ci_logical_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
Configuration Item	cmdb_ci
MAC Address	mac_address
Name	name

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Server [cmdb_ci_server]

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data:

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Attribute label	Attribute name
Class	sys_class_name
CPU core thread	cpu_core_thread
CPU count	cpu_count
CPU speed (MHz)	cpu_speed
CPU type	cpu_type
Disk space (GB)	disk_space
DNS Domain	dns_domain
Fully qualified domain name	fqdn
Name	name
Operating System	os
RAM (MB)	ram

Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Server [cmdb_ci_server]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Server [cmdb_ci_server]	Reference	Key Value [cmdb_key_value]

Related topics

Service Graph Connector for Observability - Datadog

Accessing the connection details of Service Graph Connector for Observability - Datadog

You can access the connection details of the Service Graph Connector for Observability - Datadog in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Observability - Datadog. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Datadog connection

Access the details of a Datadog connection configured for the Service Graph Connector for Observability - Datadog.

Before you begin

Role required: admin

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Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Datadog** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Related topics

Service Graph Connector for Observability - Datadog

Service Graph Connector for Observability - Dynatrace

Use the Service Graph Connector for Observability - Dynatrace to ingest CI data, events, metrics, and logs from Dynatrace into your ServiceNow instance.

Note:
The Service Graph Connector for Observability - Dynatrace provided by ServiceNow is different from the Service Graph Connector for Dynatrace provided by Dynatrace.

Request apps on the Store

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

Supported versions

- Supported versions:
  - Minimum version supported: Dynatrace SaaS; Version 1.284
- Supported ServiceNow versions:
  - Yokohama
  - Zurich
  - Australia

Important information for upgrading Service Graph Connector for Observability - Dynatrace

Before upgrading the Service Graph Connector for Observability - Dynatrace to version 1.10.0 or later, disable the reconciliation rules for tables extending the Application [cmdb_ci_appl] table. See the Reconciliation rules(ServiceNow, ServiceWatch) on multiple table like Apache web server stopping other discovery source to update fields on those tables [KB1649455] article in the Now Support Knowledge Base.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the Service Graph Workspace or CMDB Workspace enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for Observability - Dynatrace using SGC Central.

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Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Dynatrace integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Dynatrace data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

The following table describes the data sources, the staging tables, the target tables as CMDB CI classes, and the Dynatrace entities imported by each data source.

Data mapping for Dynatrace entities

Data source	Description	Staging table	CMDB CI classes	Entities
SGO-Dynatrace Hosts V2	Ingests host data from Dynatrace. Contains computer data.	SGO-Dynatrace Hosts [sn_dynatrace_integ_sg_dynatrace_hosts]	Computer IP Address [cmdb_ci_ip_address] Key value When the Software Asset Management (SAM) application isn't installed: Software Software Instance When the SAM application is installed: Software Installation	Host

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
			Note: Only the operating system data is stored in the Software Packages, Software Instance, and Software Installation CI classes.	
SGO-Dynatrace Processes V2	Ingests process data from Dynatrace. Contains running process data.	SGO-Dynatrace Processes [sn_dynatrace_intes_sg_dynatrace_processes]	The target table is populated using Application Dependency Mapping (ADM). The ADM adapter analyzes the imported data and command-line arguments, identifies the appropriate table based on the conditions included in Discovery Process Classifications list, and inserts the data into the table, which extends the Application [cmdb_ci_appl] table. To learn about process classification, see Discovery classifiers.	Process

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
			Note: The addition of unclassified processes to the Application [cmdb_ci_appl] table depends on the value of the *sn_dynatrace_integ.createUnmatched* system property. For more information, see Service Graph Connector for Observability - Dynatrace properties.	
SGO-Dynatrace Process Groups V2	Ingests process group data from Dynatrace. Contains a group of similar running processes.	SGO-Dynatrace Process Groups [sn_dynatrace_integ_sg_dynatrace_process_groups]	Group	Process Group
SGO-Dynatrace Services V2	Ingests service data from Dynatrace. Contains information related to services that are detected via the Dynatrace agent. Can be filtered using advanced settings properties.	SGO-Dynatrace Services [sn_dynatrace_integ_sg_dynatrace_services]	Calculated Application Service Key value Application Group Computer Cloud Load Balancer	Service
SGO-Dynatrace Applications V2	Ingests application data from Dynatrace.	SGO-Dynatrace Applications [sn_dynatrace_integ_sg_dynatrace_applications]	Calculated Application Service	Application

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
	Contains information related to the applications defined manually. Applications are parents to services representing a higher level, logical group of services.		Key value	
SGO-Dynatrace Application Rels V2	Ingests application relationships from Dynatrace. Returns the same data as the SGO-Dynatrace Services data source. Maps relationships between applications and processes that could have been skipped due to filtered services.	SGO-Dynatrace Application Relationships [sn_dynatrace_integ_sg_dynatrace_application_relationships]	Calculated Application Service	Service
SGO-Dynatrace AWS Application Network LB	Ingests cloud load balancer data from Dynatrace. Contains information related to AWS application and network load balancer.	SGO-Dynatrace AWS Application Network LB [sn_dynatrace_integ_sgo_dynatrace_aws_application_network_lb]	Cloud Load Balancer Key Value	AWS Network Load Balancer AWS Application Load Balancer
SGO-Dynatrace AWS Datacenters	Ingests AWS datacenter and availability zone data from Dynatrace. Contains information	SGO-Dynatrace AWS Availability Zone [sn_dynatrace_integ_sgo_dynatrace_aws_availability_zone]	AWS Datacenter Availability Zone	AWS Availability Zone

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
	related to AWS datacenters and availability zones.			
SGO-Dynatrace AWS EC2 Instance	Ingests AWS virtual machine instance data from Dynatrace. Contains information related to virtual machine instances, server details, cloud hardware type, cloud image, and tags.	SGO-Dynatrace AWS EC2 Instance [sn_dynatrace_integ_sg_dynatrace_aws_ec2_instance]	Virtual Machine Instance Server Cloud Hardware Type Hardware Type Image Key Value	EC2 Instance
SGO-Dynatrace AWS Elastic Loadbalancer	Ingests cloud load balancer data from Dynatrace. Contains load balancer details and tags.	SGO-Dynatrace AWS Elastic Loadbalancer [sn_dynatrace_integ_sgo_dynatrace_aws_elastic_loadbalancer]	Cloud Load Balancer Key Value	Elastic Load Balancer
SGO-Dynatrace AWS Service Account	Ingests cloud service account data from Dynatrace. Contains information related to AWS account IDs.	SGO-Dynatrace AWS Service Account [sn_dynatrace_integ_sgo_dynatrace_aws_service_account]	Cloud Service Account	AWS Credentials
SGO-Dynatrace Azure Load Balancer	Ingests Azure load balancer data from Dynatrace. Contains Azure load balancer and cloud load balancer IP address and tag details.	SGO-Dynatrace Azure Load Balancer [sn_dynatrace_integ_sgo_dynatrace_azure_load_balancer]	Cloud Load Balancer Cloud LB IPAddress Key Value	Azure Load Balancer
SGO-Dynatrace Azure Region	Ingests Azure datacenter data from Dynatrace.	SGO-Dynatrace Azure Region [sn_dynatrace_integ_sgo_dynatrace_azure_region]	Azure Datacenter	Azure Region

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
	Contains Azure datacenter information.			
SGO-Dynatrace Azure Storage Accounts	Ingests Azure cloud storage account data from Dynatrace. Contains information related to cloud storage accounts.	SGO-Dynatrace Azure Storage Accounts [sn_dynatrace_integ_sgo_dynatrace_azure_storage_accounts]	Cloud Storage Account	Azure Storage Account
SGO-Dynatrace Azure Strg Acnts v2	Ingests Azure cloud storage account data from Dynatrace using v2 API. Contains information related to cloud storage accounts.	SGO-Dynatrace Azure Storage Accounts v2 [sn_dynatrace_integ_sgo_dynatrace_azure_storage_accounts_v2]	Cloud Storage Account	cloud:azure:storage:storageaccou
SGO-Dynatrace Azure Subscriptions	Ingests Azure subscription data from Dynatrace. Contains Azure subscription details.	SGO-Dynatrace Azure Subscriptions [sn_dynatrace_integ_sg_dynatrace_azure_subscriptions]	Cloud Service Account	Azure Subscription
SGO-Dynatrace Azure VM	Ingests Azure virtual machine instance data from Dynatrace. Contains information related to Azure virtual machine instances.	SGO-Dynatrace Azure VM [sn_dynatrace_integ_sgo_dynatrace_azure_vm]	Virtual Machine Instance Server	Azure VM
SGO-Dynatrace Docker Container	Ingests Docker container data from Dynatrace. Contains information related to the Docker container image.	SGO-Dynatrace Docker Container [sn_dynatrace_integ_sgo_dynatrace_docker_container]	Docker Container Application Docker Image Computer [cmdb_ci_computer]	Container Group Instance

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
SGO-Dynatrace Kubernetes Cluster	Ingests Kubernetes cluster data from Dynatrace. Contains information related to Kubernetes clusters.	SGO-Dynatrace Kubernetes Cluster [sn_dynatrace_integ_sgo_dynatrace_kubernetes_cluster]	Kubernetes Cluster Key Value	Kubernetes Cluster
SGO-Dynatrace Kubernetes Namespace	Ingests Kubernetes namespace data from Dynatrace. Contains information related to Kubernetes namespaces.	SGO-Dynatrace Kubernetes Namespace [sn_dynatrace_integ_sgo_dynatrace_kubernetes_namespace]	Kubernetes Namespace Key Value	Cloud Application Namespace
SGO-Dynatrace Kubernetes Node	Ingests Kubernetes node data from Dynatrace. Contains information related to Kubernetes nodes.	SGO-Dynatrace Kubernetes Node [sn_dynatrace_integ_sgo_dynatrace_kubernetes_node]	Kubernetes Node Key Value	Kubernetes Node
SGO-Dynatrace Kubernetes Pod	Ingests Kubernetes pod data from Dynatrace. Contains information related to Kubernetes pods.	SGO-Dynatrace Kubernetes Pod [sn_dynatrace_integ_sgo_dynatrace_kubernetes_pod]	Kubernetes Pod Key Value	Cloud Application Instance
SGO-Dynatrace Kubernetes Service	Ingests Kubernetes service data from Dynatrace. Contains information related to Kubernetes services.	SGO-Dynatrace Kubernetes Service [sn_dynatrace_integ_sgo_dynatrace_kubernetes_service]	Kubernetes Service Key Value	Kubernetes Service

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
SGO-Dynatrace Azure Cosmos DB v1	Ingests Azure Cosmos DB data from Dynatrace. Contains information related to Azure Cosmos DB.	SGO-Dynatrace Azure Cosmos DB v1 [sn_dynatrace_integ_sgo_dynatrace_azure_cosmos_db_v1]	Cloud DataBase Azure Datacenter Cloud Service Account Key value	AZURE_COSMOS_DB
SGO-Dynatrace Azure Cosmos DB V2	Ingests Azure Cosmos DB data from Dynatrace. Contains information related to Azure Cosmos DB.	SGO-Dynatrace Azure Cosmos DB V2 [sn_dynatrace_integ_sgo_dynatrace_azure_cosmos_db_v2]	Cloud DataBase Azure Datacenter Cloud Service Account Key value	cloud:azure:documentdb:databas cloud:azure:documentdb:databas
SGO-Dynatrace Azure SQL Server V2	Ingests Azure SQL Server data from Dynatrace. Contains information related to Azure SQL Server.	SGO-Dynatrace Azure SQL Server V2 [sn_dynatrace_integ_sgo_dynatrace_azure_sql_server_v2]	Cloud DataBase Azure Datacenter Key value	cloud:azure:sql:servers:databases cloud:azure:sql:servers:databases cloud:azure:sql:servers:databases
SGO-Dynatrace Azure Function App	Ingests Azure Functions app data from Dynatrace. Contains information related to Azure Functions app.	SGO-Dynatrace Azure Function App [sn_dynatrace_integ_sgo_dynatrace_azure_function_app]	Cloud Function Azure Datacenter Cloud Service Account Key value	AZURE_FUNCTION_APP
SGO-Dynatrace Azure Scale Sets VM	Ingests Azure Virtual Machine Scale Sets (VMSS) data from Dynatrace. Contains information related to Azure VMSS.	SGO-Dynatrace Azure Scale Sets VM [sn_dynatrace_integ_sgo_dynatrace_azure_scale_sets_vm]	Instance Scale Set Azure Datacenter Cloud Service Account Key value	AZURE_VM_SCALE_SET
SGO-Dynatrace AWS RDS V1	Ingests Amazon Relational Database Service (RDS) data from Dynatrace.	SGO-Dynatrace AWS RDS V1 [sn_dynatrace_integ_sgo_dynatrace_aws_rds_v1]	Cloud DataBase AWS Datacenter Key value	RELATIONAL_DATABASE_SERVIC

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
	Contains information related to Amazon RDS.			
SGO-Dynatrace AWS RDS V2	Ingests Amazon Relational Database Service (RDS) data from Dynatrace. Contains information related to Amazon RDS.	SGO-Dynatrace AWS RDS V2 [sn_dynatrace_integ_sgo_dynatrace_aws_rds_v2]	Cloud DataBase AWS Datacenter Key value	cloud:aws:rds
SGO-Dynatrace AWS Dynamo DB v1	Ingests Amazon Dynamo DB data from Dynatrace. Contains information related to Amazon Dynamo DB.	SGO-Dynatrace AWS Dynamo DB v1 [sn_dynatrace_integ_sgo_dynatrace_aws_dynamo_db_v1]	DynamoDB Table AWS Datacenter Key value	DYNAMO_DB_TABLE
SGO-Dynatrace AWS Dynamo DB v2	Ingests Amazon Dynamo DB data from Dynatrace. Contains information related to Amazon Dynamo DB.	SGO-Dynatrace AWS Dynamo DB v2 [sn_dynatrace_integ_sgo_dynatrace_aws_dynamo_db_v2]	DynamoDB Table AWS Datacenter Key value	cloud:aws:dynamodb
SGO-Dynatrace AWS Lambda Func V1	Ingests AWS Lambda Function data from Dynatrace. Contains information related to AWS Lambda Function.	SGO-Dynatrace AWS Lambda Func V1 [sn_dynatrace_integ_sgo_dynatrace_aws_lambda_func_v1]	Cloud Function Azure Datacenter Key value	AWS_LAMBDA_FUNCTION
SGO-Dynatrace AWS Lambda Func V2	Ingests AWS Lambda Function data from Dynatrace. Contains information	SGO-Dynatrace AWS Lambda Func V2 [sn_dynatrace_integ_sgo_dynatrace_aws_lambda_func_v2]	Cloud Function Azure Datacenter Key value	cloud:aws:lambda

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Data mapping for Dynatrace entities (continued)

Data source	Description	Staging table	CMDB CI classes	Entities
	related to AWS Lambda Function.			
SGO-Dynatrace AWS S3 Bucket V2	Ingests Amazon S3 bucket data from Dynatrace. Contains information related to Amazon S3 bucket.	SGO-Dynatrace AWS S3 Bucket V2 [sn_dynatrace_integ_sgo_dynatrace_aws_s3_bucket_v2]	Cloud Object Storage AWS Datacenter Key value	cloud:aws:s3
SGO-Dynatrace Custom Applications V2	Ingests custom application data from Dynatrace. Contains information related to custom applications.	SGO-Dynatrace Custom Applications [sn_dynatrace_integ_sgo_dynatrace_custom_applications]	Calculated Application Service Configuration Item [cmdb_ci] Key value	CUSTOM_APPLICATION
SGO-Dynatrace AWS Auto Scaling Group V1	Ingests AWS autoscaling group data from Dynatrace using V1 API. Contains information related to AWS autoscaling group.	SGO-Dynatrace AWS Auto Scaling Group V1 [sn_dynatrace_integ_sgo_dynatrace_aws_auto_scaling_group_v1]	Cloud Resource AWS Datacenter Key value	AUTO_SCALING_GROUP

When you complete setting up the connection, you can configure the integration to pull data from Dynatrace periodically. The data is loaded into the staging tables, and then inserted into the target tables.

For more information on where data is saved when pulling data from Dynatrace, see CMDB classes targeted in Service Graph Connector for Observability - Dynatrace.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Additional resources

- Introduction to Service Graph Connector for Observability Dynatrace article on the ServiceNow Community site
- How do I configure the Dynatrace Service Graph Connector? article on the ServiceNow Community site

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Related topics

- Service Graph Connectors
- Service Graph Connector for Observability - Dynatrace properties

Configure Service Graph Connector for Observability - Dynatrace using SGC Central

Set up scheduled import jobs to pull in Dynatrace data into your Configuration Management Database (CMDB).

Before you begin

Install Service Graph Connector for Observability - Dynatrace version 1.11.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the Dynatrace connector type, and then select **Configure connection**.
4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

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a. **Optional:** Install the Observability Commons for CMDB application (sn_observability) for event ingestion.

> **Note:**
> The **Install Observability Commons for CMDB** activity appears only when the Observability Commons for CMDB application (sn_observability) isn't already installed. If event ingestion isn't needed, you can skip this step by selecting **Continue** for the **Install Observability Commons for CMDB** activity.

i. In the **Prerequisites** stage of the playbook, select the **Install Observability Commons for CMDB** activity.

ii. Install the Observability Commons for CMDB application (sn_observability) from the ServiceNow Store.

iii. After you have installed the application, select **Continue**.

b. Create data sources for the connection.

> **Note:**
> This step is required when configuring the connector for the first time only.

i. Verify that you have edit permissions for the Datasource [sys_data_source] table.

ii. In the **Prerequisites** stage of the playbook, select the **Update data source access** activity.

iii. Select **Update access**.

iv. To edit the record, select the **Global** application scope from the application picker.

v. In the Application Access related list of the Data Source form, select the **Can create**, **Can update**, and **Can delete** check boxes.

vi. Select **Update**.

vii. From the application picker, select the application scope of the connector.

viii. After completing the **Update data source access** activity, select **Continue**.

c. Enable creating scheduled jobs for the connection by updating the scheduled data import access.

> **Note:**
> This step is required when configuring the connector for the first time only.

i. Verify that you have edit permissions for the Scheduled Data Import [scheduled_import_set] table.

ii. In the **Prerequisites** stage of the playbook, select the **Update scheduled data import access** activity.

iii. Select **Update access**.

iv. To edit the record, select the **Global** application scope from the application picker.

v. In the Application Access related list of the Data Source form, select the **Can create**, **Can update**, and **Can delete** check boxes.

vi. Select **Update**.

vii. From the application picker, select the application scope of the connector.

viii. After completing the **Update scheduled data import access** activity, select **Continue**.

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d. Enable creating values for the connection by updating the variable value access.

> **Note:**
> This step is required when configuring the connector for the first time only.

i. Verify that you have edit permissions for the Value [sys_variable_value] table.

ii. In the **Prerequisites** stage of the playbook, select the **Update variable value access** activity.

iii. Select **Update access**.

iv. To edit the record, select the **Global** application scope from the application picker.

v. In the Application Access related list of the Data Source form, select the **Can create**, **Can update**, and **Can delete** check boxes.

vi. Select **Update**.

vii. From the application picker, select the application scope of the connector.

viii. After completing the **Update variable value access** activity, select **Continue**.

e. Clear the cache on the Data Source [sys_data_source] table.

> **Note:**
> This step is required when configuring the connector for the first time only.

i. In the **Prerequisites** stage of the playbook, select the **Clear cache** activity.

ii. Select **Run clear cache**.

iii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
     GlideCacheManager.flushTable("sys_data_source");


 GlideTableManager.invalidateTable("scheduled_import_set");
     GlideCacheManager.flushTable("scheduled_import_set");


 GlideTableManager.invalidateTable("sys_variable_value");
     GlideCacheManager.flushTable("sys_variable_value");

     GlideTableManager.invalidateTable("sys_db_object");
     GlideCacheManager.flushTable("sys_db_object");
```

iv. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

v. After the script is executed, select **Close**.

vi. From the application picker, select the application scope of the connector.

vii. After completing the **Clear cache** activity, select **Continue**.

f. Verify that the Event Management application works properly with the Dynatrace environment by copying the `EvtMgmtImpactManagerMediator` script to the Global application scope.

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Note:
This step is displayed only when the Observability Commons for CMDB plugin (sn_observability) is already installed and is required when configuring the connector for the first time only.

i. In the **Prerequisites** stage of the playbook, select the **Enable script access for event management** activity.
ii. Select **Enable script access**.
iii. Select the **Global** application scope from the application picker.
iv. From the context menu, select **Insert and Stay**.
v. Verify that the `EvtMgmtImpactManagerMediator` script was copied to the Global application scope and the **Accessible from** field was set to `All application scopes`.
vi. Select **Update**.
vii. From the application picker, select the application scope of the connector.
viii. After completing the **Enable script access for event management** activity, select **Continue**.

5. Enter connection details and test the API connection for importing Dynatrace data.

a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

b. On the form, fill in the fields.

Create and test connection form

Field	Description
Connection name	Name to identify the Dynatrace connection record.
Hostname	Hostname of your Dynatrace environment.
API Key	Dynatrace API Key. **Note:** The API Key must be prefixed with `api-token`.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

6. **Optional:** Configure the connection and connector properties to map attributes and manage data imports.

Note:
To skip this step, select **Continue** for the **Set configuration properties** activity.

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a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. Fill in the form.

Configuration properties

Field	Description
Management zone Ids	List of the management zone IDs to fetch from your Dynatrace environment. For multiple entries, separate the zone IDs with commas.
Management zone names	List of the management zones to fetch from your Dynatrace environment. For multiple entries, separate the zone names with commas.
Service types	List of the Dynatrace service types from where to ingest the data into the CMDB. For multiple entries, separate the service types with commas. **Note:** All service types except for DATABASE_SERVICE are mapped to the Calculated Application Service [cmdb_ci_service_calculated] CMDB table. The DATABASE_SERVICE service type is mapped to the Database Instance [cmdb_ci_db_instance] CMDB table. Valid values are: ▪ BACKGROUND_ACTIVITY ▪ CICS_SERVICE ▪ CUSTOM_SERVICE ▪ DATABASE_SERVICE ▪ ENTERPRISE_SERVICE_BUS_SERVICE ▪ EXTERNAL ▪ IBM_INTEGRATION_BUS_SERVICE ▪ IMS_SERVICE ▪ MESSAGING_SERVICE ▪ QUEUE_LISTENER_SERVICE ▪ RMI_SERVICE ▪ RPC_SERVICE ▪ WEB_REQUEST_SERVICE ▪ WEB_SERVICE
Tags	List of the tag names to fetch from your Dynatrace environment. For multiple entries, separate the tags with commas.

c. To manage data source failures during import, select the **Save REST response as attachment** check box to save each response as an attachment temporarily.

d. Select **Continue**.

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7. **Optional:** To enable Dynatrace notifications as events in your ServiceNow instance, trigger the workflow to create a problem notification and alerting profile in your Dynatrace environment.

   Note:
   This step is displayed only when the Observability Commons for CMDB plugin (sn_observability) is already installed. To skip this step, select **Skip** for the **Configure observability** activity.

   a. In the **Setup** stage of the playbook, select the **Configure observability** activity.

   b. Select **Create problem notification**.

      Note:
      The created records appear in the Dynatrace application under the display name `ServiceNow default Problem notification` and can be customized.

   c. Dismiss any success alerts and select **Continue**.

8. Configure the import schedule to import data at regular intervals.

   a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

   b. Expand the Parent scheduled data import within the Import schedules list to select the **SGO-Dynatrace Hosts -** *`Connection Name`* import schedule.

   c. Select the **Active** check box, and then fill in the run schedule and time details.

      For more information, see Schedule a data import.

   d. Select **Save**.
      Alternatively, select **Execute Now** to execute the import schedule immediately.

   e. Select **Continue**.

9. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The created connection appears in the Installed connections list.

Related topics

Service Graph Connector for Observability - Dynatrace

CMDB classes targeted in Service Graph Connector for Observability - Dynatrace

Service Graph Connector for Observability - Dynatrace properties

Configure Service Graph Connector for Observability - Dynatrace using guided setup

Use the Service Graph Connector for Observability - Dynatrace to ingest Configuration Management Database (CMDB) data from Dynatrace using REST APIs. This connector is the second generation of the Service Graph Connector for Observability - Dynatrace application developed by ServiceNow.

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Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- The Observability Commons for CMDB (sn_observability) plugin, which is only required for event ingestion and must be installed before installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store .

Note:
To access the Dynatrace API, you need an access token with Read entities (entities.read) scope.

Role required: SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Dynatrace Observability** > **Setup**.
2. On the Getting started page, select **Get Started**.
3. Set impact values for clusters and have the connector get access to the `SNC.ImpactManager` API.

   Note:
   This step appears when Observability Commons is installed.

   a. On the Setup page, in the Enable Access To SNC.Impact Manager section, select the **Copy Script to Global Scope** task.

   b. In the Copy Script to Global Scope section, copy the script.

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i. Select **Configure**.

ii. Switch to the global scope.

iii. Select the Additional actions icon ( ).

iv. Select **Insert and Stay**.

v. Select **Mark as Complete**.

c. In the Verify script is copied properly section, verify the script.

i. Select **Configure**.

ii. Select the *EvtMgmtImpactManagerMediator* script and verify it was copied to the global scope.

iii. In the **Accessible from** field, ensure it is set to **All application scopes**.

iv. Select **Mark as Complete**.

4. Configure the basic setup.

a. On the Setup page, in the Basic section, select the **Configure Auth Token for Dynatrace** task.

b. On the next page, in the Configure Auth Token for Dynatrace section, configure the authentication token.

i. Select **Configure**.

ii. In the **API Key** field, enter `api-token <your api token>`.

For example, `api-token mytokenid`.

iii. Select **Mark as Complete**.

c. In the Configure HTTP Connection for Dynatrace section, configure the HTTP connection.

i. Select **Configure**.

ii. Update the **Host** field with a fully qualified hostname for your Dynatrace instance.

For example, `abc123.live.dynatrace.com`.

The hostname is automatically filled in the **Connection URL** field.

iii. Enable the use of a MID Server, select the **Use MID Server** check box.

Note:
The HTTP connection will be pre-configured to use the API key that was configured during the previous setup task.

iv. Select **Mark as Complete**.

d. Test the HTTP connection.

i. In the Test Connection section, select **Configure**.

ii. To test the connection configuration, select **Test Connection**.

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Note:
If any of the tests have errors, follow the suggestions for remediation.

iii. Set the Test Connection task to complete by selecting **Mark as Complete**.

e. In the Create Default Notification Payload Template section, select **Configure**.

Note:
You need an access token with the following scopes:

- Read configuration (ReadConfig)
- Write configuration (WriteConfig)
- Read log content (LogExport)
- Read metrics (metrics.read)
- Read settings (settings.read)
- Write settings (settings.write)
- Read logs (logs.read)

i. Update the name of the payload template, if needed.

ii. Select **Problem Notification Setup**.

iii. Set the Create Default Notification Payload Template task to complete by selecting **Mark as Complete**.

f. Optional: If you want to support multiple instances, in the Upgrade Source Native Keys section, select **Configure**.

i. In the **Run script** text box of the background script page, enter the following script:

```
var gr = new GlideRecord("sys_object_source");
gr.addQuery("name", "SGO-Dynatrace");
var grOR = gr.addQuery("id", "STARTSWITH", "HOST-");
grOR.addOrCondition("id", "STARTSWITH",
 "PROCESS_GROUP_INSTANCE-");
grOR.addOrCondition("id", "STARTSWITH", "PROCESS_GROUP-");
grOR.addOrCondition("id", "STARTSWITH", "SERVICE-");
grOR.addOrCondition("id", "STARTSWITH", "APPLICATION-");
gr.query();
while (gr.next()) {
    gr.setValue("id", "f379137e075820107add6a77c4a93538|||"
 + gr.getValue("id"));
    gr.update();
}
```

ii. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

iii. After the script is executed, select **Close**.

iv. From the application picker, select the **Service Graph Connector for Observability Dynatrace** application.

v. Select **Mark as Complete**.

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5. For a Grail-enabled tenant, configure the OAuth 2.0 client credentials and test the connection. For more information on Dynatrace OAuth credentials, see Authentication for the Account Management API on the Dynatrace documentation site.

   a. Set the Dynatrace Grail status to indicate whether using the Grail-enabled tenant.

   Note:

   You can check Grail enablement by contacting your Dynatrace administrator.

      i. In the Configure Dynatrace Grail OAuth section of the Service Graph Connector for Observability Dynatrace Setup page, select **Get Started**.
      ii. For the Set Dynatrace Grail status task, select **Configure** and review or modify the property settings for a Grail-enabled tenant.
      iii. If you've Grail-enabled tenant, set the **Value** field of the *grailEnabled* property to `true`.

      Else, leave the value set to `false`.

      iv. Set the Configure Dynatrace Grail OAuth task to complete by selecting **Mark as Complete**.

   b. Add a new OAuth connection.

   Note:
   You need an OAuth token with the following scope permissions in Grail:

   - storage:logs:read
   - storage:buckets:read

      i. In the Configure OAuth credentials section, select **Configure**.
      ii. On the Workflow Studio page that opens in a new browser tab, select **Add Connection**.
      iii. Enter a name, the connection URL, OAuth client ID, and OAuth client secret details.
      iv. Select **Create and Get OAuth Token**.
      v. Return to the guided setup page.
      vi. Set the Configure OAuth credentials task to complete by selecting **Mark as Complete**.

   c. Test the new OAuth connection.
      i. In the Test Connection section, select **Configure**.
      ii. To test the connection configuration, select **Test Connection**.
      iii. When the **Status** field is set to **Success**, select **Update** to close the Test the connection dialog box and return to the guided setup page.

      If any of the tests have errors, follow the suggestions for remediation.

      iv. Set the Test Connection task to complete by selecting **Mark as Complete**.

6. Set up the additional configurations.

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a. On the Guided setup page, in the Advanced section, select the **Advanced settings** task.

b. In the Advanced Settings section, select **Configure** and review or modify the existing settings for a custom configuration.
You can configure the following settings:

- Review the page size used in REST API requests to fetch Dynatrace entities.
- Define number of days a configuration item (CI) can be inactive before it is ignored.
- Enter the percentage of an application cluster's nodes that need to be in a state to raise that state to its parent in the service map.

  For example, you can define the percentage of nodes that need to go critical for the parent of a cluster to be in a critical state. If there are 10 nodes in a cluster, setting the property value to `70` would require at least 7 out of the 10 nodes in the cluster to go into a critical state to reflect up to the parent service of the cluster.

- Enable ingesting events that do not have a matching CI in the CMDB.
- Enable populating the Application (cmdb_ci_appl) CIs from Dynatrace (Dynatrace processes) during scheduled imports.

c. Select **Save**.

d. Select **Mark as Complete** for the Advanced Settings task.

e. Configure connection properties for the Dynatrace connection.

i. In the Configure Instance Settings section, select **Configure**.

ii. In the Service Graph Connection Properties related list, configure the properties of the connection record.

Dynatrace connection properties

Property	Description
managementZoneNames	Enter the name of the management zone to fetch from your Dynatrace environment. For multiple entries, separate the zone names with commas.
tags	Enter the name of the tags to fetch from your Dynatrace environment. For multiple entries, separate the tags with commas.
serviceTypes	Enter the list of Dynatrace service types from where to ingest the data into CMDB. For multiple entries, separate the service types with commas.

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Property	Description
	Note: All service types except for DATABASE_SERVICE are mapped to the Calculated Application Service [cmdb_ci_service_calculated] CMDB table. The DATABASE_SERVICE service type is mapped to the Database Instance [cmdb_ci_db_instance] CMDB table. Valid values are: ▪ BACKGROUND_ACTIVITY ▪ CICS_SERVICE ▪ CUSTOM_SERVICE ▪ DATABASE_SERVICE ▪ ENTERPRISE_SERVICE_BUS_SERVICE ▪ EXTERNAL ▪ IBM_INTEGRATION_BUS_SERVICE ▪ IMS_SERVICE ▪ MESSAGING_SERVICE ▪ QUEUE_LISTENER_SERVICE ▪ RMI_SERVICE ▪ RPC_SERVICE ▪ WEB_REQUEST_SERVICE ▪ WEB_SERVICE
managementZoneIds	Enter the management zone ID to fetch from your Dynatrace environment. For multiple entries, separate the zone IDs with commas.

iii. Select **Update**.

iv. Complete the Configure Instance Settings task by selecting **Mark as Complete**.

f. Execute the *`Fix Older Ids`* fix script to migrate the IDs of the imported data from the previous format to the latest format of the object IDs.

Note:
Beginning with the 1.9.0 version of the Service Graph Connector for Observability - Dynatrace, the latest format of the object IDs, which is Base64 Encoding, is used for data import. The *`Fix Older Ids`* fix script migrates any existing data with previous object IDs to the latest format.

g. Configure the notification settings.

The setup enables pulling ITOM events from Dynatrace into the ServiceNow instance.

i. In the Configure Problem Notification section, select **Configure**.

ii. To push the configuration to Dynatrace, select **Problem Notification Setup**.

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iii. To receive the configuration from Dynatrace, select **Fetch Notification Setup**.

iv. Complete the Configure Problem Notification task by selecting **Mark as Complete**.

7. Clean up records from the previous instance.

Note:
If you are not migrating from the previous Dynatrace version, you can skip this step.

a. On the Setup page, in the Clean Up Records From Previous Integration section, select the **Execute the New Integration** task.

b. On the next page, in the Execute the New Integration section, select **Configure** and select **Update**.

c. Select **Mark as Complete**.

d. In the Verify Integration Execution Has Completed section, verify the integration execution.

i. Select **Configure**.

ii. In the **State** field, wait for the field to change to **Complete** or **Complete with errors**.

It is normal to have errors during the migration from an older version.

iii. To refresh the list, select and hold (or right-click) the header and select **Refresh List**.

iv. Select **Mark as Complete**.

e. In the Delete Application Services Left Over From Previous Version section, select **Configure** to delete any application services that you no longer need from the previous integration.

f. Select **Mark as Complete**.

g. In the Cleanup Identification Remnants - Copy Script section, copy the script.

i. Select **Configure**.

ii. Change the current scope to **Global**.

iii. Select the menu icon ( ).

iv. Select **Insert and Stay**.

v. Select **Mark as Complete**.

h. In the Cleanup Identification Remnants - Execute Script section, execute the script.

i. Select **Configure**.

ii. Select the record of the script you copied.

iii. Select **Update**.

8. **Optional:** Add multiple instances.

Note:
If you do not need to add multiple instances, you can skip this step.

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a. In the Add Multiple Instances section of the Service Graph Connector for Observability - Dynatrace page, select **Get Started**.

b. Update the data source access to create a data source for the new connection.
   i. Ensure that you have edit permissions for the Datasource [sys_data_source] table.
   ii. For the Update Data Source Access task, select **Configure**.
   iii. To edit the record, select the **Global** application scope from the application picker.
   iv. In the Application Access related list of the Data Source form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.
   v. Select **Update** to return to the guided setup page.
   vi. Select the **Service Graph Connector for Observability Dynatrace** application scope from the application picker.
   vii. Set the Update Data Source Access task to complete by selecting **Mark as Complete**.

c. Update the scheduled data import access to create a scheduled import for the new connection.
   i. Ensure that you have edit permissions for the Scheduled data import [scheduled_import_set] table.
   ii. For the Update Scheduled Data Import Access task, select **Configure**.
   iii. To edit the record, select the **Global** application scope from the application picker.
   iv. In the Application Access related list of the Data Source form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.
   v. Select **Update** to return to the guided setup page.
   vi. Select the **Service Graph Connector for Observability Dynatrace** application scope from the application picker.
   vii. Set the Update Scheduled Data Import Access task to complete by selecting **Mark as Complete**.

d. Update the value access to create the data source for the new connection.
   i. Ensure that you have edit permissions for the Value [sys_variable_value] table.
   ii. For the Update Value Access task, select **Configure**.
   iii. To edit the record, select the **Global** application scope from the application picker.
   iv. In the Application Access related list of the Data Source form that opens in a new tab, select the **Can create**, **Can update**, and **Can delete** check boxes.
   v. Select **Update** to return to the guided setup page.
   vi. Select the **Service Graph Connector for Observability Dynatrace** application scope from the application picker.
   vii. Set the Update Value Access task to complete by selecting **Mark as Complete**.

e. Clear the data source and import set cache for the new connection.
   i. For the Clear Cache for Datasource and Import set task, select **Configure**.
   ii. In the **Run script** text box of the background script page, enter the following script:

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```
     GlideTableManager.invalidateTable("sys_data_source");
     GlideCacheManager.flushTable("sys_data_source");


GlideTableManager.invalidateTable("scheduled_import_set");
     GlideCacheManager.flushTable("scheduled_import_set");


GlideTableManager.invalidateTable("sys_variable_value");
     GlideCacheManager.flushTable("sys_variable_value");

     GlideTableManager.invalidateTable("sys_db_object");
     GlideCacheManager.flushTable("sys_db_object");
```

iii. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

iv. After the script is executed, select **Close**.

v. Select the **Service Graph Connector for Observability Dynatrace** application scope from the application picker.

vi. Set the Clear Cache for Datasource and Import set task to complete by selecting **Mark as Complete**.

f. Add another connection.

i. Ensure that the application scope is set to **Service Graph Connector for Observability** in the application picker.

ii. For the Add Another Connection task, select **Configure**.

iii. On the Workflow Studio page that opens in a new browser tab, select **Add Connection**.

iv. On the form, fill in the fields.

Connection form

Field	Description
Connection Name	Display name for the connection.
Connection Hostname	Host name of the Dynatrace instance.
API Key	Dynatrace API Key. **Note:** The API Key must be prefixed with `api-token`.

v. Select **Create Connection**.

vi. Return to the guided setup page.

vii. Set the Add Another Connection task to complete by selecting **Mark as Complete**.

g. If using a Grail-enabled tenant, configure additional OAuth 2.0 connections.

i. For the Add another OAuth connection task, select **Configure**.

ii. On the Workflow Studio page that opens in a new browser tab, select **Add Connection**.

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iii. Enter a name, the connection URL, OAuth client ID, and OAuth client secret details.

iv. Select **Create and Get OAuth Token**.

v. Return to the guided setup page.

vi. Set the Add another OAuth connection task to complete by selecting **Mark as Complete**.

h. If using a Grail-enabled tenant, select the OAuth 2.0 client credentials alias created earlier in the Add another OAuth connection task.

i. For the Link connection record with OAuth client credentials task, select **Configure**.

ii. In the **OAuth 2.0 Connection and Credentials Alias** field, search for and select the OAuth connection alias you created in the step 8.g.

iii. In the **Service Graph connection record**, search for and select the connection record you created in step 8.f.

iv. Select **Submit**.

v. Return to the guided setup page.

vi. Set the Link connection record with OAuth client credentials task to complete by selecting **Mark as Complete**.

i. **Optional:** Set up the MID Server for the connection you created.

i. For the Configure Mid Servers task, select **Configure**.

ii. Select the name of the connection you created.

iii. Select the **Use MID server** check box.

iv. Select **Update**.

v. Set the Configure Mid Servers task to complete by selecting **Mark as Complete**.

j. Configure the instance settings.

i. In the Configure Instances section, select **Configure**.

ii. Select the name of the connection you want to configure and then select **Update**.

iii. Set the Configure Instances task to complete by selecting **Mark as Complete**.

k. Test the new connections.

i. For the Test Connections task, select **Configure**.

ii. Select the name of the connection you want to test.

iii. To validate the data source configuration, select **Test Load 20 Records**.

iv. When the **Status** field is set to **Success**, select **Update** to close the Test the connection dialog box and return to the guided setup page.

If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test Connections task to complete by selecting **Mark as Complete**.

l. Create default notification payload templates.

i. Ensure that you have the access token with the following scopes:

- Read configuration (ReadConfig)
- Write configuration (WriteConfig)

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- Read log content (LogExport)
- Read metrics (metrics.read)

ii. For the Create Default Notification Payload Templates task, select **Configure**.

iii. Select the connection you want to create a default notification payload template for.

iv. Update the name of the payload template, if needed.

v. Select **Problem Notification Setup**.

The notification is created with the payload parameters as described in the following table.

Notification payload paramters

Parameter	Description
name	Name of the notification. The name is automatically prefixed with `ServiceNow Default Problem Notification` and the instance name is added to it.
alertingProfile	ID of the alerting profile in Dynatrace.
type	Type of payload that is automatically set to `webhook`.
url	Webhook URL in the format `https://https://<instance name>.service-now.com/ /api/sn_em_connector/em/inbound_event?source=SGO-Dynatrace`.
payload	Custom payload created for notification in the following format:

```
{
  "ImpactedEntities": {ImpactedEntities},
  "ImpactedEntity": "{ImpactedEntity}",
  "PID": "{PID}",
  "ProblemDetailsHTML": "{ProblemDetailsHTML}",
  "ProblemDetailsJSON": {ProblemDetailsJSON},
  "ProblemDetailsMarkdown":
 "{ProblemDetailsMarkdown}",
  "ProblemDetailsText": "{ProblemDetailsText}",
  "ProblemID": "{ProblemID}",
  "ProblemImpact": "{ProblemImpact}",
  "ProblemSeverity": "{ProblemSeverity}",
  "ProblemTitle": "{ProblemTitle}",
  "ProblemURL": "{ProblemURL}",
  "State": "{State}",
  "Tags": "{Tags}"
```

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Parameter	Description
	}

vi. Repeat the steps for each connection.

vii. Set the Create Default Notification Payload Templates task to complete by selecting **Mark as Complete**.

9. Set up scheduled import jobs.

   a. In the Set up scheduled import jobs section of the Service Graph Connector for Observability - Dynatrace page, select **Get Started**.

   b. For the Configure the scheduled import jobs task, select **Configure**.

   c. Select the name of the scheduled import you want to run.

   d. On the Scheduled Data Import form, verify the field values for the scheduled job and select the **Active** check box.

      For more information, see Schedule a data import.

   e. Select **Update**.

   f. Set the Set up scheduled import jobs task to complete by selecting **Mark as Complete**.

CMDB classes targeted in Service Graph Connector for Observability - Dynatrace

When you complete setting up the connection, you can configure the integration to periodically pull data from Dynatrace. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Application [cmdb_ci_appl]

The following attributes in the Application [cmdb_ci_appl] table are populated by collected data.

Attribute label	Attribute name
Class	sys_class_name
Configuration file	config_file
Installation directory	install_directory
Name	name
Operational status	operational_status
Running process command	running_process_command
Running process key parameters	running_process key parameters
Version	version

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Relationships created for Application

Parent class	Relationship type	Child class
Application [cmdb_ci_appl]	Runs on::Runs	Computer [cmdb_ci_computer]
Application [cmdb_ci_appl]	Runs on::Runs	Docker Container [cmdb_ci_docker_container]
Application [cmdb_ci_appl]	Reference	Key value [cmdb_key_value]

Note:
Based on the Discovery Process Classifications list, the tables that extend the Application [cmdb_ci_appl] table are populated by the SGO-Dynatrace Processes [sn_dynatrace_integ_sg_dynatrace_processes] data source.

Availability Zone [cmdb_ci_availability_zone]

The following attributes in the Availability Zone [cmdb_ci_availability_zone] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id

AWS Datacenter [cmdb_ci_aws_datacenter]

The following attributes in the AWS Datacenter [cmdb_ci_aws_datacenter] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id
Region	region

Relationships created for AWS Datacenter

Parent class	Relationship type	Child class
AWS Datacenter [cmdb_ci_aws_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
AWS Datacenter [cmdb_ci_aws_datacenter]	Contains::Contained by	Availability Zone [cmdb_ci_availability_zone]

Azure Datacenter [cmdb_ci_azure_datacenter]

The following attributes in the Azure Datacenter [cmdb_ci_azure_datacenter] table are populated by collected data.

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Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id
Region	region

Relationship created for Azure Datacenter

Parent class	Relationship type	Child class
Azure Datacenter [cmdb_ci_azure_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Calculated Application Service [cmdb_ci_service_calculated]

The following attributes in the Calculated Application Service [cmdb_ci_service_calculated] table are populated by collected data.

Attribute label	Attribute name
Comments	comments
Correlation ID	correlation_id
Hide from dashboard	hide_from_dashboard
Metadata	metadata
Name	name
Operational status	operational_status
Service Populator	service_populator
Service Populator Status	populator_status
Service Type	type

Note:
The *Comments* attribute includes the following information:

- Service Type
- Edition
- TCP Port

Relationships created for Calculated Application Service

Parent class	Relationship type	Child class
Calculated Application Service [cmdb_ci_service_calculated]	Depends on::Used by	Configuration Item [cmdb_ci]

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Relationships created for Calculated Application Service (continued)

Parent class	Relationship type	Child class
Calculated Application Service [cmdb_ci_service_calculated]	Runs on::Runs	Computer [cmdb_ci_computer]
Calculated Application Service [cmdb_ci_service_calculated]	Contains::Contained by	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
Calculated Application Service [cmdb_ci_service_calculated]	Contains::Contained by	Group [cmdb_ci_group]
Calculated Application Service [cmdb_ci_service_calculated]	Reference	Key value [cmdb_key_value]

Cloud DataBase [cmdb_ci_cloud_database]

The following attributes in the Cloud DataBase [cmdb_ci_cloud_database] table are populated by collected data.

Attribute label	Attribute name
Fully qualified domain name	fqdn
Install Status	install_status
Name	name
Object ID	object_id
State	state
TCP port(s)	tcp_port
Type	type
Version	version

Relationships created for Cloud DataBase

Parent class	Relationship type	Child class
Cloud DataBase [cmdb_ci_cloud_database]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud DataBase [cmdb_ci_cloud_database]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	Key Value [cmdb_key_value]

Cloud Function [cmdb_ci_cloud_function]

The following attributes in the Cloud Function [cmdb_ci_cloud_function] table are populated by collected data.

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Attribute label	Attribute name
Code Size	code_size
Fully qualified domain name	fqdn
Install Status	install_status
Language	language
Name	name
Object ID	object_id
Version	version

Relationships created for Cloud Function

Parent class	Relationship type	Child class
Cloud Function [cmdb_ci_cloud_function]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Function [cmdb_ci_cloud_function]	Reference	Key Value [cmdb_key_value]

Cloud Hardware Type [cmdb_ci_cloud_hardware_type]

The following attributes in the Cloud Hardware Type [cmdb_ci_cloud_hardware_type] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id
Provider	provider

Relationship created for Cloud Hardware Type

Parent class	Relationship type	Child class
Cloud Hardware Type [cmdb_ci_cloud_hardware_type]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]

The following attributes in the Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id

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Cloud Load Balancer [cmdb_ci_cloud_load_balancer]

The following attributes in the Cloud Load Balancer [cmdb_ci_cloud_load_balancer] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status

Relationships created for Cloud Load Balancer

Parent class	Relationship type	Child class
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Owns::Owned by	Cloud LB IPAddress [cmdb_ci_cloud_lb_ipaddress]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	Key Value [cmdb_key_value]

Cloud Object Storage [cmdb_ci_cloud_object_storage]

The following attributes in the Cloud Object Storage [cmdb_ci_cloud_object_storage] table are populated by collected data.

Attribute label	Attribute name
Cloud Provider	cloud_provider
Install Status	install_status
Name	name
Object ID	object_id
Service Name	service_name

Relationships created for Cloud Object Storage

Parent class	Relationship type	Child class
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Reference	Key Value [cmdb_key_value]

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Cloud Resource [cmdb_ci_cmp_resource]

The following attributes in the Cloud Resource [cmdb_ci_cmp_resource] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Name	name
Object ID	object_id

Relationships created for Cloud Resource

Parent class	Relationship type	Child class
Cloud Resource [cmdb_ci_cmp_resource]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Resource [cmdb_ci_cmp_resource]	Reference	Key Value [cmdb_key_value]

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data.

Attribute label	Attribute name
Account Id	account_id
Datacenter Type	datacenter_type
Install Status	install_status
Name	name
Object ID	object_id
Operational status	operational_status

Cloud Storage Account [cmdb_ci_cloud_storage_account]

The following attributes in the Cloud Storage Account [cmdb_ci_cloud_storage_account] table are populated by collected data.

Attribute label	Attribute name
Name	name
Install Status	install_status
Object ID	object_id
Sku Name	sku_name

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Relationships created for Cloud Storage Account

Parent class	Relationship type	Child class
Cloud Storage Account [cmdb_ci_cloud_storage_account]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Storage Account [cmdb_ci_cloud_storage_account]	Reference	Key Value [cmdb_key_value]

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data.

Attribute label	Attribute name
Class	sys_class_name
CPU core count	cpu_core_count
DNS Domain	dns_domain
Fully qualified domain name	fqdn
Is Virtual	virtual
Name	name
Operating System	os
OS Version	os_version
RAM (MB)	ram

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Reference	Key Value [cmdb_key_value]
Computer [cmdb_ci_computer]	Reference	Software Installation [cmdb_sam_sw_install]

Docker Container [cmdb_ci_docker_container]

The following attributes in the Docker Container [cmdb_ci_docker_container] table are populated by collected data.

Attribute label	Attribute name
Container id	container_id
Install Status	install_status
Name	name

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Note:
The *Install Status* value is based on the value of the *properties.containerStatus.state* field in the incoming payload.

- If the *properties.containerStatus.state* value is `running`, the *Install Status* value is set to `1 (Installed)`.
- If the *properties.containerStatus.state* value is `terminated` or is empty, or if there are any errors, the *Install Status* value is set to `7 (Retired)`.
- For all other *properties.containerStatus.state* values, the *Install Status* value isn't updated.

Docker Image [cmdb_ci_docker_image]

The following attributes in the Docker Image [cmdb_ci_docker_image] table are populated by collected data.

Attribute label	Attribute name
Image id	image_id
Image digest	image_digest
Name	name

Relationship created for Docker Image

Parent class	Relationship type	Child class
Docker Image [cmdb_ci_docker_image]	Instantiates::Instantiated by	Docker Container [cmdb_ci_docker_container]

DynamoDB Table [cmdb_ci_dynamodb_table]

The following attributes in the DynamoDB Table [cmdb_ci_dynamodb_table] table are populated by collected data.

Attribute label	Attribute name
Name	name
Install Status	install_status
Object ID	object_id

Relationships created for DynamoDB Table

Parent class	Relationship type	Child class
DynamoDB Table [cmdb_ci_dynamodb_table]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
DynamoDB Table [cmdb_ci_dynamodb_table]	Reference	Key Value [cmdb_key_value]

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Group [cmdb_ci_group]

The following attribute in the Group [cmdb_ci_group] table is populated by collected data.

Attribute label	Attribute name
Name	name

Relationship created for Group

Parent class	Relationship type	Child class
Group [cmdb_ci_group]	Contains::Contained by	Application [cmdb_ci_appl]

Hardware Type [cmdb_ci_compute_template]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id

Relationship created for Hardware Type

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Image [cmdb_ci_os_template]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id

Relationship created for Image

Parent class	Relationship type	Child class
Image [cmdb_ci_os_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Instance Scale Set [cmdb_ci_instance_scale_set]

The following attributes in the Instance Scale Set [cmdb_ci_instance_scale_set] table are populated by collected data.

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Attribute label	Attribute name
Name	name
Install Status	install_status
Object ID	object_id

Relationships created for Instance Scale Set

Parent class	Relationship type	Child class
Instance Scale Set [cmdb_ci_instance_scale_set]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Instance Scale Set [cmdb_ci_instance_scale_set]	Reference	Key Value [cmdb_key_value]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data.

Attribute label	Attribute name
IP Address	ip_address
IP version	ip_version
Name	name

Key value [cmdb_key_value]

The following attributes in the Key value [cmdb_key_value] table are populated by collected data.

Attribute label	Attribute name
Key	key
Value	value

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

The following attributes in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table are populated by collected data.

Attribute label	Attribute name
Cluster Resource ID	cluster_resource_id
Install Status	install_status
Name	name

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Relationships created for Kubernetes Cluster

Parent class	Relationship type	Child class
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Namespace [cmdb_ci_kubernetes_namespace]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Cluster of::Cluster	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Service [cmdb_ci_kubernetes_service]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Pod [cmdb_ci_kubernetes_pod]

Kubernetes Namespace [cmdb_ci_kubernetes_namespace]

The following attributes in the Kubernetes Namespace [cmdb_ci_kubernetes_namespace] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Kubernetes UID	k8s_uid
Name	name

Kubernetes Node [cmdb_ci_kubernetes_node]

The following attributes in the Kubernetes Node [cmdb_ci_kubernetes_node] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Kubernetes UID	k8s_uid
Name	name

Kubernetes Pod [cmdb_ci_kubernetes_pod]

The following attributes in the Kubernetes Pod [cmdb_ci_kubernetes_pod] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace

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Relationships created for Kubernetes Pod

Parent class	Relationship type	Child class
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Runs on::Runs	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Container [cmdb_ci_docker_container]

Kubernetes Service [cmdb_ci_kubernetes_service]

The following attributes in the Kubernetes Service [cmdb_ci_kubernetes_service] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data.

Attribute label	Attribute name
DNS Domain	dns_domain
Fully qualified domain name	fqdn
Is Virtual	virtual
Name	name
Object ID	object_id

Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]
Server [cmdb_ci_server]	Reference	Key Value [cmdb_key_value]

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data.

Attribute label	Attribute name
Key	key

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Attribute label	Attribute name
Name	name
Version	version

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data.

Attribute label	Attribute name
Discovery source	discovery_source
Display name	display_name
Version	version

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data.

Attribute label	Attribute name
Installed on	installed_on
Name	name

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data.

Attribute label	Attribute name
Install Status	install_status
IP Address	ip_address
Name	name

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Attribute label	Attribute name
Object ID	object_id
Operational status	operational_status
VM Instance ID	vm_inst_id

Relationships created for Virtual Machine Instance

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Hardware Type [cmdb_ci_compute_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Cloud Hardware Type [cmdb_ci_cloud_hardware_type]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Image [cmdb_ci_os_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	Key Value [cmdb_key_value]

Set up push notifications from Dynatrace

Set up push notifications of events from Dynatrace into a ServiceNow instance that has the Service Graph Connector for Observability - Dynatrace installed.

Before you begin

If you don't have an alerting profile in Dynatrace, then complete the following steps to create one:

1. Navigate to **Settings** > **Alerting** > **Alerting Profiles**.
2. Set up an alerting profile according to your business needs.

> **Note:**
> For more information about how to set up an alerting profile, see Alerting profiles on the Dynatrace documentation site.

You must have Observability Commons for CMDB installed.

Role required: admin

Procedure

1. In the Dynatrace instance, navigate to **Settings** > **Integration** > **Problem notifications**.
2. Click **Add Notification**.
3. On the form, fill in the fields.

Field	Value
Notification Type	Custom Integra

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Field	Value
Display Name	Name of the no
Webhook URL	Use the followi `sn_em_conn`
Additional HTTP Headers > Create basic authorization	**a.** In the Servic **i.** Navigate to **ii.** Select the **iii.** Set the **Pa** **iv.** Clear the **P** **v.** Update or **b.** Set the **User** **c.** Set the **Pass** **d.** Click **Add**.
Custom Payload	Use the followi `{ "connec "Impact "Impact "PID": "Proble "Proble "Proble "Proble "Proble "Proble "Proble "Proble "Proble "State" "Tags": }`

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Field	Value
	Note: For the <cc **a.** Navigate **b.** Select to **c.** Right-cli
Alerting Profile	Select the alert
Sending Test Notifications	Click to send a

Service Graph Connector for Observability - Dynatrace properties

Service Graph Connector for Observability - Dynatrace properties control the behavior of the connector.

Connection properties

These connection properties are available for Service Graph Connector for Observability - Dynatrace.

Note:
To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **Dynatrace Observability** > **Connections** and select the connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

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Connection properties for Service Graph Connector for Observability - Dynatrace

Property	Description
managementZoneIds	Enter a list of management zone IDs to fetch from Dynatrace. For multiple entries, separate the IDs with commas.
managementZoneNames	Enter a list of management zones to fetch from Dynatrace. For multiple entries, separate the names with commas.
tags	Enter a list of tags to fetch from Dynatrace. For multiple entries, separate the tags with commas.
grailEnabled	Set the property to `true` for a Grail-enabled tenant.
OAuth Connection	View the Sys ID of the OAuth connection and credential alias linked to the Service Graph connection record.
serviceTypes	Enter a list of Dynatrace service types from where to ingest the data into CMDB. For multiple entries, separate the service types with commas. Valid values are: • BACKGROUND_ACTIVITY • CICS_SERVICE • CUSTOM_SERVICE • DATABASE_SERVICE • ENTERPRISE_SERVICE_BUS_SERVICE • EXTERNAL • IBM_INTEGRATION_BUS_SERVICE • IMS_SERVICE • MESSAGING_SERVICE • QUEUE_LISTENER_SERVICE • RMI_SERVICE • RPC_SERVICE • WEB_REQUEST_SERVICE • WEB_SERVICE
saveRESTResponseAsAttachment	Set the property to `true` to use the SGO-Dynatrace Fetch Entities For Larger Payload action flow and save the response from Dynatrace as an attachment with a `.json` extension. Set the property to `false` to use the dedicated action flow and consume the response from Dynatrace as a data stream for processing.

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Connection properties for Service Graph Connector for Observability - Dynatrace (continued)

Property	Description
	• Type: true | false • Default value: `false`
flowDesignerTimeout	Set the timeout value (in milliseconds) for a Dynatrace flow, subflow, or action execution. • Type: integer • Default value: `600000`

System properties

These system properties are available for Service Graph Connector for Observability - Dynatrace.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

System properties for Service Graph Connector for Observability - Dynatrace

Property	Description
sn_dynatrace_integ.append_environment_id_to_service_name	Set the property to `true` to append the Dynatrace Environment ID to the Service name. Set the property to `false` to retain the Service name as is. • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table
sn_dynatrace_integ.createUnmatchedApplicationCIs	Set the property to `true` to add unclassified processes to the Application [cmdb_ci_appl] table. Set the property to `false` to ignore unclassified processes. • Type: true | false • Default value: `true` • Location: System Property [sys_properties] table

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System properties for Service Graph Connector for Observability - Dynatrace (continued)

Property	Description
	Note: Classified processes are added to the corresponding child application classes in the Application [cmdb_ci_appl] table regardless of the value of this property.
sn_dynatrace_integ.default_from_value_days	Enter the number of days a configuration item (CI) can be inactive before it is ignored. • Type: integer • Default value: `300` • Location: System Property [sys_properties] table
sn_dynatrace_integ.page_size	Enter the page size used in REST requests to fetch Dynatrace entities. • Type: integer • Default value: `50` • Location: System Property [sys_properties] table
sn_dynatrace_integ.populate_applications	Set the property to `true` to populate the Application [cmdb_ci_appl] CIs from Dynatrace processes. Set the property to `false` to ignore the Application [cmdb_ci_appl] CIs. • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table

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System properties for Service Graph Connector for Observability - Dynatrace (continued)

Property	Description
	Note: This property is read via scheduled imports. The manual execution of the SGO-Dynatrace Processes and SGO-Dynatrace Process Groups data sources will not consider this property.
sn_dynatrace_integ.critical_cluster_threshold	Enter the percentage of an application cluster's nodes that need to be in a state to raise that state to its parent in the service map. **Note:** This system property is available only if the Observability Commons for CMDB (sn_observability) plugin is installed. For more information, see Observability Commons for CMDB on the ServiceNow Store. • Type: integer • Default value: `75` • Location: System Property [sys_properties] table
sn_dynatrace_integ.events_for_unmatched_ci.enabled	Set the property to `true` to ingest events that don't have a matching CI in CMDB. **Note:** This system property is available only if the Observability Commons for CMDB (sn_observability) plugin is installed. For more information, see Observability Commons for CMDB on the ServiceNow Store.

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System properties for Service Graph Connector for Observability - Dynatrace (continued)

Property	Description
	• Type: true | false • Default value: `false` • Location: System Property [sys_properties] table

Accessing the connection details of Service Graph Connector for Observability - Dynatrace

You can access the connection details of the Service Graph Connector for Observability - Dynatrace in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Observability - Dynatrace. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection.

Access the details of a Dynatrace connection

Access the details of a Dynatrace connection configured for the Service Graph Connector for Observability - Dynatrace.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Dynatrace Observability** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Related topics

Service Graph Connector for Observability - Dynatrace properties

Accessing the connection details of Service Graph Connectors

Service Graph Connector for Observability - New Relic

Use the Service Graph Connector for Observability - New Relic to ingest CMDB data from a New Relic installation using REST APIs. Push events from New Relic into ServiceNow with Event Management.

Request apps on the Store

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

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Supported versions

- New Relic version: Last tested on July 01, 2025
- Supported ServiceNow versions:
  - Xanadu
  - Yokohama
  - Zurich

Configuring a connection for the connector

Use the SGC Central view in the Service Graph Workspace or CMDB Workspace to install the connector and configure the connection. The view enables you to install and discover connectors and to manage the full life cycle of creating, editing, monitoring, and debugging connections. For instructions, see Configure Service Graph Connector for Observability - New Relic using SGC Central.

Important:
Unless there are configuration issues, use SGC Central to configure the connection. The guided setup method for configuration is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Observability New Relic integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the New Relic data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

The following data sources are included for New Relic:

- SG-New Relic Application Services
- SG-New Relic Applications
- SG-New Relic Disks
- SG-New Relic Hosts
- SG_New Relic Networks

When you complete setting up the connection, you can configure the integration to periodically pull data from the New Relic application. The data is loaded into the following staging tables:

- SG-New Relic Applications [sn_newrelic_integ_sg_new_relic_applications]
- SG-New Relic Application Services [sn_newrelic_integ_application_services]
- SG-New Relic Disks [sn_newrelic_integ_disks]
- SG-New Relic Hosts [sn_newrelic_integ_hosts]
- SG_New Relic Networks [sn_newrelic_integ_networks]

The data is then inserted into the following target tables:

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- Application [cmdb_ci_appl]
- Application service [cmdb_ci_service_calculated]
- Disk [cmdb_ci_disk]
- IP Address[cmdb_ci_ip_address]
- Network Adapter [cmdb_ci_network_adapter]
- Running Process [cmdb_running_process]
- Server [cmdb_ci_server]
- Software Installation [cmdb_sam_sw_install] (If the Software Asset Management (SAM) application is installed.)
- Software Instance [cmdb_software_instance] (If the SAM application is not installed.)
- Software [cmdb_ci_spkg] (If the SAM application is not installed.)

For more information on where data is saved when pulling data from New Relic, see CMDB classes targeted in Service Graph Connector for Observability - New Relic.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

System property

The *sn_newrelic_integ.alerts_for_unmatched_ci.enabled* system property determines whether to ingest events that don't have a matching CMDB CI class. Set the value of this system property to `true` to ingest unmatched events. The default value is `false`.

Related topics

Service Graph Connectors

Configure Service Graph Connector for Observability - New Relic using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Observability - New Relic for pulling in New Relic project data into the CMDB.

Before you begin

Dependencies and requirements:

- Install Service Graph Connector for Observability - New Relic version 1.3.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.
- Install Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

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Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the New Relic connector type, and then select **Create connection**.
4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

5. Enter connection details and test the API connection for importing New Relic data.

   a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

   b. On the form, fill in the fields.

   Configure and test connection form

Field	Description
Connection Name	Name to identify the New Relic connection record.
Connection URL	New Relic base URL in the following format: `<base-URL>`.
API Key	New Relic API key or tenant code.
Account ID	New Relic account ID.

   c. Select **Update and test connection**.

   d. After the connection test is complete, select **Continue**.

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6. For the Configure Observability activity, select **Continue**.
   New Relic creates the destination, channel, and workflow required to enable alerts for all configuration items (CIs).
7. Configure the import schedule to import data at regular intervals.
   a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.
   b. Select **Configure import schedule**.
   c. Expand the Parent scheduled data import within the Import schedules list to select the **SG-New Relic Hosts** import schedule.
   d. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.
      For more information, see Schedule a data import.
   e. Select **Save**.
      Alternatively, select **Execute Now** to execute the import schedule immediately.
   f. Select **Continue**.
8. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was configured.
9. Enable alerts for configuration items (CIs) that aren't available in the CMDB.
   a. Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
   b. Select **Settings**.
   c. Select **New Relic system properties**.
   d. On the System Properties form, select the *sn_newrelic_integ.alerts_for_unmatched_ci.enabled* system property.
   e. Set the **Value** of the system property to `true`.
   f. Select **Submit**.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for Observability - New Relic

Configure Service Graph Connector for Observability - New Relic using the guided setup

Set up scheduled import jobs to pull in data from New Relic into your CMDB.

Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from

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that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Note:
If you have an earlier version of the Service Graph Connector for Observability - New Relic, then don't migrate data from the old connector. You must uninstall the previous version and run the new integration.

Role required: SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

Procedure

1. Ensure that the application scope is set to the Service Graph Connector for Observability - New Relic application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **New Relic** > **Setup**.
3. On the Getting started page, select **Get Started**.
4. Configure the authentication credentials to send requests to the New Relic application.

   a. Configure your New Relic connection and credentials.

      i. In the Configure the Connection section of the New Relic Integration with CMDB page, select **Get Started**.

      ii. For the Configure connection and credentials task, select **Configure**.

      iii. On the Connections page of the Workflow Studio, select **Configure** for the **NewRelicConnectionAlias** connection that is available by default.

      iv. On the form, review and modify the fields.

Configure Connection form

Field	Description
Connection Information	

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Field	Description
Connection Name	Name to uniquely identify the connection record. For example, `NewRelicConnectionAlias`.
Connection URL	Base URL to connect to the New Relic application in the following format: `https://api.newrelic.com/graphql` **Note:** This field is automatically set to the URL to connect to the *NerdGraph* API in the New Relic application. Leave the field value as is.
Credential Information	
API Key	*NerdGraph* API token used for authentication on the New Relic application.
Account ID	Account ID associated with the New Relic credential.

v. Select **Configure Connection**.

Note:
The Service Graph Connector for Observability - New Relic supports connection to a single New Relic instance only. So, you can use the single default connection only.

vi. Return to the Configure the connection task page using the back button for your browser.

vii. Set the Configure connection and credentials task to complete by selecting **Mark as Complete**.

b. Test the *NerdGraph* API connection to import data from the New Relic application.

i. In the Configure the Connection section of the New Relic Integration with CMDB page, select **Continue**.

ii. For the Test Connection task, select **Configure**.

iii. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

iv. When the **Status** field is set to **Success**, select **Update**.

If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test Connection task to complete by selecting **Mark as Complete**.

5. Configure the destination, channel, and workflow for Observability New Relic and turn on alerts for unmatched configuration items (CIs).

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a. Configure the destination, channel, and workflow for Observability New Relic.

i. In the Configure Observability section of the New Relic Integration with CMDB page, select **Get started**.

ii. For the Configure destination, channel and workflow task, select **Configure**.

iii. In the SG-New Relic Webhooks list, select **New**.

iv. On the form, fill in the fields.

New record form

Field	Description
Name	Name of the New Relic configuration. The `destination`, `channel`, and `workflow` strings are appended to the configuration name when the configuration is created.
Connection and Credential Alias	Select the connection alias that you created in step 4.

v. Select **Submit**.

vi. Set the Configure destination, channel and workflow task to complete by selecting **Mark as Complete**.

b. Enable alerts for configuration items (CIs) that aren't available in the CMDB.

i. In the Configure Observability section of the New Relic Integration with CMDB page, select **Continue**.

ii. For the Turn on alerts for unmatched CI task, select **Configure**.

iii. On the System Properties form, select the *`sn_newrelic_integ.alerts_for_unmatched_ci.enabled`* system property.

iv. Set the **Value** of the system property to `true`.

v. Select **Submit**.

vi. Set the Turn on alerts for unmatched CI task to complete by selecting **Mark as Complete**.

6. Configure the scheduled jobs to import data from the New Relic application.

a. In the Set up scheduled data imports section of the New Relic Integration with CMDB page, select **Get started**.

b. For the Configure Scheduled Data Imports task, select **Configure**.

c. Select the scheduled job that you want to activate.

d. On the Scheduled Data Import form, verify the field values for the scheduled job. For more information, see Schedule a data import.

e. Select the **Active** check box to activate the scheduled job.

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f. Select **Update**.

g. Repeat steps 6.c to 6.f for each scheduled job for data import.

h. Navigate back to the guided setup page.

i. Set the Configure Scheduled Data Imports task to complete by selecting **Mark as Complete**.

CMDB classes targeted in Service Graph Connector for Observability - New Relic

When you complete setting up the connection, you can configure the integration to periodically pull data from New Relic. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data:

Attribute label	Attribute name
CPU core count	cpu_core_count
Disk space (GB)	disk_space
DNS Domain	dns_domain
Fully qualified domain name	fqdn
Host name	host_name
Operating System	os

Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Contains::Contained by	Disk [cmdb_ci_disk]
Server [cmdb_ci_server]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Server [cmdb_ci_server]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]

Calculated Application Service [cmdb_ci_service_calculated]

The following attributes in the Calculated Application Service [cmdb_ci_service_calculated] table are populated by collected data:

Attribute label	Attribute name
Name	name
Metadata	metadata
Service Populator Status	populator_status
Service Type	type

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IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
IP version	ip_version
Name	name
Nic	nic

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data:

Attribute label	Attribute name
Installed on	installed_on
Name	name

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Server [cmdb_ci_server]

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data:

Attribute label	Attribute name
Key	key
Nic	nic
Name	name

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Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Disk [cmdb_ci_disk]

The following attributes in the Disk [cmdb_ci_disk] table are populated by collected data:

Attribute label	Attribute name
Device ID	device_id
Free disk space (GB)	free_space
Computer	computer
Name	name
Disk space (GB)	disk_space
File system	file_system

Relationship created for Disk

Parent class	Relationship type	Child class
Disk [cmdb_ci_disk]	Hosted on::Hosts	Server [cmdb_ci_server]

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
Configuration Item	cmdb_ci
MAC Address	mac_address
Name	name

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Server [cmdb_ci_server]

Application [cmdb_ci_appl]

The following attributes in the Application [cmdb_ci_appl] table are populated by collected data:

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Attribute label	Attribute name
Class	sys_class_name
Name	name
Running process command	running_process_command

Relationship created for Application

Parent class	Relationship type	Child class
Application [cmdb_ci_appl]	Runs on::Runs	Server [cmdb_ci_server]

Accessing the connection details of Service Graph Connector for Observability - New Relic

You can access the connection details of the Service Graph Connector for Observability - New Relic in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Observability - New Relic. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Service Graph Connector for Observability - New Relic connection

Access the details of a New Relic connection configured for the Service Graph Connector for Observability - New Relic.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **New Relic** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Service Graph Connector for OpenTelemetry

Use the Service Graph Connector for OpenTelemetry to ingest Configuration Management Database (CMDB) data from the ServiceNow Cloud Observability (formerly Lightstep) application using REST APIs. Push events from the Cloud Observability application into ServiceNow with Event Management.

Important:
Starting with the Australia release, Service Graph Connector for OpenTelemetry is being prepared for future deprecation. It will be hidden and no longer installed on new instances but will continue to be supported. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

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Request apps on the Store

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

Supported ServiceNow versions

- Utah
- Vancouver
- Washington DC

Use cases

The following examples describe how you can use the Service Graph Connector for OpenTelemetry:

- Import project topologies from Cloud Observability so that the site reliability engineering (SRE) teams can have a single view for triage with other ServiceNow data points (such as a change request, an incident) from a single view.
- Import events created by Cloud Observability against monitored projects to pinpoint SRE triage activities.

Guided setup

The guided setup for the Service Graph Connector for OpenTelemetry provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, see Configure Service Graph Connector for OpenTelemetry.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Cloud Observability integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Cloud Observability data sources is mapped and transformed into the ServiceNow CMDB configuration item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to pull data from the application periodically.

The following table describes the data sources, the scheduled jobs, the staging tables, and the target tables as CMDB CI classes for the Cloud Observability application.

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Data mapping for Cloud Observability

Data source	Description	Scheduled job	Staging table	C cl
OpenTelemetry Resources	Imports all the Kubernetes clusters, workloads, and application services from the OpenTelemetry traces.	OpenTelemetry Resources OpenTelemetry Delta Resources	OpenTelemetry Resources [sn_sg_lightstep_resources]	C A S K C K D K N K P K S K R K D K J K C K N S K
OpenTelemetry Pods	Imports all the Kubernetes pods from the containers.	OpenTelemetry Pods OpenTelemetry Delta Pods	OpenTelemetry K8s Pods [sn_sg_lightstep_pods]	K C K P
OpenTelemetry Containers	Imports all the containers from the OpenTelemetry traces.	OpenTelemetry Containers OpenTelemetry Delta Containers	OpenTelemetry docker containers [sn_sg_lightstep_containers]	D C

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Data mapping for Cloud Observability (continued)

Data source	Description	Scheduled job	Staging table	C cl
OpenTelemetry Container Images	Imports all the container images from the OpenTelemetry traces.	OpenTelemetry Container Images OpenTelemetry Delta Container Images	Opentelemetry container images [sn_sg_lightstep_container_images]	D In
OpenTelemetry Services	Imports all the Kubernetes services from the OpenTelemetry traces.	OpenTelemetry Delta Services OpenTelemetry Services	OpenTelemetry K8s Services [sn_sg_lightstep_kubernetes_services]	K S
OpenTelemetry Dependency Map	Imports the dependency maps to get an aggregate view of the traced data. The data source also imports and loads any inferred services and their related services data in the Inferred service [sn_sg_lightstep_inferred_service] staging table. **Note:** You need to link the imported inferred services with a CI manually. See Inferred service linking.	OpenTelemetry Dependency Map	OpenTelemetry Dependency Map [sn_sg_lightstep_dependency_map]	C A S

For more information on where data is saved when pulling data from Cloud Observability, see CMDB classes targeted in Service Graph Connector for OpenTelemetry.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Inferred service linking

The ServiceNow Cloud Observability application can infer the presence of an inferred service when the span calling the remote service has the necessary information. Service Graph Connector for OpenTelemetry provides the linking of inferred services and their related services with CIs in the CMDB. For more information, see Linking inferred services with CIs.

Related topics

Service Graph Connectors

Configure Service Graph Connector for OpenTelemetry

Set up scheduled import jobs to pull in data from ServiceNow Cloud Observability (formerly Lightstep) into your Configuration Management Database (CMDB).

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Before you begin

Important:
Starting with the Australia release, Service Graph Connector for OpenTelemetry is being prepared for future deprecation. It will be hidden and no longer installed on new instances but will continue to be supported. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. For Event Management to work, the Observability Commons for CMDB app must be installed prior to installing the connector. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Note:
If you have an earlier version of the Service Graph Connector for OpenTelemetry, then don't migrate data from the old connector. You must uninstall the previous version and run the new integration.

Role required: admin

Procedure

1. Ensure that the application scope is set to Service Graph Connector for OpenTelemetry by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **OpenTelemetry** > **Setup**.
3. On the Getting started page, select **Get Started**.
4. Configure the application properties to set up your organization and authentication credentials for sending requests to the ServiceNow Cloud Observability APIs.

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a. In the Configure the connection section of the Service Graph Connector for OpenTelemetry page, select **Get started**.

b. For the Use OpenTelemetry task, ensure that the Cloud Observability application meets the conditions as discussed in the ServiceNow Cloud Observability setup [KB1527588] article in the Now Support Knowledge Base.

> **Important:**
> Note down your projects, organization, and API key details of the Cloud Observability application to be used later during the installation of the connector.

After you have set up the OpenTelemetry environment in the Cloud Observability application, return to the guided setup and mark the Use OpenTelemetry task to complete by selecting **Mark as Complete**.

c. Enter your Cloud Observability organization details from where you want to retrieve the projects, resources, and dependency-mapping information.

i. For the Set up your organization task, select **Configure**.

ii. In the **Value** field of the Service Graph Connection Properties form, enter the name of your Cloud Observability organization.

iii. Select **Update**.

iv. Mark the Set up your organization task to complete by selecting **Mark as Complete**.

d. Enter the API key details associated with the Cloud Observability application.

i. For the Set up the API key task, select **Configure**.

ii. In the **API Key** field of the API Key Credentials form, enter the API key associated with the Cloud Observability application that you noted down in step 4.b.

iii. Select **Update**.

iv. Set the Set up the API key task to complete by selecting **Mark as Complete**.

e. Test the Cloud Observability API connection to import data from the Cloud Observability application.

i. For the Test the connection task, select **Configure**.

ii. Select the **Test Connection** related link.

iii. When the **Status** field is set to **Success**, select **X** to close the Test the connection dialog box and return to the guided setup page.

If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test the connection task to complete by selecting **Mark as Complete**.

f. Retrieve all the projects included in your Cloud Observability organization.

i. For the Get projects task, select **Configure**.

ii. Select **Get Projects**.

iii. When the Project properties related list is populated with all the projects included in the organization you specified in step 4.c.ii, select **X** to close the Get projects dialog box and return to the guided setup page.

iv. Set the Get projects task to complete by selecting **Mark as Complete**.

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5. **Optional:** Configure additional configurations to set up lookback time, add excluded projects, run project diagnostics, and configure integration settings for service maps and stale configuration items (CIs).

   a. In the Advanced settings section of the Service Graph Connector for OpenTelemetry page, select **Continue**.

   b. Set up the lookback time from when you want to retrieve resources from the projects.

      (Optional) Lookback time is used to calculate the start and end time for retrieving resources from a project of an organization and should match the scheduled job frequency setting. For example, if the lookback time is set to 12 hours, resources are retrieved from the start time calculated as the current time minus 12 hours and until the end time that is the current time.

      i. For the Set up lookback time task, select **Configure**.

      ii. In the **Value** field of the Service Graph Connection Properties form, enter the lookback time in hours.

      iii. Select **Update**.

      iv. Set the Set up lookback time task to complete by selecting **Mark as Complete**.

   c. Select the projects from which you don't want to retrieve resources.

      i. For the Add excluded projects task, select **Configure**.

      ii. Select a project from the **Project** column.

      iii. Select the **Exclude project** check box.

      iv. Select **Update**.

      v. Repeat steps from 5.c.ii to 5.c.iv for each project that you want to exclude.

      vi. Select **X** to close the Add excluded projects dialog box and return to the guided setup page.

      vii. Set the Add excluded projects task to complete by selecting **Mark as Complete**.

   d. Run project diagnostics to test the Resource API response and ensure that the API contains the Kubernetes cluster name, Kubernetes namespace, and Kubernetes nodes.

      i. For the Run project diagnostics task, select **Configure**.

      ii. Select a project from the **Project** column.

      iii. Select **Run diagnostics**.

      iv. When the **Diagnostics status** field set to **Success**, select **X** to close the Run project diagnostics dialog box and return to the guided setup page.

      If any of the Diagnostic tests have errors, follow the instructions in the **Diagnostics message** field to resolve the errors.

      v. Repeat the steps 5.d.ii to 5.d.iv for each project that you want to run diagnostics.

      vi. Set the Run project diagnostics task to complete by selecting **Mark as Complete**.

   e. Configure the system properties for service maps and stale CIs.

      i. For the Configure system properties for the connector task, select **Configure**.

      ii. Verify the default values for the properties or fill in the values for a custom configuration.

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iii. Select **Save**.

iv. Set the Configure system properties for the connector task to complete by selecting **Mark as Complete**.

6. Configure the scheduled jobs to import complete or incremental data from the Cloud Observability application.

a. In the Configure the scheduled import jobs section of the Service Graph Connector for OpenTelemetry page, select **Continue**.

b. Activate the scheduled job for full data import.

By default, the *`OpenTelemetry Resources`* scheduled job is available for full data import. However, you must activate the job.

i. For the Configure the scheduled job for full import task, select **Configure**.

ii. On the Scheduled Data Import form for the *`OpenTelemetry Resources`* scheduled job, verify the field values for the scheduled job and select the **Active** check box.

For more information, see Schedule a data import.

iii. Select **Update**.

iv. Set the Configure the scheduled job for full import task to complete by selecting **Mark as Complete** in the guided setup.

c. **Optional:** Activate the scheduled job for delta data import.

(Optional) By default, the *`OpenTelemetry Delta Resources`* scheduled job is available for delta data import. However, you must activate the job.

Note:
The delta data pull doesn't occur in the following scenarios:

- The full data import is scheduled at the same time.
- The **Last Run Datetime** field of a data source is empty.
- The last delta data pull period is more than 3 days.

i. For the Configure the scheduled job for delta import task, select **Configure**.

ii. On the Scheduled Data Import form for the *`OpenTelemetry Delta Resources`* scheduled job, verify the field values for the scheduled job and select the **Active** check box.

For more information, see Schedule a data import.

iii. Select **Update**.

iv. Set the Configure the scheduled job for delta import task to complete by selecting **Mark as Complete** in the guided setup.

Note:
When adding a new project to retrieve resources, be sure to perform a full import before running a delta import to avoid partial data and populate the CMDB accurately.

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7. Manage alerts and events by sending events from the Cloud Observability application to the ServiceNow Event Management application.
   You can manage alerts and events only when the Observability Commons for CMDB application is installed.

   Note:
   Enabling this feature requires a paid Cloud Observability license, but the feature is also available to free accounts for the purpose of evaluating the product in non-production environments. You can reach out to your ServiceNow account representative for more information.

   a. In the Manage alerts and events section of the Service Graph Connector for OpenTelemetry page, select **Continue**.

   b. Create a webhook destination for a project.

      i. For the Create a webhook task, select **Configure**.

      ii. Select a project that is not excluded from the **Project** column.

      iii. Select **Create Webhook** to create a webhook destination in the Cloud Observability application.

      iv. After a success message appears, select **X** to close the Create a webhook dialog box and return to the guided setup page.

      When the webhook is created successfully:

      - The system automatically creates a user record for each webhook destination in your ServiceNow instance.
      - The user name of the user record starts with `ls_api_<project_name>` and the user is assigned the evt_mgmt_integration role.

      v. Repeat the steps 7.b.ii to 7.b.iv for each project for which you want to create a webhook.

      vi. Set the Create a webhook task to complete by selecting **Mark as Complete** in the guided setup.

   c. Configure the system property for ingesting events that don't have matching CIs in the CMDB.

      i. For the Configure the property for unmatched CIs task, select **Configure**.

      ii. In the **Value** field, enter **true**.

      iii. Select **Update**.

      iv. Set the Configure the property for unmatched CIs task to complete by selecting **Mark as Complete** in the guided setup.

Related topics

Service Graph Connector for OpenTelemetry properties

Accessing the connection details of Service Graph Connector for OpenTelemetry

Linking inferred services with CIs

CMDB classes targeted in Service Graph Connector for OpenTelemetry

When you complete setting up the connection, you can configure the integration to periodically pull data from ServiceNow Cloud Observability (formerly Lightstep). The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

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Important:
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Calculated Application Service [cmdb_ci_service_calculated]

The following attributes in the Calculated Application Service [cmdb_ci_service_calculated] table are populated by collected data:

Attribute label	Attribute name
Service Populator	service_populator
Name	name
Hide from dashboard	hide_from_dashboard
Operational status	operational_status
Service Populator Status	populator_status
Service Type	type

Relationships created for Calculated Application Service

Parent class	Relationship type	Child class
Calculated Application Service [cmdb_ci_service_calculated]	Connects to::Connected by	Kubernetes Deployment [cmdb_ci_kubernetes_deployment]
Calculated Application Service [cmdb_ci_service_calculated]	Connects to::Connected by	Calculated Application Service [cmdb_ci_service_calculated]
Calculated Application Service [cmdb_ci_service_calculated]	Reference	Key Value [cmdb_key_value]

Docker Container [cmdb_ci_docker_container]

The following attributes in the Docker Container [cmdb_ci_docker_container] table are populated by collected data:

Attribute label	Attribute name
Container id	container_id
Install Status	install_status
Name	name

Docker Image [cmdb_ci_docker_image]

The following attributes in the Docker Image [cmdb_ci_docker_image] table are populated by collected data:

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Attribute label	Attribute name
Image id	image_id
Install Status	install_status
Name	name

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

The following attributes in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table are populated by collected data:

Attribute label	Attribute name
Name	name
Namespace	namespace
Install Status	install_status
Kubernetes UID	k8s_uid

Relationships created for Kubernetes Cluster

Parent class	Relationship type	Child class
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Cluster of::Cluster	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Pod [cmdb_ci_kubernetes_pod]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Namespace [cmdb_ci_kubernetes_namespace]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Service [cmdb_ci_kubernetes_service]

Kubernetes Cronjob [cmdb_ci_kubernetes_cronjob]

The following attributes in the Kubernetes Cronjob [cmdb_ci_kubernetes_cronjob] table are populated by collected data:

Attribute label	Attribute name
Kubernetes Cluster	cluster

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Attribute label	Attribute name
Name	name
Namespace	namespace
Install Status	install_status

Relationships created for Kubernetes Cronjob

Parent class	Relationship type	Child class
Kubernetes Cronjob [cmdb_ci_kubernetes_cronjob]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Cronjob [cmdb_ci_kubernetes_cronjob]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset]

The following attributes in the Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset] table are populated by collected data:

Attribute label	Attribute name
Kubernetes Cluster	cluster
Name	name
Namespace	namespace
Install Status	install_status

Relationships created for Kubernetes DaemonSet

Parent class	Relationship type	Child class
Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes DaemonSet [cmdb_ci_kubernetes_daemonset]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Deployment [cmdb_ci_kubernetes_deployment]

The following attributes in the Kubernetes Deployment [cmdb_ci_kubernetes_deployment] table are populated by collected data:

Attribute label	Attribute name
Kubernetes Cluster	cluster
Name	name
Namespace	namespace
Install Status	install_status

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Relationships created for Kubernetes Deployment

Parent class	Relationship type	Child class
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Connects to::Connected by	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Connects to::Connected by	Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Job [cmdb_ci_kubernetes_job]

The following attributes in the Kubernetes Job [cmdb_ci_kubernetes_job] table are populated by collected data:

Attribute label	Attribute name
Kubernetes Cluster	cluster
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Install Status	install_status

Relationships created for Kubernetes Job

Parent class	Relationship type	Child class
Kubernetes Job [cmdb_ci_kubernetes_job]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Job [cmdb_ci_kubernetes_job]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Namespace [cmdb_ci_kubernetes_namespace]

The following attributes in the Kubernetes Namespace [cmdb_ci_kubernetes_namespace] table are populated by collected data:

Attribute label	Attribute name
Kubernetes Cluster	cluster
Name	name
Install Status	install_status

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Relationship created for Kubernetes Namespace

Parent class	Relationship type	Child class
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Node [cmdb_ci_kubernetes_node]

The following attributes in the Kubernetes Node [cmdb_ci_kubernetes_node] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Install Status	install_status
Namespace	namespace
Kubernetes Cluster	cluster

Relationships created for Kubernetes Node

Parent class	Relationship type	Child class
Kubernetes Node [cmdb_ci_kubernetes_node]	Hosted on::Hosts	Server [cmdb_ci_server]
Kubernetes Node [cmdb_ci_kubernetes_node]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Pod [cmdb_ci_kubernetes_pod]

The following attributes in the Kubernetes Pod [cmdb_ci_kubernetes_pod] table are populated by collected data:

Attribute label	Attribute name
Name	name
Install Status	install_status
Kubernetes Cluster	cluster
Kubernetes UID	k8s_uid
Namespace	namespace
IP Address	ip_address
Start date	start_date

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Relationships created for Kubernetes Pod

Parent class	Relationship type	Child class
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Image [cmdb_ci_docker_image]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Contains::Contained by	Docker Container [cmdb_ci_docker_container]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]

The following attributes in the Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset] table are populated by collected data:

Attribute label	Attribute name
Kubernetes UID	k8s_uid
Name	name
Namespace	namespace
Install Status	install_status
Kubernetes Cluster	cluster

Relationships created for Kubernetes ReplicaSet

Parent class	Relationship type	Child class
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Connects to::Connected by	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Kubernetes Service [cmdb_ci_kubernetes_service]

The following attributes in the Kubernetes Service [cmdb_ci_kubernetes_service] table are populated by collected data:

Attribute label	Attribute name
Name	name
Namespace	namespace
Install Status	install_status

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Kubernetes StatefulSet [cmdb_ci_kubernetes_statefulset]

The following attributes in the Kubernetes StatefulSet [cmdb_ci_kubernetes_statefulset] table are populated by collected data:

Attribute label	Attribute name
Name	name
Kubernetes Cluster	cluster
Namespace	namespace
Install Status	install_status

Relationship created for Kubernetes StatefulSet

Parent class	Relationship type	Child class
Kubernetes StatefulSet [cmdb_ci_kubernetes_statefulset]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes StatefulSet [cmdb_ci_kubernetes_statefulset]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

Server [cmdb_ci_server]

The following attribute in the Server [cmdb_ci_server] table is populated by collected data:

Attribute label	Attribute name
Name	name

Related topics

- Kubernetes extension classes
- CI relationships in the CMDB

Service Graph Connector for OpenTelemetry properties

Service Graph Connector for OpenTelemetry properties control the behavior of the connector.

Important:
Starting with the Australia release, Service Graph Connector for OpenTelemetry is being prepared for future deprecation. It will be hidden and no longer installed on new instances but will continue to be supported. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

Connection properties

These connection properties are available for Service Graph Connector for OpenTelemetry.

Note:
To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **OpenTelemetry** > **Connections** and select the connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

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Connection properties for Service Graph Connector for OpenTelemetry

Property	Description
Organization	Enter the name of an OpenTelemetry organization. • Type: string • Default value: None • Location: Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table
Lookback Time	Enter time in hours to retrieve OpenTelemetry resources. • Type: integer • Default value: `12` • Location: Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table

System properties

These system properties are available for Service Graph Connector for OpenTelemetry.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

System properties for Service Graph Connector for OpenTelemetry

Property	Description
sn_sg_lightstep.classes_to_inactivate_stale_records	Enter a list of configuration item (CI) classes to be inactivated as stale records. For multiple entries, separate the CI classes with commas. • Type: string • Default value: None • Location: System Property [sys_properties] table
sn_sg_lightstep.events_for_unmatched_ci.enabled	Set the property to `true` to ingest events that don't have a matching CI in CMDB. • Type: true | false • Default value: `false` • Location: System Property [sys_properties] table
sn_sg_lightstep.resource_api_num_rows	Enter the maximum number of rows fetched in the

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System properties for Service Graph Connector for OpenTelemetry (continued)

Property	Description
	Resource API response from OpenTelemetry resources. • Type: integer • Default value: 2500 • Location: System Property [sys_properties] table
sn_sg_lightstep.service_map_classes_to_exclude	Enter a list of CI classes to be excluded from the service map. For multiple entries, separate the CI classes with commas. • Type: string • Default value: None • Location: System Property [sys_properties] table
sn_sg_lightstep.service_map_max_levels	Enter the maximum hierarchy level of CIs to be included in the service map. • Type: integer • Default value: 5 • Location: System Property [sys_properties] table
sn_sg_lightstep.service_map_relationship_types_to_exclude	Enter a list of CI relationship types to be excluded from the service map. For multiple entries, separate the CI relationship types with commas. • Type: string • Default value: None • Location: System Property [sys_properties] table

Linking inferred services with CIs

Create inferred services relationships in your ServiceNow instance with other Cloud Observability application services as originally configured in the application by linking an inferred service configuration item (CI) in CMDB with an inferred service from the Cloud Observability application.

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Inferred services

The inferred services in the Cloud Observability application are referred to as external services, libraries, or dependencies such as a database or a third-party API that haven't been instrumented with OpenTelemetry. These types of technologies are manually defined in the Cloud Observability application, and you can import them into your ServiceNow instance through the Service Graph Connector for OpenTelemetry.

For information about adding inferred services in the Cloud Observability application, see Add inferred services in the Cloud Observability documentation.

Storing inferred services data

The OpenTelemetry Dependency Map [sn_sg_lightstep_dependency_map] data source available with the Service Graph Connector for OpenTelemetry iterates through all the included projects in a Cloud Observability organization and pulls in the inferred services details. Inferred services details include mapping of related services. The data source saves these details in the Inferred service [sn_sg_lightstep_inferred_service] table.

The following attributes in the Inferred service [sn_sg_lightstep_inferred_service] table are populated by the OpenTelemetry Dependency Map [sn_sg_lightstep_dependency_map] data source.

Attribute label	Attribute name
Project	project
Organization	organization
ID	id
Inferred service	inferred_service
Inferred service CI	inferred_service_ci
Active	active
Last scan	last_scan
Cloud Observability CI	cloud_observability_ci

Due to insufficient information for defining identification rules, the pulled in inferred services don't automatically bind to a CI in CMDB. However, as a user with the cmdb_inst_admin role, you can manually link a CI to an inferred service. The linking creates appropriate relationships with the related services and generates the inferred service mapping in the respective application service maps of your ServiceNow instance.

Link an inferred service

Link a Cloud Observability inferred service with a CI to create relationships between the inferred service and other Cloud Observability services in your ServiceNow instance.

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Before you begin

Important:
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Role required: cmdb_inst_admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **OpenTelemetry** > **Inferred services**.
2. Review the inferred services available from the Cloud Observability app in the **Inferred service** column.
3. For an inferred service, double-click the **Inferred service CI** column cell.
4. Select the lookup using list icon ( ) to search for and select an inferred service CI available within the Configuration item [cmdb_ci] table.
5. Select the save icon ( ).
6. Repeat the steps 3 to 5 for each inferred service that you want to link with a CI.

Result

The *Update CI relationship* business rule is triggered that creates appropriate relationships for the inferred service with the related services and generates the inferred service mapping in the respective application service maps.

Note:

- If you remove any mapping later, the *Delete CI relationship* business rule is triggered to delete any relationships between the inferred service CIs and the Cloud Observability inferred services.
- For any inferred services that were not last scanned in the Cloud Observability app, the Service Graph Connector automatically deactivates the corresponding records in CMDB and deletes the relationship for the inactive records.

Accessing the connection details of Service Graph Connector for OpenTelemetry

You can access the connection details of the Service Graph Connector for OpenTelemetry in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

Important:
Starting with the Australia release, Service Graph Connector for OpenTelemetry is being prepared for future deprecation. It will be hidden and no longer installed on new instances but will continue to be supported. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

With the CCF, you can access all the connections used by the Service Graph Connector for OpenTelemetry. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection.

Access the details of an OpenTelemetry connection

Access the details of an OpenTelemetry connection configured for the Service Graph Connector for OpenTelemetry.

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Before you begin

Important:
Starting with the Australia release, Service Graph Connector for OpenTelemetry is being prepared for future deprecation. It will be hidden and no longer installed on new instances but will continue to be supported. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **OpenTelemetry** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Related topics

Service Graph Connector for OpenTelemetry properties

Accessing the connection details of Service Graph Connectors

Service Graph Connector for Qualys

The Service Graph Connector for Qualys pulls in asset inventory data (hardware and software) from the Qualys database into the Configuration Management Database (CMDB) application in your ServiceNow AI Platform® instance.

Request apps on the Store

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

Supported versions

Use this data to manage your Qualys resources directly from your ServiceNow AI Platform® instance.

Supported Qualys APIs:

- Qualys Global Asset API v2. You might prefer to use this API if you are importing data for the Security Posture Control Security Posture Control application.
- Qualys Asset Management API v2. This API is deactivated by default. You should only activate this API if you don't have access to the Qualys Cybersecurity Asset Management (CSAM) product. ServiceNow uses a different API (Asset management and tagging) for this API but the data returned is not comprehensive.

Supported ServiceNow® versions:

- Utah
- Vancouver
- Washington

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Use cases

The following are examples on how you can use the Service Graph Connector for Qualys for different ServiceNow applications:

- Complements the Qualys Asset Discovery.
- Import data with the Global Asset API or the Asset Management API.
- Multi-instance support.

Guided Setup

The guided setup for the Service Graph Connector for Qualys provides you with an organized sequence of tasks to configure the integration on your instance.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Qualys integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Hardware CI Rules

The hardware Configuration item (CI) mapping rule table is equipped with hardware category1, hardware category2 and corresponding target CI class. Following a Qualys API call, the system checks the hardware category1 and hardware category2 to determine their satisfaction, if hardware category1 and hardware category2 is match with the table record then the associated target CI class is added to the import set table data. During the mapping process, this designated target CI class is then used.

Computer CI Rules

The Computer CI Mapping Rule table is equipped with predefined rules, including criteria such as OS name, OS category, OS category 2, OS Publisher, OS Product name, and the corresponding target CI class. Following a Qualys API call, the system checks these rules to determine their satisfaction. If a rule is met, the associated target CI class is added to the import set table data. During the mapping process, this designated target CI class is then used.

If you want to update CI attributes, you must create new reconciliation rules to determine which discovery sources can update CI attributes. See 'Reconciliation rules' in the online product documentation and the Identification and Reconciliation Fundamentals article in the ServiceNow Support Knowledge base for more information.

Asset Management CI Rules

The Asset Management CI Mapping Rule table is equipped with predefined rules, including criteria such as Operating System, Is Volume Info Present, Is processor Present, Cloud Provider and the corresponding target CI class. Following a Qualys API call, the system checks these rules to determine their satisfaction. If a rule is met, the associated target CI class is added to the import set table data. During the mapping process, this designated target CI class is then used.

Configure the Service Graph Connector for Qualys

Set up the Qualys environment and scheduled jobs to import in Qualys data into your Configuration Management Database (CMDB).

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Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This app must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

There are two supported Qualys APIs:

- Qualys Global Asset API v2. You might prefer to use this API if you are importing data for the Security Posture Control application.
- Qualys Asset Management API v2. This API is deactivated by default. You should only activate this API if you don't have access to the Qualys Cybersecurity Asset Management (CSAM) product. ServiceNow® uses a different API (Asset management and tagging) for this API but the data returned is not comprehensive.

For more information, see Service Graph Connector for Qualys APIs.

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Qualys** > **Setup**.
2. Select **Continue** on the Home page.
3. Select **Best Experience** and **Continue** on the Experience page.
   On the Service Graph Connector for Qualys page in the Configure the connection page, three tasks are displayed:
   - Configure the connection
   - Add multiple instances
   - Set up scheduled import jobs
4. Select **Start** for the **Configure the Connection** task to expand it.
   The following steps are displayed:

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- Configure Qualys authentication credentials
- Configure Qualys HTTP Connection
- Test Connection

5. Select **Configure Qualys authentication credentials**.

   a. In the **Username** and **Password** fields, enter your Qualys user name and password.

   b. Select the **Active** check box to activate the record.

   c. Right-click in the gray header titled Basic Auth Credentials and select **Save**.

   d. Select **Mark as complete** followed by **Continue**.
   The Configure Qualys HTTP Connection page is displayed.

6. Fill in the fields.

   a. Add the Qualys base URL or Host details.

   Domain part of the URL without the 'https'. An example might be `qualysapi.qualys.com`.

   b. **Optional:** If the API is accessible through a MID Server, activate the **Use MID Server** check box.

   c. In the advanced MID Server configuration section select the appropriate MID Server from the MID Selection list.

   d. Right-click in the gray header titled HTTP(s) Connection and select **Save**.

   e. Select **Mark as complete** followed by **Continue**.
   The Test Connection page is displayed.

7. Test the connection.

   a. Update the **use_asset_management_and_tagging_api** property in the 'Service Graph Connection Properties' section.

Option	Description
true	Set the property **use_asset_management_and_tagging_api** flag to `true` if you are using the asset management and tagging API in the configuration.
false	Set the property **use_asset_management_and_tagging_api** to `false` if you are not using the asset management and tagging API in the configuration.

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b. In the Related links section select the **Test Connection** link.
If the connection is successful, the status code field displays 200 or 201 and a message is displayed. If your connection test fails, review the Message and Suggestion fields for how to proceed.

c. Right-click in the gray header titled Service Graph Connections and select **Save**.

d. Select **Mark as complete** followed by **Continue**.
The Update Data Source Access page is displayed.

8. Update the data source.

a. Follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.

b. Select a record from the list to open it.

c. Select the **Application Access** tab.

d. Select the check boxes to set the permissions you want.

e. Right-click in the gray header titled Tables and select **Save**.

f. Select **Mark as complete** followed by **Continue**.
The Update Scheduled Data Import page is displayed.

9. Update the Scheduled Data Import record.

a. Follow the steps listed at the top of the page to switch the application scope with the application picker as required to open, edit, and save the record.

b. Select the **Application Access** tab.

c. Select the check boxes to set the permissions you want.

d. Right-click in the gray header titled Table and select **Save**.

e. Select **Mark as complete** followed by **Continue**.
The Add Another Connection task is displayed.

10. Follow the instructions at the top of the page to add a connection.

a. Follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.

b. Select the link.
The SG-Qualys Connections page is displayed.

c. Select **Add Connection** and fill out the fields.

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Field	Description
Connection name	Unique name for your connection
Connection URL	Connection URL
User name	Qualys account user name
Password	Qualys account password

d. Select **Create Connection**.

e. Navigate back to the Add Another Connection page in the Setup Assistant.

f. Select **Mark as complete** followed by **Continue**.
The Configure MID Server for new HTTP connection page is displayed.

11. Configure the MID Server

a. Select a record to open it.

b. Select the Use MID server check box.

c. Select the search icon in the MID Server field and choose one from the list.

d. Right-click in the gray header titled HTTP(s) Connection and select **Save**.

e. Select **Mark as complete** followed by **Continue**.
The Test New Connections page is displayed.

12. Test the connection.

a. Select the record for the connection you want to test.

b. Scroll to the Related links section and select the **Test Connection** link.
If the connection is successful, the status code field displays 200 or 201 and a message is displayed. If your connection test fails, review the Message and Suggestion fields for how to proceed.

c. Right-click in the gray header titled, Service Graph Connections and select **Save**.

d. Select **Mark as complete** followed by **Continue**.
The Configure the scheduled jobs page is displayed.

13. Configure the scheduled jobs.

a. Select a record to open it.

b. Fill out the scheduled data import from.

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Field	Description
Name	Name of the scheduled job.
Application	Read-only application name.
Data source	Data source record that defines the data to import.
Run	How often you want the job to run. If you want to run a test import prior to scheduling it, you might prefer to select **Once**.
Run as	Option to run the scheduled job with the credentials of the specified user.
Conditional	Specific conditions under which this job is run.
Active	Option to activate the scheduled job. Select this option.
Use connection	Leave this deactivated for the first run. Specifies another connection and credentials for this job.
Concurrent Import	Leave check box activated. Splits data into multiple imports sets. See the field message for more information.
Partition Method	Leave set as `Custom size`.
Partition Size	Leave set as 1 , 000. Import set size for early scheduling.
Execute pre-import script	Leave check box selected. Specifies a script to run before the import is performed.
Execute post-import script	Leave check box selected. Specifies a script to run after the import is performed.

c. Right-click in the gray header titled Scheduled Data Import and select **Save**.

d. Optional: Select **Execute Now**.
If you do not choose to run the job on-demand, the next job runs according to the schedule you set.

e. Select **Mark as complete** followed by **Continue**.
The Home page of the Setup Assistant is displayed.

14. Optional: Add Multiple Instances

a. Select Add Multiple Instances to expand it.
The following steps are displayed:

- Update Data Source Access
- Update Scheduled Data Import
- Add Another Connection
- Configure MID Server for New HTTP connection
- Test New Connections

b. To update the Data Source, follow the steps listed in step 8.

c. To update the Scheduled Data Import, follow the steps in step 9.

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d. To add another connection, follow the steps listed in step 10.

e. To configure a MID Server, follow the steps listed in step 11.

f. To test connections, follow the steps listed in step 12.

15. On the Service Graph Connector for Qualys page for Guided Setup, select **Complete** to finish the configuration.

Service Graph Connector for Qualys APIs

Data from the Qualys data source fields is imported with the Global Asset API and the Asset Management and Tagging API.

Global Asset API

- A Qualys Cybersecurity Asset Management (CSAM) license is required.
- Asset information includes details such as Hardware Category and OS Category.

Asset Management and Tagging API

- A CSAM license is not required
- Asset information does not include details about Hardware Category and OS Category.

Mapped attributes

The following table compares what data is imported by the two APIs. The sections after the table list data imported by the Global asset API that is not supported by the Asset Management and Tagging API.

Global Asset API	Asset Management and Tagging API
Mapped attributes	Mapped attributes
assetId	created
assetUUID	name
hostId	dnsHostName
lastModifiedDate	fqdn
agentId	os
createdDate	manufacturer
sensorLastUpdatedDate	tracking method
assetType	netbios
address	timezone
dnsName	network guid
assetName	IsDockerHost
netbiosName	modified

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Global Asset API	Asset Management and Tagging API
timeZone	lastVulnScan
biosDescription	model
lastBoot	cloudProvider
totalMemory	type
cpuCount	qwebHostId
lastLoggedOnUser	criticalSocre
domainRole	lastSystemBoot
hwUUID	domain
biosSerialNumber	lastLogOnUser
biosAssetTag	lastComplianceScan
isContainerHost	
AWS Cloud details	AWS Cloud details
accountId	instanceId
availabilityZone	privateDnsName
hasAgent	privateIpAddress
hostname	instanceState
imageId	monitoringEnabled
instanceId	region
instanceState	accountId
privateDNS	availabilityZone
privateIpAddress	instance_type
instanceType	AWS Cloud tag details • key • value
qualysScanner	
kernelId	
launchdate	
region.code	
region.name	
spotInstance	
subnetId	
vpcId	
tags.key	

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Global Asset API	Asset Management and Tagging API
tags.value	
MS Azure Cloud details vmId state name imagePublisher imageVersion offer location platform resourceGroupName size subnet subscriptionId virtualNetwork	MS Azure Cloud details resourceGroupName vmId state subscriptionId location image_id publisher version offer vm_size subnet_id vpc_id MS Azure Cloud tag details • key • value
Network interface details hostname addressIpV4 addressIpV6 macAddress interfaceName dnsAddress gatewayAddress manufacturer macVendorIntroDate netmask addresses	Network interface details address host_name interface_name macAddress gatewayAddress interface_id type
Software details token1	Software details version

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Global Asset API	Asset Management and Tagging API
token2 uniqueKey publisher installDate id installPath lastUseDate authorization authorizationDetectionScore	name
Volume details name free size	Volume details name free size
Open port details port description protocol detectedService firstFound lastUpdated	Open port details port protocol serviceName service_id
Processor details description speed numCPUs noOfSocket threadsPerCore coresPerSocket multithreadingStatus	Processor details name speed
Tag details tagId	Asset tag details id

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Global Asset API	Asset Management and Tagging API
tagName foregroundColor backgroundColor businessImpact criticalityScore	name
Agent details version configurationProfile activations connectedFrom lastActivity lastCheckedIn lastInventory udcManifestAssigned errorStatus	Agent details agentVersion agentLastCheckIn status platform connectedFrom agentId AgentConfigurationName ChirpStatus

Additional Global asset API details

The following sections list data imported by the Global asset API that is not supported by the Asset Management and Tagging API.

Global asset API OS details

- fullName
- version
- publisher
- osName
- category
- category1
- category2
- productName
- edition
- marketVersion
- update
- architecture
- productUrl
- productFamily

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- installDate
- release

Global asset API OS lifecycle

OS lifecycle details

- gaDate
- eolDate
- eosDate
- stage
- lifeCycleConfidence
- eolSupportStage
- eosSupportStage

Global asset API OS taxonomy

OS Taxonomy details

- id
- name
- category1
- category2

Global asset API hardware

Hardware details

- fullName
- category
- category1
- category2
- manufacturer
- productName
- model
- productUrl
- productFamily

Global asset API hardware lifecycle

Hardware lifecycle details

- introDate
- gaDate
- eosDate
- obsoleteDate

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- stage
- lifeCycleConfidence

Global asset API taxonomy

Hardware taxonomy details

- id
- name
- category1
- category2

Global asset API sensor

Sensor details

- activatedForModules
- pendingActivationForModules
- lastVMScan
- lastComplianceScan
- lastFullScan
- lastVmScanDateScanner
- lastVmScanDateAgent
- lastPcScanDateScanner
- lastPcScanDateAgent
- firstEasmScanDate
- lastEasmScanDate

Global asset API service

Service details

- name
- status
- description

Global asset API last location

Last location details

- city
- state
- country
- name
- continent
- postal

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Global asset API criticality

Criticality details

- score
- isDefault
- lastUpdated

Global asset API processor

Processor details

- description
- speed
- numCPUs
- noOfSocket
- threadsPerCore
- coresPerSocket
- multithreadingStatus

Global asset API business information

Business information details

- businessAppListData
- riskScore
- passiveSensor
- domain
- subdomain
- missingSoftware
- whois
- organizationName
- isp
- asn
- easmTags
- hostingCategory1
- customAttributes

CMDB classes targeted in the Service Graph Connector for Qualys

When you complete setting up the connection, you can configure the integration to periodically pull data. The data is saved in tables that extend from the Configuration item [cmdb_ci] table. The Service Graph Connector for Qualys identifies and classifies information about various configuration Items (CIs).

SGC Qualys Asset Cloud Tag

The following attributes in the SGC Qualys Asset Cloud Tag [sn_sec_sgc_qualys_asset_cloud_tag] table are populated by collected data.

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Attribute label	Attribute name
Key	key
Qualys Asset	qualys_asset
Value	value
Configuration item	configuration_item

SGC Qualys Asset Software Details [sn_sec_sgc_qualys_asset_software_details]

The following attributes in the SGC Qualys Asset Software Details [sn_sec_sgc_qualys_asset_software_details] table are populated by collected data.

Attribute label	Attribute name
Name	token1
Qualys Asset	qualys_asset
Configuration item	configuration_item
Unique key	unique_key
Id	id
Install Path	install_path
Last Use Date	last_use_date
Version	token2

Hardware Type [cmdb_ci_compute_template]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id

Image [cmdb_ci_os_template]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id
Offer	offer
Version	version

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Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data.

Attribute label	Attribute name
Key	key
Discovery source	discovery_source
Name	name
Version	version
Manufacturer	manufacturer

SGC Qualys Asset Network Interface Details [sn_sec_sgc_qualys_asset_nic_details]

The following attributes in the SGC Qualys Asset Network Interface Details [sn_sec_sgc_qualys_asset_nic_details] table are populated by collected data.

Attribute label	Attribute name
Configuration item	configuration_item
IPv4	ip_v4
Addresses	addresses
Interface Id	interface_id
IPv6	ip_v6
MAC Vendor Intro Date	mac_vendor_intro_date
Qualys Asset	qualys_asset
Type	type

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data.

Attribute label	Attribute name
Manufacturer	manufacturer
Name	name
Asset tag	asset_tag
Class	sys_class_name
CPU count	cpu_count
DNS Domain	dns_domain
First discovered	first_discovered
Fully qualified domain name	fqdn
Install Status	install_status

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Attribute label	Attribute name
Operating System	os
Operational status	operational_status
OS Address Width (bits)	os_address_width
OS Service Pack	os_service_pack
OS Version	os_version
RAM (MB)	ram

SGC Qualys Asset Open Port Details [sn_sec_sgc_qualys_asset_open_port_details]

The following attributes in the SGC Qualys Asset Open Port Details [sn_sec_sgc_qualys_asset_open_port_details] table are populated by collected data.

Attribute label	Attribute name
Port	port
Protocol	protocol
Description	description
Detected Service	detected_service
First Found	first_found
Last Updated	last_updated
Qualys Asset	qualys_asset
Service Id	service_id

SGC Qualys Asset Details [sn_sec_sgc_qualys_asset_details]

The following attributes in the SGC Qualys Asset Details [sn_sec_sgc_qualys_asset_details] table are populated by collected data.

Attribute label	Attribute name
Asset Name	asset_name
Activated Modules	activated_modules
Address	address
Agent Configuration Profile	agent_configuration_profile
Agent Connected From	agent_connected_from
Agent Eror Status	agent_error_status
Agent ID	agent_id
Agent Last Activity	agent_last_activity
Agent Last Checked In	agent_last_checked_in
Agent Last Inventory	agent_last_inventory

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Attribute label	Attribute name
Agent Platform	platform
Agent Status	status
Agent UDC Manifest Assigned	agent_udc_manifest_assigned
Agent Version	agent_version
ASN	asn
Asset ID	asset_id
Asset Type	asset_type
Asset UUID	asset_uuid
Assigned Location	assigned_location
AWS Host Name	aws_host_name
AWS Kernel ID	aws_kernel_id
AWS Launch Date	aws_launch_date
AWS Region Name	aws_region_name
Azure Image Publisher	azure_image_publisher
Azure Platform	azure_platform
Azure Subnet	azure_subnet
Azure Virtual Network	azure_virtual_network
Bios Description	bios_description
Bios Serial Number	bios_serial_number
Business AppListData	business_applist_data
Business Information	business_information
Chirp Status	chirp_status
City	lastlocation_city
Continent	lastlocation_continent
Country	lastlocation_country
Custom Attribrutes	custom_attributes
Domain	domain
Domain Role	domain_role
ESAM Tags	easm_tags
First EASM Scan Date	first_easm_scan_date
Hardware Category	hardware_category
Hardware Category1	hardware_category1
Hardware Category2	hardware_category2
Hardware FullName	hardware_fullname
Hardware Lifecycle Confidence	hardware_lifecycle_lifecycleconfidence

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Attribute label	Attribute name
Hardware Lifecycle EOSDate	hardware_lifecycle_eosdate
Hardware Lifecycle GaDate	hardware_lifecycle_gadate
Hardware Lifecycle IntroDate	hardware_lifecycle_introdate
Hardware Lifecycle ObsoleteDate	hardware_lifecycle_obsoletedate
Hardware Lifecycle Stage	hardware_lifecycle_stage
Hardware Model	hardware_model
Hardware Product Family	hardware_product_family
Hardware Product Name	hardware_product_name
Hardware Product URL	hardware_product_url
Hardware Texonomy Category1	hardware_taxonomy_category1
Hardware Texonomy Category2	hardware_taxonomy_category2
Hardware Texonomy ID	hardware_taxonomy_id
Hardware Texonomy Name	hardware_taxonomy_name
Has Agent	aws_has_agent
Host ID	host_id
Hosting Category1	hosting_category1
Hw UUID	hw_uuid
Is Container Host	is_container_host
IsDefault	criticality_isdefault
ISP	isp
Last Boot	last_boot
Last Compliance Scan	last_compliance_scan
Last EASM Scan Date	last_easm_scan_date
Last Full Scan	last_full_scan
Last Location Name	lastlocation_name
Last Logged On User	last_logged_on_user
Last Modified Date	last_modified_date
Last PC Scan Date Agent	last_pc_scan_date_agent
Last PC Scan Date Scanner	last_pc_scan_date_scanner
Last Updated	criticality_lastupdated
Last VM Scan	last_vm_scan
Last VM Scan Date Agent	last_vm_scan_date_agent
Last VM Scan Date Scanner	last_vm_scan_date_scanner
Missing Software	missing_software
NetBios Name	netbios_name

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Attribute label	Attribute name
Network Guid	network_guid
Organization Name	organization_name
OS Category	os_category
OS Category1	os_category1
OS Category2	os_category2
OS Edition	os_edition
OS Lifecycle Confidence	os_lifecycle_confidence
OS Lifecycle EOL Date	os_lifecycle_eol_date
OS Lifecycle EOLSupport Stage	os_lifecycle_eol_supportstage
OS Lifecycle EOS Date	os_lifecycle_eos_date
OS Lifecycle EOSSupport Stage	os_lifecycle_eos_supportstage
OS Lifecycle Ga Date	os_lifecycle_ga_date
OS Lifecycle Stage	os_lifecycle_stage
OS Market Version	os_market_version
OS Name	os_name
OS Product Family	os_product_family
OS Product Name	os_product_name
OS Product URL	os_product_url
OS Release	os_release
OS Taxonomy Category1	os_taxonomy_category1
OS Taxonomy Category2	os_taxonomy_category2
OS Taxonomy ID	os_taxonomy_id
OS Taxonomy Name	os_taxonomy_name
Passive Sensor	passive_sensor
Postal	lastlocation_postal
Provider	provider
Qualys Scanner	qualys_scanner
Risk Score	risk_score
Score	criticality_score
Sensor Last Updated Date	sensor_last_updated_date
Spot Instance	spot_instance
State	lastlocation_state
SubDomain	subdomain
Time Zone	time_zone
Tracking Method	tracking_method

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Attribute label	Attribute name
Whols	whois

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id
IP Address	ip_address
Monitor	monitor
State	state
VM Instance ID	vm_inst_id

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data.

Attribute label	Attribute name
Account Id	account_id
Name	name
Object ID	object_id
Datacenter Type	datacenter_type

Cloud Mgmt Network Interface [cmdb_ci_nic]

The following attributes in the Cloud Mgmt Network Interface [cmdb_ci_nic] table are populated by collected data.

Attribute label	Attribute name
MAC Address	mac_address
Name	name
Object ID	object_id
Public IP	public_ip
DNS Domain	dns_domain
Host Name	host_name
IP default gateway	ip_default_gateway
Netmask	netmask

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Attribute label	Attribute name
Manufacturer	manufacturer

Availability Zone [cmdb_ci_availability_zone]

The following attributes in the Availability Zone [cmdb_ci_availability_zone] table are populated by collected data.

Attribute label	Attribute name
Object ID	object_id

SGC Qualys Asset Tag [sn_sec_sgc_qualys_asset_tag]

The following attributes in the SGC Qualys Asset Tag [sn_sec_sgc_qualys_asset_tag] table are populated by collected data.

Attribute label	Attribute name
Tag Id	tag_id
Tag Name	tag_name
Background Color	background_color
Business Impact	business_impact
Criticality Score	criticality_score
Foreground Color	foreground_color
Qualys Asset	qualys_asset

SGC Qualys Asset Processor Details [sn_sec_sgc_qualys_asset_processor_details]

The following attributes in the SGC Qualys Asset Processor Details [sn_sec_sgc_qualys_asset_processor_details] table are populated by collected data.

Attribute label	Attribute name
Description	processor_description
Cores Per Socket	processor_corespersocket
Multi Threading Status	processor_multithreadingstatus
No Of Socket	processor_noofsocket
Number of CPUs	processor_numcpus
Qualys Asset	qualys_asset
Speed	processor_speed

File System [cmdb_ci_file_system]

The following attributes in the File System [cmdb_ci_file_system] table are populated by collected data.

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Attribute label	Attribute name
Name	name
Free space bytes	free_space_bytes
Size bytes	size_bytes

Software Instance [cmdb_software_instance]

The following attributes in the File System [cmdb_ci_file_system] table are populated by collected data.

Attribute label	Attribute name
Installed on	installed_on
Name	name
Install date	install_date

Azure Datacenter [cmdb_ci_azure_datacenter]

The following attributes in the Azure Datacenter [cmdb_ci_azure_datacenter] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id
Region	region

AWS Datacenter [cmdb_ci_aws_datacenter]

The following attributes in the AWS Datacenter [cmdb_ci_aws_datacenter] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object ID	object_id
Region	region

Cloud Subnet [cmdb_ci_cloud_subnet]

The following attributes in the Cloud Subnet [cmdb_ci_cloud_subnet] table are populated by collected data.

Attribute label	Attribute name
Object ID	object_id

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Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data.

Attribute label	Attribute name
Display name	display_name
Publisher	publisher
Version	version
Discovery source	discovery_source
Install date	install_date

Cloud Network [cmdb_ci_network]

The following attributes in the Cloud Network [cmdb_ci_network] table are populated by collected data.

Attribute label	Attribute name
Object ID	object_id

SGC Qualys Asset Service Details [sn_sec_sgc_qualys_asset_service_details]

SGC Qualys Asset Service Details [sn_sec_sgc_qualys_asset_service_details].

Name	name
Description	description
Qualys Asset	qualys_asset
Status	status

Relationships created by Cloud Network [cmdb_ci_network]

Parent class	Relationship type	Child class
Cloud Network [cmdb_ci_network]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Network [cmdb_ci_network]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]

Relationships created by Virtual Machine Instance [cmdb_ci_vm_instance]

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Image [cmdb_ci_os_template]

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Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Virtualized by::Virtualizes	Server [cmdb_ci_server]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Hardware Type [cmdb_ci_compute_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Relationships created by Server [cmdb_ci_server]

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Network Interface Details [sn_sec_sgc_qualys_asset_nic_details]
Server [cmdb_ci_server]	Reference	Software Installation [cmdb_sam_sw_install]
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Service Details [sn_sec_sgc_qualys_asset_service_details]
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Software Details [sn_sec_sgc_qualys_asset_software_details]
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Open Port Details [sn_sec_sgc_qualys_asset_open_port_details]
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Processor Details [sn_sec_sgc_qualys_asset_processor_details]
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Tag [sn_sec_sgc_qualys_asset_tag]
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Cloud Tag [sn_sec_sgc_qualys_asset_cloud_tag]
Server [cmdb_ci_server]	Reference	SGC Qualys Asset Details [sn_sec_sgc_qualys_asset_details]
Server [cmdb_ci_server]	Contains::Contained by	File System [cmdb_ci_file_system]

Relationships created by Azure Datacenter [cmdb_ci_azure_datacenter]

Parent class	Relationship type	Child class
Azure Datacenter [cmdb_ci_azure_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

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Parent class	Relationship type	Child class
AWS Datacenter [cmdb_ci_aws_datacenter]	Contains::Contained by	Availability Zone [cmdb_ci_availability_zone]
Azure Datacenter [cmdb_ci_azure_datacenter]	Contains::Contained by	Availability Zone [cmdb_ci_availability_zone]
AWS Datacenter [cmdb_ci_aws_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Relationships created by Hardware Type [cmdb_ci_compute_template]

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Relationships created by Image [cmdb_ci_os_template]

Parent class	Relationship type	Child class
Image [cmdb_ci_os_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Image [cmdb_ci_os_template]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

Relationships created by Cloud Mgmt Network Interface [cmdb_ci_nic]

Parent class	Relationship type	Child class
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]

Reference-type relationships

Parent class	Relationship type	Child class
SGC Qualys Asset Software Details [sn_sec_sgc_qualys_asset_software_details]	Reference	Server [cmdb_ci_server]
SGC Qualys Asset Network Interface Details [sn_sec_sgc_qualys_asset_nic_details]	Reference	Cloud Mgmt Network Interface [cmdb_ci_nic]
SGC Qualys Asset Cloud Tag [sn_sec_sgc_qualys_asset_cloud_tag]	Reference	Server [cmdb_ci_server]

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Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Server [cmdb_ci_server]
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Service Graph Connector for Rapid7

The Service Graph Connector for Rapid7 pulls in asset inventory data (hardware and software) from the Rapid7 database into the Configuration Management Database (CMDB) application in your ServiceNow AI Platform® instance.

Request apps on the Store

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

Supported versions

- Version 4.0 of the Rapid7 InsightVM application.
- Utah, Vancouver, and Washington ServiceNow® family releases.

Use cases

- Complement the data from the Rapid7 InsightVM discovery product.
- Import hardware data and details about your assets from the Rapid7 InsightVM integration and store them in appropriate configuration item (CI) classes in your CMDB.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Rapid7 integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Guided setup

Use the guided setup feature for the Service Graph Connector for Rapid7 to help you configure your integration in an organized sequence of tasks.

Note:
The API token requires the InsightIDR viewer role.

Configure the Service Graph Connector for Rapid7

After you have followed the instructions provided to you to download and activate the Service Graph Connector for Rapid7 application, refer to Download an application from the ServiceNow Store for the first time and Install a Security Operations integration. There are a few steps you need to complete before you configure this integration.

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Configure the Service Graph Connector for Rapid7

Configure your connections, set up scheduled imports, verify successful connections and optionally add multiple instances in the Guided Setup.

Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Observability Commons for CMDB (sn_observability), which is only required for event ingestion. This app must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Roles required:

- admin for tasks in the Guided Setup
- insightIDR viewer role for the API token

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Rapid7** > **Setup** in the navigation panel in your instance.
2. On the Welcome to Guided Setup Home page, select **Continue**.
3. On the Experience page that is displayed, select **Best Experience** followed by **Continue**.
   On the Service Graph Connector for Rapid7 page, there are three tasks displayed:
   - Configure the connection
   - Add multiple instances
   - Set up scheduled imports
4. Select **Configure the connection** to expand it.
   There are three steps:
   - Configure Rapid7 authentication credentials
   - Configure Rapid7 HTTP Connection
   - Test Connection
5. Select **Configure Rapid7 authentication credentials** and fill in the fields.

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a. Enter a name for the credentials, for example **SGRapid7.Credential**.

b. Verify the **Active** check box is selected.

c. In the API Key field, enter your Rapid7 InsightVM API key.

d. Leave the other field values in their current settings.

e. Right-click in the gray header titled API Key Credentials and select **Save**.

f. Select **Mark as complete** followed by **Continue**.
The Configure Rapid7 HTTP Connection page is displayed.

6. Configure Rapid7 HTTP Connection.

a. Fill in the fields,

Field	Value
Name	Connection name, `SGRapid7`, for example.
Active	Selected.
Credential	Credentials to use for the connection. Select one from the list.
Connection alias	Select one from the list. **sn_sec_sgc_rapid7.SGRapid7**, for example
URL builder	Select the check box. Fill in the new fields.
Connection URL	URL that includes 'https', for example, https://us.api.insight.rapid7.com
Host	Rapid7 domain part of the URL without the 'https'. An example might be `us.api.insight.rapid7.com`.
Protocol	`https`

b. Right-click in the gray header titled HTTP(s) Connection and select **Save**.

c. Select **Mark as complete** followed by **Continue**.
The Test Connection page is displayed.

7. Test the connection.

a. Select the **Test Connection** link under Related Links.
If the connection is successful, 200 is displayed in the Status Code field and a message is displayed. If your connection test fails, review the Message and Suggestion fields for how to proceed.

b. Right-click in the gray header titled Service Graph Connections and select **Save**.

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c. Select **Mark as complete** followed by **Continue**.
The steps for Add Multiple Instances is displayed. This step is optional and you might prefer to wait after you confirm you can import data before setting up multiple instances.

8. To configure the scheduled job, navigate back to the Guided Setup page and select **Set up scheduled import jobs**.

a. Follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.
You must select the Active check box to activate the scheduled job.

b. Select a record.

c. Fill in the fields.

Field	Value
Name	Unique Name for scheduled job.
Application	Read-only: Service Graph Connector for Rapid7.
Data source	Data source used.
Run	How often you want the job to run. If you want to run a test import prior to scheduling it, you might prefer to select **Once**.
Run as	Run the scheduled job with the credentials of another specified user.
Time	When you want the job to run.
Active	Select the check box to activate the job.
Conditional	Specific conditions under which this job is run.
Use connection	Leave this check box deactivated for the first run. Specifies another connection and credentials for this job.
Concurrent import	Leave check box activated. Splits data into multiple imports sets. See the field message for more information.
Partition Method	Leave as `Custom size`.
Partition size	15,000. Leave this value for the import set size for early scheduling.
Execute pre-import script	Leave check box activated. Specifies a script to run before the import is performed.
Execute post-import script	Leave check box activated. Specifies a script to run after the import is performed.

d. **Optional:** Select **Execute now** to run the job.

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If you do not choose to run the job on-demand, the next job runs according to the schedule you set.

e. Right-click in the gray header titled Scheduled Data Imports and select **Save**.

f. Select **Mark as complete** followed by **Continue**.

9. **Optional:** Return to Guided setup and add multiple instances.
When indicated, follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.
10. Select **Update Data Sources**.

a. On the Update Data Source Access page, select **Data Source**.

b. On the page that is displayed, select the **Application Access** tab.

c. Review the access settings and update as needed.

d. Right-click in the gray header titled Table and select **Save**.

e. Select **Mark as complete** followed by **Continue**.

f. Select Schedule **Update Schedule Data Import**.

g. Select the **Application Access** tab to view the permission settings.

h. When you are satisfied with the settings, right-click in the gray header titled Tables and select **Save**.

i. Select **Mark as complete** followed by **Continue**.

j. Follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.

k. On the Add Another Connection page, select the **Click here** link.
The Workflow Studio connection page is displayed and you can create a new connection.

l. From this page, select **Add Connection**.

m. Fill in the fields with your connection information.

Field	Description
Rapid7 Connection name	Unique name for your connection.
Rapid7 Connection URL	Connection URL.
API Key	Rapid7 API key.

n. Select **Create Connection**.
Your connections are displayed on the Rapid7 page.

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o. Select **Mark as complete** followed by **Continue**.
The Test New Connections page is displayed. Locate your new connection and note the status is 'Pending'.

p. Scroll and select the **Test Connection** link.
If the connection is successful, 200 is displayed in the Status Code field and a message is displayed. If your connection test fails, review the Message and Suggestion fields for how to proceed.

q. Right-click in the gray header titled Service Graph Connections and select **Save**.

r. Select **Mark as complete** followed by **Continue**.
The Configure the scheduled jobs page is displayed.

s. Repeat the steps listed previously in step 8.

t. On the Service Graph Connector for Rapid7 page for Guided Setup, select **Complete** to finish the configuration.

CMDB classes targeted in the Service Graph Connector for Rapid7

When you complete setting up the connection, you can configure the integration to periodically pull data. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Hardware [cmdb_ci_hardware]

The following attributes in the Hardware [cmdb_ci_hardware] table are populated by collected data.

Attribute label	Attribute name
Name	name
Correlation ID	correlation_id
MAC Address	mac_address
Install Status	install_status
Operational Status	operational_status

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data.

Attribute label	Attribute name
Name	name
IP Address	ip_address
Owned By Configuration Item	owned_by_cmdb_ci

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SGC Rapid7 Asset [sn_sec_sgc_rapid7_sgc_rapid7_asset]

The following attributes in the SGC Rapid7 Asset [sn_sec_sgc_rapid7_sgc_rapid7_asset] table are populated by collected data.

Attribute label	Attribute name
Assessed for policies	assessed_for_policies
Assessed for vulnerabilities	assessed_for_vulnerabilities
Configuration item	configuration_item
Credential assessments	credential_assessments
Critical vulnerabilities	critical_vulnerabilities
Exploits	exploits
Last assessed for vulnerabilities	last_assessed_for_vulnerabilities
Last scan end	last_scan_end
Last scan start	last_scan_start
Malware kits	malware_kits
Moderate vulnerabilities	moderate_vulnerabilities
New	new
OS architecture	os_architecture
OS description	os_description
OS family	os_family
OS name	os_name
OS system name	os_system_name
OS type	os_type
OS vendor	os_vendor
OS version	os_version
Remediated	remediated
Risk score	risk_score
Same	same
Severe vulnerabilities	severe_vulnerabilities
Tags	tags
Total vulnerabilities	total_vulnerabilities
Type	type
Unique identifiers	unique_identifiers
Configuration item	configuration_item

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Relationships created for Hardware

Parent class	Relationship type	Child class
Hardware [cmdb_ci_hardware]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Hardware [cmdb_ci_hardware]	Reference	SGC Rapid7 Asset [sn_sec_sgc_rapid7_sgc_rapid7_asset]

Relationships created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Hardware [cmdb_ci_hardware]

Relationships created by SGC Rapid7 Asset

Parent class	Relationship type	Child class
SGC Rapid7 Asset [sn_sec_sgc_rapid7_sgc_rapid7_asset]	Reference	Hardware [cmdb_ci_hardware]

Service Graph Connector for SentinelOne

The Service Graph Connector for SentinelOne pulls in asset inventory data (hardware and software) from the SentinelOne database into the Configuration Management Database (CMDB) application in your ServiceNow AI Platform® instance.

Request apps on the Store

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

Supported Versions

- Supported SentinelOne API versions: Get Agents- V2.1
- Supported ServiceNow AI Platform® versions:
  - Xanadu
  - Washington
  - Vancouver

Use cases

- Import SentinelOne agent information and store it in appropriate configuration item (CI) classes in your CMDB.
- Configure multiple instances of SentinelOne in the Service Graph Connector.

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Guided setup

Use the guided setup feature to help you configure your integration in an organized sequence of tasks.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring SentinelOne integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Configure the Service Graph Connector for SentinelOne

The guided setup for the Service Graph Connector for SentinelOne provides an organized sequence of tasks to configure the integration on your ServiceNow AI Platform instance.

Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI Class Models store app store app, which is automatically installed.
- Discovery Core plugin (com.snc.discovery.core), which is automatically installed by Discovery.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- Guided Setup (com.sn.ads.setup).
- Data Stream (com.glide.hub.action_type.datastream).
- ITOM Patterns.

Roles required:

- SentinelOne Role - viewer
- ServiceNow AI Platform® Role - admin

Guided Setup

The guided setup for the Service Graph Connector for SentinelOne provides an organized sequence of tasks to configure the integration on your instance.

Procedure

1. Navigate to **Service Graph Connectors** > **SentinelOne** > **Setup**.
2. On the Home page, select **Continue**.

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3. On the Experience page, select the **Best Experience** from it.
4. On the Service Graph Connector for SentinelOne page in the Configure the connection page, select the **Configure SentinelOne Authentication Credentials** task and follow these steps:
   a. In the API Key field, enter your SentinelOne API Key and update the credential record.
   b. Select the **Mark as Complete** checkbox and select **Continue**.
5. In the **Configure SentinelOne HTTP Connection** task follow these steps:
   a. Add the SentinelOne base URL (Uniform Resource Locator).
   b. Select the **Mark as Complete** checkbox and select **Continue**.
6. In the **Test Connection** task follow these steps:
   a. Select the **Test Connection** link.

      The Status code field displays 200 if the connection is successful.

   b. Select the **Mark as Complete** checkbox and select **Continue**.
7. **Optional:** To create another connection, select the **Update Data Source Access** section and follow these steps:
   a. Give permission to create and update the data source.
   b. Select the **Mark as Complete** checkbox and select **Continue**.
   c. Give permission to create and update the Scheduled Import Sets.
   d. Select the **Mark as Complete** checkbox and select **Continue**.
   e. Clear the cache with the code snippet mentioned previously using Scripts-Background.
   f. Select the **Mark as Complete** checkbox and select **Continue**.
   g. Add a new connection by clicking the link.
   h. After you add a new connection, select the **Mark as Complete** checkbox and select **Continue**.
   i. Select the new connection record and select the **Test Connection link**.

      The Status code field displays 200 if the connection is successful.

   j. Select the **Mark as Complete** checkbox and select **Continue**.
8. Fill out the fields on the Scheduled Data Import form:

Field	Description
Name	Name of the scheduled job.
Data source	Data source record that defines the data to import.
Run as	Option to run the scheduled job with the credentials of the specified user.
Active	Option to activate the scheduled job. Select this option.
Concurrent Import	Function that loads the data from multiple import sets. The function then processes and transforms the data concurrently.

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Field	Description
Partition Method	Partition method for the concurrent import set.
Partition Size	Import set size for early scheduling.
Execute pre-import script	Option to specify a script to run before the import is performed.
Execute post-import script	Option to specify a script to run after the import is performed.
Application	Application that contains this scheduled job.
Run	Frequency of running the import.
Conditional	Conditions under which this job is executed.

9. Click **Execute Now**.
10. In the Help task bar, select **Mark as Complete**.

CMDB classes targeted in the Service Graph Connector for SentinelOne

When you complete setting up the connection, you can configure the integration to periodically pull data. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

AWS Datacenter [cmdb_ci_aws_datacenter]

The following attributes in the AWS Datacenter [cmdb_ci_aws_datacenter] table are populated by collected data.

Attribute label	Attribute name
Object Id	object_id
Region	region
Name	name

Relationships for AWS Datacenter

Parent Class	Relationship Type	Child Class
AWS Datacenter [cmdb_ci_aws_datacenter]	Hosted On: Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Azure Datacenter [cmdb_ci_azure_datacenter]

The following attributes in the Azure Datacenter [cmdb_ci_azure_datacenter] table are populated by collected data.

Attribute label	Attribute name
Object Id	region
Name	name
Region	region

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Relationships for Azure Data Center

Parent Class	Relationship Type	Child Class
Azure Datacenter [cmdb_ci_azure_datacenter]	Hosted On: Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Availability Zone [cmdb_ci_availability_zone]

The following attributes in the Availability Zone [cmdb_ci_availability_zone] table are populated by collected data.

Relationships for Availability Zone

Parent Class	Relationship Type	Child Class
Azure Datacenter [cmdb_ci_azure_datacenter]	Contains:Contained by	Availability Zone [cmdb_ci_availability_zone]

Attribute label	Attribute name
Name	name
Object Id	object_id
Region	region

GCP Datacenter [cmdb_ci_google_datacenter]

The following attributes in the GCP Datacenter [cmdb_ci_google_datacenter] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object Id	object_id
Account Id	account_id
Datacenter Type	datacenter_type

Relationships for GCP Datacenter

Parent Class	Relationship Type	Child Class
GCP Datacenter [cmdb_ci_google_datacenter]	Hosted On: Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data.

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Attribute label	Attribute name
Name	name
Object Id	object_Id
Account Id	account_Id
Datacenter Type	datacenter_type

Relationships for Cloud Service Account

Parent Class	Relationship Type	Child Class
Network [cmdb_ci_network]	Hosted On: Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Cloud Subnets [cmdb_ci_cloud_subnet]

The following attributes in the Cloud Subnets [cmdb_ci_cloud_subnet] table are populated by collected data.

Attribute label	Attribute name
Object Id	object_id
Name	name

Relationships for Cloud Subnets

Parent Class	Relationship Type	Child Class
Network [cmdb_ci_network]	Contains:Contained by	Cloud Subnets [cmdb_ci_cloud_subnet]

Hardware Type [cmdb_ci_compute_template]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data.

Attribute label	Attribute name
Name	name
Object Id	object_id

Relationships for Hardware Type

Parent Class	Relationship Type	Child Class
Compute Template [cmdb_ci_compute_template]	Hosted On: Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
VM Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Compute Template [cmdb_ci_compute_template]

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Cloud Network [cmdb_ci_network]

The following attributes in the Cloud Network [cmdb_ci_network] table are populated by collected data.

Attribute label	Atribute name
Object Id	object_id
Name	name

Relationships for Cloud network

Parent Class	Relationship Type	Child Class
Network [cmdb_ci_network]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data.

Attribute label	Attribute name
Object Id	object_id
Name	name
VM Instance ID	vm_inst_id

Relationships for VM Instance

Parent Class	Relationship Type	Child Class
VM Instance [cmdb_ci_vm_instance]	Hosted On: Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
VM Instance [cmdb_ci_vm_instance]	Virtualized by::Virtualizes	Server [cmdb_ci_server]
VM Instance [cmdb_ci_vm_instance]	Hosted On: Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data.

Attribute label	Attribute name
Key	key
Value	value
Tag	tag

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Image [cmdb_ci_os_template]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data.

Attribute label	Attribute name
Object Id	object_id
Name	name

Relationships for Image

Parent Class	Relationship Type	Child Class
Image [cmdb_ci_os_template]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data.

Attribute label	Attribute name
Name	name
Serial number	serial_number
CPU speed (MHz)	cpu_speed
CPU count	cpu_count
RAM (MB)	ram
OS Address Width (bits)	os_address_width
Operating System	os
CPU core count	cpu_core_count
Fully qualified domain name	fqdn
CPU name	cpu_name
First Discovered	first_discovered

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data.

Attribute label	Attribute name
Name	name
Serial number	serial_number
CPU speed (MHz)	cpu_speed
CPU count	cpu_count

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Attribute label	Attribute name
RAM (MB)	ram
OS Address Width (bits)	os_address_width
Operating System	os
CPU core count	cpu_core_count
Fully qualified domain name	fqdn
CPU name	cpu_name
First Discovered	first_discovered

SentinelOne Asset Tags [sn_sec_sgc_sntlone_asset_tags]

The following attributes in the SentinelOne Asset Tags [sn_sec_sgc_sntlone_asset_tags] table are populated by collected data.

Attribute label	Attribute name
ID	tags_id
Key	tags_key
Value	tags_value
Assigned At	tags_assignedat
Assigned By	tags_assignedby
Assigned By ID	assigned_by_id

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data.

Attribute label	Attribute name
IP Address	ip_address
Name	name
Nic	nic
IP version	ip_version

Relationships for IP Address

Parent Class	Relationship Type	Child Class
Server [cmdb_ci_server]	Owns:Owned by	IP Address [cmdb_ci_ip_address]

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data.

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Attribute label	Attribute name
Mac Address	mac_address
Name	name
Ip Default Gateway	ip_default_gateway
Discovery Source	discovery_source

Relationships for Network Adapter

Parent Class	Relationship Type	Child Class
Server [cmdb_ci_server]	Owns:Owned by	Network Adapter [cmdb_ci_network_adapter]

SentinelOne Additional Attributes [sn_sec_sgc_sntlone_additonal_attributes]

The following attributes in the SentinelOne Additional Attributes [sn_sec_sgc_sntlone_additonal_attributes] table are populated by collected data.

Attribute label	Attribute name
NetworkInterfaces Name	networkinterfaces_name
NetworkInterfaces GatewayMacAddress	networkinterfaces_gatewaymacaddress
UUID	uuid
Configuration item	configuration_item
Network Quarantine Enabled	network_quarantine_enabled
Last Successful Scan Date	last_successful_scan_date
License_Key	license_key
First Discovered	first_discovered
Location Enabled	location_enabled
Ad ComputerDistinguishedName	ad_computerdistinguishedname
Agent Version	agent_version
Scan Status	scan_status
Scan Started At	scan_started_at
ID	id
IP Address Subnet	ip_address_subnet
Mitigation Mode Suspicious	mitigation_mode_suspicious
Last Scan Finished At	last_scan_finished_at
Firewall Enabled	firewall_enabled
Console Migration Status	console_migration_status
Group ID	group_id
Operational State Expiration	operational_state_expiration

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Attribute label	Attribute name
Last IP To Mgmt	last_ip_to_mgmt
Threat Reboot Required	threat_reboot_required
Machine Type	machine_type
Is Pending Uninstall	Is_pending_uninstall
Ranger Status	ranger_status
Ad LastUserDistinguishedName	ad_lastuserdistinguishedname
Agent Up To Date	agent_up_to_date
Ranger Version	ranger_version
Last Boot Time	last_boot_time
Disk Encryption Status	disk_encryption_status
Mitigation Mode	mitigation_mode
Last Full Scan	last_full_scan
Agent Uninstalled	agent_uninstalled
Extenal Id	extenal_id
Updated At	updated_at
Last Scan Aborted At	last_scan_aborted_at
Network Status	network_status
Show Alert Icon	show_alert_icon
Subscribed On	subscribed_on
Account ID	account_id
Recently Active	recently_active
Active Threats	active_threats
Allow Remote Shell	allow_remote_shell
Site Name	site_name
First Full Mode Time	first_full_mode_time
Infected	infected
App Vulnerability Status	app_vulnerability_status
Site ID	site_id
Agent Installer Type	agent_installer_type
Account Name	acount_name
NetworkInterfaces Name	networkinterfaces_name
NetworkInterfaces GatewayMacAddress	networkinterfaces_gatewaymacaddress
NetworkInterfaces ID	networkinterfaces_id
user_actions_needed	user_actions_needed

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Attribute label	Attribute name
aws_security_group	aws_security_group
proxyState_console	proxyState_console
proxyState_deepVisibility	proxyState_deepVisibility
Ad UserPrincipalName	ad_userPrincipalName
Ad ComputerMemberOf	ad_computerMemberOf
Ad ComputerDistinguishedName	ad_computerDistinguishedName
Ad LastUserMemberOf	ad_lastUserMemberOf
Ad LastUserDistinguishedName	ad_lastUserDistinguishedName
Ad Mail	ad_mail
Agent Decommissioned	agent_decommissioned
Agent Operational State	agent_operational_state
Last Active Date	last_active_date
Group Updated At	group_updated_at
Missing Permissions	missing_permissions

Service Graph Connector for SentinelOne Properties

Property	Description
sn_sec_sgc_sntlone.api_page_size	Enter the number of records per page to retrieve. • Type: string • Default value: 1000 • Location: System Property [sys_properties] table

Note:
To open the System Properties [sys_properties] table, enter sys_properties.LIST in the navigation filter.

Service Graph Connector for Splunk

The Service Graph Connector for Splunk pulls in asset inventory data (hardware and software) from the Splunk database into the Configuration Management Database (CMDB) application in your ServiceNow AI Platform® instance.

Request apps on the Store

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

Supported versions

Supported versions:

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- Xanadu
- Washingtondc
- Vancouver

Use cases

By default, the Service Graph Connector for Splunk pulls the following basic forwarding details:

- Forwarder's version
- Forwarder's type
- Forwarder's last check-in time
- OS
- Host
- Host IP address

With the Service Graph Connector for Splunk add-on, you have the option to import extended data for your Windows and Linux assets with the Service Graph Connector for Splunk that includes the following details:

- MAC address
- Operating system details
- Asset name
- Software details
- File system
- Last logon date
- Open ports

This data is stored in the Configuration Management Database (CMDB) and Splunk Asset Details extension attributes custom tables. To import these extended asset details, the add-on is required. See Install the add-on for the Service Graph Connector for Splunk.

Guided setup

The guided setup for the Service Graph Connector for Splunk provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, see the section titled Configure the Service Graph Connector for Splunk.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Configure the Service Graph Connector for Splunk

Configure your connections, set up scheduled imports, verify successful connections and optionally add multiple instances in the Guided Setup.

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Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.
- Optional: Only required for event ingestion. Observability Commons for CMDB (sn_observability). If used, this app must be installed prior to installing the connector for Event Management to work. For more information, see Observability Commons for CMDB on the ServiceNow Store.

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Splunk** > **Setup** in the navigation panel in your instance.
2. On the Welcome to Guided Setup Home page, select **Continue**.
3. On the Experience page that is displayed, select **Best Experience** followed by **Continue**.
   On the Service Graph Connector for Splunk page, there are three tasks displayed:
   - Configure the connection
   - Add multiple instances
   - Set up scheduled import jobs
4. Select **Configure the connection** to expand it.
   There are three tasks:
   - Configure Splunk authentication credentials
   - Configure Splunk HTTP Connection
   - Test Connection
5. Select **Configure Splunk authentication credentials** and fill in the fields.

   a. Enter a name for the credentials, for example **SG-Splunk Credentials**.

   b. Verify the **Active** check box is selected.

   c. Enter your User name and Password for your Splunk instance.

   d. Leave the other field values in their current settings.

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e. Right-click in the gray header titled Basic Auth Credentials and select **Save**.

f. Select **Mark as complete** followed by **Continue**.
The Configure Splunk HTTP Connection page is displayed.

6. Configure the Splunk HTTP connection.

a. Fill in the fields.

Field	Value
Name	Connection name, `SG-Splunk Connection`, for example.
Active	Selected.
Credential	Credentials to use for the connection. Select one from the list.
Domain	global.
Connection alias	Select one from the list. **sn_sec_sgc_splunk.SGSplunk**, for example
URL builder	Select the check box. Fill in the new fields.
Host	Splunk domain part of the URL without the 'https'. An example might be `splunk3.com` or an IP address.
Override default port	The Splunk instance port,`8089`, for example.
Protocol	https.
(Optional) Use MID server	Select the check box for a dedicated MID Server for the connection, if available. i. Select **Specific MID Server** from the MID Selection drop down list. ii. Select a MID Server from the list. **Note:** A MID Server is required for on-premise connections if the connection is not publicly accessible.

b. Right-click in the gray header titled HTTP(s) Connection and select **Save**.

c. Select **Mark as complete** followed by **Continue**.
The Test Connection page is displayed.

d. **Optional:** Set the flag for the **is the servicenow addon installed** (*is_snow_addon_installed*).
By default, the property on the Service Graph Connection Properties tab is set to **false**.

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Option	Description
false	The default query is set to extract only essential information about the forwarder that includes the host name and the operating system.
true	The query offers more information about the forwarder along with extensive asset details via the ServiceNow add-on. (Optional) This data is imported only if the add-on is installed on the Splunk instance.

7. Test the connection.

   a. Select the **Test Connection** link under Related Links.
   If the connection is successful, 201 is displayed in the Status Code field and a message is displayed after a few moments. If your connection test fails, review the Message and Suggestion fields for how to proceed.

   b. After a successful test, right-click in the gray header titled Service Graph Connections and select **Save**.

   c. Select **Mark as complete** followed by **Continue**.
   The steps for Add Multiple Instances is displayed. To add multiple instances, proceed to step 9. This step is optional and you might prefer to wait after you confirm you can import data before setting up multiple instances. To set the import schedule, follow the steps below.

8. To configure the scheduled job, select **Set up scheduled import jobs** from the drop down list under Add Multiple Instances in the header.

   a. On the Configure the scheduled jobs page, select a record under Scheduled Data Imports.

   b. Select the frequency from the list for the Run field.
   If you want to run a test import prior to scheduling it, you might prefer to select **Once**.

   c. Select the **Active** box to activate the scheduled job.

   d. **Optional:** Edit the fields as required.

   (Optional) You might prefer to leave these fields in their default settings for the first few runs to confirm data imports.

Field	Value
Name	Unique Name for scheduled job.
Application	Read-only: Service Graph Connector for Splunk
Data source	Data source used.

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Field	Value
Run as	Run the scheduled job with the credentials of another specified user.
Time	When you want the job to run.
Conditional	Specific conditions under which this job is run.
Use connection	Leave this check box deactivated for the first run. Specifies another connection and credentials for this job.
Concurrent import	Leave check box activated. Splits data into multiple imports sets. See the field message for more information.
Partition Method	Leave as `Custom size`.
Partition size	15,000. Leave this value for the import set size for early scheduling.
Execute pre-import script	Leave check box activated. Specifies a script to run before the import is performed.
Execute post-import script	Leave check box activated. Specifies a script to run after the import is performed.

e. **Optional:** Select **Execute now** to run the job.
If you do not choose to run the job on-demand, the next job runs according to the schedule you set.

f. Right-click in the gray header titled Scheduled Data Import and select **Save**.

g. Select **Mark as complete** followed by **Continue**.
The main task page is displayed.

9. **Optional:** To add multiple instances, select **Update Data Sources**.

(Optional) When indicated, follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.

a. On the Update Data Source Access page, select **Data Source**.

b. On the page that is displayed, select the **Application Access** tab.

c. Review the access settings and update as needed.

d. Right-click in the gray header titled Table and select **Save**.

e. Select **Mark as complete** followed by **Continue**.

f. On the **Update Schedule Data Import** record, select **Schedule Data Import** to open it.

g. Select the **Application Access** tab to view the permission settings.

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h. When you are satisfied with the settings, right-click in the gray header titled Tables and select **Save**.

i. Select **Mark as complete** followed by **Continue**.

j. Follow the steps listed at the top of the page to switch the application scope with the application picker to open, edit, and save the record.

k. On the Add Another Connection page, select the **Click here** link.
The Flow Designer connection page is displayed and you can create a new connection.

l. From this page, select **Add Connection**.

m. Fill in the fields with your connection information.

Field	Description
Splunk Connection name	Unique name for your connection.
Splunk Connection URL	Connection URL in https format.
User name	Splunk user name.
Password	Splunk password.

n. Select **Create Connection**.
Your connections are displayed on the page.

o. On the Add Multiple Instance page, select **Mark as complete** followed by **Continue**.
The Configure MID Server for New HTTP Connection page is displayed.

p. Locate your new connection and select it to open the record.
The connection URL is displayed in the Connection URL field.

q. **Optional:** Select the Use MID server check box to add a MID Server.

i. Select **Specific MID Server** from the MID Selection drop down list.

ii. Select a MID Server from the list.

r. Right-click in the gray header titled HTTP(s) Connection and select **Save**.

s. Select **Mark as complete** followed by **Continue**.
The Test New Connections page is displayed.

10. Test the new connection.

a. Scroll and select the connection you want to test.

b. Select the **Test Connection** link under Related Links.
If the connection is successful, 201 is displayed in the Status Code field and a message is displayed after a few moments. If your connection test fails, review the Message and Suggestion fields for how to proceed.

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c. After a successful test, right-click in the gray header titled Service Graph Connections and select **Save**.

d. Select **Mark as complete** followed by **Continue**.
The Configure the scheduled jobs page is displayed

e. On the Service Graph Connector for Splunk page for Guided Setup, select **Complete** to finish the configuration.

Service Graph Connector for Splunk add-on

Import more detailed asset data with the Service Graph Connector for Splunk with an add-on developed by ServiceNow engineering. The add-on permits you to import data about your Windows and Linux assets.

Service Graph Connector for Splunk

The Service Graph Connector for Splunk retrieves computer and software information from the Splunk product and imports it into the Configuration Management Database (CMDB) in your instance. By default, the following basic data is imported:

- Forwarder's version (agent)
- Forwarder's type (agent)
- Forwarder's last check-in time (agent)
- OS
- Host
- Host IP address

The service graph connector for Splunk is available on the ServiceNow® Store.

The ServiceNow Add-on for Windows and Linux assets

With the Windows and Linux Assets add-on, you have the option to import more detailed asset data with the Service Graph Connector for Splunk that includes the following data:

- MAC address
- Operating system details
- Asset name
- Installed software details
- File system
- Last logon date
- Open ports
- Running processes
- Running services

This add-on is available for download into your Splunk console from splunkbase.

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Downloading and installing the add-on

Prior to installing this add-on, you must verify you have installed and activated the following applications and add-ons:

- Service Graph Connector Splunk
- Splunk_TA_nix version 9.0.0 (Linux) or later
- Splunk_TA_windows version 8.9.0 or later add-ons available from splunkbase.

These add-ons permit you to identify and import more specific data related to your Linux and Windows assets with your imports with the Splunk Service Graph Connector API.

For example, searches from these add-ons might provide you with data you want about Windows drivers, Windows Network Adaptors, Linux Hardware, and other OS Details.

Target workloads

In the app.manifest, individual agents on a specific machine send information to a central hub (server) where data is collected, stored, and managed. This central machine is where the apps are installed.

To adjust workloads to specify resources for a search, indexing, or other workloads, in Splunk Web, select **Settings** > **Workload Management** > **Workload Rules**.

In the Status column, select the toggle to activate or deactivate individual workload rules.

Supported deployments

This add-on supports the following types of deployments:

- standalone
- distributed
- search head clustering

See Splunk documentation for more information about their supported workloads.

Install the add-on for the Service Graph Connector for Splunk

Install the Splunk add-on developed by ServiceNow® engineering from splunkbase to search for Windows and Linux Assets.

Before you begin
Role required: admin or security_admin

Procedure

1. Navigate to **splunkbase** (splunkbase) and log in.
2. In your Splunk console, select **Apps** > **FInd More Apps**.
3. Locate the **ServiceNow Add-on for Windows and Linux Assets** app and select **Install**.

   Note:
   You can upgrade from within the app.

4. Follow the prompts.

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5. **Optional:** Navigate to **Settings** > **Searches, reports and alerts** to view when searches are scheduled.

   Note:

   (Optional) You can change the schedules, but since the schedules run in a specific order and require successful completion before the next search in the list is initiated, you might prefer to leave the settings in their defaults.

   After all the searches are completed, the data is grouped from each search into a few coalesced key-value parings (kvstores) for import into your instance: asset details, asset process details, asset service details, and asset software details.

6. Select **App: Search and Reporting (search)** > **ServiceNow Add-on for Windows and Linux Assets.**

   By default, search data is stored in the following key definitions:

   - Asset_index_macro: Index="internal"
   - Asset_linex_Index_macro: index="main"
   - Asset_windows_index="main"

   If you are storing the search data for Linux and Windows in custom indexes, you must update your search macros.

7. To update your search macros, navigate to **Settings** > **Advanced search** > **Search macros** > **Search & Reporting (Search)** > **ServiceNow Add-on for Windows and Linux Assets ServiceNow_TA_windows_linux_assets**
8. On the Search macros page, update the index as required in the Definition column.
9. **Optional:** Adjust workloads to specify resources for search, indexing, and other workloads.
   a. In Splunk Web, select **Settings** > **Workload Management** > **Workload Rules**.
   b. In the Status column, select the toggle to activate or deactivate individual workload rules. See Service Graph Connector for Splunk add-on for more information about target workloads and supported deployments.

CMDB classes targeted in the Service Graph Connector for Splunk

When you complete setting up the connection, you can configure the integration to periodically pull data. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Hardware [cmdb_ci_computer] table are populated by collected data.

Attribute label	Attribute name
Name	name
Serial Number	serial_number
Operating System	os
OS Version	os_version
CPU name	cpu_name

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Attribute label	Attribute name
CPU manufacturer	cpu_manufacturer
CPU type	cpu_type
CPU speed (MHz)	cpu_speed
CPU core count	cpu_core_count
CPU count	cpu_count
Manufacturer	manufacturer

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data.

Attribute label	Attribute name
Name	name
IP Address	ip_address

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data.

Attribute label	Attribute name
Name	name
MAC Address	mac_address
Manufacturer	manufacturer

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data.

Attribute label	Attribute name
Name	name
Version	version

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data.

Attribute label	Attribute name
Name	name
Product name	software

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Attribute label	Attribute name
Installed On	installed_on

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data. This table is populated only when the Software Asset Management applications are installed.

Attribute label	Attribute name
Display Name	display_name
Version	version
Discovery Source	discovery_source

Splunk Asset Details [sn_sec_sgc_splunk_asset_details]

The following attributes in the Splunk Asset Details [sn_sec_sgc_splunk_asset_details] table are populated by collected data.

Attribute label	Attribute name
Configuration Item	configuration_item
Forwarder GUID	forwarder_guid
Forwarder Type	forwarder_type
Forwarder Version	forwarder_version
Host Name	host_name
Host Status	host_status
Host type	host_type
Last logon date	last_check_in
Model Name	model_name
OS Architecture	os_architecture
OS Build Number	os_build_number
OS Family	os_family

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_rel_ci	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_rel_ci	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Computer [cmdb_rel_ci	Contains::Contained by	File system [cmdb_ci_file_system]

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Service Graph Connector for SolarWinds

Use the Service Graph Connector for SolarWinds to pull in data from the SolarWinds software into your ServiceNow instance.

The Service Graph Connector for SolarWinds pulls in asset inventory data (hardware and software) from the SolarWinds database into the ServiceNow® Configuration Management Database (CMDB) application.

Request apps on the Store

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

Supported versions

- Supported SolarWinds Orion minimum versions:
  - 2019.4 HF6
  - 2020.2.1. HF2
- Supported ServiceNow versions:
  - Washington DC
  - Xanadu
  - Yokohama

Use cases

The following are examples on how you can use the Service Graph Connector:

- Automatic normalization of asset information for hardware, virtualization and cloud resources, and software.
- Ability to configure and save synchronization schedules.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the Service Graph Workspace or CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure Service Graph Connector for SolarWinds using SGC Central.

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed Service Graph Connectors. You can see metrics for all integration runs. You can filter the view to a specific integration, a specific time duration, or a specific integration run. For more details about monitoring SolarWinds integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

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Data mapping

Data from data sources in the SolarWinds software is mapped and transformed into ServiceNow CMDB tables using the Robust Transform Engine (RTE). Data is inserted into ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from the SolarWinds software.

The data is loaded into staging tables and then inserted into the following CMDB target tables:

- AIX Server [cmdb_ci_aix_server]
- Availability Zone [cmdb_ci_availability_zone]
- CI Relationship [cmdb_rel_ci]
- Cloud Network [cmdb_ci_network]
- Cloud Service Account [cmdb_ci_cloud_service_account]
- Cloud Subnet [cmdb_ci_cloud_subnet]
- Computer [cmdb_ci_computer]
- Disk [cmdb_ci_disk]
- Hardware [cmdb_ci_hardware]
- Hardware Type [cmdb_ci_compute_template]
- Hyper-V Server [cmdb_ci_hyper_v_server]
- IIS Virtual Directory [cmdb_ci_iisdirectory]
- Image [cmdb_ci_os_template]
- IP Address [cmdb_ci_ip_address]
- Linux Server [cmdb_ci_linux_server]
- Logical Datacenter [cmdb_ci_logical_datacenter]
- Microsoft iis Web Server [cmdb_ci_microsoft_iis_web_server]
- MS SQL Server [cmdb_ci_db_mssql_server]
- MS SQL DataBase [cmdb_ci_db_mssql_database]
- Network Adapter [cmdb_ci_network_adapter]
- Network Gear [cmdb_ci_netgear]
- Serial Number [cmdb_serial_number]
- Server [cmdb_ci_server]
- Software Installation [cmdb_sam_sw_install] (If the Software Asset Management (SAM) application is installed.)
- Software Instance [cmdb_software_instance] (If the SAM application is not installed.)
- Software [cmdb_ci_spkg] (If the SAM application is not installed.)
- Solaris Server [cmdb_ci_solaris_server]
- Storage Volume [cmdb_ci_storage_volume]
- UNIX Server [cmdb_ci_unix_server]
- VM Instance [cmdb_ci_vm_instance]
- Windows Server [cmdb_ci_win_server]

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For more information on where data is saved when pulling data from SolarWinds, see CMDB classes targeted in Service Graph Connector for SolarWinds.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Related topics

Service Graph Connectors

Configure Service Graph Connector for SolarWinds using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for SolarWinds for pulling in SolarWinds data into the CMDB.

Before you begin

Install Service Graph Connector for SolarWinds version 2.6.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Air gap connections are available from version 2.5.0 of the Service Graph Connector for SolarWinds. You can set up either standard data sources or air gap data sources. Before you set up air gap data sources, you must configure the air gap solution for the Service Graph Connector for SolarWinds in your high-secure server and low-secure server. See Configuring air gap connections for Service Graph Connector for SolarWinds.

Role required: admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Dashboard page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the SolarWinds connector type, and then select **Create connection**.
4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

5. Complete the setup for configuring the connector for importing data.

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a. Select the data source type.

i. In the **Setup** stage of the playbook, select the **Select data source type** activity.

- Select **Standard data sources** if you're working with environments that have direct internet access.

  Proceed to step 5.c.

- Select **Air gap data sources** if you're working with restricted environments that don't have direct internet access.

ii. Select **Continue**.

b. Download and run the PowerShell scripts to set up an air gap connection.

> **Note:**
> Before you add an air gap connection, you must configure the air gap solution for the Service Graph Connector for SolarWinds in your high-secure and low-secure servers. See Configuring air gap connections for Service Graph Connector for SolarWinds.

i. In the **Setup** stage of the playbook, select the **Download PowerShell scripts** activity.

The **Download PowerShell scripts** activity appears only when you select **Air gap data sources** as the data source type in step 5.a.

ii. Select **Download PowerShell scripts**.

iii. Run the PowerShell scripts.

For more information on configuring an air gap connection, see Configuring air gap connections for Service Graph Connector for SolarWinds.

iv. After configuring the air gap connection, select **Continue**.

c. Create and test a connection.

i. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

ii. On the form, fill in the fields.

- For standard data sources:

Create and test connection form

Field	Description
Connection Name	Display name for the connection.
Connection URL	Connection host name for SolarWinds.
User name	User name for SolarWinds authentication.
Password	Password for SolarWinds authentication.
Use MID server	Option to use a MID Server. Select this check box.
MID selection	Select a MID Server from the list. This field appears only when the **Use MID Server** check box is selected.

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Field	Description
MID application	Select a MID Server application from the list. This field appears only when the **Use MID Server** check box is selected.

- For air gap data sources:

Create and test connection form

Field	Description
Connection name	Display name for the connection.
Parent directory	Path of the SolarWinds directory where the data is stored in your low-secure server.
Archive data after retrieval	Option to archive data after retrieval.
Archive path [Optional]	Folder where the data is to be archived if the **Archive data after retrieval** check box is selected.
MID server	Name of the MID Server that you deployed in your low-secure server. See Configure air gap solution for Service Graph Connector for SolarWinds in a low-secure server.

iii. Select **Create and test connection**.

iv. Once the connection test is complete, select **Continue**.

d. Configure the properties of the connector to access resources.

i. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

- Select **SAM installed** if a Service & Application Monitor (SAM) module is installed on the SolarWinds instance.
- Select **NPM installed** if a Network Performance Monitor (NPM) module is installed on the SolarWinds instance.

ii. Select **Continue**.

e. Configure the import schedule to import data at regular intervals.

i. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

ii. Expand the Parent scheduled data import within the Import schedules list, and select the SG-Solarwinds Hardware import schedule.

iii. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

iv. Select **Save**.

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Alternatively, select **Execute Now** to execute the import schedule immediately.

v. Select **Continue**.

f. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

- Service Graph Connector for SolarWinds
- CMDB classes targeted in Service Graph Connector for SolarWinds
- Accessing the connection details of Service Graph Connector for SolarWinds
- Configuring air gap connections for Service Graph Connector for SolarWinds

Configure Service Graph Connector for SolarWinds

Set up authentication credentials and scheduled jobs to import SolarWinds data into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Before you start the configuration, navigate to **System Definition** > **Business Rules**, and deactivate the *`ValidateServiceAccountID`* business rule.

Air gap connections are available from version 2.5.0 of the Service Graph Connector for SolarWinds. You can set up either regular data sources or air gap data sources. Before you set up air gap data sources, you must configure the air gap solution for the Service Graph Connector for SolarWinds in your high-secure server and low-secure server. See Configuring air gap connections for Service Graph Connector for SolarWinds.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- Discovery Core plugin (com.snc.discovery.core), which is automatically installed by Discovery.
- ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.

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- SolarWinds Orion Platform.
- SolarWinds Server & Application Monitor and/or Network Performance Monitor.

Roles required:

- To configure the ServiceNow platform: admin
- To access SolarWinds data: User with SWIS (SolarWinds Information Service) access (the same as through the Orion website, not database users).

About this task

Note:
SolarWinds Integration can work with or without Service & Application Monitor (SAM) and Network Performance Monitor (NPM) being installed.

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **SolarWinds** > **Setup**.
2. On the Getting started page, select **Get Started**.
3. Configure your authentication credentials used to connect to the SolarWinds SWIS API.

   a. On the Service Graph Connector for SolarWinds page, in the Configure the connection section, select the **Configure the authentication credentials used to connect to SolarWinds SWIS API** task.

   b. For the Configure the authentication credentials used to connect to SolarWinds SWIS API task, select **Configure**.

   c. Fill in the fields on the Basic Auth Credentials form.

Basic Auth Credentials form

Field	Description
Name	Human-readable name for this credential. This field is automatically set. You can optionally change this setting.
User name	SolarWinds user name. **Note:** The SolarWinds user must have a role with read privileges to the SolarWinds Information Service API for all SolarWinds data sources that the integration can pull data.
Password	SolarWinds password that is stored in the database in encrypted form.
Active	Option to check whether this credential is active.
Credential alias	Advanced selection criteria for this credential.

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Field	Description
Order	Order in which credentials are tried. Smaller numbers are tried first.

d. Select **Update** if required.

e. Set the Configure the authentication credentials used to connect to the SolarWinds SWIS API task to complete by selecting **Mark as Complete**.

4. Configure the SolarWinds HTTP connection.

a. For the Configure SolarWinds HTTP connection task, select **Configure**.

b. Review the HTTP(s) Connection form, and fill in the fields as required.

HTTP(s) Connection form

Field	Description
Name	Name of the connection. This field is automatically set. You can optionally change the name.
Use MID server	Option to enable the connection to use a MID server.
Host	Target host value used by the connection. This field is automatically set by the connection URL.
Credential	Credential value used by the connection.
Connection alias	Connection alias value with which the connection can be referred.
URL builder	URL builder that is used to build the connection URL.
Mutual authentication	Option to enable mutual authentication.
Protocol	Underlying protocol used by the connection.
Active	Option to activate the HTTP connection.
Domain	Domain to which the connection belongs.
Override default port	Target port value used by the connection.
Base path	Base path for HTTP(S) connection that is required but should not be modified.

c. Select **Update**, if required.

d. Set the Configure SolarWinds HTTP connection task to complete by selecting **Mark as Complete**.

5. Configure the SolarWinds modules.

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a. For the Configure SolarWinds Modules task, select **Configure**.

b. Update the **Value** for the *sn_solarwinds_inte.npm_installed* and the *sn_solarwinds_inte.sam_installed* properties in one of the following ways:

- If the respective module is installed on the SolarWinds instance, then set the fields to **true**.
- If the respective module is not installed on the SolarWinds instance, then set the fields to **false**.

Note:
This update changes the API class and the data that is returned from them.

c. Set the Configure SolarWinds Modules task to complete by selecting **Mark as Complete**.

6. Test the connection.

a. For the Test the connection task, select **Configure**.

b. Review the fields on the Data Source form, which are automatically set.

Data Source form

Field	Description
Name	Unique name for this data source.
Import set table label	Label of the table that will be created for this data source.
Import set table name	Name of the table that will be created for this data source.
Type	Data storage type of the data to be imported.
Data in single column	Data in single column.
Application	Application containing this record.
Data stream action	The Data Source request action that will be invoked to get data.

c. Test the connection by selecting the **Test Load 20 Records** related link.

Testing the connection takes a few moments, after which the page refreshes to show the test results.

This step tests the SG-Solarwinds Hardware data source, and verifies that data is loaded into the staging table. A successful connection for the SG-Solarwinds Hardware data source means that all SolarWinds data sources connect successfully, so you do not need to individually test all data sources.

The connection is successful if the **HTTP Status** is **200**. If there is an **Error Code** and **Error Message**, the connection failed and further troubleshooting is required.

d. Navigate back to the guided setup, and set the Test the connection task to complete by selecting **Mark as Complete**.

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7. Add multiple instances.

   Note:
   If you do not need to add multiple instances, you can skip this step.

   a. On the Service Graph Connector for SolarWinds page, in the Add Multiple Instances section, select the **Update Data Source Access** task.

   b. For the Update Data Source Access task, select **Configure**.

   c. Select the Data Source [sys_data_source] table.

   d. Select the **Global** application scope by using the application picker.

   e. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

   f. Select **Update** to close the tab and return to the guided setup.

   g. Modify the application scope again to **Service Graph Connector for SolarWinds** by using the application picker.

   h. Set the **Update Data Source Access** task to complete by selecting **Mark as Complete**.

   i. Repeat the steps 7.d to 7.g for the Update Scheduled Data Import Access task with the Scheduled data import [scheduled_data_set] table and for the Update Value Access task with the Value [sys_variable_table] table, and set the tasks to complete by selecting **Mark as Complete**.

8. Clear the cache for the new connection.

   a. Select the **Clear Cache for Datasource and Import set** task, and then select **Configure**.

   b. Clear the cache by selecting **Global** from the Scope menu.

   c. Enter the following script.

```
     GlideTableManager.invalidateTable("sys_data_source");
     GlideCacheManager.flushTable("sys_data_source");


GlideTableManager.invalidateTable("scheduled_import_set");
     GlideCacheManager.flushTable("scheduled_import_set");


GlideTableManager.invalidateTable("sys_variable_value");
     GlideCacheManager.flushTable("sys_variable_value");

     GlideTableManager.invalidateTable("sys_db_object");
     GlideCacheManager.flushTable("sys_db_object");
```

   d. Select **Run Script**.

   e. From the Scope menu, select **Service Graph Connector for SolarWinds**.

   f. Set the Clear Cache for Datasource and Import set task to complete by selecting **Mark as Complete**.

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9. Add a connection to another SolarWinds instance.

Note:
Confirm that the current scope is **Service Graph Connector for SolarWinds**.

a. Select the **Add Another Connection** task, and then select **Configure**.

b. In the Select Data Source Type section, select either regular data sources or air gap data sources.

- To add or edit regular data sources, select **Regular Data Sources**.
- To add or edit air gap data sources, select **Airgap Data Sources**.

Note:
Before you add an air gap data source, you must configure the air gap solution for the Service Graph Connector for SolarWinds in your high-secure and low-secure servers. See Configuring air gap connections for Service Graph Connector for SolarWinds.

c. Either create or edit a connection.

- To create a new connection, select **Add Connection**.
- To edit an existing connection, select **Edit**.

d. Fill in or edit the fields on the form, as required.

- For regular data sources:

Create Connection form

Field	Description
Connection Name	Display name for the connection.
Connection URL	Connection host name for SolarWinds.
User name	User name for SolarWinds authentication.
Password	Password for SolarWinds authentication.

- For air gap data sources:

Create Connection form

Field	Description
Connection Name	Display name for the connection.
MID Server	Name of the MID server that you deployed in your low-secure server. See Configure air gap solution for Service Graph Connector for SolarWinds in a low-secure server.
Parent Directory	Path of the SolarWinds directory where the data is stored in your low-secure server.

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Field	Description
Archive Data After Retrieval	Option to archive data after retrieval.
Archive Path [Optional]	Folder where the data is to be archived if the **Archive Data After Retrieval** check box is selected.

e. Either add or save the connection.
   - To add a new connection, select **Create Connection**.
   - To save the edits for the existing connection, select **Edit Connection**.

f. Navigate back to the guided setup, and select **Mark as Complete** to set the Add Another Connection task to complete.

g. If required, set up the MID Server for the connection you created.
   i. For the Configure Mid Servers task, select **Configure**.
   ii. Select the name of the connection you created.
   iii. Select the **Use MID server** check box.
   iv. Select **Update**.
   v. Set the Configure Mid Servers task to complete by selecting **Mark as Complete**.

h. If required, configure the connections in the Configure SolarWinds Modules section by selecting **Configure**.

i. When you're finished, close the window, and navigate back to the guided setup.

j. Set the Configure SolarWinds Modules task to complete by selecting **Mark as Complete**.

k. For the Test New Connections task, select **Configure**.
   i. Select the name of the data source associated with the newly created connection.
   ii. Select the **Test Load 20 Records** related link.

   Note:
   If the displayed completion code is `Success`, then the sources are validated. But if the displayed completion code is `Error`, then there is an error that you must fix.

   iii. Navigate back to the guided setup, and set the Test New Connections task to complete by selecting **Mark as Complete**.

10. Set up scheduled import jobs.

a. On the Service Graph Connector for SolarWinds page, in the Set up scheduled import jobs section, select the **Configure the scheduled import jobs** task.

b. For the Configure the scheduled import jobs task, select **Configure**.

c. Review the fields on the Scheduled Data Import form, which are automatically set.

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Scheduled Data Import form

Field	Description
Name	Name of the scheduled job.
Data source	Data source record that defines the data to import.
Run as	Option to run the scheduled job with the credentials of the specified user.
Active	Option to activate the scheduled job. Select this option.
Concurrent Import	Function that loads the data from multiple import sets. The function then processes and transforms the data concurrently.
Partition Method	Partition method for the concurrent import set.
Partition Size	Import set size for early scheduling.
Execute pre-import script	Option to run a pre-import script before the import is performed.
Execute post-import script	Option to run a post-import script after the import is performed.
Application	Application containing this record.
Run	Frequency of running the import.
Conditional	Conditions under which this job is executed.

Note:
All active SolarWinds scheduled jobs will run in their specified order after the SG-Solarwinds Hardware scheduled job runs. You can modify the **Active** setting for each SolarWinds scheduled job as appropriate for your integration.

d. Select **Update** if required, and then select **Mark as Complete** to set the Set up scheduled import jobs task to complete.

Related topics

Service Graph Connector for SolarWinds

CMDB classes targeted in Service Graph Connector for SolarWinds

Configure Service Graph Connector for SolarWinds using SGC Central

Accessing the connection details of Service Graph Connector for SolarWinds

Configuring air gap connections for Service Graph Connector for SolarWinds

CMDB classes targeted in Service Graph Connector for SolarWinds

When you complete setting up the connection, you can configure the integration to periodically pull data from Solarwinds. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

The following attributes in the Availability Zone [cmdb_ci_availability_zone] table are populated by collected data:

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Attribute label	Attribute name
Name	name
Object ID	object_id

Relationships created for Availability Zone

Parent class	Relationship type	Child class
Availability Zone [cmdb_ci_availability_zone]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]
Availability Zone [cmdb_ci_availability_zone]	Contains::Contained by	Cloud Network [cmdb_ci_network]

The following attributes in the Cloud Key Pair [cmdb_ci_cloud_key_pair] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Name	name

Relationship created for Cloud Key Pair

Parent class	Relationship type	Child class
Cloud Key Pair [cmdb_ci_cloud_key_pair]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]

The following attributes in the Cloud Network [cmdb_ci_network] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

Relationships created for Cloud Network

Parent class	Relationship type	Child class
Cloud Network [cmdb_ci_network]	Contains::Contained by	Cloud Subnet [cmdb_ci_cloud_subnet]
Cloud Network [cmdb_ci_network]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data:

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Attribute label	Attribute name
Account Id	account_id
Name	name
Object ID	object_id
Datacenter Type	datacenter_type

The following attributes in the Cloud Subnet [cmdb_ci_cloud_subnet] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name
CPU core count	cpu_core_count
CPU core thread	cpu_core_thread
CPU name	cpu_name
CPU speed (MHz)	cpu_speed
CPU manufacturer	cpu_manufacturer
Is Virtual	virtual

Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]
Computer [cmdb_ci_computer]	Contains::Contained by	Disk [cmdb_ci_disk]

The following attributes in the Disk [cmdb_ci_disk] table are populated by collected data:

Attribute label	Attribute name
Model ID	model_id
Device ID	device_id
Name	name
Disk space (GB)	disk_space
Free disk space (GB)	free_space

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Attribute label	Attribute name
Size	size
Size bytes	size_bytes
Computer	computer
Manufacturer	manufacturer
Volume serial number	volume_serial_number

Relationship created for Disk

Parent class	Relationship type	Child class
Disk [cmdb_ci_disk]	Reference	Computer [cmdb_ci_computer]

The following attributes in the Hardware [cmdb_ci_hardware] table are populated by collected data:

Attribute label	Attribute name
Model ID	model_id
Name	name
DNS Domain	dns_domain
Manufacturer	manufacturer
Serial number	serial_number
Class	sys_class_name
Default Gateway	default_gateway
Fully qualified domain name	fqdn

Relationships created for Hardware

Parent class	Relationship type	Child class
Hardware [cmdb_ci_hardware]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Hardware [cmdb_ci_hardware]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

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Relationship created for Hardware Type

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosed on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]

The following attributes in the IIS Virtual Directory [cmdb_ci_iisdirectory] table are populated by collected data:

Attribute label	Attribute name
Alias	alias
Installation directory	install_directory
Name	name

Relationship created for IIS Virtual Directory

Parent class	Relationship type	Child class
IIS Virtual Directory [cmdb_ci_iisdirectory]	Runs on::Runs	Hardware [cmdb_ci_hardware]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id

Relationship created for Image

Parent class	Relationship type	Child class
Image [cmdb_ci_os_template]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Netmask	netmask
IP version	ip_version
Nic	nic

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Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Logical Datacenter [cmdb_ci_logical_datacenter] table are populated by collected data:

Attribute label	Attribute name
Name	name
Region	region
Class	sys_class_name

Relationships created for Logical Datacenter

Parent class	Relationship type	Child class
Logical Datacenter [cmdb_ci_logical_datacenter]	Contains::Contained by	Availability Zone [cmdb_ci_availability_zone]
Logical Datacenter [cmdb_ci_logical_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Microsoft iis Web Server [cmdb_ci_microsoft_iis_web_server] table are populated by collected data:

Attribute label	Attribute name
Name	name
Running process command	running_process_command
Version	version
Operational status	operational_status
PID	pid
Install Status	install_status
Type	type

Relationships created for Microsoft iis Web Server

Parent class	Relationship type	Child class
Microsoft iis Web Server [cmdb_ci_microsoft_iis_web_server]	Contains::Contained by	IIS Virtual Directory [cmdb_ci_iisdirectory]
Microsoft iis Web Server [cmdb_ci_microsoft_iis_web_server]	Runs on::Runs	Hardware [cmdb_ci_hardware]

The following attributes in the MS SQL DataBase [cmdb_ci_db_mssql_database] table are populated by collected data:

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Attribute label	Attribute name
Data Base	database
Name	name

Relationship created for MS SQL DataBase

Parent class	Relationship type	Child class
MS SQL DataBase [cmdb_ci_db_mssql_database]	Runs on::Runs	Hardware [cmdb_ci_hardware]

The following attributes in the MSFT SQL Instance [cmdb_ci_db_mssql_instance] table are populated by collected data:

Attribute label	Attribute name
Edition	edition
Instance Name	instance_name
Name	name
Operational status	operational_status
Service pack	service_pack
Install Status	install_status

Relationships created for MSFT SQL Instance

Parent class	Relationship type	Child class
MSFT SQL Instance [cmdb_ci_db_mssql_instance]	Runs on::Runs	Hardware [cmdb_ci_hardware]
MSFT SQL Instance [cmdb_ci_db_mssql_instance]	Contains::Contained by	MS SQL DataBase [cmdb_ci_db_mssql_database]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
DHCP Enabled	dhcp_enabled
Netmask	netmask
Configuration Item	cmdb_ci
Mac manufacturer	mac_manufacturer
MAC Address	mac_address
Name	name

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Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Hardware [cmdb_ci_hardware]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data:

Attribute label	Attribute name
Serial Number	serial_number
Serial Number Type	serial_number_type
Valid	valid

Relationship created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Hardware [cmdb_ci_hardware]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data:

Attribute label	Attribute name
Key	key
Name	name
Version	version
Manufacturer	manufacturer

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data:

Attribute label	Attribute name
Install date	install_date
Installed on	installed_on
Name	name

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Relationships created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]
Software Instance [cmdb_software_instance]	Reference	Hardware [cmdb_ci_hardware]

The following attributes in the Storage Volume [cmdb_ci_storage_volume] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Volume ID	volume_id
Name	name
Size bytes	size_bytes

Relationship created for Storage Volume

Parent class	Relationship type	Child class
Storage Volume [cmdb_ci_storage_volume]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
IP Address	ip_address
State	state

Relationships created for Virtual Machine Instance

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Image [cmdb_ci_os_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Hardware Type [cmdb_ci_compute_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Use End Point To::Use End Point From	Storage Volume [cmdb_ci_storage_volume]

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Related topics

Service Graph Connector for SolarWinds

Accessing the connection details of Service Graph Connector for SolarWinds

You can access the connection details of the Service Graph Connector for SolarWinds in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for SolarWinds. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a SolarWinds connection

Access the details of a SolarWinds connection configured for the Service Graph Connector for SolarWinds.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **SolarWinds** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Configuring air gap connections for Service Graph Connector for SolarWinds

Air gap connections for the Service Graph Connector for SolarWinds enable safe and controlled data transfer without compromising security.

An air gap is a security measure that involves isolating a computer or network and preventing it from establishing an external connection. Air-gapped networks keep critical systems secure by isolating them from external connections to protect the systems from cyber threats. Air gap connections for the Service Graph Connector for SolarWinds facilitate controlled data exchange between the air-gapped networks and external systems while maintaining the integrity of the air-gapped environment.

Air gap connections are available from version 2.5.0 of the Service Graph Connector for SolarWinds. You can add either regular data sources or air gap data sources during the guided setup. To access the guided setup, see Configure Service Graph Connector for SolarWinds.

Perform the following sequence of tasks to configure the air gap solution before you add air gap data sources during the guided setup:

1. Configure air gap solution for Service Graph Connector for SolarWinds in a high-secure server
2. Configure air gap solution for Service Graph Connector for SolarWinds in a low-secure server
3. Configure air gap solution for Service Graph Connector for SolarWinds in a ServiceNow instance

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4. Perform a test data load for the air gap solution for Service Graph Connector for SolarWinds
5. Perform a full data load for the air gap solution for Service Graph Connector for SolarWinds

Configure air gap solution for Service Graph Connector for SolarWinds in a high-secure server

Configure the air gap solution for the Service Graph Connector for SolarWinds in your high-secure server.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **SolarWinds** > **Setup** > **Add Multiple Instances** > **Add Another Connection**.
2. Download the `SgSolarWindsHighSecureSetup.ps1` and `GetSolarWindsData.ps1` PowerShell scripts from the link provided in the Add Another Connection section.
3. Log on to your high-secure server.
4. Create a SolarWinds directory.

   All the configurations required for the air gap solution are created in the SolarWinds directory.
5. Copy the `GetSolarWindsData.ps1` and `SgSolarWindsHighSecureSetup.ps1` PowerShell scripts that you downloaded in step 2 to the SolarWinds directory.
6. Start a PowerShell session, and run the `SgSolarWindsHighSecureSetup.ps1` script to generate the JSON configuration file that is used by the `GetSolarWindsData.ps1` script.

   a. At the prompt, enter the path for the SolarWinds directory that you created in step 4.

   b. Enter a name for the configuration file, or press the Return key to accept the default value.

   c. Enter the values for the global properties, or press the Return key to accept the default values.

   - *`npmInstalled`*: Set the value to `true` if the module is installed on the SolarWinds instance. Set the value to `false` if the module isn't installed on the SolarWinds instance.
   - *`samInstalled`*: Set the value to `true` if the module is installed on the SolarWinds instance. Set the value to `false` if the module isn't installed on the SolarWinds instance.
   - *`pageSize`*: Enter the number of records to be fetched in a SolarWinds API call.
   - *`endpoint`*: Update the **Host** field with the host name for your SolarWinds instance.
   - *`port`*: Specify the port on which the SolarWinds instance allows API calls.
   - *`credentialsPath`*: Specify the location to store the SolarWinds credentials XML file.
   - *`logDirectory`*: Specify the location to store the log file from the `GetSolarWindsData.ps1` script.

   d. Specify names for the data source data directories, or press the Return key to accept the default values.

   The directories are created if they don’t already exist.

   e. Enter the SolarWinds credentials.

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Note:
You can either use Windows credential manager to store the user name and password, or implement your own mechanism for storing the credentials. The `GetSolarWindsData.ps1` script must have access to the credentials to trigger REST calls.

f. Exit the PowerShell session.

7. Provide write and delete permissions for the SolarWinds directory and the child directories.

   You must provide delete permissions for old records to be cleaned up.

Related topics

Configure air gap solution for Service Graph Connector for SolarWinds in a low-secure server

Configure air gap solution for Service Graph Connector for SolarWinds in a low-secure server

Configure the air gap solution for the Service Graph Connector for SolarWinds in your low-secure server after you finish the configuration in your high-secure server.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **SolarWinds** > **Setup** > **Add Multiple Instances** > **Add Another Connection**.
2. Download the `SgSolarWindsLowSecureSetup.ps1` PowerShell script from the link provided in the Add Another Connection section.
3. Log on to your low-secure server.
4. Create a SolarWinds directory.

   All the configurations required for the air gap solution are created in the SolarWinds directory.

5. Copy the `SgSolarWindsLowSecureSetup.ps1` PowerShell script that you downloaded in step 2 to the SolarWinds directory.
6. Start a PowerShell session, and run the `SgSolarWindsLowSecureSetup.ps1` script.

   a. At the prompt, enter the path for the SolarWinds directory that you created in step 4.

   b. Specify names for the data source data directories, or press the Return key to accept the default values.

      The directories are created if they don't already exist.

   c. Exit the PowerShell session.

7. Provide read and delete permissions for the SolarWinds directory.

Related topics

Configure air gap solution for Service Graph Connector for SolarWinds in a ServiceNow instance

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Configure air gap solution for Service Graph Connector for SolarWinds in a ServiceNow instance

Configure the air gap solution for the Service Graph Connector for SolarWinds in your ServiceNow instance after you finish the configuration in your high-secure and low-secure servers.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Plugins**, and download the `ServiceNow IntegrationHub Action Step – PowerShell` plugin.
2. Navigate to **All** > **Service Graph Connectors** > **SolarWinds** > **Setup** > **Add Multiple Instances** > **Add Another Connection**.
3. Select the **Add Another Connection** task, and then select **Configure**.
4. In the Select Data Source Type section, select **Airgap Data Sources**, and then select **Add Connection**.
5. Fill in the fields on the Create Connection form.

Create Connection form

Field	Description
Connection Name	Display name for the connection.
MID Server	Name of the MID Server that you deployed in your low-secure server. You can obtain the *sys_id* of the MID Server from the ecc_agent table.
Parent Directory	Path of the SolarWinds directory where the data is stored in your low-secure server. See Configure air gap solution for Service Graph Connector for SolarWinds in a low-secure server.
Archive Data After Retrieval	Option to archive data after retrieval.
Archive Path [Optional]	Folder where the data is to be archived if the **Archive Data After Retrieval** check box is selected.

6. Select **Create Connection**.

Related topics

Perform a test data load for the air gap solution for Service Graph Connector for SolarWinds

Perform a test data load for the air gap solution for Service Graph Connector for SolarWinds

After you configure the air gap solution for the Service Graph Connector for SolarWinds, test whether the SolarWinds endpoint is accessible from the high-secure server.

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Before you begin

Role required: admin

Procedure

1. Navigate to the SolarWinds directory in your high-secure server.
2. Run the `.\GetSolarWindsData.ps1 -configFilePath` *`CONFIG_PATH`* script, where *`CONFIG_PATH`* is the location of the JSON configuration file that is generated by the setup script.
   The script accesses the SolarWinds Hardware API, and creates a sample file in the Hardware directory and a log file in the Logs directory.
   - If the test data load is successful, the log file contains the `Test Load status` SUCCESS! message.
   - If the test data load fails, the log file contains the `Error occurred while processing hardware StatusCode 403` message.

     If the test data load fails, verify the SolarWinds user credentials and ensure that the user has the required permissions to pull the data from SolarWinds. If the credentials need to be updated, you must run the `SgSolarWindsHighSecureSetup.ps1` PowerShell script again. See Configure air gap solution for Service Graph Connector for SolarWinds in a high-secure server.

Related topics

Perform a full data load for the air gap solution for Service Graph Connector for SolarWinds

Perform a full data load for the air gap solution for Service Graph Connector for SolarWinds

After you verify that the test data load for the air gap solution for the Service Graph Connector for SolarWinds is successful, you can perform a full data load.

Before you begin

Role required: admin

Procedure

1. Navigate to the SolarWinds directory in your high-secure server.
2. Run the `.\GetSolarWindsdata.ps1 -completeLoad $true -configFilePath` *`CONFIG_PATH`* script, where *`CONFIG_PATH`* is the location of the JSON configuration file that is generated by the setup script.

   By default, the existing files in the data source data directories are deleted each time the `.\GetSolarWindsdata.ps1 -completeLoad $true -configFilePath` *`CONFIG_PATH`* script is run. You can add the *`-clean $false`* parameter to the script if you want to retain the existing files.

   The script fetches data from all the SolarWinds APIs, and stores the data in the respective directories.
3. After the data is loaded in your high-secure server, transfer the data to your low-secure server using a method of your choice, such as SFTP.
4. Verify that the data is loaded in your low-secure server.
5. Set the full data load job (using the `.\GetSolarWindsdata.ps1 -completeLoad $true -configFilePath` *`CONFIG_PATH`* script) to run on a schedule based on that of the Scheduled Import Job on your Service Graph Connector for SolarWinds instance.

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6. Set the data transfer job (from your high-secure server to your low-secure server) on a schedule based on that of the Scheduled Import Job on your Service Graph Connector for SolarWinds instance.
7. Test the air gap connection in your ServiceNow instance.
   a. Navigate to **All** > **Service Graph Connectors** > **SolarWinds** > **Connections**.
   b. Select the air gap connection that you created.
   c. Select the **Test Connection** related link.
   When the connection is successful, the **Status** field is set to `Success`. If the connection fails, follow the suggestions for remediation.

Service Graph Connector for Tanium

Use the Service Graph Connector for Tanium to bring in hardware, software, and software usage data from a Tanium environment into your ServiceNow instance.

Request apps on the Store

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

Supported versions

Versions

Tanium	ServiceNow
• Tanium 1.9 or later versions for hardware and software • Tanium 1.17 or later versions for software usage	• Washington DC • Xanadu • Yokohama

Important information for upgrading Service Graph Connector for Tanium

Tanium Platform 7.6.2 or later versions support token-based authorization only. After you have installed the latest version of the Service Graph Connector for Tanium, verify the following configurations to use Tanium Platform 7.6.2 or later versions in your on-premise setups:

- For a single instance, reconfigure the authentication type of an existing connection to use token-based authorization.
- For multiple instances, deactivate the existing scheduled jobs for previously configured instances that used basic authorization, and then create and configure new instances to use token-based authorization.

Configuring a connection

Use the SGC Central view in the Service Graph Workspace or CMDB Workspace to install the connector and configure the connection. The view enables you to install and discover connectors and to manage the full life cycle of creating, editing, monitoring, and debugging connections. For instructions, see Configure Service Graph Connector for Tanium using SGC Central.

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Important:
Unless there are configuration issues, use SGC Central to configure the connection. The guided setup method for configuration is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Tanium integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Tanium data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

The following table describes the data sources, the staging tables, and the target tables including CMDB CI and non-CMDB CI classes for the Tanium application.

Data mapping for Tanium

Data source	Staging table	Target tables	Resource types
SG-Tanium Applications	SG-Tanium Applications [sn_tanium_integ_sg_tanium_applications]	Application Running Process TCP	Applications
SG-Tanium Hardware and Software	SG Tanium Import [sn_tanium_integ_sg_tanium_import]	Computer File System Disk IP Address When the Software Asset Management (SAM) application isn't installed: Software Software Instance When the SAM application is installed: Software Installation	Server and software

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Data mapping for Tanium (continued)

Data source	Staging table	Target tables	Resource types
SG-Tanium Usage	SG Tanium Usage Import [sn_tanium_integ_sg_tanium_usage_import]	Software Usage [samp_sw_usage]	None
SG-Tanium Remove Software	Integration Commons Remove Record [sn_cmdb_int_util_remove_record]	None	None

Note:

- The SG-Tanium Usage data source is available only when the Software Asset Management Professional plugin (com.snc.samp) plugin is activated on your ServiceNow instance. See Request Software Asset Management.
- The SG-Tanium Remove Software data source creates import sets and uses the transform map-based method for removing any target records for software data that weren't updated in the last delta query check. See Managing CMDB data deletion.
- Starting with the Service Graph Connector for Tanium 1.8.0 release, a buffer time is added for software removal when the *buffer_days_from_last_scan_for_hardware* system property is enabled. When this system property is enabled, the software removal candidate is removed only if the last scan time of the hardware on which the software removal candidate is installed is earlier than the last success import time + buffer time. To enable this property, set the value of the *buffer_days_from_last_scan_for_hardware* system property to a non-zero numeral value according to the number of days of buffer that you require. To disable this property, set the value to 0.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Additional resource

How do I configure the Tanium Service Graph Connector? article on the ServiceNow Community site

Related topics

Service Graph Connectors

Configure Service Graph Connector for Tanium using SGC Central

Set up scheduled import jobs to pull in Tanium data into your Configuration Management Database (CMDB).

Before you begin

Install Service Graph Connector for Tanium version 1.7.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Role required: admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

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Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Tanium connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Complete the prerequisites for setting up the Tanium environment.

   a. Create a custom view on your Tanium instance.

      i. In the **Prerequisites** stage of the playbook, select the **Create custom view** activity.

      ii. Create a custom view on your Tanium instance to be used in the **Select view** activity later by referring to the Tanium Asset User Guide for Cloud.

      Note:
      Copy the unmodifiable **ServiceNow (reserved)** view from the Tanium instance to create the custom view.

      iii. After creating a view, select the **I have created a custom view for this connection according to the instructions** check box.

      iv. After completing the **Select view** activity, select **Continue**.

7. Determine the type of authentication for the Tanium connection.

   a. In the **Setup** stage of the playbook, select the **Select alias template** activity.
   If needed, expand the **Setup** stage to select an activity.

   b. Select an alias template for the connection.

   - **Basic authentication**: Select when using Basic authentication that grants access to the Tanium data.
   - **Token-based authentication**: Select when using an authentication token for the Tanium API to grants access to the Tanium data.

   c. Select **Continue**.

8. Enter connection details and test the API connection for importing Tanium data.

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a. In the **Setup** stage of the playbook, select the **Configure and test connection** activity.

b. On the form, fill in the fields.

Create and test connection form

Field	Description
Connection name	Name to identify the Tanium connection record.
Host name	Base URL or IP address of the Tanium server.
Username	Tanium account user name that is used to authenticate the connection request. This field appears only when the **Basic authentication** alias template was selected in the **Select alias template** activity.
Password	Password associated with the user name required for authenticating requests. This field appears only when the **Basic authentication** alias template was selected in the **Select alias template** activity.
Token	Authentication token for the Tanium API that grants access to the Tanium data. This field appears only when the **Token-based authentication** alias template was selected in the **Select alias template** activity.
Use MID Server	Option to use a MID Server. **Note:** Use of a MID Server is optional.
MID selection	Name of the MID Server used by the connector. This field appears only when the **Use MID Server** check box is selected.

c. Select **Update and test connection**.

d. Once the connection test is complete, select **Continue**.

9. Select the view created on your Tanium instance.

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a. In the **Setup** stage of the playbook, select the **Select view** activity.

b. In the **View** field, select the custom view you created on the Tanium instance in the Prerequisites activity.

c. Select **Continue**.

10. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Expand the Parent scheduled data import within the Import schedules list to select the *`Connection name`* **- SG-Tanium Usage** import schedule.

c. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

d. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

e. Repeat steps 10.b to 10.d for the *`Connection name`* **- SG-Tanium Hardware and Software** parent import schedule.

f. Select **Continue**.

11. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

Related topics

Service Graph Connector for Tanium

CMDB classes targeted in Service Graph Connector for Tanium

Accessing the connection details of Service Graph Connector for Tanium

Configure Service Graph Connector for Tanium using the guided setup

Set up scheduled import jobs to pull in data from Tanium into your Configuration Management Database (CMDB).

Before you begin

Important:
Unless there are configuration issues, use SGC Central to configure the connection. The guided setup method for configuration is being deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from

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that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.

Note:
If you have an earlier version of the Service Graph Connector for Tanium, then do not migrate data from the old connector. You must uninstall the previous version and run the new integration.

Role required: admin

About this task

For more information on the Service Graph Connector for Tanium setup, see How do I configure the Tanium Service Graph Connector? article on the ServiceNow Community site.

Procedure

1. Ensure that the application scope is set to the Service Graph Connector for Tanium application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Tanium** > **Setup**.
3. On the Getting started page, select **Get Started**.
4. Configure the authentication credentials and HTTP connection.

   a. On the Service Graph Connector for Tanium page, in the Configure the Connection and Credentials section, select **Set authentication type**.

   b. For the Set authentication type task, select **Configure**.

   c. Specify the system property details for the authentication type.

      i. In the **Value** field, enable either token-based authentication or basic authentication.

      - To enable the basic authorization, enter `basic`.
      - To enable the token-based authorization, enter `token`.

      Note:
      Tanium Platform 7.6.2 supports only token-based authorization for an on-premise setup. To use Tanium Platform 7.6.2 or later versions, enable the token-based authorization type and enter the details for the token-based authorization in the next step.

      ii. Select **Update**.

      iii. Set the Set authentication type task to complete by selecting **Mark as Complete**.

   d. Configure the connection based on the authentication type.

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i. For the basic authorization type:

1. For the Configure the Basic auth Credentials task, select **Configure**.

> **Note:**
> The Configure the Basic auth Credentials task appears only when you have specified `basic` as the value in the step 4.c.i.

2. Select **Edit** for Basic authentication within the sn_tanium_integ scope.
3. In the Connection Information section of the Edit Connection window, fill in the fields.

Connection Information

Field	Description
Connection name	Name to identify the Tanium connection record. `Token-based authentication` is the default credential alias name and is read-only.
Host name	Base URL or IP address of the Tanium server. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.

4. (Optional) If a MID Server is required for the Tanium server connection, select the **Use MID Server** check box. Then, select the MID Server-related fields accordingly.
5. In the Credential Information section, enter the Tanium account user name in the **Username** field and the password in the **Password** field.
6. Select **Edit connection**.
7. Return to the guided setup page.
8. Set the Configure the Basic auth Credentials task to complete by selecting **Mark as Complete**.

ii. For the token-based authorization type:

1. For the Configure the Token auth Credentials task, select **Configure**.

> **Note:**
> The Configure the Token auth Credentials task appears only when you have specified `token` as the value in the step 4.c.i.

2. Select **Edit** for Token-based authentication within the sn_tanium_integ scope.
3. In the Connection Information section of the Edit Connection window, fill in the fields.

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Connection Information

Field	Description
Connection name	Name to identify the Tanium connection record. `Token-based authentication` is the default credential alias name and is read-only.
Host name	Tanium base URL or IP address. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.

4. (Optional) If a MID Server is required for the Tanium server connection, select the **Use MID Server** check box. Then, select the MID Server-related fields accordingly.
5. In the Credential Information section of the Edit Connection window, enter the authentication token for the Tanium API in the **Token** field to grants access to Tanium data.
6. Select **Edit connection**.
7. Return to the guided setup page.
8. Set the Configure the Token auth Credentials task to complete by selecting **Mark as Complete**.

e. Test the connection.

i. For the Test connection task, select **Configure**.

ii. Select the **Test Connection** related link to start the testing process.

iii. When the **Status** field is set to **Success**, return to the guided setup page.

Note:
If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test the connection task to complete by selecting **Mark as Complete**.

f. Create a custom view.

Note:
The integration depends on a custom view from Tanium.

i. Configure the view on your Tanium instance.

1. On your Tanium instance, navigate to **Modules** > **Asset**.
2. Select **Views**.
3. If you have not done so already, create the ServiceNow (reserved) view by selecting **Create View** > **Create ServiceNow view**.

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Note:
By default, the ServiceNow (reserved) view is non-editable.

4. Create a copy of the view to edit it.
5. Edit the copy.
   a. Add all fields from the **SIU Product Usage** bucket.
   b. Add **Asset** to the **Last Seen** field.
   c. Add **Network Adapter** to the **Model** field.
6. Save the view.

ii. Select the view on your ServiceNow instance.
1. In the guided setup, for the Configure the View task, select **Configure**.
2. In the ServiceNow instance, select the view you created in step 4.f.i.
3. Select **Set View**.
4. Set the Configure the View task to complete by selecting **Mark as Complete**.

g. In the ADM setup instruction section, ignore the instructions as application dependency mapping is not supported currently.

5. Configure the Tanium scheduled jobs.

a. For the Configure the Scheduled Import task, select **Configure**.

b. Select the scheduled job that you want to activate.

c. On the Scheduled Data Import form, verify the field values for a scheduled job and select the **Active** check box to activate the scheduled job.

Note:
When using a token-based authentication, the user you specify in the **Run as** field for a scheduled job must have the connection_admin role.

For more information, see Schedule a data import.

d. Select **Update**.

e. Repeat the steps 5.b to 5.d for each scheduled job for data import.

f. Set the Configure the Scheduled Import task to complete by selecting **Mark as Complete**.

6. **Optional:** Add multiple instances.

Note:
If you don't need to add multiple instances, you can skip this step.

a. On the Service Graph Connector for Tanium page, in the Add Multiple Icons section, select the **Update Data Source Access** task.

b. On the next page, in the Update Data Source Access section, select **Configure**.

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c. Select the Data Source [sys_data_source] table.

d. Select the **Global** application scope by using the application picker.

e. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

f. Select **Update** to close the tab and return to the guided setup.

g. Modify the application scope again to **Service Graph Connector for Tanium** by using the application picker.

h. Set the Update Data Source Access task to complete by selecting **Mark as Complete**.

i. Repeat the steps 6.d to 6.g for the Update Scheduled data import access task with the Scheduled data import [scheduled_data_set] table and set the task to complete by selecting **Mark as Complete**.

a. Clear the cache for the new connection.

i. For the Clear Cache for Datasource and Import set task, select **Configure**.

ii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
      GlideCacheManager.flushTable("sys_data_source");


 GlideTableManager.invalidateTable("scheduled_import_set");
      GlideCacheManager.flushTable("scheduled_import_set");

      GlideTableManager.invalidateTable("sys_db_object");
      GlideCacheManager.flushTable("sys_db_object");
```

iii. Select **Run Script** to run the background script in the **global** scope.

The script may take several minutes to execute.

iv. After the script is executed, select **Close**.

v. From the application picker, select the **Service Graph Connector for Tanium** application.

vi. Set the Clear Cache for Datasource and Import set task to complete by selecting **Mark as complete**.

b. Add a basic authorization connection to another Tanium instance.

Note:
Tanium Platform 7.6.2 supports only token-based authorization for an on-premise setup. To use Tanium Platform 7.6.2 or later versions, use the token-based authorization.

i. For the Add Another Basic Auth Connection task, select **Configure**.

ii. To create a new connection, select **Add Connection**.

iii. Enter the connection details on the Create Connection form.

iv. Select **Create Connection**.

v. Navigate back to the guided setup and set the Add Another Basic Auth Connection task to complete by selecting **Mark as Complete**.

c. Add a token-based authorization connection to another Tanium instance.

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i. For the Add Another Token Auth Connection task, select **Configure**.

ii. To create a new connection, select **Add Connection**.

iii. Enter the connection details on the Create Connection form.

iv. Select **Create Connection**.

v. Navigate back to the guided setup and set the Add Another Token Auth Connection task to complete by selecting **Mark as Complete**.

d. Set configuration properties for newly added connections.

i. For the Set configuration properties task, select **Configure**.

ii. From the **Name** column, select the new connection.

iii. In the Service Graph Connection Properties related list, review and modify the following properties.

Field	Value
max_retry_count	Determines the number of retry attempts triggered for a Tanium Asset REST action in case of failure.
pagination_record_count	Specifies the page size for each API call made during a Tanium Application Data REST action.
rest_action_limit	Specifies the page size for each API call made during a Tanium Asset REST action.
view_id	Specifies the identifier used to fetch hardware and software data from a specific Tanium view. To modify the view identifier, access the SG Tanium Connection [sn_tanium_integ_connection] table.

iv. Return to the guided setup page.

v. Set the Set configuration properties task to complete by selecting **Mark as Complete**.

e. Test the newly added connections.

i. For the Test connections task, select **Configure**.

ii. From the **Name** column, select the new connection.

iii. Select the **Test Connection** related link to start the testing process.

iv. When the **Status** field is set to **Success**, return to the guided setup page.

> **Note:**
> If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test connections task to complete by selecting **Mark as Complete**.

f. Set the Tanium view for the connection.

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i. For the Set view task, select **Configure**.

ii. In the **Connection and Credentials Alias** field, search for and select the alias created earlier in the Add Another Basic Auth Connection or Add Another Token Auth Connection task.

iii. In the **View** field, search for and select the corresponding Tanium view associated with the connection.

iv. Select **Set View**.

v. Set the Set view task to complete by selecting **Mark as Complete**.

g. Skip the ADM setup for multi instance task as ADM is not supported currently.

h. Configure the Tanium scheduled job.

i. For the Configure the Scheduled Imports task, select **Configure**.

ii. Select the scheduled data import that you want to activate.

iii. On the Scheduled Data Import form, verify the field values for the scheduled job and select the **Active** check box.

> **Note:**
> When using a token-based authentication, the user you specify in the **Run as** field for a scheduled job must have the connection_admin role.

For more information, see Schedule a data import.

iv. Select **Update**.

v. Repeat steps 6.h.ii to 6.h.iv for each scheduled job for data import.

vi. Set the Configure the Scheduled Imports task to complete by selecting **Mark as Complete**.

7. **Optional:** Use the advanced settings to manage excluding the serial number population on the IBM AIX and Oracle Solaris operating system (OS) platforms.

a. In the Advanced section of the guided setup, for the Advanced Settings task, select **Configure**.

b. To exclude the serial number population, enter `false` in the **Exclude the serial number population** field.

c. Select **Save**.

d. Close the window and set the Advanced Settings task to complete by selecting **Mark as Complete**.

CMDB classes targeted in Service Graph Connector for Tanium

When you complete setting up the connection, you can configure the integration to periodically pull data from Tanium. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Application [cmdb_ci_appl]

The following attributes in the Application [cmdb_ci_appl] table are populated by collected data:

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Attribute label	Attribute name
Class	sys_class_name
Name	name
Running process command	running_process_command

Relationship created for Application

Parent class	Relationship type	Child class
Application [cmdb_ci_appl]	Runs on::Runs	Computer[cmdb_ci_computer]

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name
Name	name
Serial number	serial_number
Class	sys_class_name
CPU core count	cpu_core_count
CPU count	cpu_count
CPU speed (MHz)	cpu_speed
CPU type	cpu_type
DNS Domain	dns_domain
IP Address	ip_address
CPU manufacturer	cpu_manufacturer
CPU name	cpu_name
Is Virtual	virtual
Most recent discovery	last_discovered
Operating System	os
OS Domain	os_domain
OS Service Pack	os_service_pack
OS Version	os_version
RAM (MB)	ram
Model ID	model_id
Manufacturer	manufacturer

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Relationships created for Computer

Parent class	Relationship type	Child class
Computer [cmdb_ci_computer]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Computer [cmdb_ci_computer]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Computer [cmdb_ci_computer]	Contains::Contained by	Disk [cmdb_ci_disk]
Computer [cmdb_ci_computer]	Contains::Contained by	File System [cmdb_ci_file_system]
Computer [cmdb_ci_computer]	Reference	Software Installation [cmdb_sam_sw_install]
Computer [cmdb_ci_computer]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]

Disk [cmdb_ci_disk]

The following attributes in the Disk [cmdb_ci_disk] table are populated by collected data:

Attribute label	Attribute name
Manufacturer	manufacturer
Name	name
Computer	computer
Serial number	serial_number
Device interface	device_interface
Storage type	storage_type
Model ID	model_id
Device ID	device_id
Size bytes	size_bytes

Relationship created for Disk

Parent class	Relationship type	Child class
Disk [cmdb_ci_disk]	Reference	Computer [cmdb_ci_computer]

File System [cmdb_ci_file_system]

The following attributes in the File System [cmdb_ci_file_system] table are populated by collected data:

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Attribute label	Attribute name
Name	name
File system	file_system
Free space bytes	free_space_bytes
Label	label
Media type	media_type
Mount point	mount_point
Size bytes	size_bytes
Computer	computer

Relationship created for File System

Parent class	Relationship type	Child class
File System [cmdb_ci_file_system]	Reference	Computer [cmdb_ci_computer]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
Nic	nic
IP Address	ip_address
IP version	ip_version
Name	name

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
Discovery source	discovery_source
Netmask	netmask
Mac manufacturer	mac_manufacturer

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Attribute label	Attribute name
MAC Address	mac_address
Name	name
Model ID	model_id
DHCP Enabled	dhcp_enabled

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Computer [cmdb_ci_computer]

Serial Number [cmdb_serial_number]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data:

Attribute label	Attribute name
Serial Number	serial_number
Serial Number Type	serial_number_type
Valid	valid

Relationship created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Computer [cmdb_ci_computer]

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data when the Software Asset Management (SAM) application isn't installed:

Attribute label	Attribute name
Version	version
Manufacturer	manufacturer
Key	key
Name	name

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

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Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data when the SAM application is installed:

Attribute label	Attribute name
Display name	display_name
Publisher	publisher
Version	version
Discovery source	discovery_source
Last scanned	last_scanned

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data when the SAM application isn't installed:

Attribute label	Attribute name
Name	name
Installed on	installed_on

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Computer [cmdb_ci_computer]

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attribute in the Virtual Machine Instance [cmdb_ci_vm_instance] table is populated by collected data:

Attribute label	Attribute name
Sys ID	sys_id

Note:
Service Graph Connector for Tanium doesn't create a Virtual Machine Instance CI. During look-up in the Virtual Machine Instance [cmdb_ci_vm_instance] table, if a VM instance is found that has an object ID that matches the cloud instance ID of a server instance, a relationship is created between that VM instance and the server instance.

Accessing the connection details of Service Graph Connector for Tanium

You can access the connection details of the Service Graph Connector for Tanium in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

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With the CCF feature, you can access all connections for a connector. Connection details include the alias, properties, data sources, and associated scheduled data imports. In addition, you can test a connection. Additional details may appear depending on the connector type. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Tanium connection

Access the details of a Tanium connection configured for the Service Graph Connector for Tanium.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Tanium** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Service Graph Connector for Trellix

Use the Service Graph Connector for Trellix to bring in device, server, and network data from a Trellix environment into your ServiceNow instance to streamline your incident response and asset management use cases.

Request apps on the Store

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

Supported versions

Supported ServiceNow versions:

- Washington DC
- Xanadu
- Yokohama

Use cases

The following examples describe how you can use the Service Graph Connector for Trellix for security operations management:

- Identify cybersecurity risks in the environment.
- Assess dependencies between configuration items (CI).
- Enable effective security incident response and endpoint management systems.
- Identify data quality issues, reconcile inconsistencies, and manage incidents and changes on discovered CIs.

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Configuring a connection for the connector

Use the SGC Central view in the Service Graph Workspace or CMDB Workspace to install the connector and configure the connection. The view enables you to install and discover connectors and to manage the full life cycle of creating, editing, monitoring, and debugging connections. For instructions, see Configure Service Graph Connector for Trellix using SGC Central.

Important:
Unless there are configuration issues, use SGC Central to configure the connection. The guided setup method for configuration is being deprecated.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Trellix integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Trellix data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

The following data source is included for the Trellix application:

SG-Trellix-Devices

Imports data from devices and loads the imported data in the SGC Trellix Device Import [sn_trellix_integ_sgc_trellix_device_import] staging table.

The imported data is then inserted into the following target tables:

- File System [cmdb_ci_file_system]
- IP Address [cmdb_ci_ip_address]
- Network Adapter [cmdb_ci_network_adapter]
- Server [cmdb_ci_server]
- Software Installation [cmdb_sam_sw_install] (if the Software Asset Management (SAM) application is installed)
- Software [cmdb_ci_spkg] (if the SAM application isn't installed)
- Software Instance [cmdb_software_instance] (if the SAM application isn't installed)
- Storage Disk [cmdb_ci_storage_disk]

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

System property

The following system property is available for Service Graph Connector for Trellix: `sn_trellix_integ.getdevices_count`. This property sets the pagination size for the records that are fetched from the Trellix API.

- Type: integer
- Default value: `100`

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Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

Related topics

Service Graph Connectors

Configure Service Graph Connector for Trellix using SGC Central

Configure Service Graph Connector for Trellix using guided setup

CMDB classes targeted in Service Graph Connector for Trellix

Configure Service Graph Connector for Trellix using SGC Central

Use the playbook available with the SGC Central application to set up the Service Graph Connector for Trellix for pulling in Trellix data into the CMDB.

Before you begin

Install Service Graph Connector for Trellix version 1.0.0 from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Role required: admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Dashboard page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the Trellix connector type, and then select **Create connection**.
4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

5. Complete the setup for configuring the connector for importing data.

   a. Create and test a connection.

      i. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

      ii. On the form, fill in the fields.

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Create and test connection form

Field	
Connection name	Name to identify the Trellix connection record. For example, `SGTrellix`.
Connection url	URL of the connection.
User name	User name of your Trellix account.
Password	Password of your Trellix account.
Use MID server	Option to use a MID Server. Select this check box if you're using an on-premises instance of Trellix. **Note:** A MID Server must be configured on your ServiceNow instance before you select this option.
Mid Selection	Name of the MID Server used by the connector. This field appears only when the **Use MID Server** check box is selected.

iii. Select **Create and test connection**.

iv. Once the connection test is complete, select **Continue**.

b. Configure the import schedule to import data at regular intervals.

i. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

ii. Expand the Parent scheduled data import within the Import schedules list, and select the SG-Trellix-Devices import schedule.

iii. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

iv. Select **Save**.

Alternatively, select **Execute Now** to execute the import schedule immediately.

v. Select **Continue**.

c. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

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Related topics

- Service Graph Connector for Trellix
- CMDB classes targeted in Service Graph Connector for Trellix
- Accessing the connection details of Service Graph Connector for Trellix

Configure Service Graph Connector for Trellix using guided setup

Set up scheduled import jobs to pull in data from a Trellix project into your CMDB.

Before you begin

Important:
Unless there are configuration issues, use the SGC Central view in the Service Graph Workspace or CMDB Workspace to configure the connection for the connector, as the guided setup method is planned for deprecated.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed. See Integration Commons for CMDB.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The ITOM Licensing plugin (com.snc.itom.license). See Request Discovery.

Role required: admin

Procedure

1. Verify that the application scope is set to the Service Graph Connector for Trellix application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Trellix** > **Setup**.
3. On the Service Graph Connector for Trellix page, verify that the **Quick Start** option is selected, and then select **Continue**.
4. Configure the connection to send requests to the Trellix application.
   a. On the Service Graph Connector for Trellix page, in the Configure the Connection and Credentials section, select **Start**.
   b. Configure the authentication credentials.

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i. For the Configure Trellix authentication credentials task, fill in the fields on the Basic Auth Credentials form.

Basic Auth Credentials form

Field	Description
Name	Credentials to use for the connection. For example, `SGTrellix.Credentials`.
Order	The sequence in which the records are processed. The default value is `100`.
User name	User name of your Trellix account.
Password	Password of your Trellix account.
Active	Verify that the check box is selected.

ii. Select **Update** to save the authentication credentials.

iii. Set the Configure Trellix authentication credentials task to complete by selecting **Mark as complete**, and then select **Continue**.

c. Configure the HTTP connection.

i. For the Configure Trellix HTTP Connection task, fill in the fields on the HTTP(s) Connection form.

HTTP(s) Connection form

Field	Description
Name	Name to identify the Trellix connection record. For example, `SGTrellix`. Don't modify the name for the default connection `SGTrellix`.
Active	Verify that the check box is selected.
Credential	Credentials to use for the connection.
Domain	Domain that contains the connection.
Connection alias	Connection alias that resolves your connection and credentials at runtime. **Note:** Only one connection is active per connection alias at a time.
Connection URL	Base URL of the connection. The base URL is the hostname of your Trellix instance. For example, `https://`*`subdomain`*`.`*`domain`*`.com:`*`port`*.
Use MID server	Option to use a MID Server. Select this check box if you're using an on-premises instance of Trellix. Complete the **Advanced MID Server Configuration**. **Note:** A MID Server must be configured on your ServiceNow instance before you select this option.

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Field	Description
MID selection	Select a MID Server from the list. This field appears only when the **Use MID Server** check box is selected.
MID application	Select a MID Server application from the list. This field appears only when the **Use MID Server** check box is selected.
Connection timeout	The maximum time (in seconds) the system waits while attempting to establish a connection.

ii. Select **Update** to save the HTTP connection details.

iii. Set the Configure Trellix HTTP Connection task to complete by selecting **Mark as complete**, and then select **Continue**.

d. Test the Trellix API connection to import data from the Trellix application.

i. Test the connection by selecting the **Test Connection** related link in the Test Connection task.

Testing the connection might take a few moments. The page is refreshed to show the test results.

ii. When the **Status** field is set to **Success**, set the Test Connection task to complete by selecting **Mark as complete**, and then select **Continue**.

If any of the tests have errors, follow the suggestions for remediation.

5. Optional: Add multiple instances.

Note:
If you don't need to add multiple instances, you can skip this step.

a. On the Service Graph Connector for Trellix page, in the Add Multiple Instances section, select **Start**.

b. In the Update Data Source Access section, select the Data Source [sys_data_source] table.

c. Select the **Global** application scope by using the application picker.

d. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

e. Modify the application scope again to **Service Graph Connector for Trellix** by using the application picker.

f. Select **Update** to save the data source access details.

g. Set the Update Data Source Access task to complete by selecting **Mark as Complete**, and then select **Continue**.

h. Repeat steps 5.c to 5.e for the Update Scheduled Data Import Access task with the Scheduled data import [scheduled_data_set] table.

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i. Select **Update** to save the scheduled data import access details.

j. Set the Update Scheduled Data Import Access task to complete by selecting **Mark as Complete**, and then select **Continue**.

k. In the Add Another Connection section, modify the application scope to **Service Graph Connector for Trellix** by using the application picker.

l. Select **Click Here**.

m. On the Workflow Studio page, select **Add Connection** in the SGTrellix section.

n. Fill in the fields on the Create Connection form, and then select **Create Connection**.

Create Connection form

Field	Description
Connection name	Name to identify the Trellix connection record.
Connection url	URL of the connection.
Use MID server	Option to use a MID Server. Select this check box if you're using an on-premises instance of Trellix. Complete the **Advanced MID Server Configuration**. **Note:** A MID Server must be configured on your ServiceNow instance before you select this option.
MID selection	Select a MID Server from the list. (Optional) This field appears only when the **Use MID Server** check box is selected.
MID application	Select a MID Server application from the list. (Optional) This field appears only when the **Use MID Server** check box is selected.
User name	User name of your Trellix account.
Password	Password of your Trellix account.

o. Close the Workflow Studio page, and navigate back to the guided setup.

p. Set the Add Another Connection task to complete by selecting **Mark as Complete**, and then select **Continue**.

q. In the Test New Connections section, select the newly created connection record, and then select the **Test Connection** related link.

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(Optional) Testing the connection might take a few moments. The page is refreshed to show the test results.

r. When the **Status** field is set to **Success**, set the Test New Connections task to complete by selecting **Mark as complete**, and then select **Continue**.

(Optional) If any of the tests have errors, follow the suggestions for remediation.

6. Configure the scheduled jobs to import data from the Trellix application.

a. On the Service Graph Connector for Trellix page, in the Set up scheduled import jobs section, select **Start**.

b. For the Configure the scheduled jobs task, select the connection.

Note:
The SG-Trellix-Devices scheduled import job is set to inactive by default.

c. On the Scheduled Data Import form, verify the field values for the scheduled job.

For more information, see Schedule a data import.

d. Select the **Active** check box to activate the SG-Trellix-Devices scheduled import job.

e. In the **Run** field, select **Periodically** to specify how often the job runs.

f. Select **Execute Now** to execute the import schedule.

g. Set the Configure the scheduled jobs task to complete by selecting **Mark as complete**, and then select **Continue**.

7. On the Service Graph Connector for Trellix page, select **Exit** to exit the guided setup.

Related topics

Service Graph Connector for Trellix

CMDB classes targeted in Service Graph Connector for Trellix

Accessing the connection details of Service Graph Connector for Trellix

CMDB classes targeted in Service Graph Connector for Trellix

When you complete setting up the connection, you can configure the integration to periodically pull data from Trellix. The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

File System [cmdb_ci_file_system]

The following attributes in the File System [cmdb_ci_file_system] table are populated by collected data:

Attribute label	Attribute name
Computer	computer

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Attribute label	Attribute name
Disk Space (GB)	disk_space
Free space bytes	free_space_bytes
Name	name

Relationship created for File System

Parent class	Relationship type	Child class
File System [cmdb_ci_file_system]	Reference	Server [cmdb_ci_server]

IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
IP Address	ip_address
Netmask	netmask
Nic	nic

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

Attribute label	Attribute name
Configuration Item	cmdb_ci
IP Address	ip_address
MAC Address	mac_address
Name	name
Netmask	netmask

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Server [cmdb_ci_server]

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Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data:

Attribute label	Attribute name
Class	sys_class_name
CPU count	cpu_count
CPU speed (MHz)	cpu_speed
CPU type	cpu_type
DNS Domain	dns_domain
Host name	host_name
Install Status	install_status
IP Address	ip_address
Is Virtual	virtual
MAC Address	mac_address
Manufacturer	manufacturer
Model ID	model_id
Name	name
Operating System	os
OS Service Pack	os_service_pack
OS Version	os_version
RAM (MB)	ram
Serial number	serial_number

Relationships created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Contains::Contained by	Storage Disk [cmdb_ci_storage_disk]
Server [cmdb_ci_server]	Contains::Contained by	File System [cmdb_ci_file_system]
Server [cmdb_ci_server]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Server [cmdb_ci_server]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data:

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Attribute label	Attribute name
Key	key
Name	name
Version	version

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Installation [cmdb_sam_sw_install]

The following attributes in the Software Installation [cmdb_sam_sw_install] table are populated by collected data:

Attribute label	Attribute name
Discovery Source	discovery_source
Installed on	installed_on
Name	name
Version	version

Relationship created for Software Installation

Parent class	Relationship type	Child class
Software Installation [cmdb_sam_sw_install]	Reference	Server [cmdb_ci_server]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data:

Attribute label	Attribute name
Installed on	installed_on
Name	name

Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Server [cmdb_ci_server]

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Storage Disk [cmdb_ci_storage_disk]

The following attributes in the Storage Disk [cmdb_ci_storage_disk] table are populated by collected data:

Attribute label	Attribute name
Computer	computer
Disk space (GB)	disk_space
Free disk space (GB)	free_space
Name	name

Relationship created for Storage Disk

Parent class	Relationship type	Child class
Storage Disk [cmdb_ci_storage_disk]	Reference	Server [cmdb_ci_server]

Related topics

Service Graph Connector for Trellix

Accessing the connection details of Service Graph Connector for Trellix

You can access the connection details of the Service Graph Connector for Trellix in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Trellix. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Trellix connection

Access the details of a Trellix connection configured for the Service Graph Connector for Trellix.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Trellix** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Related topics

Service Graph Connector for Trellix

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Service Graph Connector for VMware Workspace ONE UEM

Use the Service Graph Connector for VMware Workspace ONE UEM to pull data from VMware Workspace ONE Unified Endpoint Management (UEM) into your ServiceNow Instance.

Request apps on the Store

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

The integration imports different hardware assets into the ServiceNow® Configuration Management Database (CMDB) application.

Supported versions

- Supported versions:
  - VMware Workspace ONE UEM version 25.6.961.16 (2506)
  - Application Discovery Manager (ADM) API version 2
- Supported ServiceNow versions:
  - Yokohama
  - Zurich
  - Australia

Use cases

The following are examples on how you can use the Service Graph Connector for different ServiceNow applications:

- IT Operations Management (ITOM) Visibility
  - Detailed hardware and application inventory for Android, Apple, and Windows mobile devices. The inventory can be used with or without Software Asset Management (SAM).
  - Compliance tracking for mobile devices. You can build your own device (BYOD) or use corporate-owned devices.
- IT Service Management (ITSM)
  - Incident, problem, change on discovered configuration items (CI).
  - Ownership tracking and assignment for mobile devices.

Guided setup

The guided setup for the Service Graph Connector for VMware Workspace ONE UEM provides an organized sequence of tasks to configure the integration on your instance. To access the guided setup, see Configure Service Graph Connector for VMware Workspace ONE UEM.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Workspace ONE integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

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Data mapping

Data from the VMware Workspace ONE UEM Devices and Apps data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you configure the integration to periodically pull data from VMware Workspace ONE UEM.

The data is loaded into the SG-Workspace ONE UEM Devices and Apps staging [sn_vmwoneuem_integ_devices_and_apps] table.

The data is then inserted into the following target tables:

- Computer [cmdb_ci_computer]
- Handheld Computing Device [cmdb_ci_handheld_computing]
- Media Player [cmdb_ci_media_player]
- Network Adapter [cmdb_ci_network_adapter]
- Printer [cmdb_ci_printer]
- SAM Software Installation [cmdb_sam_sw_install], if com.snc.sams plugin is installed.
- Serial Number [cmdb_serial_number]
- Software Instance [cmdb_software_instance], if com.snc.sams plugin is not installed.
- Software Package [cmdb_ci_spkg], if com.snc.sams plugin is not installed.

Note:
To view any additional information such as the device owner, type of ownership, or compliance status, you need to switch to the SG-Workspace ONE UEM view. This view displays a **SG-Workspace ONE UEM Device Related** tab in the related list tabs with the additional information.

For more information on where data is saved when pulling data from VMware Workspace ONE Unified Endpoint Management (UEM), see CMDB classes targeted in Service Graph Connector for VMware Workspace ONE UEM.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Related topics

Service Graph Connectors

Configure Service Graph Connector for VMware Workspace ONE UEM

Use the Service Graph Connector for VMware Workspace ONE UEM to pull mobile and computing devices data from VMware Workspace ONE Unified Endpoint Management (UEM) into your ServiceNow instance.

Before you begin

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from

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that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- The Integration Commons for CMDB store app, which is automatically installed.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- The ITOM Discovery License plugin (com.snc.itom.discovery.license). You must activate this plugin.
- ITOM Licensing plugin (com.snc.itom.license). For more information, see Request Discovery.
- The Datastream Action plugin (com.glide.hub.action_type.datastream), which is automatically installed.

Role required: SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

When using client credentials for authentication, obtain the OAuth credentials from your VMware Workspace ONE UEM administrator. Make a note of the following details:

- Application (client) ID
- Client Secret
- Token URL

For information about how to get OAuth credentials, see the VMware documentation site.

About this task

To configure the Service Graph Connector for VMware Workspace ONE UEM, you must configure either OAuth authentication credentials or basic authentication credentials.

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Workspace ONE UEM** > **Setup**.
2. On the Getting started page, select **Get Started**.
3. In the Configure the Connection and Credentials section of the Service Graph Connector for VMware Workspace ONE UEM page, select **Get Started**.
4. Configure authentication credentials for the connection.
   You can configure either a basic authentication connection or an OAuth connection.

   a. For the Set authentication type task, select **Configure**.
      - To enable basic authentication, set the value of the *auth_type* connection property to `basic`.
      - To enable OAuth authentication, set the value of the *auth_type* connection property to `oauth`.

   b. Select **Update**, and navigate back to the guided setup page.

   c. Set the Set authentication type task to complete by selecting **Mark as Complete**.

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5. Configure the credentials for authentication.
   - Configure a basic authentication connection.
     a. For the Configure the Basic Auth Credentials task, select **Configure**.
     b. On the form, fill in the fields.

Field	Description
Name	Name of the authentication. For example, `WorkspaceOneUEM Basic Auth Credentials`.
User name	Your VMware Workspace ONE UEM user name.
Password	Your VMware Workspace ONE UEM password.

     c. Select **Update**, and navigate back to the guided setup page.
     d. Set the Configure the Basic Auth Credentials task to complete by selecting **Mark as Complete**.
     e. For the Configure API key task, select **Configure** to configure an API key for the basic authentication connection.
     f. In the **API Key** field, enter your VMware Workspace ONE UEM API key or tenant code.
     g. Select **Update**, and navigate back to the guided setup page.
     h. Set the Configure API key task to complete by selecting **Mark as Complete**.
   - Configure an OAuth connection.
     a. For the Configure the OAuth Credentials task, select **Configure**.
     b. On the form, fill in the fields.

Field	Description
Name	Name of the authentication. For example, `WorkspaceOneUEM OAuth Provider`.
Client ID	Application (client) ID of your VMware Workspace ONE UEM client application as noted in the Before you begin section.
Client Secret	Client secret of your VMware Workspace ONE UEM client application as noted in the Before you begin section.

     c. Select **Update**, and navigate back to the guided setup page.
     d. Set the Configure the OAuth Credentials task to complete by selecting **Mark as Complete**.
6. Establish an HTTP connection to send requests to the VMware Workspace ONE UEM API.

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a. For the Configure HTTP connection task, select **Configure**.

b. On the HTTP(s) Connection form, specify the host name of your VMware Workspace ONE UEM instance in the **Host** field.

> **Note:**
> The HTTP connection is pre-configured to use the authentication credentials that were configured in steps 4 and 5.

c. Select **Update**.

d. Set the Configure HTTP Connection task to complete by selecting **Mark as Complete**.

7. Test the connection.

a. For the Test the Connection task, select **Configure**.

b. Select the **Test Connection** related link to start the testing process.

c. When the **Status** field is set to **Success**, navigate back to the guided setup page.
If any of the tests have errors, follow the suggestions for remediation.

d. Set the Test the Connection task to complete by selecting **Mark as Complete**.

8. Set up the scheduled import job.

a. For the Configure the scheduled job task, select **Configure**.
The SG-Workspace ONE UEM Devices and Apps scheduled job is set to inactive by default.

b. Select the **SG-Workspace ONE UEM Devices and Apps** scheduled job.

c. On the Scheduled Data Import form, verify the field values for the scheduled job.
For more information, see Schedule a data import.

d. Select the **Active** check box to activate the SG-Workspace ONE UEM Devices and Apps scheduled job.

e. In the **Run** field, select **Periodically** to specify how often the job should run.

f. Select **Update**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

g. Set the Configure the scheduled job task to complete by selecting **Mark as Complete**.

9. **Optional:** Add multiple instances.

> **Note:**
> If you don't need to add multiple instances, you can skip this step.

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a. In the Add multiple instances section of the Service Graph Connector for VMware Workspace ONE UEM page, select **Get Started**.

b. For the Update scheduled data import access task, select **Configure**.

c. Select the Scheduled data import [scheduled_import_set] table.

d. Select the **Global** application scope by using the application picker.

e. In the Application Access related list, select the **Can create**, **Can update**, and **Can delete** check boxes, if not already selected.

f. Select **Update**, and then navigate back to the guided setup.

g. Modify the application scope again to **Service Graph Connector for VMware Workspace ONE UEM** by using the application picker.

h. Set the Update scheduled data import access task to complete by selecting **Mark as Complete**.

i. For the Update Data Source Access task, select **Configure**.

j. Select the Data Source [sys_data_source] table.

k. Repeat steps 9.d to 9.g.

l. Set the Update Data Source Access task to complete by selecting **Mark as Complete**.

m. Clear the cache for the new connection.

i. For the Clear cache for Data Source and Import Set tables task, select **Configure**.

ii. Select the **Global** application scope by using the application picker.

iii. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
      GlideCacheManager.flushTable("sys_data_source");

 GlideTableManager.invalidateTable("scheduled_import_set");
      GlideCacheManager.flushTable("scheduled_import_set");
      GlideTableManager.invalidateTable("sys_db_object");
      GlideCacheManager.flushTable("sys_db_object");
```

iv. Select **Run Script** to run the background script.

The script may take several minutes to execute.

v. After the script is executed, select **Close**.

vi. Modify the application scope again to **Service Graph Connector for VMware Workspace ONE UEM** by using the application picker.

vii. Set the Clear cache for Data Source and Import Set tables task to complete by selecting **Mark as complete**.

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n. Configure the connection for the VMware Workspace ONE UEM instance.

(Optional) You can configure either a basic authentication connection or an OAuth connection.

- Configure a basic authentication connection.
  - **i.** For the Add basic authentication connection task, select **Configure**.
  - **ii.** To create a new connection, select **Add Connection**.
  - **iii.** In the Connection Information section of the Create Connection window, fill in the fields.

Connection Information

Field	Description
Connection name	Name to identify the VMware Workspace ONE UEM connection record.
Connection URL	Connection URL of your VMware Workspace ONE UEM connection. Use the format `https://host-name/API` for the connection URL.

  - **iv.** In the Credential Information section of the Create Connection window, fill in the fields.

Credential Information

Field	Description
Username	VMware Workspace ONE UEM account user name that is used to authenticate the connection request.
Password	Password that is used to authenticate the connection request.

  - **v.** Select **Create Connection**.
  - **vi.** Navigate back to the guided setup, and set the Add basic authentication connection task to complete by selecting **Mark as Complete**.
  - **vii.** For the Configure API key task, select **Configure** to configure an API key for the basic authentication connection.
  - **viii.** Select the **API Key** record that corresponds to the connection alias for the new basic authentication connection.
  - **ix.** Set the API key, and then select **Update**.
  - **x.** Navigate back to the guided setup, and set the Configure API key task to complete by selecting **Mark as Complete**.
- Configure an OAuth connection.
  - **i.** For the Add an OAuth connection task, select **Configure**.
  - **ii.** To create a new connection, select **Add Connection**.
  - **iii.** In the Connection Information section of the Create Connection window, fill in the fields.

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Connection Information

Field	Description
Connection Name	Name to identify the VMware Workspace ONE UEM connection record.
Connection URL	Connection URL of your VMware Workspace ONE UEM controller. Use the format `https://host-name/API` for the connection URL.

iv. In the Credential Information section of the Create Connection window, fill in the fields.

Credential Information

Field	Description
OAuth Client ID	Application (client) ID of your VMware Workspace ONE UEM client application as noted in the Before you begin section.
OAuth Client Secret	Client secret of your VMware Workspace ONE UEM client application as noted in the Before you begin section.

For information about how to get OAuth credentials, see the VMware documentation site.

v. Select **Create and Get OAuth Token**.

vi. Navigate back to the guided setup, and set the Add an OAuth connection task to complete by selecting **Mark as Complete**.

o. Test the newly added connections.

i. For the Test connections task, select **Configure**.

ii. From the **Name** column, select the new connection.

iii. Select the **Test Connection** related link to start the testing process.

iv. When the **Status** field is set to **Success**, return to the guided setup page.

> **Note:**
> If any of the tests have errors, follow the suggestions for remediation.

v. Set the Test connections task to complete by selecting **Mark as Complete**.

p. Configure the scheduled job to import data from the VMware Workspace ONE UEM application.

(Optional) The SG-Workspace ONE UEM Devices and Apps scheduled job is set to inactive by default.

i. For the Configure import schedule task, select **Configure**.

ii. Select the **SG-Workspace ONE UEM Devices and Apps** scheduled job.

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iii. On the Scheduled Data Import form, verify the field values for the scheduled job.

(Optional) For more information, see Schedule a data import.

iv. Select the **Active** check box to activate the SG-Workspace ONE UEM Devices and Apps scheduled job.

v. In the **Run** field, select **Periodically** to specify how often the job should run.

vi. Select **Update**.

Alternatively, select **Execute Now** to execute the import schedule immediately.

10. **Optional:** Configure additional settings.

a. In the Configure additional settings (optional) section of the Service Graph Connector for VMware Workspace ONE UEM page, select **Get Started**.

b. For the Configure duplicate detection rules task, select **Configure**.

c. On the CMDB Duplicate Row Rule form, select **Active**.

d. Update the Value field to `true` to activate the duplicate detection rule during data import.

e. Select **OK**, and navigate back to the guided setup.

f. To remove fields from being evaluated, add the field names as a comma-separated list in the Ignore Fields column on the CMDB Duplicate Row Rules form.
Use this option for fields that change with every import.

g. Set the Configure duplicate detection rules task to complete by selecting **Mark as Complete**.

h. For the Enable software import task, select **Configure**.

i. Select the connection record for which you want to enable the import of software data.
The *turn_off_software_import* connection property is set to `true` by default.

j. Set the *turn_off_software_import* connection property value to `false` to import software data.

k. Set the Enable software import task to complete by selecting **Mark as Complete**.

l. For the Import non-managed software task, select **Configure**.

m. Select the connection record for which you want to import non-managed software data.
By default, software records that have the **IsManaged** field set to `false` aren't imported.

n. Set the *managed_apps_only* connection property value to `false` to import non-managed software data.

o. Set the Import non-managed software task to complete by selecting **Mark as Complete**.

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p. For the Import apps based on software status value task, select **Configure**.
By default, the connector imports applications that have the status value 2, 3, or 5.

Status values of applications

Status	Value
Pending Install	1
Installed	2
Pending Removal	3
Removed	4
Unknown	5

q. Select the connection record for which you want to update the set of imported applications.

r. Set the *import_apps_with_status* connection property value to the required software status values (as a comma-separated list).

s. Set the Import apps based on software status value task to complete by selecting **Mark as Complete**.

CMDB classes targeted in Service Graph Connector for VMware Workspace ONE UEM

When you complete setting up the connection, you can configure the integration to periodically pull data from VMware Workspace ONE Unified Endpoint Management (UEM). The data is saved in tables that extend from the Configuration item [cmdb_ci] table.

Computer [cmdb_ci_computer]

The following attributes in the Computer [cmdb_ci_computer] table are populated by collected data:

Attribute label	Attribute name
Name	name
Serial number	serial_number
Is Virtual	virtual
Most recent discovery	last_discovered
Operating System	os
OS Version	os_version
RAM (MB)	ram
Assigned to	assigned_to
Model ID	model_id
Manufacturer	manufacturer

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Handheld Computing Device [cmdb_ci_handheld_computing]

The following attributes in the Handheld Computing Device [cmdb_ci_handheld_computing] table are populated by collected data:

Attribute label	Attribute name
MAC Address	mac_address
Name	name
Serial number	serial_number
IMEI	imei
Most recent discovery	last_discovered
Operating System	os
OS Version	os_version
Phone Number	phone_number
RAM (MB)	ram
Root Access	root_access
Manufacturer	manufacturer
Model ID	model_id
Carrier	carrier
Assigned to	assigned_to

Hardware [cmdb_ci_hardware]

The following attribute in the Hardware [cmdb_ci_hardware] table is populated by collected data:

Attribute label	Attribute name
Most recent discovery	last_discovered

Relationships created for Hardware

Parent class	Relationship type	Child class
Hardware [cmdb_ci_hardware]	Owns::Owned by	Network Adapter [cmdb_ci_network_adapter]
Hardware [cmdb_ci_hardware]	Owns::Owned by	IP Address [cmdb_ci_ip_address]
Hardware [cmdb_ci_hardware]	Reference	SG-Workspace ONE UEM Device Related [sn_vmwoneuem_integ_device_related]
Hardware [cmdb_ci_hardware]	Reference	Key Value [cmdb_key_value]

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IP Address [cmdb_ci_ip_address]

The following attributes in the IP Address [cmdb_ci_ip_address] table are populated by collected data:

Attribute label	Attribute name
Name	name
Nic	nic
IP Address	ip_address
IP version	ip_version

Relationship created for IP Address

Parent class	Relationship type	Child class
IP Address [cmdb_ci_ip_address]	Reference	Network Adapter [cmdb_ci_network_adapter]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

Media Player [cmdb_ci_media_player]

The following attributes in the Media Player [cmdb_ci_media_player] table are populated by collected data:

Attribute label	Attribute name
Name	name
Serial number	serial_number
Manufacturer	manufacturer
Model ID	model_id
MAC Address	mac_address
Assigned to	assigned_to
Most recent discovery	last_discovered

Network Adapter [cmdb_ci_network_adapter]

The following attributes in the Network Adapter [cmdb_ci_network_adapter] table are populated by collected data:

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Attribute label	Attribute name
Name	name
Configuration Item	cmdb_ci
MAC Address	mac_address
Most recent discovery	last_discovered

Relationship created for Network Adapter

Parent class	Relationship type	Child class
Network Adapter [cmdb_ci_network_adapter]	Reference	Hardware [cmdb_ci_hardware]

Printer [cmdb_ci_printer]

The following attributes in the Printer [cmdb_ci_printer] table are populated by collected data:

Attribute label	Attribute name
Assigned to	assigned_to
MAC Address	mac_address
Name	name
Most recent discovery	last_discovered
Manufacturer	manufacturer
Model ID	model_id
Serial number	serial number

Serial Number [cmdb_serial_number]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data:

Attribute label	Attribute name
Serial Number	serial_number
Serial Number Type	serial_number_type
Valid	valid

Relationships created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Computer [cmdb_ci_computer]
Serial Number [cmdb_serial_number]	Reference	Handheld Computing Device [cmdb_ci_handheld_computing]

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Relationships created for Serial Number (continued)

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Printer [cmdb_ci_printer]
Serial Number [cmdb_serial_number]	Reference	Media Player [cmdb_ci_media_player]

SG-Workspace ONE UEM Device Related [sn_vmwoneuem_integ_device_related]

The following attributes in the SG-Workspace ONE UEM Device Related [sn_vmwoneuem_integ_device_related] table are populated by collected data:

Attribute label	Attribute name
Device ID	device_id
Device Compliance State	compliance_state
Device Ownership	device_ownership
User Email	user_email
User Name	user_name

Software [cmdb_ci_spkg]

The following attributes in the Software [cmdb_ci_spkg] table are populated by collected data:

Attribute label	Attribute name
Key	key
Name	name
Version	version

Relationship created for Software

Parent class	Relationship type	Child class
Software [cmdb_ci_spkg]	Reference	Software Instance [cmdb_software_instance]

Software Instance [cmdb_software_instance]

The following attributes in the Software Instance [cmdb_software_instance] table are populated by collected data:

Attribute label	Attribute name
Name	name
Installed on	installed_on

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Relationship created for Software Instance

Parent class	Relationship type	Child class
Software Instance [cmdb_software_instance]	Reference	Hardware [cmdb_ci_hardware]

Accessing the connection details of Service Graph Connector for VMware Workspace ONE UEM

You can access the connection details of the Service Graph Connector for VMware Workspace ONE UEM in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for VMware Workspace ONE UEM. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a VMware Workspace ONE UEM connection

Access the details of a VMware Workspace ONE UEM connection configured for the Service Graph Connector for VMware Workspace ONE UEM.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Workspace ONE UEM** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name, alias, and data sources.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Related topics

Service Graph Connector for VMware Workspace ONE UEM

Service Graph Connector for Wiz

Use the Service Graph Connector for Wiz to ingest CMDB data from projects within the Wiz platform using the REST APIs.

Request apps on the Store

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

Key features

- Get started quickly with a streamlined onboarding process.
- Use only the credentials you need.

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- Be instantly aware of any modifications with near real-time discovery of changes.
- Get visibility across multiple cloud environments.
- Identify risks in the environment through Wiz.
- Assess application dependencies.
- Get the most out of your security incident response and endpoint management with the ServiceNow AI Platform.

Supported versions

Versions

Wiz	ServiceNow
Last tested on February 20, 2026	• Yokohama • Zurich • Australia

Use cases

You can use the Service Graph Connector for Wiz to get visibility into cloud resource identities, relationships, and state in real-time.

Configuring a connection

Use the SGC Central view in the Service Graph Workspace or CMDB Workspace to install the connector and configure the connection. The view enables you to install and discover connectors and to manage the full life cycle of creating, editing, monitoring, and debugging connections. For instructions, see Set up the Wiz environment.

Important:
Starting with the Service Graph Connector for Wiz version 1.4.0, the guided setup method is deprecated. Use the SGC Central view in the CMDB Workspace to configure the connection for the connector.

CMDB integrations dashboard

The Integration Commons for CMDB store app provides a dashboard with a central view of the status, processing results, and processing errors of all installed integrations. You can see metrics for all integration runs. You can filter the view to a specific CMDB integration, a specific time duration, or a specific integration run. For more details about monitoring Wiz integrations in the CMDB Integrations Dashboard, see Using the CMDB Integrations Dashboard.

Data mapping

Data from the Wiz data sources is mapped and transformed into the ServiceNow CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the ServiceNow CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from the Wiz application.

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Note:
For any discovered resources that were deleted later, the Service Graph Connector for Wiz automatically marks the corresponding records as retired or absent in CMDB.

The following table lists the data sources, the staging tables, and the target tables CMDB CI classes and non-CMDB classes where data is stored for a Wiz project.

Data sources mapping for Wiz

Data source	Staging table	Target tables
SG-Wiz-Organization	SG-Wiz-Organization [sn_wiz_integ_sg_wiz_organization]	Cloud Organizations SG-Wiz Extension Attributes Google Organization Folder
SG-Wiz-Subscription	SG-Wiz-Subscription [sn_wiz_integ_sg_wiz_subscription]	Cloud Service Account Google Organization Project VMware vCenter Datacenter SG-Wiz Extension Attributes Key Value
SG-Wiz-Datacenter	SG-Wiz-Datacenter [sn_wiz_integ_sg_wiz_datacenter]	AWS Datacenter Azure Datacenter Google Datacenter Logical Datacenter OCI Datacenter SG-Wiz Extension Attributes
SG-Wiz-Resource-Group	SG-Wiz-Resource-Group [sn_wiz_integ_sg_wiz_resource_group]	Resource Group SG-Wiz Extension Attributes Key Value
SG-Wiz-Network-Interface	SG-Wiz-Network-Interface [sn_wiz_integ_sg_wiz_network_interface]	Cloud Mgmt Network Interface SG-Wiz Extension Attributes Key Value
SG-Wiz-Virtual-Network	SG-Wiz-Virtual-Network [sn_wiz_integ_sg_wiz_virtual_network]	Cloud Network SG-Wiz Extension Attributes Key Value
SG-Wiz-Firewall	SG-Wiz-Firewall [sn_wiz_integ_sg_wiz_firewall]	Compute Security GroupKey Value

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Data sources mapping for Wiz (continued)

Data source	Staging table	Target tables
SG-Wiz-Volume	SG-Wiz-Volume [sn_wiz_integ_sg_wiz_volume]	Storage Volume Cloud Disk Type SG-Wiz Extension Attributes Key Value
SG-Wiz-Virtual-Machine	SG-Wiz-Virtual-Machine [sn_wiz_integ_sg_wiz_virtual_machine]	Virtual Machine Instance Hardware Type Cloud Hardware Type Linux Server Windows Server Server Key Value SG-Wiz Extension Attributes
SG-Wiz-Virtual-Machine-Image	SG-Wiz-Virtual-Machine-Image [sn_wiz_integ_sg_wiz_virtual_machine_image]	Image **Note:** Data with no subscription IDs for images aren't imported. Also, if the subscription ID for an image is available, but the subscription-specific details are not available in Wiz, the data isn't imported by the connector. Key Value SG-Wiz Extension Attributes
SG-Wiz-Load Balancer	SG-Wiz-Load Balancer [sn_wiz_integ_sg_wiz_load_balancer]	Cloud Load Balancer Key Value SG-Wiz Extension Attributes
SG-Wiz-Database	SG-Wiz-Database [sn_wiz_integ_sg_wiz_database]	Cloud DataBase Cloud DataBase Cluster DynamoDB Table

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Data sources mapping for Wiz (continued)

Data source	Staging table	Target tables
		Key Value SG-Wiz Extension Attributes
SG-Wiz-Bucket	SG-Wiz-Bucket [sn_wiz_integ_sg_wiz_bucket]	Cloud Object Storage Key Value SG-Wiz Extension Attributes
SG-Wiz-Serverless	SG-Wiz-Serverless [sn_wiz_integ_sg_wiz_serverless]	Cloud Function Key Value SG-Wiz Extension Attributes
SG-Wiz-Network-Address	SG-Wiz-Network-Address [sn_wiz_integ_sg_wiz_network_address]	Cloud Public IP Address Key Value SG-Wiz Extension Attributes
SG-Wiz-Storage-Account	SG-Wiz-Storage-Account [sn_wiz_integ_sg_wiz_storage_account]	Cloud Storage Account Key Value SG-Wiz Extension Attributes
SG-Wiz-API-Gateway	SG-Wiz-API-Gateway [sn_wiz_integ_sg_wiz_api_gateway]	Cloud Gateway Key Value SG-Wiz Extension Attributes
SG-Wiz-Snapshot	SG-Wiz-Snapshot [sn_wiz_integ_sg_wiz_snapshot]	Storage Volume Snapshot Key Value SG-Wiz Extension Attributes
SG-Wiz Kubernetes Cluster	SG-Wiz Kubernetes Cluster [sn_wiz_integ_sg_wiz_k8s_cluster]	Kubernetes Cluster Key Value SG-Wiz Extension Attributes
SG-Wiz Kubernetes Namespace	SG-Wiz-K8s Namespace [sn_wiz_integ_sg_wiz_k8s_namespace]	Kubernetes Namespace Key Value SG-Wiz Extension Attributes
SG-Wiz-Kubernetes Node	SG-Wiz-Kubernetes Node [sn_wiz_integ_sg_wiz_kubernetes_node]	Kubernetes Node Key Value

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Data sources mapping for Wiz (continued)

Data source	Staging table	Target tables
		SG-Wiz Extension Attributes
SG-Wiz-Kubernetes Deployment	SG-Wiz-Kubernetes Deployment [sn_wiz_integ_sg_wiz_kubernetes_deployment]	Kubernetes Deployment Key Value SG-Wiz Extension Attributes
SG-Wiz-Kubernetes Service	SG-Wiz-Kubernetes Service [sn_wiz_integ_sg_wiz_kubernetes_service]	Kubernetes Service Key Value SG-Wiz Extension Attributes
SG-Wiz-Kubernetes Pod	SG-Wiz-Kubernetes Pod [sn_wiz_integ_sg_wiz_kubernetes_pod]	Kubernetes Pod Key Value SG-Wiz Extension Attributes
SG-Wiz-Kubernetes Replica Set	SG-Wiz-Kubernetes Replica Set [sn_wiz_integ_sg_wiz_kubernetes_replica_set]	Kubernetes ReplicaSet Key Value SG-Wiz Extension Attributes
SG-Wiz Kubernetes Container	SG-Wiz Kubernetes Container [sn_wiz_integ_sg_wiz_kubernetes_container]	Docker Container SG-Wiz Extension Attributes
SG-Wiz-Compute Instance Group	SG-Wiz-Compute Instance Group [sn_wiz_integ_sg_wiz_compute_instance_group]	Instance Scale Set SG-Wiz Extension Attributes Key Value
SG-Wiz-Gateway	SG-Wiz-Gateway [sn_wiz_integ_sg_wiz_gateway]	Internet Gateway AWS Datacenter SG-Wiz Extension Attributes Key Value

Note:
All the labels or tags associated with a Wiz resource are added to the Key Value [cmdb_key_value] table and the project information about a Wiz resource is stored in the SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes] table.

For more information on where data is saved when pulling data from a Wiz project, see Target tables for storing Service Graph Connector for Wiz data and Supported Wiz types.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

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Related topics

Service Graph Connectors

Set up the Wiz environment

You must obtain the credentials associated with the Wiz service account to configure Wiz for use with the Service Graph Connector for Wiz.

Before you begin

Role required: Wiz user with a role that has Write (W) permission on service accounts

About this task

To create a service account, you must be logged in as a Wiz user with Write (W) permission on service accounts. Project-scoped roles can create service accounts only on their own projects.

For more information on obtaining Wiz details, see Add a Service Account on the Wiz documentation site (requires Wiz login).

Procedure

1. Log in to your Wiz dashboard.
2. Obtain the Wiz URL.
   a. Navigate to your user profile and copy the API Endpoint URL.

   Note:
   The Service Graph Connector for Wiz uses the following token URL:

   ```
   https://auth.app.wiz.io/oauth/token
   ```

3. Obtain the client ID and client secret.
   a. Navigate to **Settings** > **Service Accounts**.
   b. Select **Add Service Account**.
   c. Name the new service account.
   d. **Optional:** In the Projects list, select projects to limit access of the service account.
   e. In the **API Scopes** field, select the permissions `read:resources` and `read:projects`.
   f. Select **Add Service Account**.
   g. From the Copy your secret credentials dialog box that appears, copy the client secret and client ID from their respective fields.
   h. Select **Finish** to return to the Wiz dashboard.

Configure Service Graph Connector for Wiz using SGC Central

Set up scheduled import jobs to pull in data from a Wiz project into your Configuration Management Database (CMDB).

Before you begin

- Install Service Graph Connector for Wiz version 1.3.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.
- You must obtain the OAuth credentials associated with the Wiz service account and make a note of the following details:

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- Client ID
- Client secret
- OAuth token URL
- Connection URL

For more information, see Set up the Wiz environment.

- You must have the following permissions for the Wiz service account:
  - read:resources
  - read:projects

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	cmdb_inst_admin or admin

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select the Wiz connector type, and then select **Configure connection**.
   A default connection, SG-Wiz, for Wiz is available within the application. As the Service Graph Connector for Wiz supports only a single instance, you can configure the default connection for the first time or resume editing it thereafter.
4. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required when configuring the connector for the first time only. See Perform initial setup tasks when creating a connection in SGC Central.

5. Enter connection details and test the API connection for importing Wiz data.

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a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

b. On the form, fill in the fields.

Create and test connection form

Field	Description
Connection name	Name to identify the Wiz connection record.
Connection URL	Base URL to connect to your Wiz application. **Note:** Based on the region of your Wiz application, enter the connection URL in the following format: `https://api.<region>.app.wiz.io` Where *<region>* is the region where the Wiz tenant is located. For example, us1, us2, eu1, or eu2.
Client ID	Client ID of your Wiz application as described in Before you begin.
Client secret	Client secret of your Wiz application as described in Before you begin.
OAuth token URL	Token generation URL. This field is automatically set to the following URL: `https://auth.app.wiz.io/oauth/token`

c. Select **Update and test connection**.

d. Once the connection test is complete, select **Continue**.

6. **Optional:** Configure properties of the connector to access resources.

Note:
To skip this step, select **Continue** for the **Set configuration properties** activity.

a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. On the form, fill in the fields.

Configuration properties

Field	Description
Projects	List of project IDs for which the resources are to be imported. (Optional) Separate multiple entries with a comma.

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Field	Description
Exclude projects	List of project IDs for which the resources are excluded only when the **Projects** property isn't set. In this case, all the resources except for the specified projects are imported. Separate multiple entries with a comma.

c. Select **Continue**.

7. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Expand the Parent scheduled data import within the Import schedules list to select the **SG-Wiz-Organization** import schedule.

c. Select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

d. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

8. **Optional:** Enable the `Reset Last Run Datetime for SG-Wiz` script to retrieve full data periodically.

Note:
To skip this step, select **Skip** for the **Enable full data retrieval** activity.

a. In the **Setup** stage of the playbook, select the **Enable full data retrieval** activity.

b. Select the **Active** check box, and then fill in the run schedule and time details.

Note:
When active, the script clears the **Last Run Date Time** field value in a data source, ensuring that the SG-Wiz Organization scheduled job retrieves all Wiz-related data sources periodically.

c. Select **Continue**.

9. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The created connection appears in the Installed connections list.

Related topics

Service Graph Connector for Wiz

Target tables for storing Service Graph Connector for Wiz data

Service Graph Connector for Wiz properties

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Supported Wiz types

Accessing the connection details of Service Graph Connector for Wiz

Configure Service Graph Connector for Wiz using guided setup

Set up scheduled import jobs to pull in data from a Wiz project into your CMDB.

Before you begin

Important:
Starting with the Service Graph Connector for Wiz version 1.4.0, the guided setup method is deprecated. Use the SGC Central view in the CMDB Workspace to configure the connection for the connector.

To use this Service Graph Connector, you need a subscription to a Subscription Unit that is based in the IT Operations Management (ITOM) Visibility application or in the ITOM Discovery application. As defined in the section titled "Managed IT Resource Types" in ServiceNow Subscription Unit Overview for your subscription, for managed IT resources that are created or modified in the CMDB by this Service Graph Connector, but that aren't yet managed by ITOM Visibility or ITOM Discovery, these resources will increase Subscription Unit consumption from that application. Review your current Subscription Unit consumption within ITOM Visibility or ITOM Discovery to ensure available capacity.

Dependencies and requirements:

- Wiz advanced or standard license
- The Integration Commons for CMDB store app, which is automatically installed. See Integration Commons for CMDB.
- The CMDB CI class models store app, which is automatically installed. See CMDB CI Class Models.
- ITOM Licensing plugin (com.snc.itom.license). See Request Discovery.
- Discovery and Service Mapping Patterns (sn_itom_pattern). See Install Discovery and Service Mapping Patterns.
- Discovery Core (com.snc.discovery.core)

You must obtain the OAuth credentials associated with the Wiz service account and make a note of the following details:

- Client ID
- Client Secret
- OAuth Token URL
- Connection URL

See Set up the Wiz environment.

You must have the following permissions for the Wiz service account:

- read:resources
- read:projects

Role required: admin

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Procedure

1. Verify that the application scope is set to the Service Graph Connector for Wiz application by using the application picker.
   For more information, see Application picker.
2. Navigate to **All** > **Service Graph Connectors** > **Wiz** > **Setup**.
3. On the Service Graph Connector for Wiz page, verify that the **Quick Start** option is selected and then select **Continue**.
4. Configure the connection to send requests to the Wiz application.

   a. In the Configure the Connection and Credentials section of the Service Graph Connector for Wiz page, select **Start**.

   b. Configure the connection.

      i. Select the Configure the Connection task and then select **Click Here**.

      ii. On the Connections page that opens in another browser tab, select **Edit** for the **SG-Wiz** connection that is available by default.

      iii. On the form, fill in the fields.

Edit Connection form

Field	Description
Connection Name	Name to identify the connection record. For example, `SG-Wiz`. Don't modify the name for the default connection alias `SG-Wiz`.
Connection URL	Base URL to connect to your Wiz application. **Note:** Based on the region of your Wiz application, enter the connection URL in the following format: `https://api.<region>.app.wiz.io` Where *<region>* is the region where the Wiz tenant is located. For example, us1, us2, eu1, or eu2.
Client ID	Client ID of your Wiz application as described in Before you begin.
Client Secret	Client secret of your Wiz application as described in Before you begin.
OAuth Token URL	Token generation URL. This field is automatically set to the following URL: `https://auth.app.wiz.io/oauth/token`

      iv. Select **Edit and Get OAuth Token**.

      v. Return to the guided setup.

      vi. Set the Configure the Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

   c. Configure the connection properties.

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i. Select the Add configuration properties task.

ii. In the Service Graph Connections section, review and modify the property details by selecting a property from the **Property** column in the Service Graph Connection Properties related list.

You can configure the following properties:

Projects

A list of comma-separated project IDs for which the resources are to be pulled.

Exclude Projects

A list of comma-separated project IDs for which the resources are excluded only when the **Projects** property isn't set. In this case, all the resources except for the specified projects are imported.

Note:
If no property is configured, data from all the Wiz projects are fetched.

iii. Select **Update** in the Service Graph Connection Properties section.

iv. Set the Add connection properties task to complete by selecting the **Mark as complete** check box and then select **Continue**.

d. Test the Wiz API connection to import data from the Wiz application.

i. Select the Test Connection task.

ii. Test the connection by selecting the **Test Connection** related link.

Testing the connection might take a few moments. The page is refreshed to show the test results.

iii. When the **Status** field is set to **Success**, select **Update**.

If any of the tests have errors, follow the suggestions for remediation.

iv. Set the Test Connection task to complete by selecting the **Mark as complete** check box and then select **Continue**.

5. Configure the scheduled jobs to import data from the Wiz application.

a. Configure the scheduled job for the complete (full) import of data during the initial execution, and then incremental (delta) import of data on subsequent executions.

i. Select the Configure the scheduled jobs task.

ii. Select the **SG-Wiz-Organization** scheduled job.

iii. On the Scheduled Data Import form, verify the field values for the scheduled job.

For more information, see Schedule a data import.

iv. Select the **Active** check box to activate the SG-Wiz-Organization scheduled job.

v. In the **Run** field, select **Periodically** to specify how often the job will run.

vi. Select **Update**.

vii. Set the Configure the scheduled jobs task to complete by selecting the **Mark as complete** check box and then select **Continue**.

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b. Configure the Reset Last Run Datetime for SG-Wiz scheduled script to enable full pull for subsequent execution of the scheduled job.

> **Note:**
> To fetch the complete data using a data source on subsequent executions, you must remove the **Last Run Date Time** field value from a data source. The Reset Last Run Datetime for SG-Wiz scheduled script provided with the connector resets the **Last Run Date Time** field value automatically. Therefore, confirming that the SG-Wiz Organization scheduled job executes all data sources for a full pull.

i. Select the Configure the scheduled script for full data retrieval task.

ii. Select the **Active** check box to activate the SG-Wiz scheduled script.

iii. In the **Run** field, select **Periodically** to specify how often the script will run.

For more information, see Automatically run a script of your choosing.

iv. Select **Update**.

v. Set the Configure the scheduled script for full data retrieval task to complete by selecting the **Mark as complete** check box and then select **Continue**.

6. On the Service Graph Connector for Wiz page, select **Complete** to save your changes.
7. In Complete setup dialog box, select **Complete** to complete the setup.
8. In the message box that appears, select **Done**.

Target tables for storing Service Graph Connector for Wiz data

When you complete setting up the connection, you can configure the integration to periodically pull data from a Wiz project. The data is saved in tables that extend from the CMDB CI classes and other non-CMDB classes.

AWS Datacenter [cmdb_ci_aws_datacenter]

The following attributes in the AWS Datacenter [cmdb_ci_aws_datacenter] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Region	region	externalId

Relationships created for AWS Datacenter

Parent class	Relationship type	Child class
AWS Datacenter [cmdb_ci_aws_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
AWS Datacenter [cmdb_ci_aws_datacenter]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

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Azure Datacenter [cmdb_ci_azure_datacenter]

The following attributes in the Azure Datacenter [cmdb_ci_azure_datacenter] table are populated by collected data.

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Region	region	externalId

Relationships created for Azure Datacenter

Parent class	Relationship type	Child class
Azure Datacenter [cmdb_ci_azure_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Azure Datacenter [cmdb_ci_azure_datacenter]	Contains::Contained by	Resource Group [cmdb_ci_resource_group]
Azure Datacenter [cmdb_ci_azure_datacenter]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Cloud DataBase [cmdb_ci_cloud_database]

The following attributes in the Cloud DataBase [cmdb_ci_cloud_database] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Install Status	install_status	None
Type	type	nativeType

Relationships created for Cloud DataBase

Parent class	Relationship type	Child class
Cloud DataBase [cmdb_ci_cloud_database]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Cloud DataBase [cmdb_ci_cloud_database]	Reference	Key Value [cmdb_key_value]

Cloud DataBase Cluster [cmdb_ci_cloud_db_cluster]

The following attributes in the Cloud DataBase Cluster [cmdb_ci_cloud_db_cluster] table are populated by collected data:

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Attribute label	Attribute name	Wiz attribute
Cluster ID	cluster_id	externalId
Name	name	name
Cluster Type	cluster_type	kind
Install Status	install_status	None
Vendor	vendor	None

Relationships created for Cloud DataBase Cluster

Parent class	Relationship type	Child class
Cloud DataBase Cluster [cmdb_ci_cloud_db_cluster]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud DataBase Cluster [cmdb_ci_cloud_db_cluster]	Reference	Key Value [cmdb_key_value]
Cloud DataBase Cluster [cmdb_ci_cloud_db_cluster]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Cloud Disk Type [cmdb_ci_disk_type]

The following attributes in the Cloud Disk Type [cmdb_ci_disk_type] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	properties.volumeType, zone
Object ID	object_id	properties.volumeType, zone

Relationship created for Cloud Disk Type

Parent class	Relationship type	Child class
Cloud Disk Type [cmdb_ci_disk_type]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]

Cloud Function [cmdb_ci_cloud_function]

The following attributes in the Cloud Function [cmdb_ci_cloud_function] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
CodeSha256	codesha256	awsLambda_codeSha256
Install Status	install_status	None
Language	language	runtime

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Relationships created for Cloud Function

Parent class	Relationship type	Child class
Cloud Function [cmdb_ci_cloud_function]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Function [cmdb_ci_cloud_function]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Function [cmdb_ci_cloud_function]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Function [cmdb_ci_cloud_function]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Cloud Function [cmdb_ci_cloud_function]	Reference	Key Value [cmdb_key_value]

Cloud Gateway [cmdb_ci_cloud_gateway]

The following attributes in the Cloud Gateway [cmdb_ci_cloud_gateway] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Install Status	install_status	None

Relationships created for Cloud Gateway

Parent class	Relationship type	Child class
Cloud Gateway [cmdb_ci_cloud_gateway]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Gateway [cmdb_ci_cloud_gateway]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Gateway [cmdb_ci_cloud_gateway]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Cloud Gateway [cmdb_ci_cloud_gateway]	Reference	Key Value [cmdb_key_value]

Cloud Hardware Type [cmdb_ci_cloud_hardware_type]

The following attributes in the Cloud Hardware Type [cmdb_ci_cloud_hardware_type] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId

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Attribute label	Attribute name	Wiz attribute
Provider	provider	cloudPlatform

Relationships created for Cloud Hardware Type

Parent class	Relationship type	Child class
Cloud Hardware Type [cmdb_ci_cloud_hardware_type]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Hardware Type [cmdb_ci_cloud_hardware_type]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]

Cloud Load Balancer [cmdb_ci_cloud_load_balancer]

The following attributes in the Cloud Load Balancer [cmdb_ci_cloud_load_balancer] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	name (for AWS Load Balancer v1) externalId (for Azure and AWS Load Balancer v2)
Install Status	install_status	None

Relationships created for Cloud Load Balancer

Parent class	Relationship type	Child class
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	Key Value [cmdb_key_value]
Cloud Load Balancer [cmdb_ci_cloud_load_balancer]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

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Cloud Mgmt Network Interface [cmdb_ci_nic]

The following attributes in the Cloud Mgmt Network Interface [cmdb_ci_nic] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
MAC Address	mac_address	macAddress
Name	name	name
Object ID	object_id	externalId
Install Status	install_status	None

Relationships created for Cloud Mgmt Network Interface

Parent class	Relationship type	Child class
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	Key Value [cmdb_key_value]
Cloud Mgmt Network Interface [cmdb_ci_nic]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Cloud Network [cmdb_ci_network]

The following attributes in the Cloud Network [cmdb_ci_network] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Cidr	cidr	addressRanges
Install Status	install_status	None

Relationships created for Cloud Network

Parent class	Relationship type	Child class
Cloud Network [cmdb_ci_network]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Network [cmdb_ci_network]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

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Relationships created for Cloud Network (continued)

Parent class	Relationship type	Child class
Cloud Network [cmdb_ci_network]	Reference	Key Value [cmdb_key_value]
Cloud Network [cmdb_ci_network]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Cloud Object Storage [cmdb_ci_cloud_object_storage]

The following attributes in the Cloud Object Storage [cmdb_ci_cloud_object_storage] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId (for Azure and GCP) providerUniqueId (for AWS)
Cloud Provider	cloud_provider	cloudPlatform
Install Status	install_status	None

Relationships created for Cloud Object Storage

Parent class	Relationship type	Child class
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Cloud Object Storage [cmdb_ci_cloud_object_storage]	Reference	Key Value [cmdb_key_value]

Cloud Organizations [cmdb_ci_cloud_org]

The following attributes in the Cloud Organizations [cmdb_ci_cloud_org] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Object ID	object_id	ProviderUniqueId(AWS and Azure), externalId (for GCP)
Name	name	name

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Relationships created for Cloud Organizations

Parent class	Relationship type	Child class
Cloud Organizations [cmdb_ci_cloud_org]	Contains::Contained by	Cloud Service Account [cmdb_ci_cloud_service_account]
Cloud Organizations [cmdb_ci_cloud_org]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]

The following attributes in the Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId (for Azure and GCP) ProviderUniqueId (for AWS)
Install Status	install_status	None
Public IP Address	public_ip_address	address

Relationships created for Cloud Public IP Address

Parent class	Relationship type	Child class
Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Cloud Public IP Address [cmdb_ci_cloud_public_ipaddress]	Reference	Key Value [cmdb_key_value]

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Account Id	account_id	externalId
Name	name	name
Object ID	object_id	externalId

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Attribute label	Attribute name	Wiz attribute
Datacenter Type	datacenter_type	cloudPlatform
Is management account	is_master_account	ProviderUniqueID (AWS only)
Organization Id	organization_id	ProviderUniqueID (AWS only)
Parent account	parent_account	ProviderUniqueID (AWS only)

Relationships created for Cloud Service Account

Parent class	Relationship type	Child class
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	Cloud Service Account [cmdb_ci_cloud_service_account]
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	Key Value [cmdb_key_value]
Cloud Service Account [cmdb_ci_cloud_service_account]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Cloud Storage Account [cmdb_ci_cloud_storage_account]

The following attributes in the Cloud Storage Account [cmdb_ci_cloud_storage_account] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Install Status	install_status	None

Relationships created for Cloud Storage Account

Parent class	Relationship type	Child class
Cloud Storage Account [cmdb_ci_cloud_storage_account]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Cloud Storage Account [cmdb_ci_cloud_storage_account]	Reference	Key Value [cmdb_key_value]
Cloud Storage Account [cmdb_ci_cloud_storage_account]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Compute Security Group [cmdb_ci_compute_security_group]

The following attributes in the Compute Security Group [cmdb_ci_compute_security_group] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId

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Attribute label	Attribute name	Wiz attribute
Install Status	install_status	None
Region	region	region

Relationships created for Compute Security Group

Parent class	Relationship type	Child class
Compute Security Group [cmdb_ci_compute_security_group]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Compute Security Group [cmdb_ci_compute_security_group]	Hosted on::Hosts	OCI Datacenter [cmdb_ci_oci_datacenter]
Compute Security Group [cmdb_ci_compute_security_group]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Compute Security Group [cmdb_ci_compute_security_group]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Compute Security Group [cmdb_ci_compute_security_group]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Compute Security Group [cmdb_ci_compute_security_group]	Reference	Key Value [cmdb_key_value]

Docker Container [cmdb_ci_docker_container]

The following attributes in the Docker Container [cmdb_ci_docker_container] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Container id	container_id	externalId (for Kubernetes, ACA, and ACI) providerUniqueId (for ECS)
Install Status	install_status	None
Name	name	name

Relationships created for Docker Container

Parent class	Relationship type	Child class
Docker Container [cmdb_ci_docker_container]	Hosts:: Hosted on	AWS Datacenter [cmdb_ci_aws_datacenter] (for ECS)
Docker Container [cmdb_ci_docker_container]	Hosts:: Hosted on	Azure Datacenter [cmdb_ci_azure_datacenter] (for ACA, ACI)
Docker Container [cmdb_ci_docker_container]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

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DynamoDB Table [cmdb_ci_dynamodb_table]

The following attributes in the DynamoDB Table [cmdb_ci_dynamodb_table] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Install Status	install_status	None

Relationships created for DynamoDB Table

Parent class	Relationship type	Child class
DynamoDB Table [cmdb_ci_dynamodb_table]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
DynamoDB Table [cmdb_ci_dynamodb_table]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
DynamoDB Table [cmdb_ci_dynamodb_table]	Reference	Key Value [cmdb_key_value]

Google Datacenter [cmdb_ci_google_datacenter]

The following attributes in the Google Datacenter [cmdb_ci_google_datacenter] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Region	region	externalId

Relationships created for Google Datacenter

Parent class	Relationship type	Child class
Google Datacenter [cmdb_ci_google_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Google Datacenter [cmdb_ci_google_datacenter]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Google Organization Folder [cmdb_ci_gcp_folder]

The following attributes in the Google Organization Folder [cmdb_ci_gcp_folder] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Object ID	object_id	externalId

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Attribute label	Attribute name	Wiz attribute
Name	name	name

Relationship created for Google Organization Folder

Parent class	Relationship type	Child class
Google Organization Folder [cmdb_ci_gcp_folder]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Google Organization Project [cmdb_ci_gcp_project]

The following attributes in the Google Organization Project [cmdb_ci_gcp_project] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Project Id	project_id	providerUniqueId

Relationship created for Google Organization Project

Parent class	Relationship type	Child class
Google Organization Project [cmdb_ci_gcp_project]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Hardware Type [cmdb_ci_compute_template]

The following attributes in the Hardware Type [cmdb_ci_compute_template] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	instanceType
Object ID	object_id	instanceType

Relationships created for Hardware Type

Parent class	Relationship type	Child class
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Hardware Type [cmdb_ci_compute_template]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]

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Image [cmdb_ci_os_template]

The following attributes in the Image [cmdb_ci_os_template] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Install Status	install_status	None

Relationships created for Image

Parent class	Relationship type	Child class
Image [cmdb_ci_os_template]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Image [cmdb_ci_os_template]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Image [cmdb_ci_os_template]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Image [cmdb_ci_os_template]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Image [cmdb_ci_os_template]	Reference	Key Value [cmdb_key_value]

Note:
Data with no subscription IDs for images aren't imported. Also, if the subscription ID for an image is available, but the subscription-specific details are not available in Wiz, the data isn't imported by the connector.

Instance Scale Set [cmdb_ci_instance_scale_set]

The following attributes in the Instance Scale Set [cmdb_ci_instance_scale_set] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Install Status	install_status	None
Object ID	object_id	externalId

Relationships created for Instance Scale Set

Parent class	Relationship type	Child class
Instance Scale Set [cmdb_ci_instance_scale_set]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Instance Scale Set [cmdb_ci_instance_scale_set]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]

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Relationships created for Instance Scale Set (continued)

Parent class	Relationship type	Child class
Instance Scale Set [cmdb_ci_instance_scale_set]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Instance Scale Set [cmdb_ci_instance_scale_set]	Reference	Key Value [cmdb_key_value]

Internet Gateway [cmdb_ci_internet_gateway]

The following attributes in the Internet Gateway [cmdb_ci_internet_gateway] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Install Status	install_status	None

Relationships created for Internet Gateway

Parent class	Relationship type	Child class
Internet Gateway [cmdb_ci_internet_gateway]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Internet Gateway [cmdb_ci_internet_gateway]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Internet Gateway [cmdb_ci_internet_gateway]	Reference	Key Value [cmdb_key_value]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Key	key	tags
Value	value	tags

Note:
The cloud resource tags (key-value pairs) from the API response are populated in the Key Value [cmdb_key_value] table.

Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

The following attributes in the Kubernetes Cluster [cmdb_ci_kubernetes_cluster] table are populated by collected data:

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Attribute label	Attribute name	Wiz attribute
Cluster Resource ID	cluster_resource_id	providerUniqueId
Kubernetes UID	k8s_uid	externalId
Name	name	name
Install Status	install_status	None

Relationships created for Kubernetes Cluster

Parent class	Relationship type	Child class
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Service [cmdb_ci_kubernetes_service]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Namespace [cmdb_ci_kubernetes_namespace]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Kubernetes Pod [cmdb_ci_kubernetes_pod]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Contains::Contained by	Docker Container [cmdb_ci_docker_container]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Cluster of::Cluster	Kubernetes Node [cmdb_ci_kubernetes_node]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Reference	Key Value [cmdb_key_value]
Kubernetes Cluster [cmdb_ci_kubernetes_cluster]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Kubernetes Deployment [cmdb_ci_kubernetes_deployment]

The following attributes in the Kubernetes Deployment [cmdb_ci_kubernetes_deployment] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Kubernetes UID	k8s_uid	uid
Name	name	name
Namespace	namespace	namespace
Available Replicas	available_replicas	status_availableReplicas
Desired Replicas	desired_replicas	spec_replicas
Install Status	install_status	None

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Attribute label	Attribute name	Wiz attribute
Total Replicas	total_replicas	status_replicas
Updated Replicas	updated_replicas	status_updatedReplicas
Kubernetes Cluster	cluster	Kubernetes_clusterExternalID
SelfLink	self_link	api_version namespace name
Unavailable Replicas	unavailable_replicas	status_unavailableReplicas

Relationships created for Kubernetes Deployment

Parent class	Relationship type	Child class
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Reference	Key Value [cmdb_key_value]
Kubernetes Deployment [cmdb_ci_kubernetes_deployment]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Kubernetes Namespace [cmdb_ci_kubernetes_namespace]

The following attributes in the Kubernetes Namespace [cmdb_ci_kubernetes_namespace] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Install Status	install_status	None
Namespace	namespace	name
Kubernetes Cluster	cluster	Kubernetes_clusterExternalID
Name	name	name

Relationships created for Kubernetes Namespace

Parent class	Relationship type	Child class
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Reference	Key Value [cmdb_key_value]
Kubernetes Namespace [cmdb_ci_kubernetes_namespace]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

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Kubernetes Node [cmdb_ci_kubernetes_node]

The following attributes in the Kubernetes Node [cmdb_ci_kubernetes_node] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
IP Address	ip_address	status_address
Kubernetes UID	k8s_uid	uid
Name	name	name
Install Status	install_status	None
Kubernetes Cluster	cluster	Kubernetes_clusterExternalID

Relationships created for Kubernetes Node

Parent class	Relationship type	Child class
Kubernetes Node [cmdb_ci_kubernetes_node]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Node [cmdb_ci_kubernetes_node]	Reference	Key Value [cmdb_key_value]
Kubernetes Node [cmdb_ci_kubernetes_node]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Kubernetes Pod [cmdb_ci_kubernetes_pod]

The following attributes in the Kubernetes Pod [cmdb_ci_kubernetes_pod] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Kubernetes UID	k8s_uid	uid
Namespace	namespace	namespace
Host IP	host_ip	status_hostIP
Install Status	install_status	None
IP Address	ip_address	status_podIPs
Kubernetes Cluster	cluster	Kubernetes_clusterExternalID
Name	name	name
Resource version	resource_version	resourceVersion

Relationships created for Kubernetes Pod

Parent class	Relationship type	Child class
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]

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Relationships created for Kubernetes Pod (continued)

Parent class	Relationship type	Child class
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Reference	Key Value [cmdb_key_value]
Kubernetes Pod [cmdb_ci_kubernetes_pod]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]

The following attributes in the Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Kubernetes UID	k8s_uid	uid
Name	name	name
Namespace	namespace	namespace
Available Replicas	available_replicas	status_availableReplicas
Desired Replicas	desired_replicas	spec_replicas
Install Status	install_status	None
SelfLink	self_link	api_version namespace name
Total Replicas	total_replicas	status_replicas
Kubernetes Cluster	cluster	Kubernetes_clusterExternalID

Relationships created for Kubernetes ReplicaSet

Parent class	Relationship type	Child class
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Hosted on::Hosts	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Reference	Key Value [cmdb_key_value]
Kubernetes ReplicaSet [cmdb_ci_kubernetes_replicaset]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Kubernetes Service [cmdb_ci_kubernetes_service]

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Attribute label	Attribute name	Wiz attribute
Kubernetes UID	k8s_uid	uid
Name	name	name
Install Status	install_status	None
Kubernetes Cluster	cluster	Kubernetes_clusterExternalID
Namespace	namespace	namespace
IP Address	ip_address	spec_clusterIP
Selector	selector	spec_selector
Service Type	service_type	spec_type

Relationships created for Kubernetes Service

Parent class	Relationship type	Child class
Kubernetes Service [cmdb_ci_kubernetes_service]	Reference	Kubernetes Cluster [cmdb_ci_kubernetes_cluster]
Kubernetes Service [cmdb_ci_kubernetes_service]	Reference	Key Value [cmdb_key_value]
Kubernetes Service [cmdb_ci_kubernetes_service]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Linux Server [cmdb_ci_linux_server]

The following attributes in the Linux Server [cmdb_ci_linux_server] table are populated by collected data.

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Serial number	serial_number	providerUniqueId
CPU count	cpu_count	vCPUs
Install Status	install_status	None
Is Virtual	None	None
Operating System	os	operatingSystem

Relationship created for Linux Server

Parent class	Relationship type	Child class
Linux Server [cmdb_ci_linux_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]

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Logical Datacenter [cmdb_ci_logical_datacenter]

The following attributes in the Logical Datacenter [cmdb_ci_logical_datacenter] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Region	region	externalId

Relationships created for Logical Datacenter

Parent class	Relationship type	Child class
Logical Datacenter [cmdb_ci_logical_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Logical Datacenter [cmdb_ci_logical_datacenter]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

OCI Datacenter [cmdb_ci_oci_datacenter]

The following attributes in the OCI Datacenter [cmdb_ci_oci_datacenter] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Region	region	externalId

Relationships created for OCI Datacenter

Parent class	Relationship type	Child class
OCI Datacenter [cmdb_ci_oci_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
OCI Datacenter [cmdb_ci_oci_datacenter]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Resource Group [cmdb_ci_resource_group]

The following attributes in the Resource Group [cmdb_ci_resource_group] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId

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Attribute label	Attribute name	Wiz attribute
Install Status	install_status	None

Relationships created for Resource Group

Parent class	Relationship type	Child class
Resource Group [cmdb_ci_resource_group]	Contains::Contained by	Cloud Load Balancer [cmdb_ci_cloud_load_balancer]
Resource Group [cmdb_ci_resource_group]	Contains::Contained by	Storage Volume [cmdb_ci_storage_volume]
Resource Group [cmdb_ci_resource_group]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Resource Group [cmdb_ci_resource_group]	Reference	Key Value [cmdb_key_value]

Serial Number [cmdb_serial_number]

The following attributes in the Serial Number [cmdb_serial_number] table are populated by collected data:

Attribute label	Attribute name	Wiz
Serial Number	providerUniqueID	providerUniqueId
Serial Number Type	serial_number_type	None
Valid	serial_number_valid	providerUniqueId

Note:
The Serial Number [cmdb_serial_number] table is populated for Azure only.

Relationships created for Serial Number

Parent class	Relationship type	Child class
Serial Number [cmdb_serial_number]	Reference	Server [cmdb_ci_server]
Serial Number [cmdb_serial_number]	Reference	Windows Server [cmdb_ci_win_server]
Serial Number [cmdb_serial_number]	Reference	Linux Server [cmdb_ci_linux_server]

Server [cmdb_ci_server]

The following attributes in the Server [cmdb_ci_server] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId

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Attribute label	Attribute name	Wiz attribute
Serial number	serial_number	providerUniqueId
CPU count	cpu_count	vCPUs
Install Status	install_status	None
Is Virtual	virtual	None
Operating System	os	operatingSystem
Sys ID	sys_id	Not applicable

Relationship created for Server

Parent class	Relationship type	Child class
Server [cmdb_ci_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]

SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

The following attributes in the SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Project ID	project_id	productIDs
CMDB Class	u_cmdb_class	None

Note:
Cloud resource project IDs are populated in the SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes] table.

Storage Volume [cmdb_ci_storage_volume]

The following attributes in the Storage Volume [cmdb_ci_storage_volume] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Object ID	object_id	externalId
Volume ID	volume_id	externalId
Install Status	install_status	None
Name	name	name
Size	size	sizeGb
Size bytes	size_bytes	sizeGb
Storage type	storage_type	volumeType

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Relationships created for Storage Volume

Parent class	Relationship type	Child class
Storage Volume [cmdb_ci_storage_volume]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Storage Volume [cmdb_ci_storage_volume]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Storage Volume [cmdb_ci_storage_volume]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Storage Volume [cmdb_ci_storage_volume]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Storage Volume [cmdb_ci_storage_volume]	Reference	Key Value [cmdb_key_value]

Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]

The following attributes in the Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot] table is populated by collected data:

Attribute label	Attribute name	Wiz attribute
Object ID	object_id	externalId
Name	name	name
Install Status	install_status	None

Relationships created for Storage Volume Snapshot

Parent class	Relationship type	Child class
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Reference	Key Value [cmdb_key_value]
Storage Volume Snapshot [cmdb_ci_storage_vol_snapshot]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]

Virtual Machine Instance [cmdb_ci_vm_instance]

The following attributes in the Virtual Machine Instance [cmdb_ci_vm_instance] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	name

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Attribute label	Attribute name	Wiz attribute
Object ID	object_id	externalId
CPUs	cpus	vCPUs
Disks	disks	totalDisks
Install Status	install_status	None
Memory (MB)	memory	memoryGB
VM Instance ID	vm_inst_id	externalId providerUniqueId (for Azure)

Relationships created for Virtual Machine Instance

Parent class	Relationship type	Child class
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	AWS Datacenter [cmdb_ci_aws_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Azure Datacenter [cmdb_ci_azure_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Google Datacenter [cmdb_ci_google_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	OCI Datacenter [cmdb_ci_oci_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	Logical Datacenter [cmdb_ci_logical_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Hosted on::Hosts	VMware vCenter Datacenter [cmdb_ci_vcenter_datacenter]
Virtual Machine Instance [cmdb_ci_vm_instance]	Managed by::Manages	Instance Scale Set [cmdb_ci_instance_scale_set]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Hardware Type [cmdb_ci_compute_template]
Virtual Machine Instance [cmdb_ci_vm_instance]	Provisioned From::Provisioned	Cloud Hardware Type [cmdb_ci_cloud_hardware_type]
Windows Server [cmdb_ci_win_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]
Linux Server [cmdb_ci_linux_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]
Server [cmdb_ci_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	SG-Wiz Extension Attributes [sn_wiz_integ_extension_attributes]
Virtual Machine Instance [cmdb_ci_vm_instance]	Reference	Key Value [cmdb_key_value]

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VMware vCenter Datacenter [cmdb_ci_vcenter_datacenter]

The following attributes in the VMware vCenter Datacenter [cmdb_ci_vcenter_datacenter] table are populated by collected data:

Attribute label	Attribute name	Wiz attribute
Name	name	externalId
Object ID	object_id	externalId
Region	region	externalId

Relationship created for VMware vCenter Datacenter

Parent class	Relationship type	Child class
VMware vCenter Datacenter [cmdb_ci_vcenter_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

Windows Server [cmdb_ci_win_server]

The following attributes in the Windows Server [cmdb_ci_win_server] table are populated by collected data.

Attribute label	Attribute name	Wiz attribute
Name	name	name
Object ID	object_id	externalId
Serial number	providerUniqueID	providerUniqueId
CPU count	cpu_count	vCPUs
Install Status	install_status	None
Is Virtual	None	None
Operating System	os	operatingSystem

Relationship created for Windows Server

Parent class	Relationship type	Child class
Windows Server [cmdb_ci_win_server]	Virtualized by::Virtualizes	Virtual Machine Instance [cmdb_ci_vm_instance]

Service Graph Connector for Wiz properties

Service Graph Connector for Wiz properties control the behavior of the connector.

Connection properties

These connection properties are available for Service Graph Connector for Wiz.

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Note:
To open the Service Graph Connection Properties [sn_cmdb_int_util_service_graph_connection_property] table for the connector, navigate to **All** > **Service Graph Connectors** > **Wiz** > **Connections** and select the connection name. The connection properties are displayed in the Service Graph Connection Properties related list.

Connection properties for Service Graph Connector for Wiz

Property	Description
Projects	Enter a list of comma-separated Project IDs for which the resource data should be collected. For multiple entries, separate the IDs with commas.
Exclude Projects	Enter a list of comma-separated Project IDs for which the resources are excluded only when the Projects property isn't set. In this case, all the resources except for the specified projects are imported. For multiple entries, separate the names with commas.
Server Bypass	Set the value to `true` to link VM data to existing Server records instead of creating new records. If the value is set to `false`, new Server and VM records are created.
Fetch Scaleset VMs	Set the value to `true` to import Scale Set VM records. If the value is set to `false`, Scale Set VMs aren't imported.

System properties

These system properties are available for Service Graph Connector for Wiz.

Note:
To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

System properties for Service Graph Connector for Wiz

Property	Description
sn_wiz_integ.list_resources_action.page_size	Enter the page size used in REST requests to fetch Wiz entities. • Type: string • Default value: `100` • Location: System Property [sys_properties] table

Supported Wiz types

The Wiz types and corresponding native types are imported as CMDB data and saved in tables that extend from the Configuration item [cmdb_ci] table.

For information on Wiz types and Wiz native types, see Security Graph Object Normalization on the Wiz documentation site (requires Wiz login).

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Wiz types	Wiz native types	CMDB CI classes
Cloud Organization	AWS Organization GCP Organization	Cloud Organizations
	GCP Folder	Google Organization Folder
Subscription	AWS Account	Cloud Service Account
	Azure Subscription	
	GCP Project	Cloud Service Account Google Organization Project
	OCI Compartment	VMware vCenter Datacenter
	Alibaba Account	
	vSphere Datacenter	
Region	AWS Region	AWS Datacenter
	Azure Location	Azure Datacenter
	GCP Region	Google Datacenter
	OCI Region	OCI Datacenter
	Alibaba Region	Logical Datacenter
Resource Group	Azure Resource Group	Resource Group
Compute Instance Group	AWS Auto Scaling Group	Instance Scale Set
	Azure Compute Virtual Machine Scale Set	
Network Interface	AWS Network Interface	Cloud Mgmt Network Interface
	Azure Network Interface	
	GCP Compute Network Interface	
Virtual Network	AWS VPC	Cloud Network
	Azure Virtual Network	
Firewall	AWS EC2 Security Group	Compute Security Group
	Azure Network Security Group	

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Wiz types	Wiz native types	CMDB CI classes
	GCP Firewall	
	OCI Network Security Group	
	OCI Security List	
Volume	AWS EC2 Volume (EBS)	Storage Volume
	AWS Lightsail Disk	
	Azure Disk	
	GCP Compute Disk	Storage Volume, Cloud Disk Type
Virtual Machine	AWS EC2 Instance	Virtual Machine Instance, Server, Hardware Type
	AWS Lightsail Instance	
	Azure Scale Set Virtual Machine	
	Azure Compute Virtual Machine	
	GCP Compute Instance	
	OCI Compute Instance	
	Alibaba ECS Instance	
	vSphere Virtual Machine	
Snapshot	AWS EBS Unencrypted Snapshot	Storage Volume Snapshot
	AWS DB Cluster Snapshot	
	AWS DB Instance Snapshot	
	AWS DocumentDB Elastic Cluster Snapshot	
	AWS EBS Encrypted Snapshot	
	AWS Elasticache Snapshot	
	AWS MemoryDB Snapshot	

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Wiz types	Wiz native types	CMDB CI classes
	AWS DynamoDB Backup	
	AWS Neptune Analytics Graph Snapshot	
	AWS Redshift Cluster Snapshot	
	Azure Compute Public Snapshot	
	Azure SQL LTR Backup	
	GCP Compute Snapshot	
	GCP AlloyDB Backup	
	GCP Cloud SQL Backup	
	GCP Cloud SQL Backup Run	
Gateway	AWS Egress Only Internet Gateway	Internet Gateway
	AWS VPN Gateway	
Virtual Machine Image	AWS Machine Image (AMI)	Image
	Azure Compute Virtual Machine Image	
	Azure Compute Gallery VM image version	
	GCP Compute Image	
Load Balancer	AWS ELB v1	Cloud Load Balancer
	AWS ELB V2 Application Load Balancer	
	AWS ELB V2 Gateway Load Balancer	
	AWS ELB V2 Network Load Balancer	
	AWS ELB V2	
	Azure Application Gateway	
	Azure Load Balancer	
	Azure Traffic Manager	

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Wiz types	Wiz native types	CMDB CI classes
	GCP Compute Backend Service	
	GCP Compute Region Backend Service	
Bucket	AWS S3 Bucket	Cloud Object Storage
	Azure Blob Storage Container	
	GCP Bucket	
Serverless	AWS Lambda Function	Cloud Function
	Azure Function	
	GCP Cloud Function	
Database	AWS DynamoDB Table	DynamoDB Table
	AWS ElastiCache for Memcached Cluster	Cloud DataBase Cluster
	AWS ElastiCache Redis OSS Cluster	
	AWS ElastiCache Valkey Cluster	
	AWS Elastic DocumentDB Cluster	
	AWS RDS Aurora MySQL Cluster	
	AWS DocumentDB Cluster	
	AWS MemoryDB Cluster	
	AWS RDS MSSQL Server Cluster	
	AWS RDS MariaDB Cluster	
	AWS RDS MySQL Cluster	
	AWS Neptune Cluster	
	AWS RDS Oracle Cluster	
	AWS RDS PostgreSQL Cluster	
	AWS RDS Aurora PostgreSQL Cluster	
	Azure Cosmos DB SQL Database	Cloud DataBase

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Wiz types	Wiz native types	CMDB CI classes
	Azure Cosmos DB Cassandra Keyspace	
	Azure MariaDB Database	
	Azure Cosmos DB MongoDB Collection	
	Azure Cosmos DB for PostgreSQL Node	
	Azure Database for MySQL Database	
	Azure Database for MySQL Flexible Database	
	Azure Database for PostgreSQL Database	
	Azure Database for PostgreSQL Flexible Database	
	Azure Redis Database	
	Azure Redis Enterprise Database	
	Azure Synapse Dedicated SQL Pool	
	Azure Databricks Schema	
	Azure SQL Database	
	Azure SQL Managed Instance Database	
	Azure Data Explorer Kusto Database Instance	
Bucket	AWS S3 Bucket	Cloud Object Storage
	Azure Blob Storage Container	
	GCP Bucket	
Serverless	AWS Lambda Function	Cloud Function
	Azure Function	
	GCP Cloud Function	
Network Address	AWS Elastic IP Address	Cloud Public IP Address
	Azure CDN Endpoint	
	Azure Public IP Addresses	
	GCP Compute Address	

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Wiz types	Wiz native types	CMDB CI classes
	GCP Endpoint	
Storage Account	Azure Storage Account	Cloud Storage Account
API Gateway	AWS API Gateway	Cloud Gateway
	AWS API Gateway V2	
	Azure API Management	
Kubernetes Cluster	AWS Elastic Kubernetes Service (EKS) Cluster	Kubernetes Cluster
	Azure Kubernetes Service (AKS) Cluster	
	GCP Kubernetes Engine (GKE) Cluster	
	Kubernetes Cluster	
Namespace	Kubernetes Namespace	Kubernetes Namespace
Kubernetes Node	Kubernetes Node	Kubernetes Node
Deployment	Kubernetes Deployment	Kubernetes Deployment
Kubernetes Service	Kubernetes Service	Kubernetes Service
Pod	Kubernetes Pod	Kubernetes Pod
Replica Set	Kubernetes Replica Set	Kubernetes ReplicaSet
Container	Kubernetes Container	Docker Container
	AWS ECS Container	
	Azure ACA Container	
	Azure ACI Container	

Accessing the connection details of Service Graph Connector for Wiz

You can access the connection details of the Service Graph Connector for Wiz in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the Service Graph Connector for Wiz. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Wiz connection

Access the details of a Wiz connection configured for the Service Graph Connector for Wiz.

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Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Wiz** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name and alias.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

Domain separation and Service Graph Connectors

Domain separation is supported for Service Graph Connectors. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard*

The support level is Standard but has some exceptions or special conditions.

- Includes all aspects of **Basic** level support.
- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must be able to configure minimum viable product (MVP) business logic and data parameters. This configuration is done per tenant, as expected for the specific application.

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

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

How domain separation works in Service Graph Connectors

Domain separation is supported only for multi-instance Service Graph Connectors.

Note:
The Identification and Reconciliation Engine (IRE) uses strict domain separation in releases prior to San Diego. That is, hierarchical domains are not supported.

You must install the Domain Support - Domain Extensions Installer (`com.glide.domain.msp_extensions.installer`) plugin before working with the Service Graph Connectors tables. See Request domain separation.

Tables that do not have a Domain (sys_domain) column are not domain-separated. You can add a Domain (sys_domain) column to an existing table. See Add a domain field to a table.

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Note:

- The import set tables are not domain-separated.
- Transform histories are not domain-separated.
- The Key Value [cmdb_key_value] and Software Instance [cmdb_software_instance] tables, which are related to the Configuration Management Database (CMDB), are not domain-separated.

For more information about domain separation for Service Graph Connectors, see the Service Graph Connector Domain Separation article in the Now Support Knowledge Base.

Related topics

Domain separation for service providers

Cloud discovery solutions comparison

Comparing cloud discovery solutions provides insights on the relative strengths of each solution. The comparison showcases the number of resource types supported by the solutions across AWS, Azure, and GCP. The comparison can help you understand the capabilities of each solution and better manage your CMDB when using one or multiple methods.

Discovery and Service Mapping Patterns vs. Service Graph Connectors

ITOM Visibility offers two primary solutions for discovering cloud resources and mapping them into the Configuration Management Database (CMDB): Cloud Discovery and Service Mapping Patterns and Cloud Service Graph Connectors.

Patterns are the core of ITOM Visibility's native discovery capabilities. They provide a deeper, more dynamic, and holistic view of your infrastructure. Patterns use a variety of discovery methods: Agentless, agent-based, and cloud-native, to create a unified, business-aware view of your services. By leveraging machine learning, patterns automatically map technical components to their business context, creating rich relationships, and a comprehensive knowledge graph.

Service Graph Connectors, on the other hand, provides fast, point-in-time data ingesting from existing systems. They assist you quickly ingest data from specific sources like public cloud providers (AWS, Azure, GCP), endpoint management systems, and security or network tools.

While Service Graph Connectors provides rapid data import, Patterns provide the foundation for ongoing, automated service mapping and deeper operational insights based on regular updates from the ServiceNow Store. This difference is crucial for solving complex challenges like certificate management, firewall auditing, and a wide range of other service and operation use cases.

The choice between patterns and connectors affects coverage, level of detail, the way data is modeled in the CMDB and the frequency of update. While some resource types are supported by both solutions, the data might be populated in different CMDB CI Classes. Understanding these differences helps you plan a consistent and effective discovery strategy.

By reviewing the coverage tables for AWS, Azure, and GCP, you can

- Identify which resources are supported by patterns, by connectors, or both.
- Understand how the same resource type may be handled differently (for example, patterns may bring in all zone data, while connectors may only bring in zones tied to an instance).
- Decide on a solution per provider, considering its CI coverage or data model. For example: Use connectors to discover your GCP resources, but use patterns for AWS and Azure.

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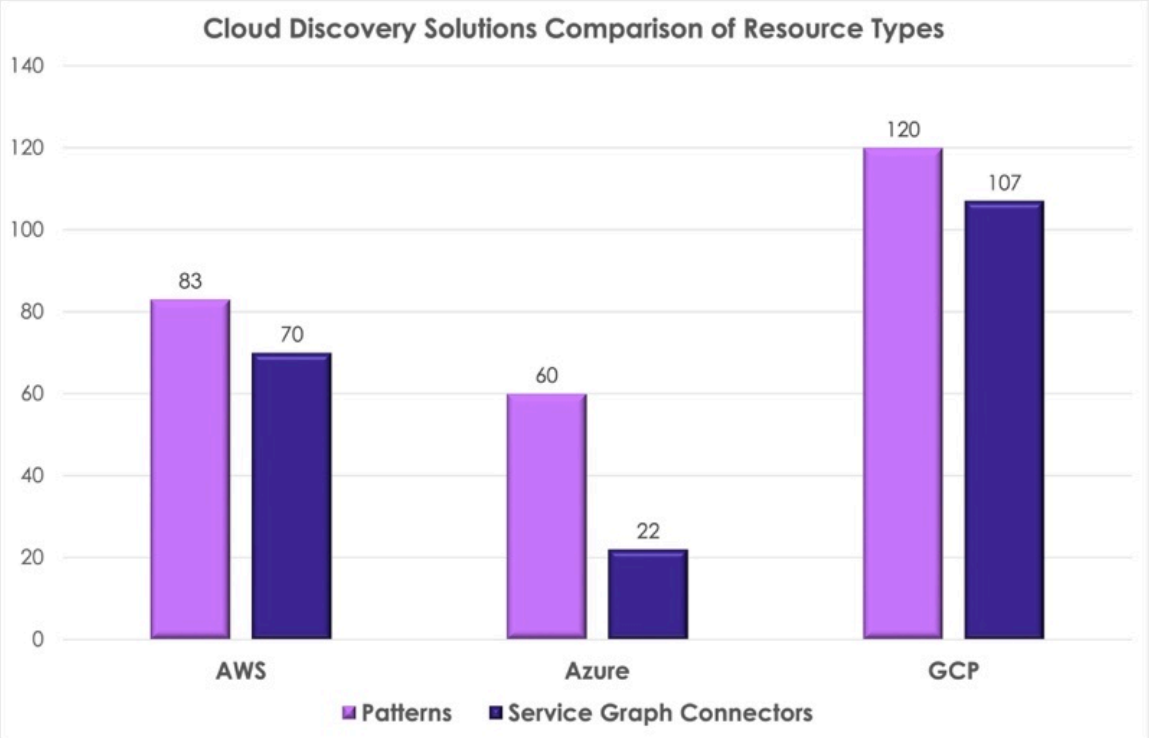
Discovery and Service Mapping Patterns and Service Graph Connectors comparison



Service Graph Connector Support Tools

You can use the ServiceNow® Service Graph Connector Support Tools application to resolve any issues or perform a general analysis on a Service Graph Connector installed on your instance.

Request apps on the Store

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

Key features

The Service Graph Connector Support Tools application includes prebuilt conversations as a response to an issue type and enables resolving Service Graph Connector issues and to perform a general analysis.

The application provides capability to debug and resolve the following types of issues:

Connection issues

Depending on the data source selected, asks to update or set required properties, enables to run the Workflow Studio action corresponding to the connector manually, and provides a link to HTTP logs for verifying the response from the data source.

Data issues

Checks for customizations in Identification and Reconciliation engine (IRE) rules, reconciliation rules, business rules, and mappings. Reviews the field and import causing the issue, reprocesses the import row, and provides the complete transformation information. Also, provides additional troubleshooting steps.

Performance issues

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Depending on the data source and import set selected, makes a basic performance check and reviews the history of the Configuration Management Database (CMDB) integration executions.

Mapping issues

Reviews mappings for input and output fields using the IntegrationHub ETL store app.

The chatbot conversation also directs to the knowledge articles landing page in the Now Support knowledge base, if available for a connector.

Install Service Graph Connector Support Tools

You can install Service Graph Connector Support Tools if you have the admin role. The application installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Confirm that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.

Role required: admin

About this task

The following applications or plugins are installed with Service Graph Connector Support Tools:

Integration Commons for CMDB (sn_cmdb_int_util)

Contains the CMDB Integrations Dashboard and a set of Robust Transform Engine (RTE) transforms and script includes.

Glide Virtual Agent Lite (com.glide.cs.chatbot.lite)

Provides IT service assistance using several prebuilt IT Service Management (ITSM) conversations.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Service Graph Connector Support Tools application (sn_sgc_support) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
4. Select **Install**.

Resolving Service Graph Connector issues

You can use the Service Graph Connector Support Tools application to initiate a chatbot conversation with a virtual agent and resolve an issue or perform a general analysis on a Service Graph Connector installed on your instance.

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If a user with the admin role has installed the Service Graph Connector Support Tools application, you can initiate a chat conversation with a virtual agent to resolve Service Graph Connector issues. The application includes prebuilt conversations as a response to an issue type.

You can use the prebuilt conversations to debug and resolve the following types of issues:

Connection issues

Depending on the data source selected, the virtual agent suggests you to update or set required properties, run the Workflow Studio action corresponding to the connector manually, and verify the response from the data source using HTTP logs.

Data issues

The virtual agent suggests you to check for customizations in Identification and Reconciliation engine (IRE) rules, reconciliation rules, business rules, and mappings. Review the field and import causing the issue, reprocess the import row, and view the complete transformation information. Also, suggests to perform additional troubleshooting steps.

Performance issues

Depending on the data source and import set selected, the virtual agent suggests you to make a basic performance check and review the history of the Configuration Management Database (CMDB) integration executions.

Mapping issues

The virtual agent suggests you to review mappings for input and output fields using the IntegrationHub ETL store app.

Resolve a Service Graph Connector issue

Resolve the Service Graph Connector issues or perform a general analysis using the Troubleshooting module available for Service Graph Connectors.

Before you begin

Install Service Graph Connector Support Tools

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Troubleshooting**.
2. In the Now Support window, select **Click here to start a new conversation**.
3. Select **Show me everything**.
4. Select **Service Graph Connector Help**.
5. Select a help option.
6. Based on the selected help option, follow the help instructions to resolve an issue or perform a general analysis.
7. **Optional:** Close the conversation by selecting **End the chat**.

API Service Graph Connectors

You can use an API Service Graph Connector to import and integrate third-party API data into CMDB tables.

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Important:
Visit the ServiceNow Store website to view the latest list of all API Service Graph Connectors.

Select a technology to learn about the API Service Graph Connector available for ingesting data from an application using the technology into your CMDB.

Apigee X	AWS API Gateway	Azure API Management
Boomi Cloud API Management	Kong Gateway	Kong Konnect
MuleSoft		

API Service Graph Connector for Apigee X

Use the ServiceNow® API Service Graph Connector for Apigee X to import API proxy details from an Apigee X application into the Configuration Management Database (CMDB).

Request apps on the Store

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

Key features

Import data into a normalized data model for consistency across other technologies.

The API Insights workspace provides a centralized interface where you can analyze and interact with API data, without needing direct access to Apigee X, enhancing visibility, governance, and collaboration across the API estate. To learn more, see API Insights.

Supported ServiceNow versions

- Yokohama
- Zurich
- Australia

Use cases

You can use the API Service Graph Connector for Apigee X to:

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- Maintain an end-to-end inventory of exposed and backend APIs, identifying what APIs are published, used, and by whom.
- Track APIs from customer-facing endpoints to the underlying services, identifying impacted endpoints when services change or fail and creating incidents for reported issues.
- Address vulnerabilities and security incidents related to API endpoints, and create compliance requirements to measure against.

Important information for upgrading API Service Graph Connector for Apigee X

If you're an existing customer using production instances, reach out to Now Support before upgrading to API Service Graph Connector for Apigee X v2.3.0. This upgrade alters source native keys that can impact Source [sys_object_source] table records. Coordinating with Now Support helps to prevent duplicate record creation.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure API Service Graph Connector for Apigee X using SGC Central.

Data mapping

Data from the Apigee X data sources is mapped and transformed into the CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from an Apigee X application.

The following table lists the data sources in the order that they run, the staging tables, and the target tables as CMDB CI and non-CMDB classes for an Apigee X application.

Data mapping for Apigee X

Data source	Staging table	Target tables
Apigee Organization	SGA Apigee X Apigee Organization [sn_apigee_x_apigee_organization]	Google Organization Project Apigee API Gateway
Managed API	SGA Apigee X Managed API [sn_apigee_x_sga_apigee_x_managed_api]	Managed API API Deployment Apigee API Gateway
API Consumer	SGA Apigee X API Consumer [sn_apigee_x_sga_apigee_x_api_consumer]	API Consumer
API Frontend Backend	SGA Apigee X Frontend Backend [sn_apigee_x_sga_apigee_x_frontend_backend]	API Frontend

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Data mapping for Apigee X (continued)

Data source	Staging table	Target tables
		API Backend
API Product	SGA Apigee X API Product [sn_apigee_x_sga_apigee_x_api_product]	API Product Bundle Key Value
API Consumer Subscription	SGA Apigee X API Consumer Subscription [sn_apigee_x_sga_apigee_x_api_consumer_subscription]	API Consumer Subscription Key Value
API Consumer Access	SGA Apigee X API Consumer Access [sn_apigee_x_sga_apigee_x_api_consumer_access]	API Consumer Access
GCP Organization	SGA Apigee X Organization [sn_apigee_x_sga_apigee_x_organization]	Cloud Organizations
GCP Folder	SGA Apigee X Folder [sn_apigee_x_sga_apigee_x_folder]	Google Organization Folder
GCP Project	SGA Apigee X Project [sn_apigee_x_sga_apigee_x_project]	Google Organization Project

For more information on where data is saved when pulling data from an Apigee X application, see Target tables for storing API Service Graph Connector for Apigee X data.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Record removal process

The connector supports soft deletion for CMDB CI classes only, meaning records aren't permanently removed from the system. Instead, any CMDB CI records not discovered during the last scheduled job run are marked as **Non-Operational**.

Configure API Service Graph Connector for Apigee X using SGC Central

Set up scheduled import jobs to pull in Apigee X data into your CMDB.

Before you begin

Install API Service Graph Connector for Apigee X version 1.0.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

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Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Note:
Alternatively, you can configure a default connection already available from the installed or draft connections in SGC Central. Go to **All** > **Service Graph Connectors**, then select **Setup** for the connector from the menu. To learn about installed and draft connections, see Managing connections added for Service Graph Connectors in SGC Central.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Apigee X connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Complete the prerequisites for setting up the Apigee X environment.

   a. Set up the Apigee X environment and create a Java KeyStore (JKS) certificate to encrypt the security certificates obtained from an Apigee X application.

      i. In the **Prerequisites** stage of the playbook, select the **Review setup instructions** activity.

      ii. Review and complete the setup instructions on the API Service Graph connector for Apigee X - Setup Instructions [KBB0010364] article in the Now Support Knowledge Base.

      You must create a service account, assign roles, bind roles to the service account, enable APIs, create a P12 file, and register it in your ServiceNow instance.

      Make a note of the destination keystore password. You need to specify this password while importing the JKS certificate into the API Service Graph Connector for Apigee X application.

      iii. Select the **I have read the setup instructions** check box to confirm that you have set up the Apigee X environment according to the instructions.

      iv. Select **Continue**.

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b. Create an X.509 certificate to associate the Java KeyStore (JKS) certificate for the Apigee X application with the connector.

> **Note:**
> You can skip this step if you're reusing a previously created certificate.

i. In the **Prerequisites** stage of the playbook, select the **Create X.509 certificate** activity.

ii. On the form, fill in the fields.

X.509 Certificate form

Field	Description
Name	Name of the X.509 certificate. For example, `ApigeeX-509Certificate`.
Key store password	Password to access the JKS certificate as noted down in the previous step.
Short description	Description of the X.509 certificate.

iii. In the Attachments section, select **Add File**.

iv. Browse and select the P12 file for the JKS certificate you created in the previous step.

v. On the Upload a file dialog box, select **Upload**.

vi. Select **Continue**.

7. Enter connection details and test the API connection for importing Apigee X data.

a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

b. On the form, fill in the fields.

Configure and test connection form

Field	Description
Connection name	Name to identify the Apigee X connection record.
Service account email	Email address associated with the ServiceNow service account used for authentication with Apigee X as noted in the previous step.
X.509 certificate	Name of the X.509 certificate as noted in the previous step.
Keystore password	Password associated with the keystore as noted in the previous step.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

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8. Set the configuration properties for the connection.

   a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

   b. Enter the properties.

Service Graph Connection Properties

Property	Description
Apigee identification	
Apigee organization name/GCP project id	Apigee X organization names or GCP project IDs from which data should be fetched. If left blank, data is retrieved from all permitted Apigee X organizations. For multiple values, separate them with commas.
Data retrieval configuration	
Include environments	Apigee X environments to include in the connection. For multiple environments, separate them with commas. Only API proxies in the environments listed in the *`Include environments`* property are imported. If you leave this field empty, the data sources within the connector import API proxies from all environments.
Collection period (in days)	Duration in days for collecting API usage data.
Collect usage data	Option to enable usage data collection to retrieve API usage data over a specified duration.
Expand HTTP method types	HTTP methods including `GET`, `POST`, `PUT`, `PATCH`, `DELETE`, `OPTIONS`, `HEAD`, `CONNECT`, and `TRACE`, to consider for routes. For multiple methods, separate them with commas.If left blank, results in a single API Frontend being created with the `ALL` method, indicating support for all standard HTTP methods.
GCP identification	
GCP Organization id	GCP organization ID for retrieving data from GCP Organization, GCP Folder, and GCP Project data sources.

   c. Select **Continue**.

9. Configure the import schedule to import data at regular intervals.

   a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

   b. Expand the Parent scheduled data import within the Import schedules list to select the **Apigee Organization** import schedule associated with your connection.

> **Note:**
> The connection name is prefixed to the schedule name.

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c. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

   For more information, see Schedule a data import.

d. Select **Save**.
   Alternatively, select **Execute Now** to execute the import schedule immediately.

e. Select **Continue**.

10. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

You can then manage connections from the SGC Central view of the CMDB Workspace. For more information, see Managing connections added for Service Graph Connectors in SGC Central.

Related topics

API Service Graph Connector for Apigee X

Target tables for storing API Service Graph Connector for Apigee X data

Target tables for storing API Service Graph Connector for Apigee X data

When you complete setting up the connection, you can configure the integration to periodically pull data from an Apigee X application. The data is saved in tables that extend from the Configuration item [cmdb_ci] classes and other non-CMDB tables.

Google Organization Project [cmdb_ci_gcp_project]

The following attributes in the Google Organization Project [cmdb_ci_gcp_project] table are populated by collected data:

Attribute label	Attribute name
Parent	parent_ci
Name	name
Object ID	object_id
Install Status	install_status
Operational status	operational_status
Parent Id	parent_id
Parent Type	parent_type
Project Id	project_id
Time	time

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Relationships created for Google Organization Project

Parent class	Relationship type	Child class
Google Organization Project [cmdb_ci_gcp_project]	Reference	Cloud Organizations [cmdb_ci_cloud_org]
Google Organization Project [cmdb_ci_gcp_project]	Reference	Google Organization Folder [cmdb_ci_gcp_folder]
Google Organization Project [cmdb_ci_gcp_project]	Contains::Contained by	Apigee API Gateway [cmdb_ci_apigee_api_gateway]

Apigee API Gateway [cmdb_ci_apigee_api_gateway]

The following attributes in the Apigee API Gateway [cmdb_ci_apigee_api_gateway] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
Install Status	install_status
Operational status	operational_status

Relationships created for Apigee API Gateway

Parent class	Relationship type	Child class
APIgee API Gateway [cmdb_ci_apigee_api_gateway]	Provides::Provided by	Managed API [cmdb_ci_managed_api]
APIgee API Gateway [cmdb_ci_apigee_api_gateway]	Reference	API Consumer [api_consumer]
Apigee API Gateway [cmdb_ci_apigee_api_gateway]	Provides::Provided by	API Consumer Subscription [cmdb_ci_api_consumer_subscription]
Apigee API Gateway [cmdb_ci_apigee_api_gateway]	Provides::Provided by	API Product Bundle [cmdb_ci_api_product_bundle]

Managed API [cmdb_ci_managed_api]

The following attributes in the Managed API [cmdb_ci_managed_api] table are populated by collected data:

Attribute label	Attribute name
Description	short_description
Life Cycle Stage	life_cycle_stage
ID	id
Name	name
Version	version

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Attribute label	Attribute name
Base URL	base_url
Model ID	model_id
Correlation ID	correlation_id
Life Cycle Stage Status	life_cycle_stage_status
Operational status	operational_status

Relationships created for Managed API

Parent class	Relationship type	Child class
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Frontend [cmdb_ci_api_frontend]
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Backend [cmdb_ci_api_backend]
Managed API [cmdb_ci_managed_api]	Reference	API Deployment [api_deployment]
Managed API [cmdb_ci_managed_api]	Uses::Used by	DNS Alias [cmdb_ci_dns_alias]

API Deployment [api_deployment]

The following attributes in the API Deployment [api_deployment] table are populated by collected data:

Attribute label	Attribute name
API	api
Name	name

API Consumer [api_consumer]

The following attributes in the API Consumer [api_consumer] table are populated by collected data:

Attribute label	Attribute name
ID	id
API Gateway	api_gateway
Custom ID	custom_id
Email	email
Registration Date	registration_date
Username	username

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API Frontend [cmdb_ci_api_frontend]

The following attributes in the API Frontend [cmdb_ci_api_frontend] table are populated by collected data:

Attribute label	Attribute name
API Version	api_version
Host	host
Method	method
Path	path
URL	url
Description	short_description
Name	name
Operational status	operational_status
Protocol	protocol

Relationship created for API Frontend

Parent class	Relationship type	Child class
API Frontend [cmdb_ci_api_frontend]	Use End Point To::Use End Point From	API Backend [cmdb_ci_api_backend]

API Backend [cmdb_ci_api_backend]

The following attributes in the API Backend [cmdb_ci_api_backend] table are populated by collected data:

Attribute label	Attribute name
URL	url
Name	name
Operational status	operational_status
Type	type

API Product Bundle [cmdb_ci_api_product_bundle]

The following attributes in the API Product Bundle [cmdb_ci_api_product_bundle] table are populated by collected data:

Attribute label	Attribute name
ID	id
Creation Date	creation_date
Description	short_description

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Attribute label	Attribute name
Discovered Access Type	discovered_access_type
Discovered Approval Type	discovered_approval_type
Last Modified Date	last_modified_date
Name	name
Operational status	operational_status

Relationships created for API Product Bundle

Parent class	Relationship type	Child class
API Product Bundle [cmdb_ci_api_product_bundle]	Contains::Contained by	API [cmdb_ci_api]
API Product Bundle [cmdb_ci_api_product_bundle]	Used by::Uses	API Consumer Subscription [cmdb_ci_api_consumer_subscription]
API Product Bundle [cmdb_ci_api_product_bundle]	Reference	Key Value [cmdb_key_value]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Tag	tag
Configuration item	configuration_item
Key	key
Value	value

API Consumer Subscription [cmdb_ci_api_consumer_subscription]

The following attributes in the API Consumer Subscription [cmdb_ci_api_consumer_subscription] table are populated by collected data:

Attribute label	Attribute name
ID	id
Creation Date	creation_date
API Consumer	api_consumer
Discovered State	discovered_state
Last Modified Date	last_modified_date
Name	name
Operational status	operational_status

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Relationship created for API Consumer Subscription

Parent class	Relationship type	Child class
API Consumer Subscription [cmdb_ci_api_consumer_subscription]	Reference	Key Value [cmdb_key_value]

API Consumer Access [api_consumer_access]

The following attributes in the API Consumer Access [api_consumer_access] table are populated by collected data:

Attribute label	Attribute name
Auth Method	access_type
State	state
Valid to	valid_to
API Product Bundle	api_product_bundle
API Consumer Subscription	api_consumer_subscription
API	api
API Consumer	api_consumer

Cloud Organizations [cmdb_ci_cloud_org]

The following attributes in the Cloud Organizations [cmdb_ci_cloud_org] table are populated by collected data:

Attribute label	Attribute name
Object ID	object_id
Install Status	install_status
Name	name
Operational status	operational_status
Time	time

Relationship created for Cloud Organizations

Parent class	Relationship type	Child class
Cloud Organizations [cmdb_ci_cloud_org]	Contains::Contained by	Google Organization Folder [cmdb_ci_gcp_folder]

Google Organization Folder [cmdb_ci_gcp_folder]

The following attributes in the Google Organization Folder [cmdb_ci_gcp_folder] table are populated by collected data:

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Attribute label	Attribute name
Parent	parent_ci
Object ID	object_id
Install Status	install_status
Name	name
Operational status	operational_status
Parent Id	parent_id
Parent Type	parent_type
Time	time

Relationships created for Google Organization Folder

Parent class	Relationship type	Child class
Google Organization Folder [cmdb_ci_gcp_folder]	Reference	Google Organization Folder [cmdb_ci_gcp_folder]
Google Organization Folder [cmdb_ci_gcp_folder]	Reference	Cloud Organizations [cmdb_ci_cloud_org]

DNS Alias [cmdb_ci_dns_alias]

The following attributes in the DNS Alias [cmdb_ci_dns_alias] table are populated by collected data:

Attribute label	Attribute name
Name	name
Operational status	operational_status

Accessing the connection details of API Service Graph Connector for Apigee X

You can access the connection details of the API Service Graph Connector for Apigee X in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the API Service Graph Connector for Apigee X. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of an Apigee X connection

Access the details of an Apigee X connection configured for the API Service Graph Connector for Apigee X.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Apigee X** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name and alias.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

API Service Graph Connector for AWS API Gateway

Use the ServiceNow® API Service Graph Connector for AWS API Gateway to import API details from an AWS API Gateway service into the Configuration Management Database (CMDB).

Request apps on the Store

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

Key features

Import data into a normalized data model for consistency across other technologies.

The API Insights workspace provides a centralized interface where you can analyze and interact with API data, without needing direct access to AWS API Gateway, enhancing visibility, governance, and collaboration across the API estate. To learn more, see API Insights.

Supported ServiceNow versions

- Xanadu
- Yokohama
- Zurich

Use cases

You can use the API Service Graph Connector for AWS API Gateway to:

- Maintain an end-to-end inventory of defined APIs, identifying what APIs are published, used, and by whom.
- Track APIs from customer-facing endpoints to the underlying services, identifying impacted endpoints when services change or fail and creating incidents for reported issues.
- Address vulnerabilities and security incidents related to API endpoints, and create compliance requirements to measure against.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure API Service Graph Connector for AWS API Gateway using SGC Central.

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Data mapping

Data from the AWS API Gateway data sources is mapped and transformed into the CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the CMDB using the Identification and Reconciliation Engine (IRE).

The following table lists the data sources in the order they run, the staging tables, and the target tables as CMDB CI and non-CMDB classes for an AWS API Gateway service.

Data mapping for AWS API Gateway

Data source	Staging table	Target tables
Managed API Rest	SGA-AWS Managed API Rest [sn_aws_api_gw_int_api_gateway_managed_api_import_set]	AWS API Gateway DNS Alias Managed API Key Value
Managed API V2	SGA-AWS Managed API V2 [sn_aws_api_gw_int_sga_aws_managed_api_v2]	Managed API AWS API Gateway DNS Alias Key Value
Frontend Backend REST	SGA-AWS Frontend-Backend REST [sn_aws_api_gw_int_sga_aws_frontend_backend_rest]	API Backend API Frontend
Backend V2	SGA-AWS Backend V2 [sn_aws_api_gw_int_sga_aws_backend_v2]	API Backend
Frontend V2	SGA-AWS Frontend V2 [sn_aws_api_gw_int_sga_aws_frontend_v2]	API Frontend
Deployment Rest	SGA-AWS API Gateway Deployment Rest [sn_aws_api_gw_int_sga_aws_api_gateway_deployment_rest]	API Deployment
Deployment V2	SGA-AWS API Gateway Deployment V2 [sn_aws_api_gw_int_sga_aws_api_gateway_deployment_v2]	API Deployment
Consumer	SGA-AWS Consumers [sn_aws_api_gw_int_sga_aws_consumers]	API Consumer
Policies	SGA-AWS API Gateway Policies [sn_aws_api_gw_int_sga_aws_api_gateway_policies]	API Policy
API Consumer Access	SGA-AWS-API-Consumer-Access [sn_aws_api_gw_int_sga_aws_api_consumer_access]	API Consumer Access

When you complete setting up the connection, you can configure the integration to periodically pull data from an AWS API Gateway service. For information on where data is saved when

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pulling data from an AWS API Gateway service, see Target tables for storing API Service Graph Connector for AWS API Gateway data.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Record removal process

The connector supports soft deletion for CMDB CI classes only, meaning records are not permanently removed from the system. Instead, any CMDB CI records not discovered during the last scheduled job run are marked as **Non-Operational**.

Configure API Service Graph Connector for AWS API Gateway using SGC Central

Set up scheduled import jobs to pull in AWS API Gateway data into your CMDB.

Before you begin

Install API Service Graph Connector for AWS API Gateway version 1.0.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

The authentication mechanism used by the connector is AWS Signature Type (HMAC Authentication Technique) with AWS Security Token Service (STS) token. For information about permissions, see the API Service Graph Connector for AWS API Gateway - Setup Instructions [KB1962734] article in the Now Support Knowledge Base.

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Note:
Alternatively, you can configure a default connection already available from the installed or draft connections in SGC Central. Go to **All** > **Service Graph Connectors**, then select **Setup** for the connector from the menu. To learn about installed and draft connections, see Managing connections added for Service Graph Connectors in SGC Central.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

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Tip:
Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the AWS API Gateway connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

Note:
This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Enter connection details and test the API connection for importing AWS API Gateway data.

   a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

   b. On the form, fill in the fields.

Create and test connection form

Field	Description
AWS API Gateway Connection Name	Name to identify the AWS API Gateway connection record. For example, `SG-AWS-API-Gateway connection`.
Access Key	Access key ID of the IAM user that has permissions to interact with the AWS resources.
Secret Key	Secret access key that corresponds to the Access key ID required for authenticating the connection securely.

   c. Select **Create and test connection**.

   d. Once the connection test is complete, select **Continue**.

7. **Optional:** Copy configuration properties from an existing AWS connection.

Note:
The Copy configuration properties activity is displayed only when an AWS connection is already set up on your instance.

   a. In the **Setup** stage of the playbook, select the **Copy configuration properties** activity.

   b. In the **AWS Connection** field, select the connection.
   The values of the following properties are copied from the selected AWS connection:

   - Standalone account ID
   - Management account ID

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- Gov cloud
- STS assume role
- AWS regions
- Config aggregator name
- Config aggregator account
- Config aggregator region

c. Select **Continue**.

d. Once the connection test is complete, select **Continue**.

8. Set the configuration properties for the connection.

a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. Fill in the property details.

> **Note:**
> If you select to copy the configuration properties from an existing AWS connection, the properties listed in the step 7.b are copied from the existing connection automatically.

AWS API Gateway configuration properties

Property	Description
Management account ID or standalone account ID	
Management account ID	Management account ID associated with the AWS API Gateway account.
Standalone account ID	ID of a member account associated with the AWS API Gateway account.
STS assume role name and AWS regions	
STS assume role name	STS Assume Role name of the AWS account that is used for querying the `STS Assume Role` API to obtain the API credentials.
AWS regions	List of comma-separated regions where the AWS API Gateway resides.
Config aggregator setup	
Config aggregator account ID	AWS account ID where the aggregator resource type in the AWS Config service has been configured.
Config aggregator name	Name of the aggregator resource type in the AWS Config service.
Config aggregator region	Region where the aggregator resource type resides.
API usage data	
Collect Usage Data	Option to enable usage data collection to retrieve API usage data over a specified duration.

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Property	Description
Management account ID or standalone account ID	
Collection period in days	Duration in days for collecting API usage data.
Gov cloud setup	
Is gov cloud	Option to indicate that the connection setup is for the AWS GovCloud.

c. Select **Continue**.

9. Configure the import schedule to import data at regular intervals.

   a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

   b. Expand the Parent scheduled data import within the Import schedules list to select the **Managed API Rest** import schedule associated with your connection.

   > **Note:**
   > The connection name is prefixed to the schedule name.

   c. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

   For more information, see Schedule a data import.

   d. Select **Save**.
   Alternatively, select **Execute Now** to execute the import schedule immediately.

   e. Select **Continue**.

10. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was configured.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

You can then manage connections from the SGC Central view of the CMDB Workspace. For more information, see Managing connections added for Service Graph Connectors in SGC Central.

Related topics

API Service Graph Connector for AWS API Gateway

Target tables for storing API Service Graph Connector for AWS API Gateway data

Target tables for storing API Service Graph Connector for AWS API Gateway data

When you complete setting up the connection, you can configure the integration to periodically pull data from an AWS API Gateway service. The data is saved in tables that extend from the Configuration item [cmdb_ci] classes and other non-CMDB classes.

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AWS API Gateway [cmdb_ci_aws_api_gateway]

The following attributes in the AWS API Gateway [cmdb_ci_aws_api_gateway] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
Operational status	operational_status

Relationships created for AWS API Gateway

Parent class	Relationship type	Child class
AWS API Gateway [cmdb_ci_aws_api_gateway]	Provides::Provided by	Managed API [cmdb_ci_managed_api]
AWS API Gateway [cmdb_ci_aws_api_gateway]	Reference	API Policy [api_policy]
AWS API Gateway [cmdb_ci_aws_api_gateway]	Reference	API Consumer [api_consumer]
AWS API Gateway [cmdb_ci_aws_api_gateway]	Uses::Used by	DNS Alias [cmdb_ci_dns_alias]

DNS Alias [cmdb_ci_dns_alias]

The following attributes in the DNS Alias [cmdb_ci_dns_alias] table are populated by collected data:

Attribute label	Attribute name
Name	name
Operational status	operational_status

Managed API [cmdb_ci_managed_api]

The following attributes in the Managed API [cmdb_ci_managed_api] table are populated by collected data:

Attribute label	Attribute name
Life Cycle Stage Status	life_cycle_stage_status
ID	id
Name	name
Base URL	base_url
Operational status	operational_status
Life Cycle Stage	life_cycle_stage

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Attribute label	Attribute name
Model ID	model_id
Type	type

Relationships created for Managed API

Parent class	Relationship type	Child class
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Frontend [cmdb_ci_api_frontend]
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Backend [cmdb_ci_api_backend]
Managed API [cmdb_ci_managed_api]	Reference	API Deployment [api_deployment]
Managed API [cmdb_ci_managed_api]	Reference	Key Value [cmdb_key_value]

API Frontend [cmdb_ci_api_frontend]

The following attributes in the API Frontend [cmdb_ci_api_frontend] table are populated by collected data:

Attribute label	Attribute name
Host	host
Method	method
Path	path
URL	url
Authorization	authorization
Name	name
Operational status	operational_status
Protocol	protocol

Relationship created for API Frontend

Parent class	Relationship type	Child class
API Frontend [cmdb_ci_api_frontend]	Use End Point To::Use End Point From	API Backend [cmdb_ci_api_backend]

API Backend [cmdb_ci_api_backend]

The following attributes in the API Backend [cmdb_ci_api_backend] table are populated by collected data:

Attribute label	Attribute name
ID	id

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Attribute label	Attribute name
URL	url
Name	name
Operational status	operational_status
Type	type

API Consumer [api_consumer]

The following attributes in the API Consumer [api_consumer] table are populated by collected data:

Attribute label	Attribute name
ID	id
Username	username
API Gateway	api_gateway

API Consumer Access [api_consumer_access]

The following attributes in the API Consumer Access [api_consumer_access] table are populated by collected data:

Attribute label	Attribute name
API	api
API Consumer	api_consumer
State	state

API Deployment [api_deployment]

The following attributes in the API Deployment [api_deployment] table are populated by collected data:

Attribute label	Attribute name
Name	name
API	api

API Policy [api_policy]

The following attributes in the API Policy [api_policy] table are populated by collected data:

Attribute label	Attribute name
Name	name
Consumer	consumer
ID	id

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Attribute label	Attribute name
Managed API	managed_api

Relationship created for API Policy

Parent class	Relationship type	Child class
API Policy [api_policy]	Reference	Managed API [cmdb_ci_managed_api]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Tag	tag
Configuration item	configuration_item
Key	key
Value	value

Additional features within the API Service Graph Connector for AWS API Gateway

Use the additional features available within the API Service Graph Connector for AWS API Gateway to maximize its use for importing data.

The following features are available within the API Service Graph Connector for AWS API Gateway:

Set partition size for AWS API Gateway accounts

Optimize the performance of parallel-loading supported data sources by configuring the partition size setting in the *PartitionSize* connection property.

Set page size for AWS API Gateway accounts

Control the number of records fetched per API call by setting the *PageSize* connection property.

Set partition size for AWS API Gateway accounts

You can optimize their performance of AWS API Gateway data sources by setting the partition size in the *PartitionSize* connection property.

Before you begin

Set the application scope to API Service Graph Connector for AWS API Gateway using the application picker. For more information, see Application picker.

Role required: admin

About this task

The parallel loading feature is available for the following AWS API Gateway data sources:

- Frontend Backend REST
- Frontend V2
- Backend V2

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- Deployment Rest
- Deployment V2

This feature determines how many Managed APIs execute as parallel jobs to retrieve configuration item (CI) data. The partition size specifies how many Managed APIs a single parallel thread evaluates for data retrieval. For example, if you set the *PartitionSize* property to 5 and there are 25 Managed APIs, the application generates 5 parallel jobs during data loading.

Note:
If the *PartitionSize* property isn't configured, the partition size computation feature of the Integration Commons for CMDB application automatically determines the partition size for parallel loading at runtime. See Partition size computation for parallel loading in Integration Commons for CMDB.

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **AWS API Gateway** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. From the **Property** column of the Service Graph Connection Properties related list, select **PartitionSize**.
4. In the **Value** field, enter a numeric value greater than 0 for the partition size.
5. Select **Update**.

Set page size for AWS API Gateway accounts

When retrieving data from an AWS API Gateway service, you can control the number of records fetched per API call by setting the *PageSize* connection property. This affects pagination behavior when calling APIs.

Before you begin

Set the application scope to API Service Graph Connector for AWS API Gateway using the application picker. For more information, see Application picker.

Role required: admin

About this task

The *PageSize* property controls how many records are retrieved in each API request to AWS. This property affects pagination behavior across all data sources.

Example: If you set the *PageSize* property to 50 and there are 200 REST APIs in your API Service Graph Connector for AWS API Gateway account, the connector makes 4 API calls to retrieve all records.

Note:
For AWS Config Aggregator setups, the page size must not exceed 100 due to AWS API limitations on the *SelectAggregateResourceConfig* API.

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **AWS API Gateway** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. From the **Property** column of the Service Graph Connection Properties related list, select **PageSize**.

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4. In the **Value** field, enter a numeric value depending on the configuration type.

5. Select **Update**.

Accessing the connection details of API Service Graph Connector for AWS API Gateway

You can access the connection details of the API Service Graph Connector for AWS API Gateway in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the API Service Graph Connector for AWS API Gateway. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of an AWS API Gateway connection

Access the details of an AWS API Gateway connection configured for the API Service Graph Connector for AWS API Gateway.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **AWS API Gateway** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name and alias.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

API Service Graph Connector for Azure API Management

Use the ServiceNow® API Service Graph Connector for Azure API Management to import API details from an Azure API Management application into the Configuration Management Database (CMDB).

Request apps on the Store

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

Key features

Import data into a normalized data model for consistency across other technologies.

The API Insights workspace provides a centralized interface where you can analyze and interact with API data, without needing direct access to Azure API Management, enhancing visibility, governance, and collaboration across the API estate. To learn more, see API Insights.

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Supported ServiceNow versions

- Yokohama
- Zurich
- Australia

Use cases

You can use the API Service Graph Connector for Azure API Management to:

- Maintain an end-to-end inventory of exposed and backend APIs, identifying what APIs are published, used, and by whom.
- Track APIs from customer-facing endpoints to the underlying services, identifying impacted endpoints when services change or fail and creating incidents for reported issues.
- Address vulnerabilities and security incidents related to API endpoints, and create compliance requirements to measure against.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure API Service Graph Connector for Azure API Management using SGC Central.

Important:
Unless there are configuration issues, use SGC Central to configure the connection. The guided setup method for configuration is being deprecated.

Data mapping

Data from the Azure API Management data sources is mapped and transformed into the CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from an Azure API Management application.

The following table lists the data sources in the order they run, the staging tables, and the target tables as CMDB CI and non-CMDB classes for an Azure API Management application.

Data mapping for Azure API Management

Data source	Staging table	Target tables
API Management Services	SGA Azure API Management [sn_azure_api_gw_sga_azure_api_management]	Azure API Management Azure Subscription Cloud Service Account

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Data mapping for Azure API Management (continued)

Data source	Staging table	Target tables
		Resource Group DNS Alias
Managed API	SGA Azure Managed API [sn_azure_api_gw_sga_azure_managed_api]	Managed API
API Frontend Backend	SGA Azure API Frontend Backend [sn_azure_api_gw_sga_azure_api_frontend_backend_import]	API Frontend API Backend
API GraphQL Frontend Backend	SGA Azure API GraphQL Frontend Backend [sn_azure_api_gw_sga_azure_api_graphql_frontend_backend]	API Frontend API Backend
API Consumer	SGA Azure API Consumer [sn_azure_api_gw_sga_azure_api_consumer]	API Consumer
API Product	SGA Azure API Product [sn_azure_api_gw_sga_azure_api_product]	API Product Bundle
API Consumer Subscription	SGA Azure API Consumer Subscription [sn_azure_api_gw_sga_azure_api_subscription]	API Consumer Subscription
API Tag	API Tag [sn_azure_api_gw_api_tag]	Key Value
API Consumer Access	SGA Azure API Consumer Access [sn_azure_api_gw_sga_azure_managed_api]	API Consumer Access

For more information on where data is saved when pulling data from an Azure API Management application, see Target tables for storing API Service Graph Connector for Azure API Management data.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Record removal process

The connector supports soft deletion for CMDB CI classes only, meaning records are not permanently removed from the system. Instead, any CMDB CI records not discovered during the last scheduled job run are marked as **Non-Operational**.

Configure API Service Graph Connector for Azure API Management using SGC Central

Set up scheduled import jobs to pull in Azure API Management data into your CMDB.

Before you begin

Install API Service Graph Connector for Azure API Management version 1.0.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Obtain the OAuth credentials from your Azure administrator. Make a note of the following details:

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- Application (client) ID
- Client Secret
- Directory (tenant) ID
- Connection URL

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Note:
Alternatively, you can configure a default connection already available from the installed or draft connections in SGC Central. Go to **All** > **Service Graph Connectors**, then select **Setup** for the connector from the menu. To learn about installed and draft connections, see Managing connections added for Service Graph Connectors in SGC Central.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Azure API Management connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Enter connection details and test the API connection for importing Azure API Management data.

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a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

b. On the form, fill in the fields.

Create and test connection form

Field	Description
Azure API Management Connection Name	Name to identify the Azure API Management connection record. For example, `Azure API Management Connection`.
Connection URL	Base URL to connect to the Azure API Management service. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.
OAuth Client ID	Application (client) ID of your Azure client application as noted in the Before you begin section.
OAuth Client Secret	Client Secret of your Azure client application as noted in the Before you begin section.

OAuth Token URL	Token URL of your Azure client application.
	
	Based on the region of your Azure client application, enter the token URL in one of the following formats:
	▪ Global
	`https://login.microsoftonline.com/<tenantid>/oauth2/v2.0/token`
	▪ US Government
	`https://login.microsoftonline.us/<tenantid>/oauth2/v2.0/token`
	▪ China
	`https://login.partner.microsoftonline.cn/<tenantid>/oauth2/v2.0/token`
	▪ Germany
	`https://login.microsoftonline.de/<tenantid>/oauth2/v2.0/token`

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Field	Description
	Where *<tenantid>* is the tenant ID of your Azure client application as noted in the Before you begin section.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

7. **Optional:** Set the configuration properties for the connection.

> **Note:**
> To skip this step, select **Continue** for the **Set configuration properties** activity.

a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. Fill in the property details.

Azure API Management configuration properties

Property	Description
Azure API Management connection	
Discovery Scope	Discovery scope of the Azure client application. The available options are: **Management Group** Select **Management Group** when the ServiceNow service account has access to data within the Azure management group. **Subscription** Select **Subscription** when the ServiceNow service account has access to data within the Azure subscription only.
Subscription	
Subscription Id(s)	Subscription IDs of Azure API Management services. For multiple subscription IDs, separate them with commas. If the discovery scope is set to **Subscription** and this field is left blank, all subscriptions for the specified tenant in the credentials are discovered.
Management Group	
Management Group Id(s)	Management group IDs of Azure API Management services. For multiple management groups, separate them with commas.
Get Nested Group Subscriptions	Option to enable retrieving data from all nested child subscriptions when **Management Group** is set as the discovery scope. Disable the property to exclude nested child subscriptions.
Optional Exclusive Configuration	

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Property	Description
Azure API Management connection	
ExcludeServices	Azure API Management services that should be excluded from the connection. For multiple services, separate them with commas. All gateways except those listed in the *ExcludeServices* property are fetched.
ResourceGroups	Resource group name of Azure API Management services. For multiple resource groups, separate their names with commas. If you leave this field empty, the data sources within the connector import data from all the available resource groups.
Usage Data Configuration	
CollectUsageData	option to enable usage data collection to retrieve API usage data over a specified duration.

c. Select **Continue**.

8. Configure the import schedule to import data at regular intervals.

   a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

   b. Expand the Parent scheduled data import within the Import schedules list to select the **API Management Services** import schedule associated with your connection.

   > **Note:**
   > The connection name is prefixed to the schedule name.

   c. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

   For more information, see Schedule a data import.

   d. Select **Save**.
   Alternatively, select **Execute Now** to execute the import schedule immediately.

   e. Select **Continue**.

9. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The created connection appears in the Installed connections list.

You can then manage connections from the SGC Central view of the CMDB Workspace. For more information, see Managing connections added for Service Graph Connectors in SGC Central.

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Related topics

API Service Graph Connector for Azure API Management

Target tables for storing API Service Graph Connector for Azure API Management data

Target tables for storing API Service Graph Connector for Azure API Management data

When you complete setting up the connection, you can configure the integration to periodically pull data from an Azure API Management application. The data is saved in tables that extend from the Configuration item [cmdb_ci] classes and other non-CMDB classes.

Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data:

Attribute label	Attribute name
Account Id	account_id
Name	name
Object ID	object_id
Datacenter Type	datacenter_type
Operational status	operational_status

Relationship created for Cloud Service Account

Parent class	Relationship type	Child class
Cloud Service Account [cmdb_ci_cloud_service_account]	Contains::Contained by	Resource Group [cmdb_ci_resource_group]

Azure Subscription [cmdb_ci_azure_subscription]

The following attributes in the Azure Subscription [cmdb_ci_azure_subscription] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Operational status	operational_status

Azure API Management [cmdb_ci_azure_api_mgmt]

The following attributes in the Azure API Management [cmdb_ci_azure_api_mgmt] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name

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Attribute label	Attribute name
Fully qualified domain name	fqdn
Gateway URL	gateway_url
Operational status	operational_status
Version	version

Relationships created for Azure API Management

Parent class	Relationship type	Child class
Azure API Management [cmdb_ci_azure_api_mgmt]	Provides::Provided by	API Product Bundle [cmdb_ci_api_product_bundle]
Azure API Management [cmdb_ci_azure_api_mgmt]	Provides::Provided by	API Consumer Subscription [cmdb_ci_api_consumer_subscription]
Azure API Management [cmdb_ci_azure_api_mgmt]	Uses::Used by	DNS Alias [cmdb_ci_dns_alias]
Azure API Management [cmdb_ci_azure_api_mgmt]	Provides::Provided by	Managed API [cmdb_ci_managed_api]
Azure API Management [cmdb_ci_azure_api_mgmt]	Reference	API Consumer [api_consumer]

Resource Group [cmdb_ci_resource_group]

The following attributes in the Resource Group [cmdb_ci_resource_group] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Operational status	operational_status

DNS Alias [cmdb_ci_dns_alias]

The following attributes in the DNS Alias [cmdb_ci_dns_alias] table are populated by collected data:

Attribute label	Attribute name
Name	name

Managed API [cmdb_ci_managed_api]

The following attributes in the Managed API [cmdb_ci_managed_api] table are populated by collected data:

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Attribute label	Attribute name
ID	id
Minor Version	minor_version
Name	name
Version	version
Base URL	base_url
Correlation ID	correlation_id
Description	short_description
Fully qualified domain name	fqdn
Operational status	operational_status
Type	type
Life Cycle Stage Status	life_cycle_stage_status
Life Cycle Stage	life_cycle_stage
Model ID	model_id

Relationships created for Managed API

Parent class	Relationship type	Child class
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Frontend [cmdb_ci_api_frontend]
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Backend [cmdb_ci_api_backend]
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Consumer Subscription [cmdb_ci_api_consumer_subscription] **Note:** Applies only when the Discovered Scope [discovered_scope] attribute value is set to `api`.

API Frontend [cmdb_ci_api_frontend]

The following attributes in the API Frontend [cmdb_ci_api_frontend] table are populated by collected data:

Attribute label	Attribute name
API Minor Version	api_minor_version
API Version	api_version
Host	host

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Attribute label	Attribute name
Method	method
Path	path
URL	url
Description	short_description
Name	name
Operational status	operational_status

Relationship created for API Frontend

Parent class	Relationship type	Child class
API Frontend [cmdb_ci_api_frontend]	Use End Point To::Use End Point From	API Backend [cmdb_ci_api_backend]

API Backend [cmdb_ci_api_backend]

The following attributes in the API Backend [cmdb_ci_api_backend] table are populated by collected data:

Attribute label	Attribute name
Host	host
ID	id **Note:** Applicable to GraphQL APIs only.
Method	method **Note:** Applicable to GraphQL APIs only.
Path	path
URL	url
Name	name
Operational status	operational_status

API Consumer [api_consumer]

The following attributes in the API Consumer [api_consumer] table are populated by collected data:

Attribute label	Attribute name
ID	id
Discovered State	discovered_state

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Attribute label	Attribute name
Email	email
Provider	provider
Registration Date	registration_date
Username	username

API Product Bundle [cmdb_ci_api_product_bundle]

The following attributes in the API Product Bundle [cmdb_ci_api_product_bundle] table are populated by collected data:

Attribute label	Attribute name
ID	id
Discovered Access Type	discovered_access_type
Discovered Approval Type	discovered_approval_type
Discovered State	discovered_state
Name	name
Operational status	operational_status

Relationships created for API Product Bundle

Parent class	Relationship type	Child class
API Product Bundle [cmdb_ci_api_product_bundle]	Contains::Contained by	Managed API [cmdb_ci_managed_api]
API Product Bundle [cmdb_ci_api_product_bundle]	Used by::Uses	API Consumer Subscription [cmdb_ci_api_consumer_subscription]

API Consumer Subscription [cmdb_ci_api_consumer_subscription]

The following attributes in the API Consumer Subscription [cmdb_ci_api_consumer_subscription] table are populated by collected data:

Attribute label	Attribute name
ID	id
Creation Date	creation_date
Discovered Scope	discovered_scope
Name	name
Sys ID	sys_id
API Consumer	api_consumer
Operational status	operational_status

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Relationship created for API Consumer Subscription

Parent class	Relationship type	Child class
API Consumer Subscription [cmdb_ci_api_consumer_subscription]	Reference	API Consumer Access [api_consumer_access]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Key	key
Value	value

API Consumer Access [api_consumer_access]

The following attributes in the API Consumer Access [api_consumer_access] table are populated by collected data:

Attribute label	Attribute name
API Consumer	api_consumer
Access type	access_type
API Product Bundle	api_product_bundle
State	state
API Consumer Subscription	api_consumer_subscription
API	api
Valid to	valid_to

Accessing the connection details of API Service Graph Connector for Azure API Management

You can access the connection details of the API Service Graph Connector for Azure API Management in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the API Service Graph Connector for Azure API Management. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of an Azure API Management connection

Access the details of an Azure API Management connection configured for the API Service Graph Connector for Azure API Management.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Azure API Management** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name and alias.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

API Service Graph Connector for Boomi Cloud API Management

Use the ServiceNow® API Service Graph Connector for Boomi Cloud API Management to import API details from a Boomi Cloud API Management application into the Configuration Management Database (CMDB).

Request apps on the Store

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

Key features

Import data into a normalized data model for consistency across other technologies.

The API Insights workspace provides a centralized interface where you can analyze and interact with API data, without needing direct access to a Boomi Cloud API Management application, enhancing visibility, governance, and collaboration across the API estate. To learn more, see API Insights.

Supported ServiceNow versions

- Yokohama
- Zurich
- Australia

Use cases

You can use the API Service Graph Connector for Boomi Cloud API Management to:

- Maintain an end-to-end inventory of exposed and backend APIs, identifying what APIs are published, used, and by whom.
- Track APIs from customer-facing endpoints to the underlying services, identifying impacted endpoints when services change or fail and creating incidents for reported issues.
- Address vulnerabilities and security incidents related to API endpoints and create compliance requirements to measure against.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The SGC Central view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure API Service Graph Connector for Boomi Cloud API Management using SGC Central.

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Data mapping

Data from the Boomi Cloud API Management data sources is mapped and transformed into the CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from a Boomi Cloud API Management application.

The following table lists the data sources in the order they run, the staging tables, and the target tables as CMDB CI and non-CMDB classes for a Boomi Cloud API Management application.

Data mapping for Boomi Cloud API Management

Data source	Staging table	Target tables
APIs	API Component [sn_boomi_api_component]	Managed API Boomi API Gateway API Frontend API Backend
API Consumer	API Consumer [sn_boomi_api_consumer]	API Consumer

For more information on where data is saved when pulling data from a Boomi Cloud API Management application, see Target tables for storing API Service Graph Connector for Boomi Cloud API Management data.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Configure API Service Graph Connector for Boomi Cloud API Management using SGC Central

Set up scheduled import jobs to pull in Boomi Cloud API Management data into your CMDB.

Before you begin

Install API Service Graph Connector for Boomi Cloud API Management version 1.0.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Obtain the API credentials from your Boomi Cloud API Management administrator. Make a note of the following details:

- Client ID: The unique identifier for your Boomi Cloud API Management application.
- Client Secret: The secret key for authenticating your Boomi Cloud API Management application.
- Area ID: The Boomi area identifier from which data is imported.
- Area Name: The Boomi area name for your instance.

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin

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Role required for each playbook stage (continued)

Stage	Role
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Note:
Alternatively, you can configure a default connection already available from the installed or draft connections in SGC Central. Go to **All** > **Service Graph Connectors**, then select **Setup** for the connector from the menu. To learn about installed and draft connections, see Managing connections added for Service Graph Connectors in SGC Central.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Boomi connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Enter connection details and test the API connection for importing Boomi Cloud API Management data.

   a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

   b. On the form, fill in the fields.

Create and test connection form

Field	Description
Connection name	Name to identify the Boomi connection record.

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Field	Description
	For example, `Boomi connection`.
Connection URL	Base URL to connect to the Boomi Cloud API Management service. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.
OAuth client ID	Client ID of your Boomi Cloud API Management application as noted in the Before you begin section.
OAuth Client secret	Client secret of the Boomi Cloud API Management application as noted in the Before you begin section.
Area ID	Boomi area identifier from which data is imported as noted in the Before you begin section.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

7. Set the configuration properties for the connection.
   a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.
   b. In the **Area Name** field, enter the area name for your **Boomi** instance as noted in the Before you begin section.
   c. Select **Continue**.
8. Configure the import schedule to import data at regular intervals.

   a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

   b. Expand the Parent scheduled data import within the Import schedules list to select the **APIs** import schedule associated with your connection.

   Note: The connection name is prefixed to the schedule name.

   c. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

   For more information, see Schedule a data import.

   d. Select **Save**.

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Alternatively, select **Execute Now** to execute the import schedule immediately.

e. Select **Continue**.

9. In the **Setup** stage of the playbook, select the **Confirm connection setup** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The created connection appears in the Installed connections list.

You can then manage connections from the SGC Central view of the CMDB Workspace. For more information, see Managing connections added for Service Graph Connectors in SGC Central.

Target tables for storing API Service Graph Connector for Boomi Cloud API Management data

When you complete setting up the connection, you can configure the integration to periodically pull data from a Boomi Cloud API Management application. The data is saved in tables that extend from the Configuration item [cmdb_ci] classes and other non-CMDB tables.

Boomi API Gateway [cmdb_ci_boomi_api_gateway]

The following attributes in the Boomi API Gateway [cmdb_ci_boomi_api_gateway] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name

Relationships created for Boomi API Gateway

Parent class	Relationship type	Child class
Boomi API Gateway [cmdb_ci_boomi_api_gateway]	Provides::Provided by	Managed API [cmdb_ci_managed_api]
Boomi API Gateway [cmdb_ci_boomi_api_gateway]	Reference	API Consumer [api_consumer]

Managed API [cmdb_ci_managed_api]

The following attributes in the Managed API [cmdb_ci_managed_api] table are populated by collected data:

Attribute label	Attribute name
Life Cycle Stage	life_cycle_stage
Name	name
Life Cycle Stage Status	life_cycle_stage_status
ID	id
Version	version

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Attribute label	Attribute name
Base URL	base_url
Description	short_description
Operational status	operational_status
Model ID	model_id
Type	type

Relationships created for Managed API

Parent class	Relationship type	Child class
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Backend [cmdb_ci_api_backend]
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Frontend [cmdb_ci_api_frontend]

API Frontend [cmdb_ci_api_frontend]

The following attributes in the API Frontend [cmdb_ci_api_frontend] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
Method	method
Host	host
Path	path
URL	url
Operational status	operational_status

Relationship created for API Frontend

Parent class	Relationship type	Child class
API Frontend [cmdb_ci_api_frontend]	Use End Point To::Use End Point From	API Backend [cmdb_ci_api_backend]

API Backend [cmdb_ci_api_backend]

The following attribute in the API Backend [cmdb_ci_api_backend] table are populated by collected data:

Attribute label	Attribute name
ID	id

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Attribute label	Attribute name
Name	name
URL	url
Path	path
Host	host
Type	type
Operational status	operational_status

API Consumer [api_consumer]

The following attributes in the API Consumer [api_consumer] table are populated by collected data:

Attribute label	Attribute name
ID	id
API Consumer Type	api_consumer_type
Email	email
API Gateway	api_gateway
Registration Date	registration_date
Username	username

Accessing the connection details of API Service Graph Connector for Boomi Cloud API Management

You can access the connection details of the API Service Graph Connector for Boomi Cloud API Management in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF feature, you can access all connections for a connector. Connection details include the alias, properties, data sources, and associated scheduled data imports. In addition, you can test a connection. Additional details may appear depending on the connector type. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Boomi connection

Access the details of a Boomi connection configured for the API Service Graph Connector for Boomi Cloud API Management.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Boomi** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name and alias.

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4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

API Service Graph Connector for Kong Gateway

Use the ServiceNow® API Service Graph Connector for Kong Gateway to import API details from a Kong Gateway application into the Configuration Management Database (CMDB).

Request apps on the Store

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

Key features

Import data into a normalized data model for consistency across other technologies.

The API Insights workspace provides a centralized interface where you can analyze and interact with API data, without needing direct access to Kong Gateway, enhancing visibility, governance, and collaboration across the API estate. To learn more, see API Insights.

Supported ServiceNow versions

- Yokohama
- Zurich
- Australia

Use cases

You can use the API Service Graph Connector for Kong Gateway to:

- Maintain an end-to-end inventory of exposed and backend APIs, identifying what APIs are published, used, and by whom.
- Track APIs from customer-facing endpoints to the underlying services, identifying impacted endpoints when services change or fail and creating incidents for reported issues.
- Address vulnerabilities and security incidents related to API endpoints, and create compliance requirements.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The SGC Central view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure API Service Graph Connector for Kong Gateway using SGC Central.

Note:
You can also include a Prometheus connection and map it to the Kong Gateway connection during setup for importing Kong Gateway metrics data using the Prometheus plugin.
To learn more about the Prometheus plugin, see Prometheus on the Kong Developer documentation site.

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Data mapping

Data from the Kong Gateway data sources is mapped and transformed into the CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from a Kong Gateway application.

The following table lists the data sources in the order they run, the staging tables, and the target tables as CMDB CI and non-CMDB classes for a Kong Gateway application.

Data mapping for Kong Gateway

Data source	Staging table	Target tables
SG-Kong Gateway	SG-Kong Gateway [sn_kong_integ_sg_kong_gateway]	Kong Gateway
SG-Kong Workspaces	SG-Kong Workspaces [sn_kong_integ_sg_kong_workspaces]	Kong Workspace
SG-Kong Load Balancers	SG-Kong Load Balancers [sn_kong_integ_sg_kong_lbs]	Kong Load Balancer
SG-Kong Targets	SG-Kong Targets [sn_kong_integ_sg_kong_targets]	Kong Target Key Value
SG-Kong Services	SG-Kong Services [sn_kong_integ_sg_kong_services]	Managed API API Backend Key Value
SG-Kong Routes	SG-Kong Routes [sn_kong_integ_sg_kong_routes]	API Frontend
SG-Kong Consumers	SG-Kong Consumers [sn_kong_integ_sg_kong_consumers]	API Consumer
SG-Kong Plugins	SG-Kong Plugins [sn_kong_integ_sg_kong_plugins]	API Policy

For more information on where data is saved when pulling data from a Kong Gateway application, see Target tables for storing API Service Graph Connector for Kong Gateway data.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Configure API Service Graph Connector for Kong Gateway using SGC Central

Set up scheduled import jobs to pull in Kong Gateway data into your Configuration Management Database (CMDB).

Before you begin

Install API Service Graph Connector for Kong Gateway version 2.0.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

If setting up the Prometheus connection, enable the Prometheus plugin on Kong Gateway and verify that any required credentials are available. To learn more about the Prometheus plugin, see Prometheus on the Kong Developer documentation site.

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Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the Service Graph Workspace or CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Note:
Alternatively, you can configure a default connection already available from the installed or draft connections in SGC Central. Go to **All** > **Service Graph Connectors**, then select **Setup** for the connector from the menu. To learn about installed and draft connections, see Managing connections added for Service Graph Connectors in SGC Central.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Kong connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Select a template for the authentication type to create a connection.

   a. In the **Setup** stage of the playbook, select the **Select alias template** activity.

   b. Select a template type.

   - **Kong RBAC Authentication**: Select when using token-based authentication.
   - **Kong Basic Authentication**: Select when using basic authentication.

7. Enter connection details and test the API connection for importing Kong Gateway data.

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a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

b. On the form, fill in the fields.

Create and test connection form

Field	Description
Connection Name	Name to identify the Kong Gateway connection record.
Host Name	Admin URL address of the *Kong Admin* API server.
Protocol	Protocol used for the connection ensuring secured communication between the client and the Kong server.
Override default port	Port used by the *Kong Admin* API.
API Key	Authentication secret to connect to the Kong Gateway service. This field appears only when **Kong RBAC Authentication** is selected in the **Select alias template** activity.
User Name	User name required for authenticating requests to the *Kong Gateway Admin* API. This field appears only when **Kong Basic Authentication** is selected in the **Select alias template** activity.
Password	Password associated with the user name required for authenticating requests. This field appears only when **Kong Basic Authentication** is selected in the **Select alias template** activity.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

8. **Optional:** Set the configuration properties for the connection.

a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. In the *Expand HTTP Method Types* field available in the Data retrieval configuration section, enter the HTTP methods including GET, POST, PUT, PATCH, DELETE, OPTIONS, HEAD, CONNECT, and TRACE, to consider for routes.
For multiple methods, separate them with commas. If left blank, results in a single API Frontend being created with the ALL method, indicating support for all standard HTTP methods.

c. In the *Exclude workspaces* field available in the Property settings section, enter the workspace that must be excluded from import.

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(Optional) For multiple workspaces, separate them with commas. For example: `workspace1,workspace2`. If you leave this field empty, the data sources within the connector import data from all the workspaces.

d. Select the **Import tags** check box available in the tag settings section, to ingest tags from the Kong Gateway service.
When selected, specify the key-value pair separator for tags in the **Tags value separator** field. If not selected, tags won't be fetched.

e. In the **Tags value separator** field available in the tag settings section, enter the separator for key and value in tags.
For example, if the tag value separator is set to `=`, the tag `env=prod` is saved with `env` as the key and `prod` as the value.

If left empty, no tags will be ingested.

f. Select the **Collect Usage Data** check box available in the Metric Settings section to enable usage data collection to retrieve API usage data over a specified duration.

g. In the **Collection period (in days)** field available in the Metric Settings section, enter the duration in days for collecting API usage data.

h. Select **Continue**.

9. Optional: Enter Prometheus connection details and test the API connection for importing Kong Gateway metrics data using the Prometheus plugin.

> **Note:**
> You can skip this step if API usage monitoring with Prometheus isn't required or if you're using an existing Prometheus instance. To skip this step, select **Skip** for the **Create and Test Prometheus Connection** activity.

a. In the **Setup** stage of the playbook, select the **Create and Test Prometheus Connection** activity.

b. On the form, fill in the fields.

Create and Test Prometheus Connection form

Field	Description
Connection Name	Name to identify the Prometheus connection record.
Connection URL	Base URL of the Prometheus HTTP API, used for fetching metrics.
User Name	User name required for authenticating requests to the Prometheus server.
Password	Password associated with the user name required for authenticating requests to the Prometheus server.

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c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

10. **Optional:** Associate the Prometheus connection with a Kong Gateway connection.

> **Note:**
> You can skip this step if API usage monitoring with Prometheus isn't required. To skip this step, select **Skip** for the **Kong Prometheus Mapping** activity.

a. In the **Setup** stage of the playbook, select the **Kong Prometheus Mapping** activity.

b. In the **Prometheus Connections** field, search for and select a Prometheus connection to associate.
You can select the Prometheus connection created in step 9 or select any existing Prometheus connection during this step. If you skip step 9, select any existing Prometheus connection.

c. Select **Submit**.

A Prometheus connection can be associated with multiple Kong Gateway connections. You can update the Prometheus mapping in the Kong Gateway connection from the SGC Central view at any time. See Update a connection for a Service Graph Connector in SGC Central.

11. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Select **Configure import schedule**.

c. Expand the Parent scheduled data import within the Import schedules list to select the **SG-Kong Gateway** import schedule associated with your connection.

> **Note:**
> The connection name is prefixed to the schedule name.

d. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

e. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

f. Select **Continue**.

12. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to check whether the connection was configured.

What to do next

Select **View all connections** to review the connection details. The configured connections, including the Kong Gateway connection and the Prometheus connection, if created, appear in the Installed connections list.

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You can then manage connections from the SGC Central view of the CMDB Workspace. For more information, see Managing connections added for Service Graph Connectors in SGC Central.

Related topics

API Service Graph Connector for Kong Gateway

Target tables for storing API Service Graph Connector for Kong Gateway data

Target tables for storing API Service Graph Connector for Kong Gateway data

When you complete setting up the connection, you can configure the integration to periodically pull data from a Kong Gateway application. The data is saved in tables that extend from the Configuration item [cmdb_ci] classes and other non-CMDB tables.

Kong Gateway [cmdb_ci_kong_gateway]

The following attributes in the Kong Gateway [cmdb_ci_kong_gateway] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
Admin URL	admin_url
Database	database
Description	short_description
Operational status	operational_status
Version	version

Relationships created for Kong Gateway

Parent class	Relationship type	Child class
Kong Gateway [cmdb_ci_kong_gateway]	Provides::Provided by	Kong Load Balancer [cmdb_ci_kong_lb]
Kong Gateway [cmdb_ci_kong_gateway]	Provides::Provided by	Managed API [cmdb_ci_managed_api]
Kong Gateway [cmdb_ci_kong_gateway]	Reference	Kong Workspace [kong_workspace]
Kong Gateway [cmdb_ci_kong_gateway]	Reference	API Policy [api_policy]
Kong Gateway [cmdb_ci_kong_gateway]	Reference	API Consumer [api_consumer]

Kong Workspace [kong_workspace]

The following attributes in the Kong Workspace [kong_workspace] table are populated by collected data:

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Attribute label	Attribute name
ID	id
Name	name
API Gateway	api_gateway

Relationship created for Kong Workspace

Parent class	Relationship type	Child class
Kong Workspace [kong_workspace]	Reference	Kong Gateway [cmdb_ci_kong_gateway]

Kong Load Balancer [cmdb_ci_kong_lb]

The following attributes in the Kong Load Balancer [cmdb_ci_kong_lb] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
Algorithm	algorithm
Operational status	operational_status

Relationships created for Kong Load Balancer

Parent class	Relationship type	Child class
Kong Load Balancer [cmdb_ci_kong_lb]	Contains::Contained by	Kong Target [cmdb_ci_kong_target]
Kong Load Balancer [cmdb_ci_kong_lb]	Reference	Key Value [cmdb_key_value]

Kong Target [cmdb_ci_kong_target]

The following attributes in the Kong Target [cmdb_ci_kong_target] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
Target	target
Operational status	operational_status

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Relationship created for Kong Target

Parent class	Relationship type	Child class
Kong Target [cmdb_ci_kong_target]	Reference	Key Value [cmdb_key_value]

Managed API [cmdb_ci_managed_api]

The following attributes in the Managed API [cmdb_ci_managed_api] table are populated by collected data:

Attribute label	Attribute name
Life Cycle Stage	life_cycle_stage
Life Cycle Stage Status	life_cycle_stage_status
ID	id
Name	name
Base URL	base_url
Type	type
Model ID	model_id
Operational status	operational_status

Relationships created for Managed API

Parent class	Relationship type	Child class
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Frontend [cmdb_ci_api_frontend]
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Backend [cmdb_ci_api_backend]

API Backend [cmdb_ci_api_backend]

The following attributes in the API Backend [cmdb_ci_api_backend] table are populated by collected data:

Attribute label	Attribute name
Host	host
ID	id
Path	path
URL	url
Name	name
Port	port
Protocol	protocol

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Attribute label	Attribute name
Operational status	operational_status

Relationship created for API Backend

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

API Frontend [cmdb_ci_api_frontend]

The following attributes in the API Frontend [cmdb_ci_api_frontend] table are populated by collected data:

Attribute label	Attribute name
Host	host
ID	id
Method	method
Path	path
URL	url
Name	name
Protocol	protocol
Operational status	operational_status

Relationship created for API Frontend

Parent class	Relationship type	Child class
API Frontend [cmdb_ci_api_frontend]	Use End Point To::Use End Point From	API Backend [cmdb_ci_api_backend]

API Consumer [api_consumer]

The following attributes in the API Consumer [api_consumer] table are populated by collected data:

Attribute label	Attribute name
ID	id
API Gateway	api_gateway
Custom ID	custom_id
Username	username

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Relationship created for API Consumer

Parent class	Relationship type	Child class
API Consumer [api_consumer]	Reference	Kong Gateway [cmdb_ci_kong_gateway]

API Policy [api_policy]

The following attributes in the API Policy [api_policy] table are populated by collected data:

Attribute label	Attribute name
Frontend	frontend
ID	id
Active	active
Name	name
Protocols	protocols
Managed API	managed_api
Consumer	consumer
API Gateway	api_gateway

Relationship created for API Policy

Parent class	Relationship type	Child class
API Policy [api_policy]	Reference	Kong Gateway [cmdb_ci_kong_gateway]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Configuration item	configuration_item
Key	key
Value	value

Accessing the connection details of API Service Graph Connector for Kong Gateway

You can access the connection details of the API Service Graph Connector for Kong Gateway in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the API Service Graph Connector for Kong Gateway. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

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Access the details of a Kong Gateway connection

Access the details of a Kong Gateway connection configured for the API Service Graph Connector for Kong Gateway.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Kong Gateway** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name and alias.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

API Service Graph Connector for Kong Konnect

Use the ServiceNow® API Service Graph Connector for Kong Konnect to import API details from a Kong Konnect service into the Configuration Management Database (CMDB).

Request apps on the Store

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

Key features

Import data into a normalized data model for consistency across other technologies.

The API Insights workspace provides a centralized interface where you can analyze and interact with API data, without needing direct access to Kong Konnect, enhancing visibility, governance, and collaboration across the API estate. To learn more, see API Insights.

Supported ServiceNow versions

- Xanadu
- Yokohama
- Zurich

Use cases

You can use the API Service Graph Connector for Kong Konnect to:

- Maintain an end-to-end inventory of defined APIs, identifying what APIs are published, used, and by whom.
- Track APIs from customer-facing endpoints to the underlying services, identifying impacted endpoints when services change or fail and creating incidents for reported issues.
- Address vulnerabilities and security incidents related to API endpoints and create compliance requirements to measure against.

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Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure API Service Graph Connector for Kong Konnect using SGC Central.

Data mapping

Data from the Kong Konnect data sources is mapped and transformed into the CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from a Kong Konnect service.

The following table lists the data sources in the order they run, the staging tables, and the target tables as CMDB CI classes and non-CMDB tables for a Kong Konnect service.

Data mapping for Kong Konnect

Data source	Staging table	Target tables
Gateway	Gateway [sn_kong_konnect_gateway]	Kong Gateway DNS Alias Logical Datacenter Cloud Service Account Key Value
Data Plane Node	Data Plane Node [sn_kong_konnect_data_plane_node]	Kong Data Plane Node
Load Balancer	Load Balancer [sn_kong_konnect_load_balancer]	Kong Load Balancer
Target	Target [sn_kong_konnect_target]	Kong Target
Services	Services [sn_kong_konnect_services]	Managed API API Backend Key Value
Routes	Routes [sn_kong_konnect_routes]	API Frontend
Consumer	Consumer [sn_kong_konnect_consumer]	API Consumer
Policy	Policy [sn_kong_konnect_policy]	API Policy
Developers	Developers [sn_kong_konnect_developers]	API Consumer
Applications	Applications [sn_kong_konnect_applications]	API Consumer Subscription
API Consumer Access	API Consumer Access [sn_kong_konnect_api_consumer_access]	API Consumer Access

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For more information on where data is saved when pulling data from a Kong Konnect service, see Target tables for storing API Service Graph Connector for Kong Konnect data.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Record removal process

The connector supports soft deletion for CMDB CI classes only, meaning records are not permanently removed from the system. Instead, any CMDB CI records not discovered during the last scheduled job run are marked as **Non-Operational**.

Configure API Service Graph Connector for Kong Konnect using SGC Central

Set up scheduled import jobs to pull in Kong Konnect data into your CMDB.

Before you begin

Install API Service Graph Connector for Kong Konnect version 1.0.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

Note:
Alternatively, you can configure a default connection already available from the installed or draft connections in SGC Central. Go to **All** > **Service Graph Connectors**, then select **Setup** for the connector from the menu. To learn about installed and draft connections, see Managing connections added for Service Graph Connectors in SGC Central.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the Kong Konnect connector type, and then select **Create connection**.

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5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Enter connection details and test the API connection for importing Kong Konnect data.

   a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

   b. On the form, fill in the fields.

   Create and test connection form

Field	Description
Connection name	Name to identify the Kong Konnect connection record. For example, `Kong Konnect connection`.
Personal access token	Token used to securely authenticate your identity and authorize access to your Kong Konnect account via the API

   c. Select **Create and test connection**.

   d. Once the connection test is complete, select **Continue**.

7. Set the configuration properties for the connection.

   a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

   b. Fill in the property details.

   Kong Konnect configuration properties

Property	Description
Data retrieval configuration	
Gateway group IDs	Group IDs associated with a Kong Konnect gateway representing control plane groups consisting of self-managed control planes. For multiple IDs, separate them with commas. **Note:** The **Gateway group IDs** property is used if specified, and it overrides the Gateway IDs.
Gateway IDs	IDs of individual Kong Konnect gateways, each representing a control plane. For multiple IDs, separate them with commas.

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Property	Description
Data retrieval configuration	
	Note: The **Gateway IDs** property value is ignored if Gateway group IDs are specified.
Regions	List of comma-separated regions where the Kong Konnect gateway resides.
Expand HTTP method types	HTTP methods including `GET`, `POST`, `PUT`, `PATCH`, `DELETE`, `OPTIONS`, `HEAD`, `CONNECT`, and `TRACE`, to consider for routes. For multiple methods, separate them with commas. If left blank, results in a single API Frontend being created with the `ALL` method, indicating support for all standard HTTP methods.
Collect usage data	Enable usage data collection to retrieve API usage data over a specified duration.
Collection period duration	Duration for collecting API usage data. Valid values include: ▪ `15m` (Last 15 minutes) ▪ `1h` (Last 1 hour) ▪ `6h` (Last 6 hours) ▪ `12h` (Last 12 hours) ▪ `24h` (Last 24 hours) ▪ `7d` (Last 7 days) ▪ `30d` (Last 30 days) ▪ `current_week` (Current week) ▪ `previous_week` (Previous week) ▪ `current_month` (Current month) ▪ `previous_month` (Previous month)
Performance configuration	
Page size	Number of records per page. Default is `100`.
Partition size	Partition size for Kong Konnect managed APIs if parallel loading is enabled. Accepts a numeric value greater than zero. If left empty, the value is automatically calculated. **Note:** Parallel loading is available for the following data sources only: ▪ Routes ▪ Target
Tags settings	
Import tags	Option to ingest tags from the Kong Konnect gateway.

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Property	Description
Data retrieval configuration	
Tags value separator	Separator for key and value in tags.

c. Select **Continue**.

8. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Expand the Parent scheduled data import within the Import schedules list to select the **Gateway** import schedule associated with your connection.

Note:
The connection name is prefixed to the schedule name.

c. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

d. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

e. Select **Continue**.

9. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The configured connection appears in the Installed connections list.

You can then manage connections from the SGC Central view of the CMDB Workspace. For more information, see Managing connections added for Service Graph Connectors in SGC Central.

Related topics

API Service Graph Connector for Kong Konnect

Target tables for storing API Service Graph Connector for Kong Konnect data

Target tables for storing API Service Graph Connector for Kong Konnect data

When you complete setting up the connection, you can configure the integration to periodically pull data from a Kong Konnect application. The data is saved in tables that extend from the Configuration item [cmdb_ci] classes and other non-CMDB tables.

Kong Gateway [cmdb_ci_kong_gateway]

The following attributes in the Kong Gateway [cmdb_ci_kong_gateway] table are populated by collected data:

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Attribute label	Attribute name
ID	id
Name	name
Asset tag	asset_tag
Correlation ID	correlation_id
Description	short_description
Operational status	operational_status

Relationships created for Kong Gateway

Parent class	Relationship type	Child class
Kong Gateway [cmdb_ci_kong_gateway]	Provides::Provided by	Kong Load Balancer [cmdb_ci_kong_lb]
Kong Gateway [cmdb_ci_kong_gateway]	Provides::Provided by	Managed API [cmdb_ci_managed_api]
Kong Gateway [cmdb_ci_kong_gateway]	Uses::Used by	DNS Alias [cmdb_ci_dns_alias]
Kong Gateway [cmdb_ci_kong_gateway]	Reference	Key Value [cmdb_key_value]
Kong Gateway [cmdb_ci_kong_gateway]	Reference	API Consumer [api_consumer]

Kong Data Plane Node [sn_kong_konnect_kong_data_plane_node]

The following attributes in the Kong Data Plane Node [sn_kong_konnect_kong_data_plane_node] table are populated by collected data:

Attribute label	Attribute name
Hostname	hostname
Version	version
id	ID
Connection Alias SysId	connectionaliassysid
Operational status	operational_status

Relationship created for Kong Data Plane Node

Parent class	Relationship type	Child class
Kong Data Plane Node [sn_kong_konnect_kong_data_plane_node]	Reference	Kong Gateway [cmdb_ci_kong_gateway]

Note:
This table is available within the API Service Graph Connector for Kong Konnect application (sn_kong_konnect) scope.

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Cloud Service Account [cmdb_ci_cloud_service_account]

The following attributes in the Cloud Service Account [cmdb_ci_cloud_service_account] table are populated by collected data:

Attribute label	Attribute name
Account Id	account_id
Name	name
Datacenter Type	datacenter_type
Operational status	operational_status

Logical Datacenter [cmdb_ci_logical_datacenter]

The following attributes in the Logical Datacenter [cmdb_ci_logical_datacenter] table are populated by collected data:

Attribute label	Attribute name
Name	name
Object ID	object_id
Region	region
Operational status	operational_status

Relationships created for Logical Datacenter

Parent class	Relationship type	Child class
Logical Datacenter [cmdb_ci_logical_datacenter]	Hosted on::Hosts	Kong Gateway [cmdb_ci_kong_gateway]
Logical Datacenter [cmdb_ci_logical_datacenter]	Hosted on::Hosts	Cloud Service Account [cmdb_ci_cloud_service_account]

DNS Alias [cmdb_ci_dns_alias]

The following attributes in the DNS Alias [cmdb_ci_dns_alias] table are populated by collected data:

Attribute label	Attribute name
Name	name
Operational status	operational_status

Kong Load Balancer [cmdb_ci_kong_lb]

The following attributes in the Kong Load Balancer [cmdb_ci_kong_lb] table are populated by collected data:

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Attribute label	Attribute name
ID	id
Name	name
Algorithm	algorithm
Description	short_description
Operational status	operational_status

Relationship created for Kong Load Balancer

Parent class	Relationship type	Child class
Kong Load Balancer [cmdb_ci_kong_lb]	Contains::Contained by	Kong Target [cmdb_ci_kong_target]

Kong Target [cmdb_ci_kong_target]

The following attributes in the Kong Target [cmdb_ci_kong_target] table are populated by collected data:

Attribute label	Attribute name
ID	id
Description	short_description
Name	name
Operational status	operational_status
Target	target

Managed API [cmdb_ci_managed_api]

The following attributes in the Managed API [cmdb_ci_managed_api] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
Base URL	base_url
Description	short_description
Operational status	operational_status
Life Cycle Stage Status	life_cycle_stage_status
Life Cycle Stage	life_cycle_stage
Type	type

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Relationships created for Managed API

Parent class	Relationship type	Child class
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Frontend [cmdb_ci_api_frontend]
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Backend [cmdb_ci_api_backend]

API Backend [cmdb_ci_api_backend]

The following attributes in the API Backend [cmdb_ci_api_backend] table are populated by collected data:

Attribute label	Attribute name
Host	host
ID	id
Path	path
URL	url
Name	name
Port	port
Protocol	protocol

Relationship created for API Backend

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

API Frontend [cmdb_ci_api_frontend]

The following attributes in the API Frontend [cmdb_ci_api_frontend] table are populated by collected data:

Attribute label	Attribute name
Host	host
ID	id
Method	method
Path	path
URL	url
Description	short_description
Name	name
Operational status	operational_status

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Attribute label	Attribute name
Protocol	protocol

Relationship created for API Frontend

Parent class	Relationship type	Child class
API Frontend [cmdb_ci_api_frontend]	Use End Point To::Use End Point From	API Backend [cmdb_ci_api_backend]

API Consumer [api_consumer]

The following attributes in the API Consumer [api_consumer] table are populated by collected data:

Attribute label	Attribute name
ID	id
Custom ID	custom_id
Email **Note:** Fetched using the Developers data source only.	email
Username	username
API Gateway	api_gateway

Relationship created for API Consumer

Parent class	Relationship type	Child class
API Consumer [api_consumer]	Reference	Kong Gateway [cmdb_ci_kong_gateway]

API Consumer Subscription [cmdb_ci_api_consumer_subscription]

The following attributes in the API Consumer Subscription [cmdb_ci_api_consumer_subscription] table are populated by collected data:

Attribute label	Attribute name
Operational status	operational_status
API Consumer	api_consumer
ID	id
Creation Date	creation_date
Description	short_description
Last Modified Date	last_modified_date

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Attribute label	Attribute name
Name	name

Relationship created for API Consumer Subscription

Parent class	Relationship type	Child class
API Gateway [cmdb_ci_api_gateway]	Provides::Provided by	API Consumer Subscription [cmdb_ci_api_consumer_subscription]

API Consumer Access [api_consumer_access]

The following attributes in the API Consumer Access [api_consumer_access] table are populated by collected data:

Attribute label	Attribute name
API	api
API Consumer	api_consumer
State	state
API Consumer Subscription	api_consumer_subscription

API Policy [api_policy]

The following attributes in the API Policy [api_policy] table are populated by collected data:

Attribute label	Attribute name
Name	name
Managed API	managed_api
ID	id
Protocols	protocols
Frontend	frontend
Active	active
Consumer	consumer

Relationship created for API Policy

Parent class	Relationship type	Child class
API Policy [api_policy]	Reference	Managed API [cmdb_ci_managed_api]

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

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Attribute label	Attribute name
Tag	tag
Configuration item	configuration_item
Key	key
Value	value

Accessing the connection details of API Service Graph Connector for Kong Konnect

You can access the connection details of the API Service Graph Connector for Kong Konnect in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF, you can access all the connections used by the API Service Graph Connector for Kong Konnect. The connection details include the connection alias, connection properties, data sources, and scheduled data imports associated with a connection. You can also test the connection. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a Kong Konnect connection

Access the details of a Kong Konnect connection configured for the API Service Graph Connector for Kong Konnect.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **Kong Konnect** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.
3. On the Service Graph Connections page, view the connection details such as the connection name and alias.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

API Service Graph Connector for MuleSoft

Use the ServiceNow® API Service Graph Connector for MuleSoft to import API details from a MuleSoft Anypoint Platform application into the Configuration Management Database (CMDB).

Request apps on the Store

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

Key features

Import data into a normalized data model for consistency across other technologies.

The API Insights workspace provides a centralized interface where you can analyze and interact with API data, without needing direct access to a MuleSoft Anypoint Platform application, enhancing visibility, governance, and collaboration across the API estate. To learn more, see API Insights.

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Supported ServiceNow versions

- Xanadu
- Yokohama
- Zurich

Use cases

You can use the API Service Graph Connector for MuleSoft to:

- Maintain an end-to-end inventory of exposed and backend APIs, identifying what APIs are published, used, and by whom.
- Create relationships between API managers, runtime deployments, and gateway instances to understand service dependencies and identify impact when services change or fail.
- Track all managed APIs across multiple MuleSoft organizations and environments, identifying which APIs are active, deployed, and their operational status.
- Address vulnerabilities and security incidents related to API endpoints and create compliance requirements.
- Identify impacted endpoints when backend services change or fail, enabling proactive incident management and faster resolution times.

Configuring a connection for the connector

You can configure a connection for the connector by using the SGC Central view in the CMDB Workspace. The SGC Central view enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections. To configure the connector using SGC Central, see Configure API Service Graph Connector for MuleSoft using SGC Central.

Data mapping

Data from the MuleSoft Anypoint Platform data sources is mapped and transformed into the CMDB Configuration Item (CI) class definitions using the Robust Transform Engine (RTE). Data is inserted into the CMDB using the Identification and Reconciliation Engine (IRE).

When you complete setting up the connection, you can configure the integration to periodically pull data from a MuleSoft Anypoint Platform application.

The following table lists the data sources in the order they run, the staging tables, and the target tables as CMDB CI and non-CMDB classes for a MuleSoft Anypoint Platform application.

Data mapping for MuleSoft Anypoint Platform

Data source	Staging table	Target tables
Gateway	Gateway [sn_mulesoft_gateway]	Anypoint API Gateway
API Manager	Managed API [sn_mulesoft_managed_api]	Managed API Key Value [cmdb_key_value]
Frontend And Backend	Frontend And Backend [sn_mulesoft_frontend_and_backend]	Frontend

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Data mapping for MuleSoft Anypoint Platform (continued)

Data source	Staging table	Target tables
		Backend
API Deployments	API Deployments [sn_mulesoft_api_deployments]	API Deployment Data Service Instance

For more information on where data is saved when pulling data from a MuleSoft Anypoint Platform application, see Target tables for storing API Service Graph Connector for MuleSoft data.

You can use the IntegrationHub ETL app to view the data maps. See IntegrationHub ETL for more information.

Configure API Service Graph Connector for MuleSoft using SGC Central

Set up scheduled import jobs to pull in MuleSoft Anypoint Platform data into your CMDB.

Before you begin

Install API Service Graph Connector for MuleSoft version 1.0.0 or later from the ServiceNow Store. For ServiceNow Store installation steps, see Install a ServiceNow Store application.

Obtain the Connected App credentials from your MuleSoft Anypoint Platform administrator. Make a note of the following details:

- Client ID: The unique identifier for your Connected App.
- Client Secret: The secret key for authenticating your Connected App.
- Directory (tenant) ID: The MuleSoft organization identifier from which data is imported.

For more information on connector setup, see the API Service Graph connector for MuleSoft - Setup Instructions [KB2560348] article in the Now Support Knowledge Base.

Role required: The following table shows the roles required for each stage of the playbook.

Role required for each playbook stage

Stage	Role
Prerequisites	admin
Setup	SGC-Admin (sn_cmdb_int_util.sgc_admin) or admin

Note:
The admin user role is required to run background scripts and to provide access to global tables to the SGC-Admin user. For information about the user roles for Service Graph Connectors, see Service Graph Connector user roles.

About this task

The playbook experience for onboarding connectors is activated with SGC Central in the CMDB Workspace. To configure the SGC Central application, see Configuring SGC Central and for more information on how to interact with a playbook, see Interact with Playbook.

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Note:
Alternatively, you can configure a default connection already available from the installed or draft connections in SGC Central. Go to **All** > **Service Graph Connectors**, then select **Setup** for the connector from the menu. To learn about installed and draft connections, see Managing connections added for Service Graph Connectors in SGC Central.

Procedure

1. Navigate to **Workspaces** > **CMDB Workspace**.
2. In the CMDB Workspace, select **SGC Central**.
3. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

4. On the Create connection window, select the MuleSoft connector type, and then select **Create connection**.
5. Complete the initial prerequisites when setting up a connection for the first time using a connector.

   Note:
   This step is required only during the first-time setup. See Perform initial setup tasks when creating a connection in SGC Central.

6. Enter connection details and test the API connection for importing MuleSoft data.

   a. In the **Setup** stage of the playbook, select the **Create and test connection** activity.

   b. On the form, fill in the fields.

Create and test connection form

Field	Description
Connection name	Name to identify the MuleSoft connection record. For example, `MuleSoft connection`.
Connection URL	Base URL to connect to the MuleSoft Anypoint Platform API service. **Note:** This field is automatically set to the URL to connect to the application. Leave the field value as is.
OAuth client ID	Client ID of your MuleSoft Connected App as noted in the Before you begin section.
OAuth Client Secret	Client secret of the MuleSoft Connected App as noted in the Before you begin section.

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Field	Description
OAuth Token URL	Token endpoint URL used to securely authenticate your identity and authorize access to your MuleSoft Anypoint Platform API account via the API.

c. Select **Create and test connection**.

d. Once the connection test is complete, select **Continue**.

7. Set the configuration properties for the connection.

a. In the **Setup** stage of the playbook, select the **Set configuration properties** activity.

b. Fill in the property details.

MuleSoft configuration properties

Property	Description
Data retrieval configuration	
Organization id	MuleSoft organization identifier from which API data is imported. If you have multiple organizations, create separate connections for each. For multiple organizations, create separate connections for each.
Environment filter	MuleSoft environments to include in the connection. For multiple environments, separate them with commas. Only API proxies in the environments listed in the *`Environment filter`* property are imported. If you leave this field empty, the data sources within the connector import API proxies from all environments.
API Manager filter	API manager instance status filter. Accepts a single value: `active`, `inactive`, or `unregistered`. When specified, only APIs matching that status are imported. If you leave this field empty, all APIs are imported regardless of status.
Only deployed API managers	Option to import only APIs currently deployed to runtime instances.
Import deployed applications	Option to collect deployed applications from runtime manager as Data Service Instances.
Collection period (in days)	Duration in days for collecting API usage data.
Collect usage data	Option to enable usage data collection to retrieve API usage metrics over a specified duration.

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Property	Description
Data retrieval configuration	
Tags settings	
Import tags	Option to ingest tags from the MuleSoft API Manager.
Tag key/ value indicator	Separator for key and value in tags.

c. Select **Continue**.

8. Configure the import schedule to import data at regular intervals.

a. In the **Setup** stage of the playbook, select the **Configure import schedule** activity.

b. Expand the Parent scheduled data import within the Import schedules list to select the **Gateway** import schedule associated with your connection.

> **Note:**
> The connection name is prefixed to the schedule name.

c. In the Configure import schedule dialog box, select the **Active** check box, and then fill in the run schedule and time details.

For more information, see Schedule a data import.

d. Select **Save**.
Alternatively, select **Execute Now** to execute the import schedule immediately.

e. Select **Continue**.

9. In the **Setup** stage of the playbook, select the **Confirm connection creation** activity to verify whether the connection was created.

What to do next

Select **View all connections** to review the connection details. The created connection appears in the Installed connections list.

You can then manage connections from the SGC Central view of the CMDB Workspace. For more information, see Managing connections added for Service Graph Connectors in SGC Central.

Target tables for storing API Service Graph Connector for MuleSoft data

When you complete setting up the connection, you can configure the integration to periodically pull data from a MuleSoft Anypoint Platform application. The data is saved in tables that extend from the Configuration item [cmdb_ci] classes and other non-CMDB tables.

Anypoint API Gateway [cmdb_ci_anypoint_api_gateway]

The following attributes in the Anypoint API Gateway [cmdb_ci_anypoint_api_gateway] table are populated by collected data:

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Attribute label	Attribute name
ID	id
Name	name
Operational status	operational_status

Relationship created for Anypoint API Gateway

Parent class	Relationship type	Child class
Anypoint API Gateway [cmdb_ci_anypoint_api_gateway]	Provides::Provided by	Managed API [cmdb_ci_managed_api]

Managed API [cmdb_ci_managed_api]

The following attributes in the Managed API [cmdb_ci_managed_api] table are populated by collected data:

Attribute label	Attribute name
ID	id
Name	name
Version	version
Base URL	base_url
Correlation ID	correlation_id
Environment	environment
Type	type
Life Cycle Stage	life_cycle_stage
Description	short_description
Model ID	model_id
Operational status	operational_status
Life Cycle Stage Status	life_cycle_stage_status

Relationships created for Managed API

Parent class	Relationship type	Child class
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Backend [cmdb_ci_api_backend]
Managed API [cmdb_ci_managed_api]	Uses::Used by	API Frontend [cmdb_ci_api_frontend]
Managed API [cmdb_ci_managed_api]	Reference	API Deployment [api_deployment]

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API Frontend [cmdb_ci_api_frontend]

The following attributes in the API Frontend [cmdb_ci_api_frontend] table are populated by collected data:

Attribute label	Attribute name
API Minor Version	api_minor_version
API Version	api_version
Host	host
ID	id
Method	method
Path	path
URL	url
Description	short_description
Name	name
Operational status	operational_status

Relationship created for API Frontend

Parent class	Relationship type	Child class
API Frontend [cmdb_ci_api_frontend]	Use End Point To::Use End Point From	API Backend [cmdb_ci_api_backend]

API Backend [cmdb_ci_api_backend]

The following attributes in the API Backend [cmdb_ci_api_backend] table are populated by collected data:

Attribute label	Attribute name
Host	host
Method	method
Path	path
URL	url
Name	name
Operational status	operational_status
Type	type

API Deployment [cmdb_ci_api_deployment]

The following attributes in the API Deployment [cmdb_ci_api_deployment] table are populated by collected data:

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Attribute label	Attribute name
API	api
Name	name

Data Service Instance [cmdb_ci_data_service_instance]

The following attributes in the Data Service Instance [cmdb_ci_data_service_instance] table are populated by collected data:

Attribute label	Attribute name
Name	name
Correlation ID	correlation_id
Environment	environment
Operational status	operational_status

Key Value [cmdb_key_value]

The following attributes in the Key Value [cmdb_key_value] table are populated by collected data:

Attribute label	Attribute name
Configuration item	configuration_item
Key	key
Value	value
Tag	tag

Accessing the connection details of API Service Graph Connector for MuleSoft

You can access the connection details of the API Service Graph Connector for MuleSoft in a single view using the common connection framework (CCF) included within the Integration Commons for CMDB (sn_cmdb_int_util) store app.

With the CCF feature, you can access all connections for a connector. Connection details include the alias, properties, data sources, and associated scheduled data imports. In addition, you can test a connection. Additional details may appear depending on the connector type. For more information, see Accessing the connection details of Service Graph Connectors.

Access the details of a MuleSoft connection

Access the details of a MuleSoft connection configured for the API Service Graph Connector for MuleSoft.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Graph Connectors** > **MuleSoft** > **Connections**.
2. From the **Name** column of the Service Graph Connections list, select a connection.

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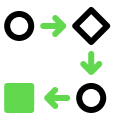
3. On the Service Graph Connections page, view the connection details such as the connection name and alias.
4. Select a related list to view further details of the connection.
5. **Optional:** Select the **Test Connection** related link to test the connection.

SGC Central

The ServiceNow® Service Graph Connector Central view also called as the SGC Central view in the Service Graph Workspace or CMDB Workspace enables you to discover and install connectors, and then effectively manage the full life cycle of creating, editing, monitoring, and debugging connections.

Get started

Explore Learn about the benefits of SGC Central and how it is used.	Configure Plan and configure your implementation.
Onboard  Onboard Service Graph Connectors to import third-part data into CMDB.	Reference Get details about installed components.

Troubleshoot and get help

- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring SGC Central

Learn about the SGC Central application with a sample workflow and review the benefits it can provide for different users in your organization.

SGC Central overview

With the SGC Central application you can discover and install integration-ready Service Graph Connectors, monitor their connection performance and insights, ensure complete visibility into discovered sources and processed data, and access tools and resources for diagnosing and resolving connection issues. You access the application from the SGC Central view in the Service Graph Workspace or CMDB Workspace.

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SGC Central users

User roles

User role	Description
Administrator	Users with the admin role can install and upgrade Service Graph Connectors, including API Service Graph Connectors. Administrators can perform the following tasks: • Create a connection and configure connection properties. • Monitor connections and data imports. • Manage connections. • Upgrade the connector. • Run background scripts. • Provide access to tables in the global scope.
SGC-admin	The sn_cmdb_int_util.sgc_admin user role has the second-highest level of permissions for Service Graph Connectors. SGC-admin users can perform the following tasks: • Create, update, and delete connections. • Configure connectors using the guided setup. • Read and write the system properties that are used by the connectors. • Perform all operations that are allowed by other user roles that have lower levels of permission.
CMDB installation administrator	Users with the cmdb_inst_admin role can use IntegrationHub ETL to create and customize integrations. CMDB installation administrators can perform the following tasks: • Read all Service Graph Connector application modules. • Read and write the system properties that are used by the connectors. • Create, update, and delete custom tables. • Create, update, and delete scheduled imports and data sources. • Read records that are owned by other applications and are related to the functionality of Service Graph Connectors (for instance, records in the em_event table).

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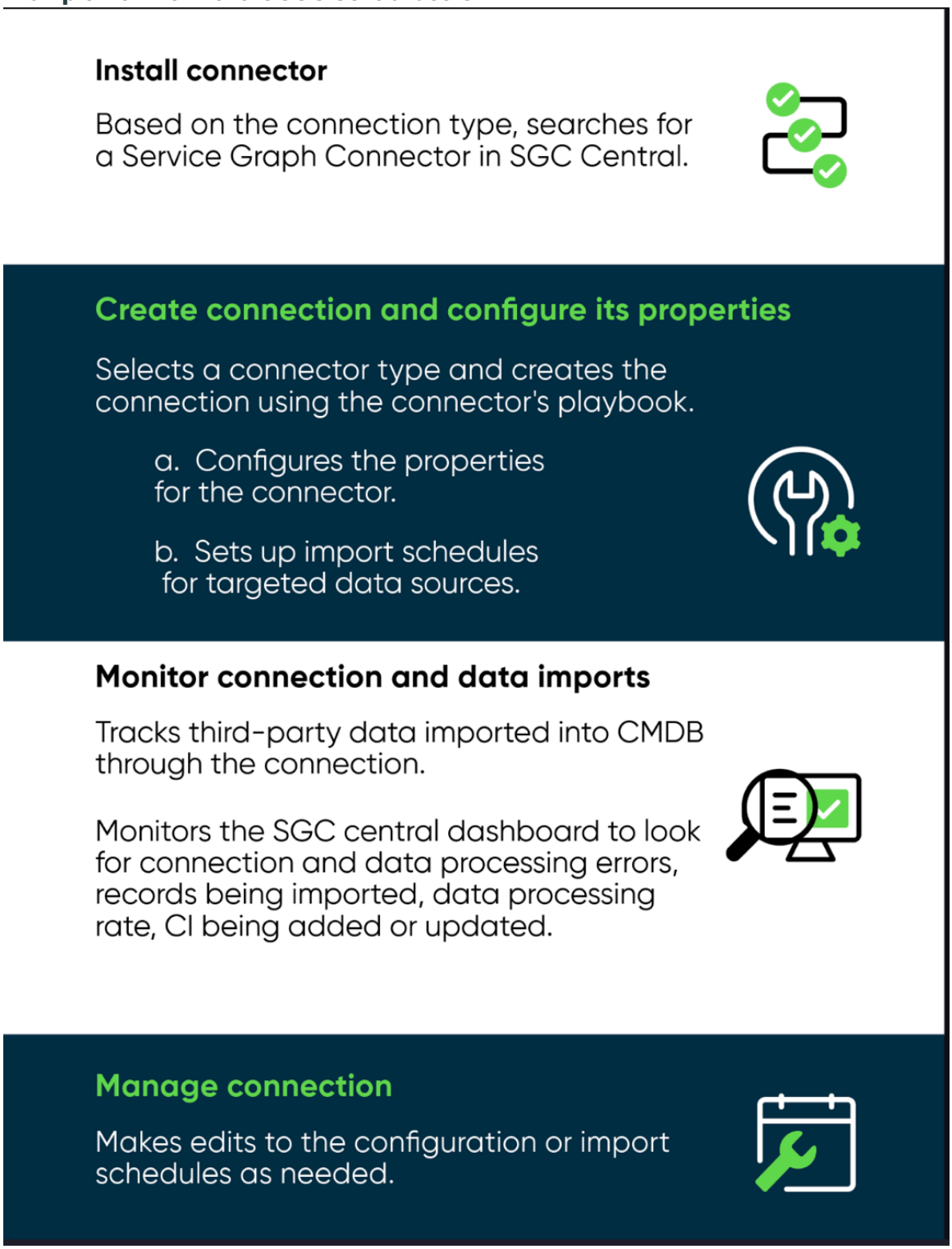
SGC Central workflow

Example workflow for the SGC Central users



A user with the SGC-admin or admin role uses SGC Central to perform the following tasks:

1. Based on the connection type, searches for a Service Graph Connector within the SGC Central view in Service Graph Workspace or CMDB Workspace.
2. Selects a connector type and creates the connection using the playbook available for the connector.

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a. Configures the properties for the connection.

b. Sets up import schedules for targeted data sources.

3. Tracks the third-party data imported by the system using the connection into CMDB.
4. Monitors the SGC Central dashboard for any errors in the connection or the data processing pipeline.
5. Makes edits to the configuration or import schedules if needed.

SGC Central benefits

SGC Central benefits

Benefit	Feature	Users
Visualize connection status	Integrated dashboard to gain instant insights into the connection status of your connectors and performance, keeping your connections running smoothly. In addition, quickly debug for seamless integration.	Administrator, SGC-admin, CMDB installation administrator
Discover integration-ready connectors	Explore and install connectors based on the connection type requirements. See which connectors have new versions available and are eligible for upgrade.	Administrator
Manage connections intuitively	Create or modify connections to your needs.	Administrator, SGC-admin

What to explore next

To learn more about configuring and using SGC Central, see:

- Configuring SGC Central
- Managing connections added for Service Graph Connectors in SGC Central
- SGC Central reference

Configuring SGC Central

Set up the SGC Central application for onboarding and maintaining Service Graph Connectors and monitoring the errors related to connections added using Service Graph Connectors.

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Configuration checklist

1. Install SGC Central.

> **Note:**
> If you don't see the SGC Central view in the Service Graph Workspace or CMDB Workspace, clear the browser cache and try accessing the view again.

2. Configure scheduled jobs for data collection.

> **Note:**
> If you don't see data on the SGC Central dashboard, run scheduled jobs to display data on the SGC Central dashboard.

3. Onboard Service Graph Connectors within SGC Central.
4. Configure the Service Graph Connector settings within SGC Central.

Install SGC Central

You can install the SGC Central application (sn_sgc_central) if you have the admin role. The application installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Confirm that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Review the SGC Central application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.
- Review the supported CMDB Workspace versions for the corresponding ServiceNow versions as listed in the following table.

ServiceNow versions and supported CMDB Workspace versions

ServiceNow versions	Supported CMDB Workspace versions
Australia	8.0.0 or later
Zurich	7.4.1 or later
Yokohama	7.3.0 or later

Role required: admin

About this task

The following items are installed with SGC Central:

- Plugins
- Store applications
- Scheduled jobs
- Tables

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For more information, see Components installed with SGC Central.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the SGC Central application (sn_sgc_central) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   In the list next to the **Install** button, the versions that are available to you are displayed.
3. Select a version from the list and select **Install**.

   In the Review Installation Details dialog box, any dependencies installed with your application are listed.
4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data are the sample records that describe application features for common use cases. Load the demo data when you first install the application on a development or test instance.
6. Select **Install**.

Configuring scheduled jobs for SGC Central

You can configure scheduled jobs to automate data collection for tracking integration performance, errors, and processing status of Service Graph Connectors within the SGC Central application.

Scheduled jobs ensure that integration performance data is consistently gathered and available for reporting and analysis within SGC Central. For more information on configuring a scheduled job, see Scheduled jobs.

Types of scheduled jobs in SGC Central

SGC Central provides different scheduled jobs to meet various data collection needs:

SGC central collection

Collects score and metric data displayed on the SGC Central dashboard for the latest integration activity. This job runs daily automatically or as configured.

> **Note:**
> As a user with the admin role, you must run this scheduled job immediately after installing SGC Central and update its schedule based on your preferences to reflect the latest integration activity.

SGC central collection onDemand with lookback

Enables on-demand collection of historical integration data for analysis. The job collects scores for a lookback period of 30 days, meaning it gathers data from 30 days ago to today (0 days ago), enabling historical data collection for performance analysis.

> **Note:**
> As a user with the admin role, you can run this scheduled job on demand, rather than on a daily schedule.

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Exploring Service Graph Connectors in SGC Central

You can explore available options for onboarding and maintaining Service Graph Connectors within the SGC Central view of the Service Graph Workspace or CMDB Workspace.

Service Graph Connectors are integrations that facilitate data ingestion into the Configuration Management Database (CMDB) from various third-party sources. To learn more, see Getting started with Service Graph Connectors.

Options for maintaining Service Graph Connectors in SGC Central include:

- Updating an installed Service Graph Connector.
- Installing a Service Graph Connector using an available entitlement.
- Installing a Service Graph Connector from the ServiceNow Store.

Update an installed Service Graph Connector in SGC Central

Keep a Service Graph Connector up-to-date within SGC Central.

Before you begin

Role required: admin

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. Select **Explore connectors**.
3. In the Updates available section, review the updates that are available for a Service Graph Connector.
4. Update the connector.
   - Select a connector to access the connector in Application Manager and then install any updates.
   - Select **Install updates** to open Application Manager, and then view and install updates for a connector from the **Updates** tab.

   For more information, see Application Manager.

Install a Service Graph Connector with an available entitlement in SGC Central

Install a Service Graph Connector that matches an entitlement available in Application Manager from within the SGC Central view of the Service Graph Workspace or CMDB Workspace.

Before you begin

Role required: admin

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. Select **Explore connectors**.

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3. In the Entitlements available section, select **Explore in Application Manager**.
4. In Application Manager, review the entitlements and install a connector.
   For more information, see Application Manager.

Install a Service Graph Connector from ServiceNow Store in SGC Central

Explore ServiceNow Store to request and use a Service Graph Connector with no available entitlements from within the SGC Central view of the Service Graph Workspace or CMDB Workspace.

Before you begin
Role required: admin

Procedure
1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. Select **Explore connectors**.
3. In the Available from ServiceNow Store section, select **Explore in ServiceNow Store**.
4. On ServiceNow Store, review the list of Service Graph Connectors and install a connector.
   For more information, see the ServiceNow Store website.

Configuring Service Graph Connector settings in SGC Central

You can view and configure settings for your Service Graph Connectors within the SGC Central view of the Service Graph Workspace or CMDB Workspace.

In SGC Central, you can configure Service Graph Connector settings related to system properties. See Configure system properties for a Service Graph Connector in SGC Central.

Configure system properties for a Service Graph Connector in SGC Central

Configure system properties for a Service Graph Connector within the SGC Central view of the Service Graph Workspace or CMDB Workspace.

Before you begin
Role required: admin

Procedure
1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. Select **Settings**.
3. In the Browse system properties by connector section, select an available Service Graph Connector.

> **Note:**
> When you select a connector type, the application scope changes to the selected type.

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4. On the system properties page of the Service Graph Connector, select a property from the **Name** column.
5. Review and modify the system property.
6. Select **Save**.
7. Repeat steps from 4 to 6 for any other property.

Managing connections added for Service Graph Connectors in SGC Central

You can create and update connections added for Service Graph Connectors within the SGC Central view of the Service Graph Workspace or CMDB Workspace to ingest data into Configuration Management Database (CMDB) from third-party sources.

You can create and manage the connections for the following connectors:

- API Service Graph Connector for Apigee X
- API Service Graph Connector for AWS API Gateway
- API Service Graph Connector for Azure API Management
- API Service Graph Connector for Boomi Cloud API Management
- API Service Graph Connector for Kong Gateway
- API Service Graph Connector for Kong Konnect
- API Service Graph Connector for MuleSoft
- Service Graph Connector for Akamai API Security
- Service Graph Connector for AWS
- Service Graph Connector for GCP
- Service Graph Connector for Infoblox
- Service Graph Connector for Jamf
- Service Graph Connector for Microsoft Azure
- Service Graph Connector for Microsoft Defender Endpoint
- Service Graph Connector for Microsoft Intune
- Service Graph Connector for Microsoft SCCM
- Service Graph Connector for Observability - AppDynamics
- Service Graph Connector for Observability - Dynatrace
- Service Graph Connector for Observability - New Relic
- Service Graph Connector for SolarWinds
- Service Graph Connector for Tanium
- Service Graph Connector for Trellix
- Service Graph Connector for Wiz

What to do next

- Create a connection.

  Create a connection added for a Service Graph Connector within SGC Central.

- Update a connection.

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Update a connection using a Service Graph Connector within SGC Central.

- View a connection.

  View installed and draft connections that were added using Service Graph Connectors within SGC Central.

- Monitor and analyze connections.

  Monitor the installation, performance, and error handling of Service Graph Connectors from the Overview page in the Service Graph Connector Central view of the Service Graph Workspace or CMDB Workspace.

- Access IntegrationHub ETL to create and manage ETL transform maps.

  Access the IntegrationHub ETL dashboard within SGC Central to manage ETL transform maps.

Perform initial setup tasks when creating a connection in SGC Central

Complete the prerequisites for setting up a connection for the first time using a Service Graph Connector within the SGC Central view of the Service Graph Workspace or CMDB Workspace.

Before you begin

Role required: admin

About this task

During the initial connection setup with a Service Graph Connector, a few tasks appear in the Prerequisites stage. Complete these tasks before proceeding to the next steps.

Procedure

1. Create data sources for the connection.
   a. Ensure that you have edit permissions for the Datasource [sys_data_source] table.
   b. In the **Prerequisites** stage of the playbook, select the **Update data source access** activity.
   c. Select **Update access**.
   d. To edit the record, select the **Global** application scope from the application picker.
   e. In the Application Access related list of the Data Source form, select the **Can create**, **Can update**, and **Can delete** check boxes.
   f. Select **Update**.
   g. From the application picker, select the application scope of the connector.
   h. After completing the **Update data source access** activity, select **Continue**.
2. Clear the cache on the Data Source [sys_data_source] table.
   a. In the **Prerequisites** stage of the playbook, select the **Clear cache** activity.
   b. Select **Run clear cache**.
   c. In the **Run script** text box of the background script page, enter the following script:

```
GlideTableManager.invalidateTable("sys_data_source");
GlideCacheManager.flushTable("sys_data_source");
GlideTableManager.invalidateTable("sys_db_object");
GlideCacheManager.flushTable("sys_db_object");
```

   d. Select **Run Script** to run the background script in the **global** scope.

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The script may take several minutes to execute.

e. After the script is executed, select **Close**.

f. From the application picker, select the application scope of the connector.

g. After completing the **Clear cache** activity, select **Continue**.

Create a connection for a Service Graph Connector in SGC Central

Create a connection added for a Service Graph Connector within the SGC Central view of the Service Graph Workspace or CMDB Workspace.

Before you begin

Role required: SGC-admin or admin

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select **Create connection**.

   Tip:
   Alternatively, you can select **Create connection** on the All connections page.

3. On the Create connection window, select a connector type and then follow the playbook instructions to create a connection.

   If the playbook experience isn't supported for a connector, follow the guided setup instructions.

   Note:
   - When you select a connector type, the application scope changes to the selected type.
   - When setting up a connection using a Service Graph Connector for the first time, you might need to complete the initial setup tasks. See Perform initial setup tasks when creating a connection in SGC Central.

Update a connection for a Service Graph Connector in SGC Central

Update a connection configured for a Service Graph Connector within the SGC Central view of the Service Graph Workspace or CMDB Workspace.

Before you begin

Role required: SGC-admin or admin

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. Select **All connections**.
3. Select the **Installed** tab.

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4. Select a connection from the **Connection** column.

> **Note:**
> When you select a connection, the application scope changes to the selected connector type.

5. On the **Details** tab, review and modify the details for a connection.
6. Select **Update and test connection**.
7. **Optional:** Select a tab to view further details of the connection, such as data sources, import schedules, and any errors.
   Additional tabs might appear depending on the connector type.

What to do next

If there are any errors and the Service Graph Connector diagnosis skill is enabled, you can diagnose the error using Now Assist. To learn more, see Diagnose a processing error in SGC Central;

Viewing connections for a Service Graph Connector in SGC Central

You can view installed and draft connections that were added using Service Graph Connectors within the SGC Central view of the Service Graph Workspace or CMDB Workspace.

The following connection types are available for viewing:

- Installed connection (see View an installed connection in SGC Central.)
- Draft connection (see View a draft connection in SGC Central.)

View an installed connection in SGC Central

View the details of an installed connection that was added using a Service Graph Connector within the SGC Central view of the Service Graph Workspace or CMDB Workspace.

Before you begin

Role required: SGC-admin or admin

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. Select **All connections**.
3. Select the **Installed** tab.
4. Review the list of installed connections.
5. Select a connection from the **Connection** column to view the details, data sources, import schedules, and errors associated with the connection.

> **Note:**
> When you select a connection, the application scope changes to the selected connector type.

View a draft connection in SGC Central

View the details and resume setting up draft connections.

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Before you begin

Role required: SGC-admin or admin

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. Select **All connections**.
3. Select the **Drafts** tab.
4. Review the list of draft connections.
5. Complete setting up the draft connections.
   - Select **Configure** to continue where a Service Graph Connector was last configured within SGC Central.
   - Select **Resume setup** to set up a single instance connector for the first time.

> **Note:**
> When you select a connection, the application scope changes to the selected connector type.

Monitoring and analyzing connections added for Service Graph Connectors in SGC Central

The Overview page in the Service Graph Connector Central (SGC Central) view of the Service Graph Workspace or CMDB Workspace provides a centralized dashboard view for administrators to monitor the installation, performance, and error handling of Service Graph Connectors.

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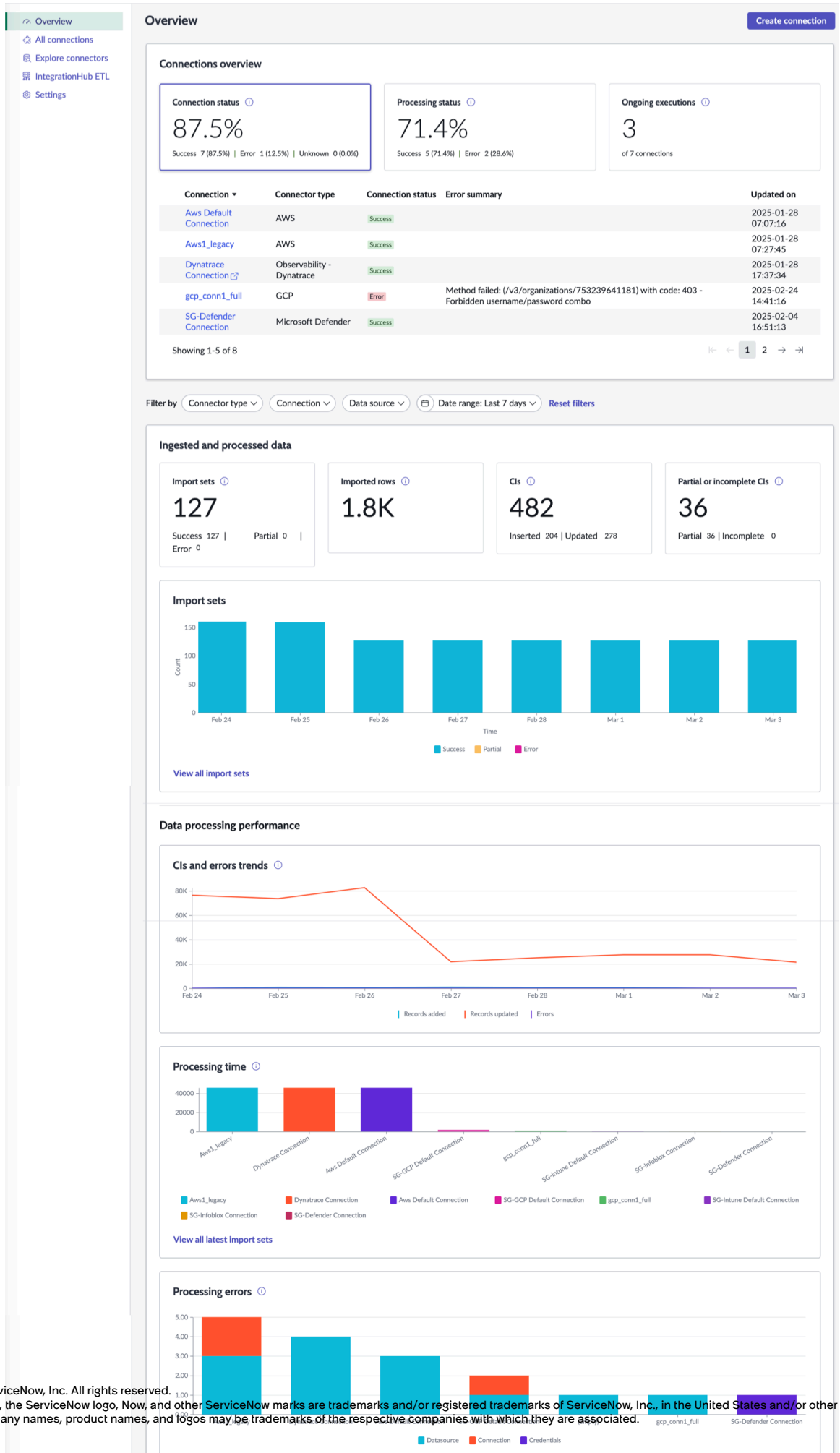

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Access the SGC Central Overview page

To open the dashboard, navigate to either **Service Graph Workspace** > **SGC Central** or **CMDB Workspace** > **SGC Central**.

Required roles

- SGC-admin
- admin

Use cases

For examples of how different people in your organization would use this dashboard, see these use cases.

User	Dashboard use
Administrators or SGC-admin	Proactively monitor, analyze, and optimize data imports to identify issues and track performance.

Overview page features

Use the Overview page to monitor and troubleshoot your Service Graph Connectors connections through dedicated sections, filters, indicators, and visual reports and gain insights on the performance of Service Graph Connectors.

Feature description

Feature	Description
Connections overview	Displays the current state of your configured Service Graph Connector connections, including status, execution results, and error summaries.
Ingested and processed data	Displays key metrics related to the data imported and processed from third-party applications.
Data processing performance	Displays how many configuration items (CIs) were added or updated over time, in addition to the number of processing errors.
Filters	Enables narrowing the data shown in graphs and metrics based on connector type, connection, data source, or date range.
Indicators	Enables viewing of high-level metrics that reflect the volume and quality of imported data and help identify issues such as incomplete or failed import set processing.
Reports	Enables real-time visualizations that provide insights into data ingestion, processing trends, and error categorization across your Service Graph Connector connections.

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Connections overview

Displays the current state of your configured Service Graph Connector connections, including status, execution results, and error summaries.

Connections overview section

Card	Description	Card summary table
Connection status	Percentage of connections tested successfully based on connection status, with the count of success, error, and unknown statuses.	The connection status summary table displays the following details: **Connection** Displays the name of the configured Service Graph Connector. Each entry links to more details about the connection. **Connector type** Displays the Service Graph Connector type as the integration source or platform for the connection. **Connection status** Displays the current state of each connection. Valid values include: **Success** All connections were configured and tested without errors. **Error** Connection configuration issues encountered during setup. **Error summary** Provides a short description of the most recent connection error, if any. **Updated on** Displays the timestamp of the last connection status update for each connection in the following format: `YYYY-MM-DD HH:MM:SS`.
Processing status	Percentage of connections for which all data import runs in the last import execution were successful, with the count of success and error statuses.	The processing status summary table displays the following details: **Connection** Displays the name of the configured Service Graph Connector. Each entry links to more details about the connection.

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Connections overview section (continued)

Card	Description	Card summary table
	Note: Only import sets that encountered errors during their last execution are counted as processing errors and shown on the card.	**Last processing status** Indicates the result of the most recent processing run. Valid values include: **Success** All scheduled jobs completed without errors. **Error** One or more jobs encountered issues during processing. **Activated schedules** Indicates the number of scheduled jobs that are activated for importing the data using the connection. **Processed** Indicates the total number of import set runs that were executed for the connection. **Success** Indicates how many of the processed import set runs completed successfully. **Error** Displays the number of import set runs that ended in an error, including those import sets that were canceled. **Error summary** Provides a short description of the most recent error, if any. The summary includes error type and cause. A **View details** link may be available for diagnosing a processing error. To learn more, see Diagnose a processing error in SGC Central. **Last processed on** Displays the timestamp of the last processing activity for the import set of the connection, including both successful and failed runs in the following format: `YYYY-MM-DD HH:MM:SS`.
Ongoing executions	Number of connections where data import execution is in progress.	The ongoing execution status summary table displays the following details: **Connection**

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Connections overview section (continued)

Card	Description	Card summary table
		Displays the name of the configured Service Graph Connector. Each entry links to more details about the connection. **Activated schedules** Indicates the number of scheduled jobs that are activated for importing the data using the connection. **In progress** Displays how many scheduled jobs are currently running for the connection. **Processed** Displays the number of completed executions, where data has been collected and processed according to the configured scheduled job. **Processing time** Indicates the total duration taken by the most recent completed import set execution in the following format `YYYY-MM-DD HH:MM:SS`.

Ingested and processed data

Displays key metrics related to the data imported and processed from third-party applications.

Ingested and processed data section

Card	Description	Indicators
Import sets	Number of import sets processed by data sources based on the selected filters, with the count of success, partial, and error statuses. Select the **View all import sets** link to view a complete list of processed import sets.	SGC.Integrations.ImportSet SGC.Fully.successful.ImportSet SGC.Part.success.ImportSet SGC.Fully.error.ImportSet
Imported rows	Count of rows imported across all import sets based on the selected filters. Select the **View all latest import set rows ingested** link to view a complete list of import set rows ingested.	SGC.Integrations.Importset.rows.ingested

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Ingested and processed data section (continued)

Card	Description	Indicators
CIs	Total CIs processed based on the selected filters, with the count of added and updated CIs. Select the **View all inserted and updated records** link to view a complete list of inserted and updated CIs.	None
Partial or incomplete CIs	Total CIs that are partial payloads based on the selected filters, with the count of partial and incomplete categories. Select the **View all partial and incomplete records** link to view a complete list of partial and incomplete CIs.	None

Data processing performance

Displays how many configuration items (CIs) were added or updated over time, in addition to the number of processing errors.

Data processing performance section

Card	Description	Indicators
CIs and errors trends	Daily trends for CIs that were added, updated, and any data processing errors occurred during data import process based on the selected filters.	Records added Records updated Errors
Processing time	Top 10 connections by the latest import set processing time. Select the **View all latest import sets** link to view a complete list of import sets.	None
Processing errors	Top 10 connections with the highest number of data processing errors, with a breakup by data source, connection, and credential issues. Select the **View all latest errors** link to view a complete list of processing errors.	None

Filters

Enables narrowing the data shown in graphs and metrics based on connector type, connection, data source, or date range.

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Name	Type	Description
Connector type	List	Filters a list of installed Service Graph Connectors.
Connection	List	Filters a list of connection records for the Service Graph Connectors.
Data source	List	Filters a list of data sources for the Service Graph Connectors.
Date range	Date	Filters the SGC Central dashboard data based on the date range selected.

Indicators

Enables viewing of high-level metrics that reflect the volume and quality of imported data and help identify issues such as incomplete or failed import set processing.

Records added

Total number of records that were inserted into the system on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_audit table. The score is calculated by counting the number of records updated on the specified day, based on operations that were marked as inserted in the audit log.

Records updated

Total number of records that were updated in the system on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_audit table. The score is calculated by counting the number of records updated on the specified day, based on operations that were marked as Updated in the audit log.

Records added or updated

Total number of records that were added or updated in the system on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_audit table. The score is calculated by counting the number of records inserted or updated on the specified day, based on operations that were marked as Inserted or Updated in the audit log.

Errors

Total number of errors categorized under credentials, data source, or connection issues that occurred during integration executions on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_error table. The score is calculated by counting the number of errors on the specified day.

SGC.processing.errors

Number of processing errors categorized under data source issues that occurred during integration executions on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_error table. The score is calculated by counting the number of errors on the specified day.

SGC.connection.errors

Total number of errors categorized under credentials or connection issues that occurred during integration executions on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_error table. The score is calculated by counting the number of errors on the specified day.

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SGC.Integrations.ImportSet

Total number of import sets that were either completed successfully or encountered errors during their transformation process on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_import_set table. The score is calculated by counting the total number of import sets on the specified day.

SGC.Fully.successful.ImportSet

Total number of import sets that were completed successfully during their transformation process on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_import_set table. The score is calculated according to this formula: `Count of import sets with Errors = 0`.

SGC.Fully.error.ImportSet

Total number of import sets that completed with errors during their transformation process on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_import_set table. The score is calculated according to this formula: `Count of import sets with Errors ≠ 0 and Rows = Errors`.

SGC.Part.success.ImportSet

Total number of import sets that completed with some errors where the number of rows processed differs from the number of errors reported on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution_import_set table. The score is calculated according to this formula: `Count of import sets with Errors ≠ 0 and Rows ≠ Errors`.

SGC.Integrations.Importset.rows.ingested

Total number of rows ingested for the import sets on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution table. The score is calculated according to this formula: `Sum of rows ingested`.

SGC.Integrations.Processing Rate

Average processing rate of import sets based on the total number of rows processed and the total processing time (in hours) for the import sets that either completed successfully or encountered errors on the previous day, as recorded in the sn_cmdb_int_util_cmdb_integration_execution table. The score is calculated according to this formula: `Sum of rows processed/Total time (in hours)`.

Reports

Enables real-time visualizations that provide insights into data ingestion, processing trends, and error categorization across your Service Graph Connector connections.

Title	Type	Source table	Description
Affected CIs and errors	Relative compare ( )	CMDB Integration Execution Error [sn_cmdb_int_util_cmdb_integration_execution_error]	Displays configuration items (CIs) added, updated, and cumulative errors occurred during data import over time.
Error breakdown	Column ( )	CMDB Integration Execution Error [sn_cmdb_int_util_cmdb_integration_execution_error]	Displays the count of errors grouped over time

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Title	Type	Source table	Description
Import set rows ingested	Single score (42)	CMDB Integration Execution Import Set [sn_cmdb_int_util_cmdb_integration_execution_import_set]	Displays the number of import set rows ingested in a day.
Import set processing rate	Single score (42)	CMDB Integration Execution [sn_cmdb_int_util_cmdb_integration_execution]	Displays the average rate at which an import set processes data within an hour.
Records added or updated	Single score (42)	CMDB Integration Execution Audit [sn_cmdb_int_util_cmdb_integration_execution_audit]	Displays the number of records that were inserted or updated in CI classes.
Total import sets	Single score (42)	CMDB Integration Execution Import Set [sn_cmdb_int_util_cmdb_integration_execution_import_set]	Displays the number of import sets initiated by data sources in the given time frame and the count of import sets categorized by their status.
Updated classes	Column ( )	CMDB Integration Execution Audit [sn_cmdb_int_util_cmdb_integration_execution_audit]	Displays the breakdown of updated and inserted CIs for a class.

Diagnose a processing error in SGC Central

Diagnose processing errors in connections configured for a Service Graph Connector and resolve them within the SGC Central view of the Service Graph Workspace or CMDB Workspace using recommendations from Now Assist.

Before you begin

Verify that the Service Graph Connector diagnosis skill is enabled. For more information, see Configure the Service Graph Connector diagnosis skill.

Role required: SGC-admin or admin

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. On the Overview page, select the **Processing status** card.

> **Note:**
> On the **Processing status** card, only import sets with errors in the last import execution are counted as processing errors, and their count is displayed. However, the Error column in the summary table, which displays more details about the processing status, also includes canceled import sets. As a result, the error count on the Processing status card might not match the number of errors displayed in the summary table.

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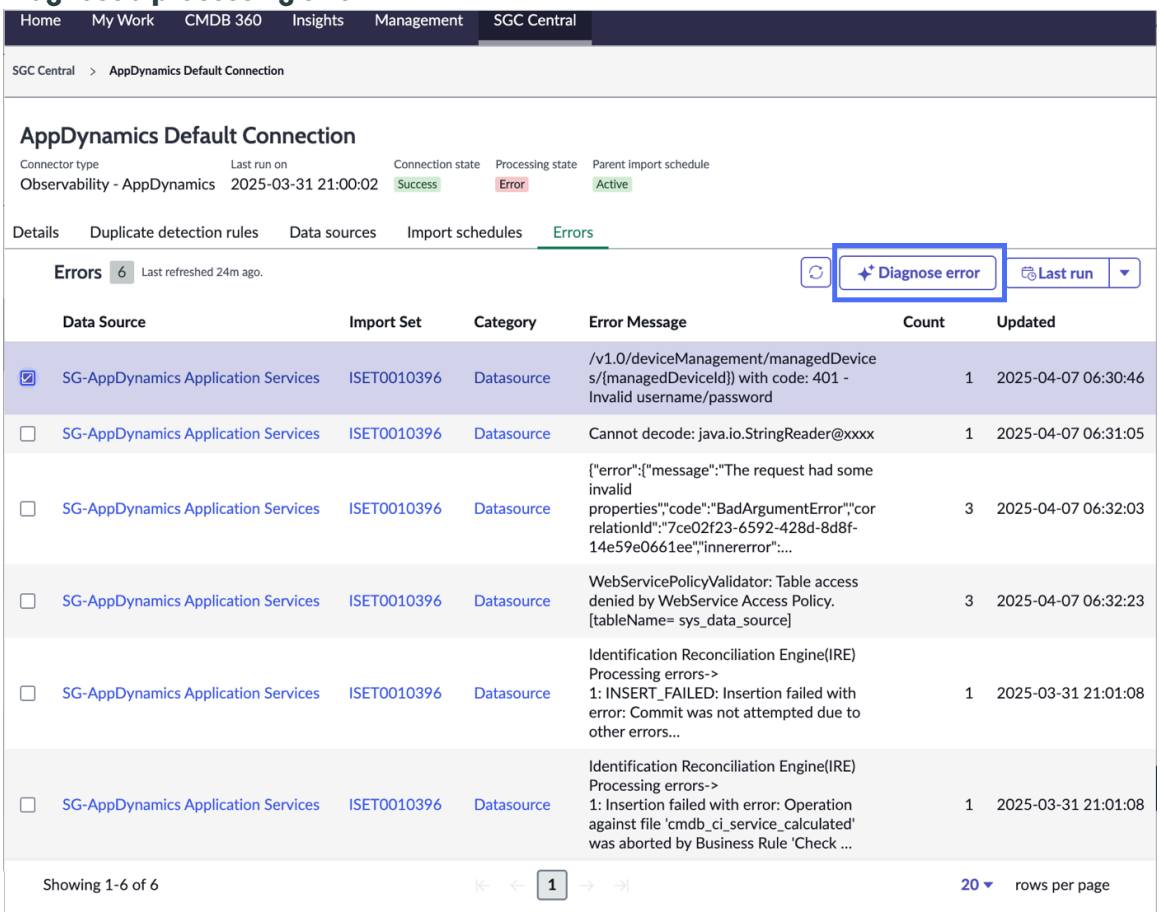
3. When an error count is displayed on the **Processing status** card, select the **View details** link from the error summary for the connection.
4. On the **Errors** tab, select an error for a failed import set.

Note:
You can diagnose only one error at a time. The **Diagnose Error** button is enabled only when you select an error from the list.

Diagnose a processing error



5. Select **Diagnose error**.

Result
Now Assist triggers the diagnosis process for the processing error. The Error diagnosis window includes two key sections: Explanation and Recommendation, each focused on explaining the error and providing a solution to resolve it. The recommendation is based on a knowledge article matched using AI Search. A link to the knowledge article is provided in the Source section for additional guidance.

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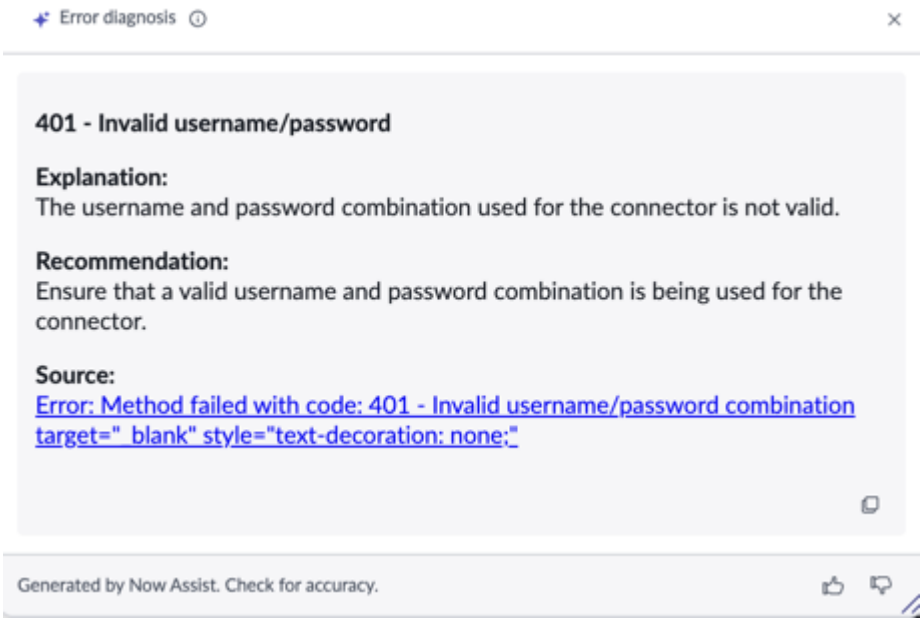
Error diagnosis result



Accessing the IntegrationHub ETL dashboard in SGC Central

You can access the IntegrationHub ETL dashboard within the SGC Central view of the Service Graph Workspace or CMDB Workspace to manage ETL transform maps.

IntegrationHub ETL is a tool for creating and managing ETL transform maps to integrate third-party data into the CMDB or non-CMDB tables. Select **Go to IntegrationHub ETL Home** to view the IntegrationHub ETL home page.

To learn about the IntegrationHub ETL store app, see IntegrationHub ETL.

Access IntegrationHub ETL in SGC Central

The IntegrationHub ETL dashboard provides a centralized platform for monitoring ETL processes within the SGC Central view of the Service Graph Workspace or CMDB Workspace.

Before you begin

Role required: admin

Procedure

1. Use one of the following methods to open SGC Central:
   - Navigate to **Workspaces** > **Service Graph Workspace**, and from the left navigation panel, select the Ingestion icon to open the SGC Central view.
   - Navigate to **Workspaces** > **CMDB Workspace** > **SGC Central**.
2. Select **IntegrationHub ETL**.
3. In the ETL definitions section of the IntegrationHub ETL page, select a category to view more details about the selected ETL definition.

ETL definitions

Category	Description
Total	Total number of ETL definitions configured within the system.
Active	Number of ETL processes that are currently active and running.

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Category	Description
Scheduled	Number of ETL processes that are scheduled for future execution.

4. To open the home page of the IntegrationHub ETL store app, select **Go to IntegrationHub ETL Home**.

SGC Central reference

Reference topics provide additional information about SGC Central components.

Components installed with SGC Central

Several types of components are installed with activation of the SGC Central (sn_sgc_central) plugin, including tables, user roles, and scheduled jobs.

Scheduled jobs installed

Scheduled job	Description
SGC central collection	Reads from the imports brought in by the connectors and updates the dashboard data.
SGC central collection onDemand with lookback	Collects historical data for the lookback period from when the data is retrieved for connectors. The default lookback period is set to 30 days.

Tables installed

Table	Description
Connection Record Tabs [sn_sgc_central_connection_record_tabs]	Includes the tabs displayed on the page to edit connection, including default tabs like Details, Data Sources, Scheduled Imports, and Errors, and additional tabs specific to individual connectors, arranged by order.
Connection property config [sn_sgc_central_conn_prop_config]	Stores the connection property fields for the Connection Properties tab displayed on the page to create or edit a connection, including group ordering, descriptions, mandatory fields, and default values for auto-population.
Service Graph Connection Trigger [sn_sgc_central_service_graph_connection_trigger]	Stores the trigger record to initialize playbook context in the create connection flow when a new record is inserted. The playbook is selected based on the referred metadata record's

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Table	Description
	application scope field that is the Service Graph Connector scope.
Service Graph Connector [sn_sgc_central_service_graph_connector]	Stores Service Graph Connector details such as scope, app ID, and associated provider.
SGC Installed Connection [sn_sgc_central_st_installed_connection]	Stores all installed or draft connections, including details such as connection, processing status, last run, and import frequency information.
SGC IntegrationHub ETL [sn_sgc_central_st_integrationhub_etl]	Stores the Extract Transform Load (ETL) list for display under the IntegrationHub ETL list view in SGC Central.

ServiceNow Store applications installed

Application	Description
Integration Commons for CMDB (sn_cmdb_int_util)	Contains the CMDB Integrations Dashboard and a set of Robust Transform Engine (RTE) transforms and script includes.
CMDB Workspace (sn_cmdb_ws)	Provides a single place to access CMDB-focused features including SGC Central.

Domain separation and SGC Central

Domain separation is unsupported for SGC Central. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: No support

- The domain field may exist on data tables but there is no business logic to manage the data.
- This level is not considered domain-separated.

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

Related topics

Domain separation for service providers

Manage instance data sources

Data management is critical to success in all aspects of your business. Platform tools give you full control over your data, whether in instances, databases, or third-party applications.

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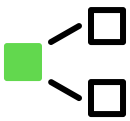
Instance Data Replication IDR Synchronize data between instances in one-to-one or one-to-many database relationships.	**MetricBase** Simplify working with large amounts of data and create time-based analyses.	**MID Server** Communicate and transmit data between ServiceNow instances and external applications.
Financial Services Remote Tables Connect your instance on the ServiceNow AI Platform to third-party sources.	**Entity View Action Mapper (EVAM)**  Standardize and chart out all data from multiple sources.	

Instance Data Replication (IDR)

Keep your records consistent across any instances or organizations in your business. Instance Data Replication lets you transfer data from one producer instance to one or more consumer instances. Bidirectional (consumer-to-producer) replication is available with IDR, along with specific data table selection, localization or translation, and other options.

MetricBase

Make large data easier to handle with MetricBase. This app summarizes information from larger data sources, and provides time-based records, analytics, and timed or event-based actions. Create graphs of data over time with Reporting to analyze system trends or incidents, or use Workflow Studio to trigger automated data flows.

MID Server

Communicate and share data with external servers, databases, and applications. The Java-based Management, Instrumentation, and Discovery (MID) Server handles various communications from your instance to third-party systems. Maintain optimum performance with automated upgrades, active server monitoring, and a full troubleshooting knowledge base—all included in the MID Server package.

Financial Services Remote Tables

Bring external data into your instance and process it to your specifications with Financial Services Remote Tables. Retrieve data from third-party servers or other ServiceNow AI Platform

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instances, with options for caching in local memory. View external data without storage, or use script definitions to set up instance cache parameters.

Entity View Action Mapper (EVAM)

Get a standard view of all the data that you work with, using Entity View Action Mapping. The EVAM application enables you to bring multiple data sources together into one view, create templates to map data to UX components, write scripts for triggers based on user interaction, and more.

Entity View Action Mapper

The Entity View Action Mapper (EVAM) is an application that standardizes how different data sources display in cards and lists.

Get started

Explore

Learn how different data sources display in cards and lists using EVAM

Configure

Set up and manage EVAM. View configurations, view templates, and configuration bundles to make it easier to use the feature.

Manage EVAM

Use EVAM to take in different data sources, configure views, and show them in a card display view.

Reference

More information about EVAM and its usage.

Exploring Entity View Action Mapper

The Entity View Action Mapper (EVAM) is an application that standardizes how different data sources display in cards and lists.

EVAM overview

EVAM enables you to show information as a card grid view or as a list of information in a list view. Users can page through large data sets of search results and see different views based on filtering.

Prior to EVAM, lists were restricted to a single type of data source. If there were more data sources, you would have to write a custom implementation. EVAM enables you ingest multiple

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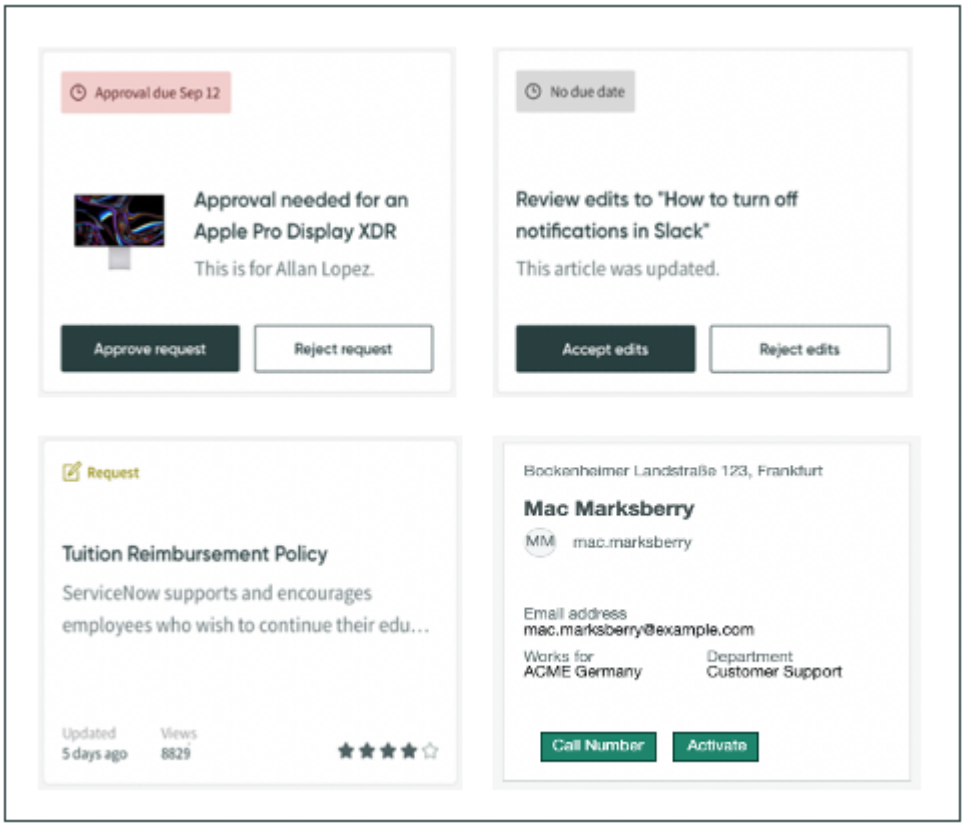
lists from different data sources, and then configure specific views without the need for customization.



Features of EVAM

Use multiple data sources for a single list view

EVAM can accept multiple disparate data sources and configure the data through sorting and filtering to return the data as a single list.

Define view templates

Map the data source output to a UX component view by using view templates. You can configure multiple view templates per data source based on a condition to customize how data displays for users.

Create view configurations to combine conditions, database fields, and declarative actions

Create a view configuration to combine conditions, database fields, and declarative actions with an associated view template. You can also group view configurations together to create configuration bundles.

Enable user interactions to trigger actions

EVAM enables user interactions to trigger a server script or UXF client action.

EVAM users

User	Description
Service desk agents	Service desk agents need a streamlined way to view and manage incidents, requests, and tasks across different tables. EVAM allows them to filter, sort, and take action on records quickly.

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User	Description
IT support staff	IT teams use EVAM to monitor and manage IT assets, service requests, and incidents by consolidating information into a structured, actionable interface.
Managers and team leads	Supervisors overseeing teams or operations benefit from EVAM's ability to present key performance indicators and open tasks and team workloads in an easy-to-navigate format.
Customer service representatives	Customer support teams interact with cases, accounts, and customer information efficiently, improving response times and service quality through EVAM.
Business analysts and process owners	Analysts use EVAM to configure views that bring together data from multiple sources, enabling better decision-making and process optimization.
Developers and admins	Developers and system administrators configure EVAM to create custom views, ensuring the right data is surfaced to the right users for improved usability.

EVAM workflow

EVAM consists of the following:

- Entity (data source) - The entity that has associated data that you intend to display. For example, a community post or a user.
- View – A view is how a card displays data and actions.
- Actions – An entity can have an action that performs on the card. For example, you can activate a user into your system.
- Map – The mapping process maps the data source data to component properties that display on the card. You can also associate actions that trigger from the card view.

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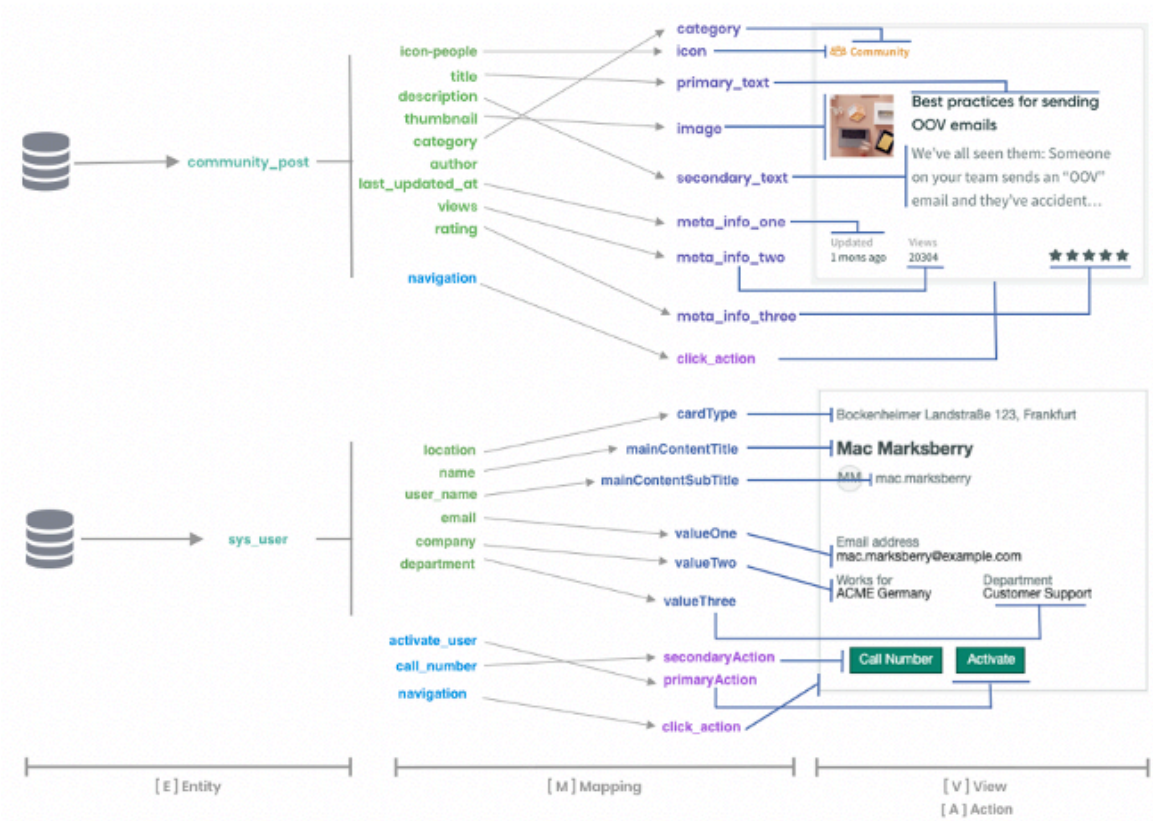
EVAM workflow



1. Entity: examples include a community post or sys_user
2. Mapping: fields found in an entity
3. View/Action: locations or actions that entity fields are mapped to

In this workflow:

1. The first record to set up is an EVAM definition. Additional records will branch off from this record to define the definition.
2. The next record to set up is the EVAM View Config Bundle. The Related List record is the EVAM View Config record. Additional conditions, the view, and the action are configured or linked here. Pay attention to where the View Template and the Action are located.
3. The third record to set up is the EVAM Configuration Bundle. Linked to the EVAM Configuration Bundle record, an EVAM action definition record defines what is triggered when a user interacts with the interface. A server script or UXF client action can be executed. Examples of an action can be to make a request, call a number, link to an external URL, or navigate within the platform.
4. The mapping step of EVAM is accomplished with the View Template. The JavaScript Objection Notation (JSON) Template on the form makes the connection from the data to the component that will display the data.

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EVAM benefits

- Configure multiple view templates per data source based on conditions to customize how data displays for users. The view template maps fields from the view configuration to component.
- Use EVAM to take in different data sources, configure views, and show them in a card display view.
- Define the list of data sources to render. The EVAM definition is the main record for an EVAM configuration.

What to explore next

To learn more about configuring and using EVAM, see:

- Configuring Entity View Action Mapper
- Using Entity View Action Mapper
- Entity View Action Mapper reference

View configurations, view templates, and configuration bundles for EVAM

A view configuration combines conditions, database fields, and declarative actions with an associated view template. You can also group view configurations together to create configuration bundles using the Entity View Action Mapper (EVAM).

EVAM has pre-defined view configurations, view templates, and configuration bundles to make it easier to use the feature. The base system configuration bundles include:

- Service Portal Search Bundle
- Service Portal bundle (sp_bundle)

These bundles have view configurations attached that are anticipated to fit the business unit associated. You can also create or edit configuration bundles to meet your needs.

View configurations have an associated view template, tables and conditions, designated table field with data, and associated declarative actions. You can look at the demo_evam_dataset for examples of base system configuration views. These view configurations are ready to use and are meant to work with many use cases. You can also create or edit view configurations to meet specific needs.

The base system view templates match an associated view configuration. The templates contain the JSON used to give the necessary information for the card display and use. For example, the Attachment Search Template contains the following:

```
{
    "component": "sn-search-result-evam-card",
    "staticValues":  {
        "detailLabelType": {
            "translatable": false,
            "key": "inline"
        },
        "textHeaderLabelOne": {
            "translatable": true,
            "key": "Attachment"
        },
        "detailLabelOne": {
            "translatable": true,
            "key": "From:"
```

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```
        }
    },
    "mappings": {
        "imageType": "doctype_image_type",
        "icon": "doctype_image",
        "imageURL":"doctype_image",
        "textHeaderLabelTwo": "doctype",
        "title": "ai_search_teaser_title",
        "summary": "ai_search_teaser_text",
        "detailValueOne":"parent_title"
    },
    "actionMappings": {
        "clickAction": "navigation",
        "footerLinkAction": "navigation_to_parent_record"
    }
}
```

The JSON structure has the following sections:

Template	Description
component	The card component name.
staticValues	The static text mapping to component properties. These values have the following properties: • translatable – Determines whether the key text should be translated based on the user's language. Can be either True or False. • key – The value the property is set to.
mappings	The mapping of the data source field to the component properties.
actionMappings	The actions that you can associate with the card.

These view templates are ready to use and are meant to work with many use cases. You can also create or edit view templates to meet specific needs.

Configuring Entity View Action Mapper

The Entity View Action Mapper (EVAM) enables you to map specific actions to entity views, enabling customized behavior and streamlined workflows. Learn how to configure EVAM so you can define, configure, and apply mappings to enhance user interactions with data in the platform.

Configuration overview

To get started with EVAM, you need the following plugins for UI Builder:

- sn_ui_builder
- sn_ui_builder_icons
- sn_ui_builder_properties_pane

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EVAM also relies on:

- Now Design System (NDS) components
- @devsnc/sn-layout (com.devsnc_sn_layout): Layout
-
-
-

Define a data source

The data source is an entity that has associated data that you intend to display. For example, a community post or a user.

Before you begin

Role required: admin or evam_admin

Procedure

1. Navigate to **All** > **Entity View Action Mapper (EVAM)** > **Data sources**, and then select **New**.
2. On the form, fill in the fields.

Field	Description
Application	Application scope of the data source.
Active	Option to activate the data source.
Name	Name of the data source.
Table	Choose a table to use for the data source.
Condition	Condition to define how to filter the data from the selected table.
Sort By	Table column to use for sorting the table data. For example, you can select to sort knowledge articles by the creation date. **Note:** You can only use *Sort By* for datetime fields when sorting different records.

3. Select **Submit**.

Define an EVAM view template

You can configure multiple view templates per data source based on conditions to customize how data displays for users. The view template maps fields from the view configuration to component.

Before you begin

Role required: admin or evam_admin

About this task

The view template is referenced from the Entity View Action Mapper (EVAM) view configuration record. For more information, see Define an EVAM configuration bundle.

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Procedure

1. Navigate to **All** > **Entity View Action Mapper (EVAM)** > **View Definition** > **View Templates**, and then select **New**.
2. On the form, fill in the fields.

Field	Description
Name	Name of the EVAM view template.
Application	Application scope of the EVAM view template.
Active	Option to activate the EVAM view template.
Template	A JSON template that defines the view for a mapped data source. For example, the default search template contains the following: `{ "component": "sn-search-result-evam-card", "staticValues": { }, "mappings": { "title": "ai_search_teaser_title", "summary": "ai_search_teaser_text" }, "actionMappings": { "clickAction": "navigation" } }` Use `sn-search-result-evam-card` as the component for search result pages.

3. Select **Submit**.

Define an EVAM configuration bundle

Create a view configuration to combine conditions, database fields, and declarative actions with an associated view template using the Entity View Action Mapper (EVAM).

Before you begin

Role required: admin or evam_admin

Procedure

1. Navigate to **All** > **Entity View Action Mapper (EVAM)** > **View Definitions** > **View Configurations**, and then select **New**.
2. On the form, fill in the fields.

Field	Description
Name	Name of the EVAM view configuration.
Active	Option to activate the EVAM view configuration.
Required Roles	Roles to define who can view the EVAM view configuration

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Field	Description
View Template	Template to associate with the EVAM view configuration.
Application	Application scope of the EVAM view configuration.
Order	Priority that the EVAM view configuration takes over other view configurations. To give higher priority to a view configuration, enter a lower number.
Table	Table to associate with the EVAM view configuration.
Condition	Conditions for when to use the EVAM view configuration. Select **Add Filter Condition** to select which conditions should be met.
Table Fields	Table fields to display on the EVAM view configuration. You can choose from available table fields and move them to *Selected*. You can also order the order they are shown.
Custom Fields	A custom field to display on the EVAM view configuration. You must supply a comma-separated list of table fields are required for the template.

3. Select **Submit**.

Using Entity View Action Mapper

Optimize data presentation and interaction by defining data sources, creating Entity View Action Mapper (EVAM) configuration bundles, and setting up EVAM view templates to structure and display entity data effectively.

Overview of using EVAM

1.

2.

3.

EVAM reference

For more information, see Entity View Action Mapper reference.

Create a multi-data source list display in Entity View Action Mapper

Use EVAM to take in different datasources, configure views, and show them in a card display view.

Before you begin

Role required: admin or evam_admin

About this task

A typical scenario is showing user requests and incidents in a single display view. A user might want to see requests that can be made from a catalog, such as a computer order. They also might want to see open or closed incidents. These items come from different data sources, but need to display through a consistent standard that can be easily configured.

This tutorial runs through creating an EVAM definition with two data sources, a configuration bundle for each data source which contains two view configurations, and associated actions and

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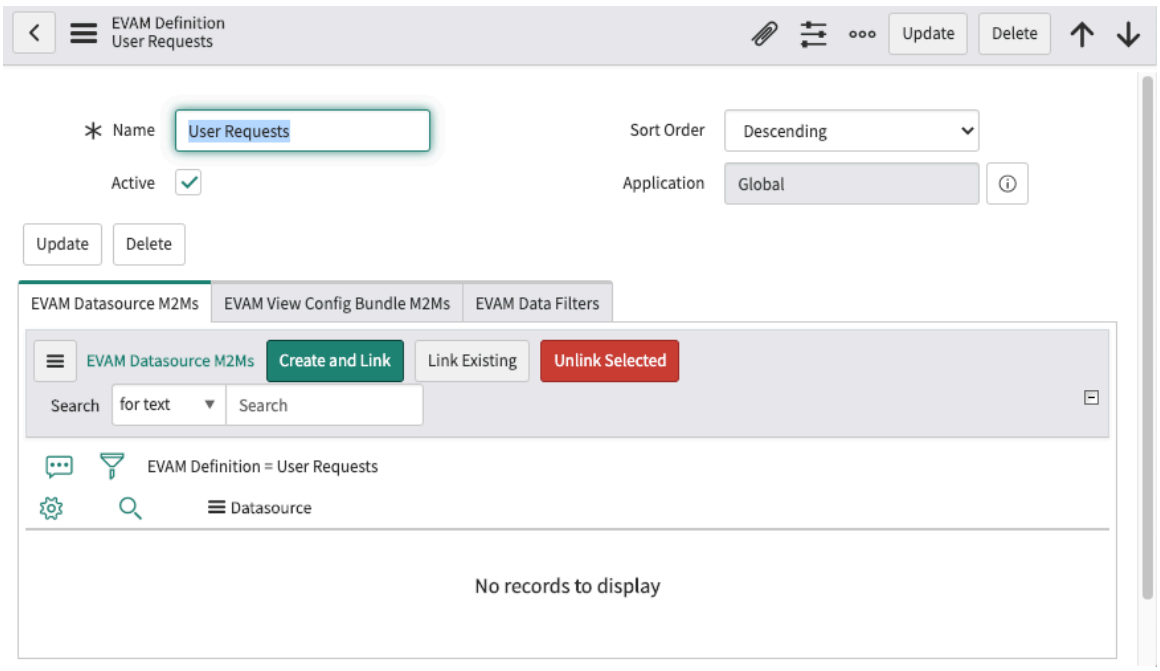
view templates. Many tasks are repeated, instead of repeating each step, the following table lists the unique configurations and definitions:

EVAM definition	Data source [Table]	Configuration bundle	Action	Configuration view	View template
User Requests	Catalog Requests [Requested Item]	Catalog Request Bundle	Navigation	Open Requests	Open Request Template
				Closed Requests	Closed Request Template
	Incidents Submitted [Incidents]	Incidents Submitted Bundle		Open Incidents	Open Incidents Template
				Closed Incidents	Closed Incidents Template

Procedure

1. Create an EVAM definition for user requests.
   An EVAM definition houses data sources, configuration bundles with associated view configurations, data filters, actions, and templates. After you initially submit your EVAM definition, you will see the related lists to add data sources, configuration bundles, and data filters.



2. Define data sources for your EVAM definition.
   Create and link each data source to the User Request definition. The initial data source is for catalog requests. You can also make one for incidents submitted.

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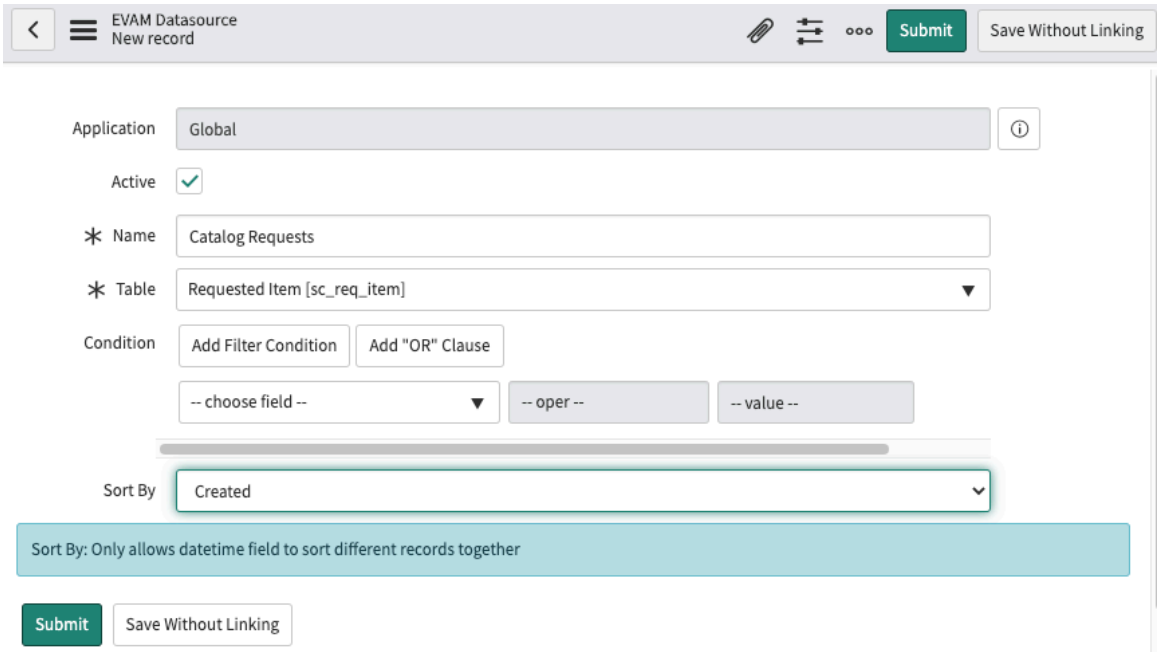
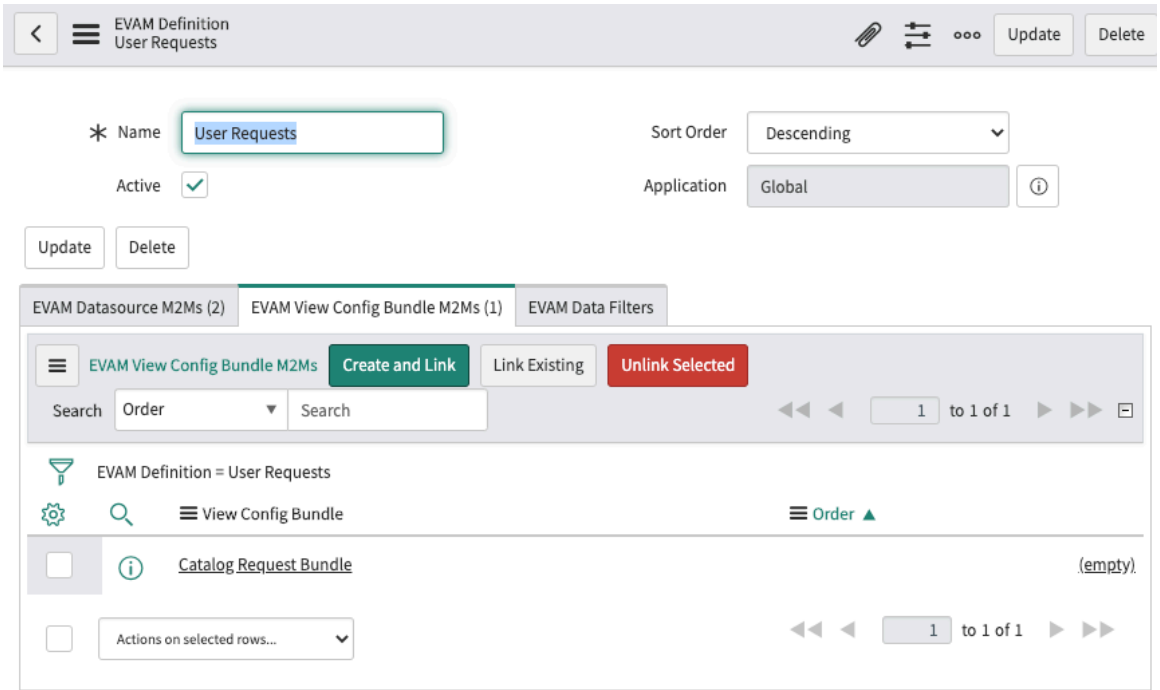


3. Create and link a view configuration bundle.
   You should create two configuration bundles, a catalog request bundle and an incidents submitted bundle.



4. Create an action definition.
   You can use the create and link related list.

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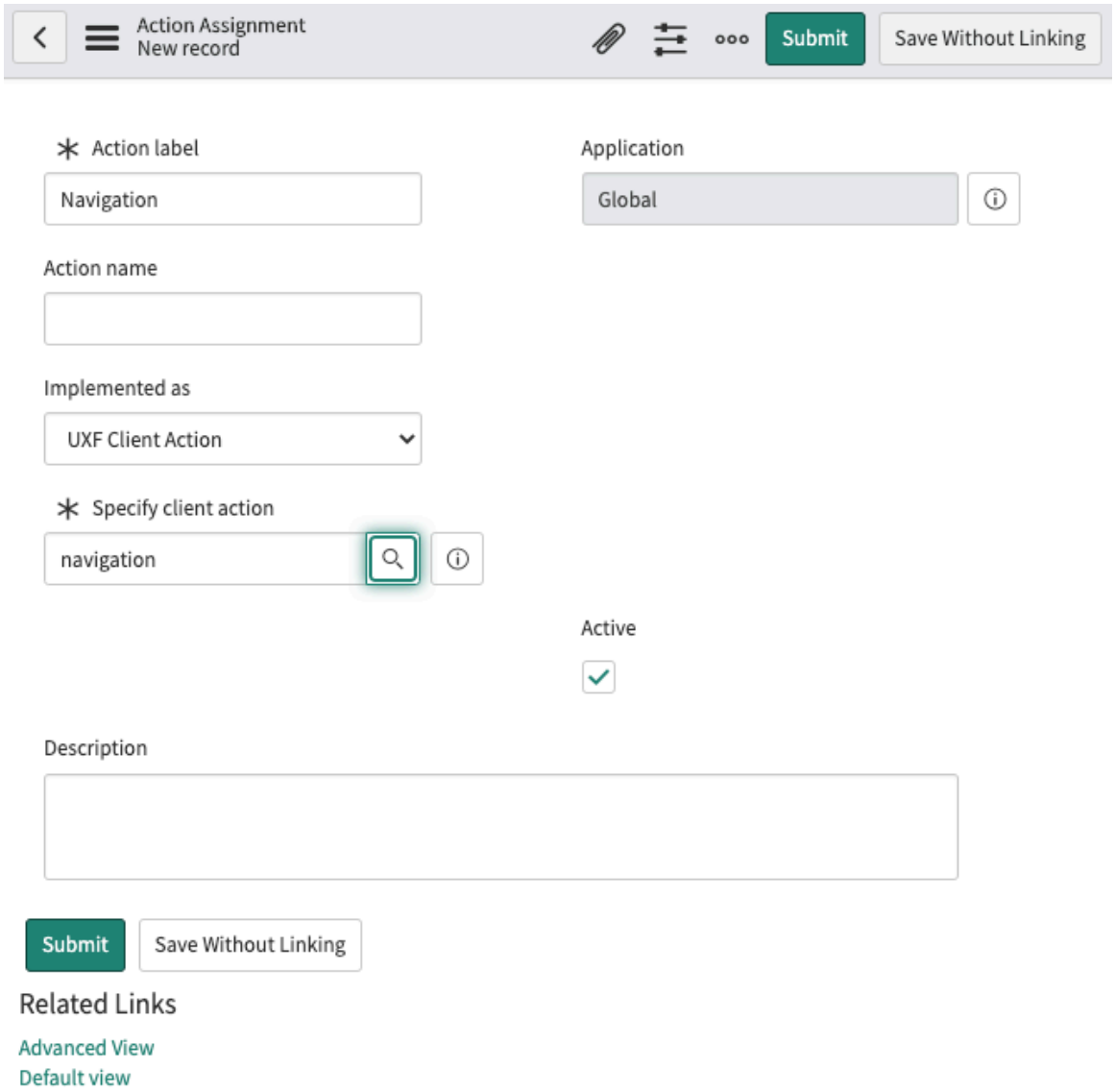

5. Create view templates for requested items and associate with the view configuration.
Here is the template info for the Requested Items Template:

```
{
 "component": "now-card-evam-record",
 "staticValues": {
  "highlightedHeaderIcon": {
   "key": "clock-outline"
  },
  "highlightedHeaderBkgColor": {
   "key": "positive"
  },
  "imageType": {
   "key": "image"
        },
  "detailLabelOne": {
   "translatable": true,
   "key": "created"
  },
  "detailLabelTwo": {
   "translatable": true,
```

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```
    "key": "number"
         }
 },
 "mappings": {
  "highlightedHeaderLabel": "state",
  "titleLabel": "cat_item.name",
  "imageURL": "cat_item.picture",
  "subtitle": "cat_item.short_description",
  "detailValueOne": "sys_created_on",
  "detailValueTwo": "number"
 },
 "actionMappings": {
  "clickAction": "navigation"
 }
}
```

6. Repeat steps 3-5 to add another view configuration for closed requests.
   You created a configuration bundle with one view configuration. Add another configuration called Closed requests. This view configuration references the same data source [requested item], but uses different conditions to show ().
7. Associate view templates to view configurations, select **Update**.
8. View your finished product.

Create an EVAM definition

Define the list of data sources to render. The Entity View Action Mapper (EVAM) definition is the main record for an EVAM configuration.

Before you begin

Role required: admin or evam_admin

Procedure

1. Navigate to **All** > **Entity View Action Mapper (EVAM)** > **EVAM Definitions**, and then select **New**.
2. On the form, fill in the fields.

Field	Description
Name	Name of the EVAM configuration.
Active	Option to activate the EVAM definition.
Sort Order	Order the data is ordered on the EVAM definition. You can select **Ascending** or **Descending**.
Application	Application scope of the EVAM definition.

3. Select **Submit** and then select your EVAM definition.
4. In the *EVAM Data source M2Ms* related list, add a data source.

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Option	Description
Create and Link	You can define a new data source and then link this data source to your EVAM definition.
Link Existing	You can add a pre-defined data source to your EVAM definition.
Unlink Selected	You can remove the selected data source from your EVAM definition.

5. Select **Submit**.
6. In the *EVAM View Config Bundle M2Ms* related list, add a configuration bundle.

Option	Description
Create and Link	You can define a new configuration bundle and then link this bundle to your EVAM definition.
Link Existing	You can add a pre-defined configuration bundle to your EVAM definition.
Unlink Selected	You can remove the selected configuration bundle from your EVAM definition.

After you link the configuration bundles, you can define an order to prioritize the bundles, with the lowest number receiving the higher precedence.

7. In the *EVAM Data Filters* related list, select **New** and fill in the form to add data filters:

Field	Description
Label	Label name of the EVAM data filter.
Active	Option to activate the EVAM data filter.
Order	Priority that the EVAM view configuration takes over other view configurations. To give higher priority to a view configuration, enter a lower number.
Application	Application scope of the EVAM view configuration.
EVAM Definition	Associate an EVAM definition with the data filter.

8. Select **Submit**.

Create an EVAM action definition

You can associate a declarative action with a view template. The Entity View Action Mapper (EVAM) also enables user interactions to trigger a server script or UXF client action.

Before you begin

Role required: admin or evam_admin

Procedure

1. Navigate to **All** > **Entity View Action Mapper** > **Action Definition**, and then select **New**.
2. On the form, fill in the fields.

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Field	Description
Action label	Display label of the EVAM action.
Action name	Database name for the EVAM action name.
Implemented as	Implementation of the EVAM action definition. Select one of the following: **Server Script** Executes a script on the server, for example, to assign a record to someone, or delete a record. **UXF Client Action** Takes action on the client side, such as opening a record or making a phone call.
Specify client action	You can choose a pre-defined action. For example, SC Content Items KB Article Navigation, to display KB articles. **Note:** This field appears only if you select to implement the action as a UXF client action.
Application	Application scope of the EVAM action.
Active	Option to activate the EVAM action.
Description	Description of the EVAM action.

3. Select **Submit**.

Entity View Action Mapper reference

Reference topics provide information about the Entity View Action Mapper (EVAM).

Roles required for EVAM

Learn about the roles needed to configure and manage the Entity View Action Mapper (EVAM).

Role	Description
admin or evam_admin	Grants full administrative rights, including the ability to configure and manage all aspects of the ServiceNow platform, such as creating data sources, configuring EVAM bundles, and defining view templates.
itil	Provides access to IT Service Management features, allowing users to interact with incidents, changes, and other ITSM records, which may be relevant when associating EVAM configurations with ITSM data.

Domain separation and EVAM

The Entity View Action Mapper (EVAM) in ServiceNow supports domain separation. This means you can configure EVAM to separate data, processes, and administrative tasks into logical groupings called domains, ensuring that users have access only to the data pertinent to their specific domain.

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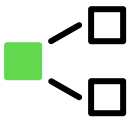
Instance Data Replication

ServiceNow® Instance Data Replication (IDR) copies data updates from one instance, called the producer instance, to one or more other instances called the consumer instances. IDR enables you to maintain consistent data across different instances. For example, you can synchronize data between different organizations in your company or even between different companies with separate instances.

Create an Instance Data Replication

Get started

Explore Learn about IDR features and concepts.	**Configure** Set up and configure IDR.	**Replicate data**  Configure IDR replication sets and settings.
Administer Maintain and monitor IDR.	**Reference** Learn about excluded tables, adapters, and data privacy in IDR.	

Exploring Instance Data Replication

Instance Data Replication (IDR) replicates data updates on one instance, called the producer instance, to one or more other instances, called the consumer instances.

IDR overview

Maintain consistent data across different instances using IDR.

- Automatically replicate data to one or more other instances.
- Synchronize data between different organizations in your company or even between different companies with separate instances.
- Data that is in transit during a crash is recoverable.

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IDR users

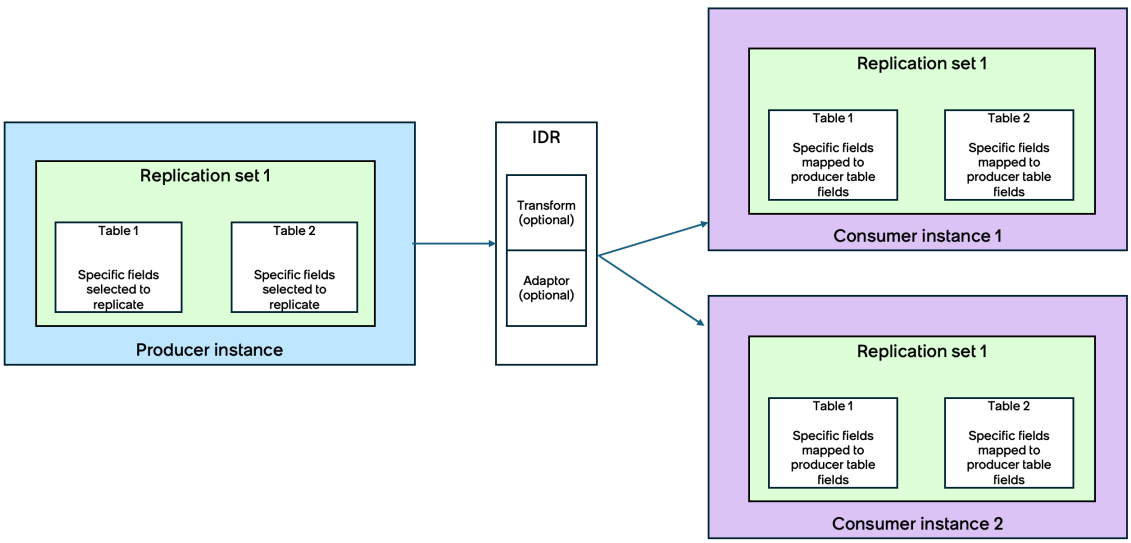
Users

User	Description
IDR admin	The IDR admin determines which tables and columns to replicate and analyzes table hierarchies and relationships. The IDR admin creates producer and consumer replication sets and monitors ongoing replication.

IDR workflow

This image shows how IDR replicates data from multiple tables on a producer instance to multiple consumer instances.

Replication overview



1. On the producer instance, the IDR admin specifies the tables and table columns to replicate by creating a producer replication set.
2. The IDR admin activates the producer replication set, which makes the producer data available for replication to consumers.
3. The IDR admin creates consumer replication sets on one or more consumer instances to receive the producer replication set data.
4. On each consumer instance, the IDR admin requests approval from the producer instance.
5. On the producer instance, the IDR admin approves or denies the requests from each consumer instance.
6. On each approved consumer instance, the IDR admin activates the consumer replication set. After the consumer replication is activated, data that is updated in a producer replication set automatically updates the corresponding data in the consumer replication sets.
7. On each consumer instance, the IDR admin can optionally replicate existing data from the producer instance by seeding data to the consumer instances.

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8. On either the producer or consumer instance, the IDR admin can optionally replicate data to tables or table columns that have different names on the consumer instance by configuring a transformation in the replication set.
9. On either the producer or consumer instance, the IDR admin can optionally modify producer data before replicating it to a consumer by configuring an adapter in the replication set.

IDR benefits

benefits

Benefit	Feature	Users
Continuously replicate inserts and updates from a producer instance to one or more consumer instances in near-real time, ensuring minimal delay.	Continuous replication	Administrator
Schedule replication of historical inserts and updates from a producer instance to one or more consumer instances at predefined intervals.	Scheduled replication	Administrator
Continuously replicate inserts and updates from a producer instance to a consumer instance in near-real time, with changes on either side replicated back to the other.	Bidirectional replication	Administrator
Continuously replicate inserts and updates from a producer instance to specific, distinguished consumer instances in near-real time, ensuring each consumer instance receives updates independently.	Discrete replication	Administrator
Map producer data to tables and table columns that are named differently on consumer instances. For example, you can modify and map table columns to localize data for different locales.	Transform replication data	Administrator
Modify producer data before replicating it to a consumer instance using an adapter. For example, you can configure adapters that perform string and mathematical operations, such as converting one currency to another, or converting one time zone to another.	Transform replication data	Administrator
Trigger post-replication workflows such as generating notifications or validating replication using business rules.	Triggering workflows after replication	Administrator

IDR limitations and when not to use IDR

- Do not use IDR to clone instances.

  IDR does not replicate metadata tables, child metadata tables, and most user and system tables. IDR is designed to replicate data, not to clone instances. For example, the Application File [sys_metadata] table and tables that extend [sys_metadata] (including the Business Rules

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[sys_script], Catalog [sc_catalog], and Workflow [wf_workflow] tables) are excluded and can't be replicated. For details on cloning, see .

- Avoid using IDR to replicate a series of large attachments on a regular basis. If you need to include attachments that are larger than 10 MB regularly, monitor IDR to ensure that the lag time doesn't exceed expectations.
- Avoid continuous replication of CMDB tables. Replicating CMDB data as changes occur can create performance issues or unforeseen consequences with replication due to the number of records involved. If you must replicate CMDB tables, consider scheduling replication or use conditions to constrain the count of replicated records and ensure all required columns are included in the replication set.
- You cannot replicate Edge Encrypted, Field Encryption, and Password (2-Way Encrypted) fields.
- IDR does not synchronize data archiving between instances. For example, archiving records or restoring archive records on a producer instance doesn't affect archived records on the consumer instance (and vice versa). You must create and manage archive rules for each instance independently.
- Additional replication limitations:
  - Maximum record size is 10 MB.
  - Continuous replication supports up to approximately 1 million records per day.
  - Seeding must not take longer than seven days to complete.
  - You can only create one scheduled replication set, with only one outbound entry in that set.

Warning:
IDR overwrites data on instances and can replicate sensitive data. Avoid potential data loss and data exposure, by testing your IDR implementation in a pre-production environment. See data privacy in IDR for more information.

What to explore next

To learn more about configuring and using IDR, see:

- Configuring Instance Data Replication
- Replicating data with Instance Data Replication
- Administering Instance Data Replication
- Instance Data Replication reference

Continuous replication

Replicate inserts and updates from a producer instance to one or more consumer instances in near-real time in Instance Data Replication (IDR).

Continuous replication in IDR enables syncing of specified tables and columns between instances. With continuous replication, inserts and updates are replicated in one direction from a producer instance to one or more consumer instances.

After you set up continuous replication, the IDRProducerJob job runs on the producer instance to detect data updates. When there are updates to replicate, the producer instance sends the updates to each subscribed consumer instance.

The IDRConsumerJob job runs on the consumer instances to detect the data updates from the producer. When the IDRConsumerJob job detects updates, it updates the data in consumer tables.

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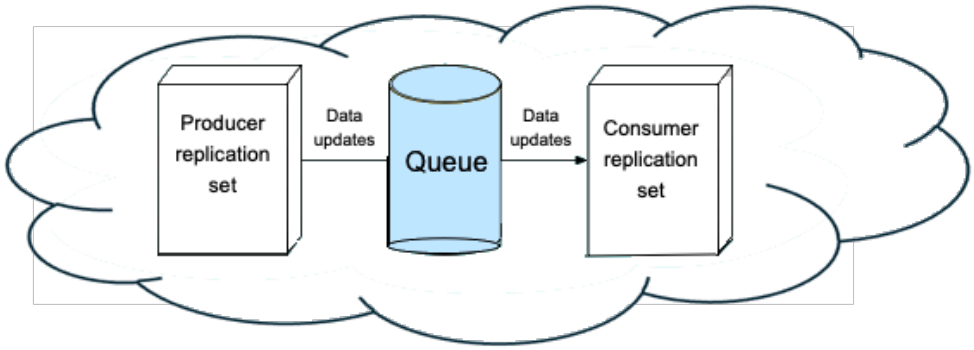
IDR data updates flow



Inserts and updates on the producer instance are replicated in near-real time.

- Monitor how long updates from the producer to the consumer are taking in the Monitoring Dashboard. See Monitoring replication status in Instance Data Replication.
- Monitor the replication record queue, message queue, and messages processed for all replications sets by in the Queue Dashboard. See Monitoring queues in Instance Data Replication.

For more information, see Set up continuous replication.

Bidirectional replication

Bidirectional replication in Instance Data Replication (IDR) enables data to flow from a producer instance to a consumer instance and accept data from a consumer instance to flow back to the producer instance.

All inserts and changes to records on either instance are sent to the other instance to keep the tables identical on both instances. For example, you can enable bidirectional replication for the Incidents table to keep incident records synchronized between two instances.

To make data flow bi-directionally, the system creates a producer replication set on the consumer instance and a consumer replication set on the producer instance.

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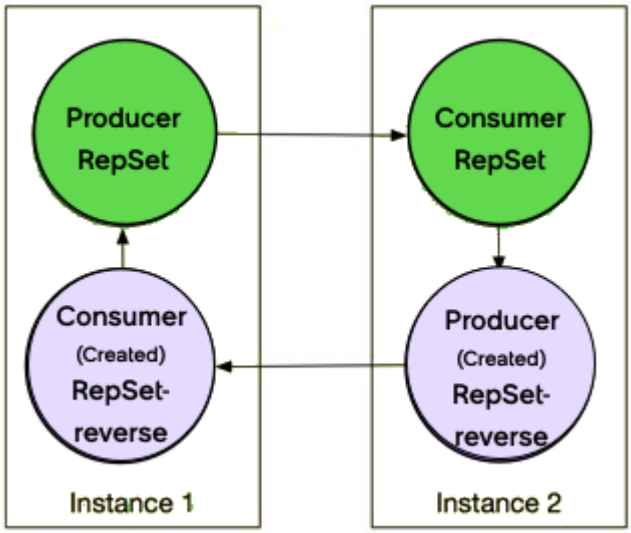
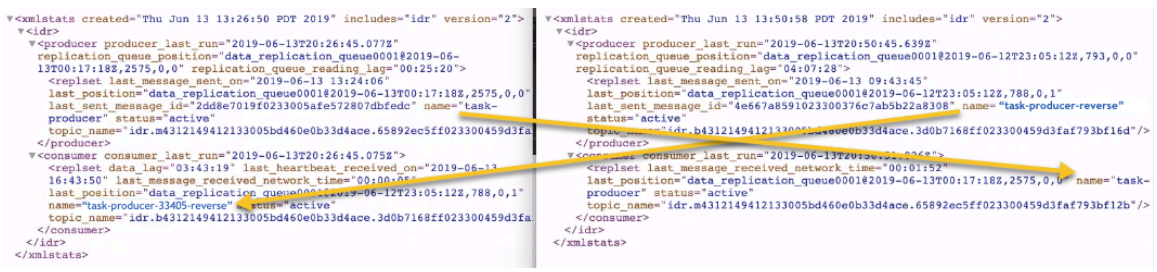
Bi-directional replication



If you look at the replication sets on the original producer instance, you see the replication set name and the automatically generated consumer instance. It has the same name appended with the suffix, `-<long-number>-reverse`, where `<long-number>` is a randomly generated number. For example, if Test is the producer replication set name, `Test-2034802-reverse` might be the name of the consumer replication set that is automatically created on the same instance. On the original consumer instance, you see the same names. Replication sets with the `reverse` suffix are read-only.

You can verify a consumer on a producer instance and a producer on a consumer instance by running `https://<producer-instance-name>/xmlstats.do?include=idr` and `https://<consumer-instance-name>/xmlstats.do?include=idr` on the producer and consumer instances. In the following image, the original producer instance is on the left and the original consumer instance is on the right.



Bidirectional replication has the following limitations:

- Auto-conflict resolution is unsupported.
- Merge conflicts happen if producer and consumer instances modify the same record at the same time.

  The most recent update wins, which means that the data on the consumer and producer tables might be different.

- Bidirectional replication supports the Number adapter but none of the other adapters.
- Bidirectional replication keeps data in sync between producer and consumer instances. However, in some scenarios, avoid using bidirectional replication and use one-way replication instead.

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  - If you plan to use adapters to differentiate data replicated between two instances, use two one-way replication sets to replicate data back and forth instead of using bidirectional sets.
  - If you need to seed data from one instance to another and vice versa, use two one-way replication sets.
- With bidirectional replication, records created on the producer instance are replicated to a consumer instance and vice versa. When the record is inserted on the consumer instance and it triggers a business rule that updates the record, that update is not replicated back to the producer instance.

If you must understand the implications of bi-direction and data transfer between instances, see data privacy in IDR for more information.

Discrete replication

Distinguish consumers in Instance Data Replication (IDR) using discrete mapping in a producer replication set.

Every producer replication set has a unique relationship with each consumer subscription. One way of distinguishing this relationship is by mapping discrete field values for producer replication sets.

Once you enable discrete mapping, you can define for each outbound entry of a replication set a discrete value field. An administrator of the producer replication set can define the mapping of each consumer subscription by the setting this discrete value.

For example, you might have an ACME corporation as the producer instance, and have consumer subscribers of ACME US and ACME Europe. You could set a discrete value of **region** on the outbound replication entries for the incident table. While both of these entries reference the same company table, a rule set for the discrete value can display US for ACME US, and Europe for ACME Europe.

If you have bi-direction enabled with discrete mappings, different consumer subscriptions:

- Should never receive records sent from other consumer subscribers
- Should never receive records from a producer intended for other consumers subscribers

With bidirectional replication, records created on a consumer instance are replicated to the producer instance and vice versa. When the consumer replicates a record to the producer, the consumer's discrete field value that you defined in the producer replication set overrides the discrete field value in the consumer record if it's different. For example, say you define a discrete mapping using separate regions for each consumer instance as follows:

Discrete mapping using the Region field

Consumer instance	Region
Consumer instance A	Asia
Consumer instance B	Europe
Consumer instance C	USA

When a record is manually added to consumer instance B with the Region field set to Asia, bi-directional replication sends the record from the consumer to the producer to be inserted, but the region field is overwritten and the value is changed to Europe. The discrete value that is defined in the producer replication set is used instead.

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For details on the implications with discrete mappings and data transfer between instances, see data privacy in IDR.

Scheduled replication

Replicate historical inserts and updates from a producer instance to one or more consumer instances on a scheduled basis in Instance Data Replication (IDR).

Instead of continuously replicating data as it's created or changed on your producer instance, you can schedule replication from the producer to one or more consumers at regular intervals each day. Consider scheduling replication for frequently updated, larger tables when immediate data replication to the consumer isn't required.

For example, you should avoid continuous replication of CMDB tables. Replicating CMDB data as changes occur can create performance issues or unforeseen consequences with replication due to the number of records involved. Instead, you can use scheduled replication to periodically replicate CMDB data that accumulates on the producer instance.

For more information, see Set up scheduled replication.

Configuring Instance Data Replication

Set up and configure Instance Data Replication (IDR).

Configuration overview

Request an Instance Data Replication subscription

The Instance Data Replication (IDR) plugin requires a separate subscription and must be activated by ServiceNow personnel.

Before you begin

Role required: admin

About this task

Beginning with the New York release, IDR is supported. The IDR plugin ID is com.glide.idr. When purchasing an IDR subscription, ServiceNow, Inc. personnel also activate the following plugins that IDR depends upon:

- com.snc.db.data_replicate
- com.glide.transform
- com.glide.kmf

IDR runs in ServiceNow data centers only, which means there is no support for using IDR with on-premise instances.

To purchase a subscription, contact your ServiceNow account manager. The account manager can arrange to have the plugin activated on your organization's production and subproduction instances, generally within a few days.

If you don't have an account manager, decide to delay activation after purchase, or want to evaluate the product on a subproduction instance without charge, follow these steps.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

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Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

4. Select **Submit**.
   After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

What to do next

Plan your replication strategy. See Preparing for Instance Data Replication.

Related topics

List of plugins (Zurich)

Preparing for Instance Data Replication

Before you set up Instance Data Replication (IDR), analyze the tables and columns in the producer and consumer instances to replicate data successfully.

Preparing your instances

Reduce latency by ensuring that the producer and consumer instances are in the same geographic region and belong to the same customer. You can replicate data between instances across different geographic regions. However, replication latency can occur when instances are located in data centers in separate regions.

Deciding which tables to replicate

Before you create a producer replication set, decide which tables to replicate. Avoid replicating system tables (tables with a sys_ prefix). If you replicate system tables (like sys_user, sys_user_group, or sys_user_grmember) that have existing data in the consumer instance, insert

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and update failures can occur during replication. If you decide to replicate these tables, you may have additional work afterwards to clean these tables.

Avoid continuous replication of CMDB tables. Replicating CMDB data as changes occur can create performance issues or unforeseen consequences with replication due to the number of records involved. If you must replicate CMDB tables, consider scheduling replication or use conditions to constrain the count of replicated records and ensure all required columns are included in the replication set.

For a list of tables to avoid replicating, see Excluded tables in Instance Data Replication.

Analyzing table hierarchies

For each table you want to replicate, determine if the table is a parent or child table. If the table belongs to a parent-child hierarchy, decide if you want to preserve the hierarchy and what strategy you want to use to move the hierarchy from the producer to the consumer.

Important:
To maintain data integrity and ensure that reference fields are populated on the consumer as you'd expect, you must replicate all of the parent and child tables in the table hierarchy.

See Preserving table hierarchy in Instance Data Replication.

Analyzing table relationships

For each table you want to replicate, determine if the table has reference fields that point to other tables. If you are replicating a table with a reference field that points to another table, but you don’t include that table in your replication set, the reference field will be empty in the record on the consumer instance. Replicating table relationships maintains data integrity and ensures that reference fields are populated on the consumer as you'd expect.

Organizing replication sets

As part of the planning phase, determine how you want to organize your replication sets and the tables they contain.

- Create a single replication set for each table. This option requires more setup, configuration, and time management, but allows you to pause replication for a single table without impacting other tables.
  - Replication is performed in parallel using multiple jobs.
  - Throughput metrics are easier to track with separate replication sets.
  - When an error occurs, replication for a single table is affected instead of all multiple tables.
- Create a replication set for a group of related tables. This option is easier to set up and manage, but oversight and potential issues impact all tables in the group.

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- If you need find information about replication status, the logical name you use for this replication set might be easier to find and understand compared to using distinct replication sets for each table.
- If you want to pause replication, you can do so for the entire group of tables by pausing replication from one replication set.
- If a replication issue occurs on one table and replication stops, this stops replication for all tables in the replication set.

If you decide to group tables in a single replication set, try to limit it to five or fewer tables. If you have more than five tables to replicate, use multiple replication sets with five or fewer tables in each set.

Deciding which columns to replicate

For each table you want to replicate, decide which columns to include. Avoid including every column in your replication set by default. Instead, decide which columns are necessary, and exclude any sys_ columns or other columns that are updated by scripts automatically.

For example, if you include a column updated by the system automatically on a frequent basis, IDR may replicate data more often than necessary. When the system replicates this data, it can negatively impact the capacity subscription. Periodically check the **IDR License and Usage Details** dashboard to monitor the message count that is generated from the producer.

Preparing target tables on the consumer instance

By default, IDR uses a record's sys_id field as the lookup value to keep data synchronized between the producer and consumer instance. If the target table contains existing data or records from prior data imports, the sys_id values in the consumer don't match the sys_ids from the producer instance.

Always consider the producer instance as the source of truth. For optimal replication results, follow these guidelines:

- Make the producer instance the exclusive data source for the consumer instance.
- Prior to replication, ensure that the target table in the consumer instance is empty. Ideally, the initial records in the target instance are created from data sent exclusively from the producer via a replication set or a clone.
- Ensure that there are no other ongoing data imports or updates to target tables on the consumer instance after replication starts.

For example, if users from LDAP are imported to the consumer instance using a different data source, the sys_ids for those records don't match the sys_id values in the producer instance. In this scenario, existing user records in the target table on the consumer aren't updated and duplicate records are created.

In situations where this cannot be avoided, clean the tables on the consumer instance prior to replication. You must delete the records in the target table or ensure the sys_id values in producer and consumer are the same.

Alternatively, you can use a custom **Coalesce** field to identify unique records (instead of the default sys_id column) for replication. Use a custom **Coalesce** column when records on the consumer instance have a different sys_id for the same records on the producer instance. For more information on using a custom **Coalesce**, see Custom coalescing.

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Reviewing business rules

You can use business rules to trigger workflows after replication, such as sending a notification or validating the replicated data. Review any business rules on the consumer instance that might prevent the idr.system user from inserting, updating, or deleting records in the target table.

If failures related to business rules occur, they appear in the **Instance Data Replication** > **Replication Payload Error** table on the consumer instance. View the **Error Message** field for details on the script that is causing the failure.

With bidirectional replication, records created on the producer instance are replicated to a consumer instance and vice versa. When the record is inserted on the consumer instance and it triggers a business rule that updates the record, that update is not replicated back to the producer instance.

Reviewing ACLs

Review the ACLs in place on the target table in the consumer instance to ensure that IDR can replicate data successfully. Confirm that the idr.system user has the appropriate roles for the target table.

If failures related to ACLs occur, they appear in the **Instance Data Replication** > **Replication Payload Error** table on the consumer instance. View the **Error Message** field for details on the ACL that is causing the failure.

Reviewing data policies

Review any data policies in place on the target table in the consumer instance to ensure that IDR can replicate data successfully. Confirm that the data you are replicating satisfies the data policy.

If failures related to data policies occur, they appear in the **Instance Data Replication** > **Replication Payload Error** table on the consumer instance. View the **Error Message** field for details on the data policy that is causing the failure.

Preserving table hierarchy in Instance Data Replication

Decide if you want to replicate a parent-child table hierarchy and what strategy to use for replicating the data in Instance Data Replication (IDR).

Before you create a replication set, determine if the table that you want to replicate is part of a parent-child table hierarchy. If it is, decide if you want to preserve the hierarchy and whether to replicate the data from the parent perspective (retaining only columns belonging to the parent table) or from the child perspective (retaining all columns that belong to the child tables). Review the following available strategies.

Strategy 1: Preserve the entire hierarchy and replicate child columns

You can preserve the entire hierarchy, including all of the child table columns, by creating an outbound entry for each child table, and specifying a sys_class_name filter for each child table.

For example, to replicate the Task table and ensure that all of the columns from all of the child tables are included, specify the following:

Outbound entries

Table	Filter
Task	sys_class_name=task

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Outbound entries (continued)

Table	Filter
Incident	sys_class_name=incident
Problem	sys_class_name=problem
Change Request	sys_class_name=change

And so forth, for all of the child tables, including filters with each table for the sys_class_name.

With this strategy, records are inserted into each child table on the consumer, including data from the columns that belong to each child table on the producer.

Strategy 2: Preserve the hierarchy, but don't replicate child columns

To preserve the hierarchy but only replicate columns from the parent table, replicate the parent table and include the Class Name [sys_class_name] field in the **Included Fields** list. Including the Class Name field maintains the distinction between parent and child records on the consumer instance.

For example, if you want to replicate the Task table and its children (Incident, Problem, Change Request), but only replicate the columns that belong to the Task table, specify the following:

Outbound entry

Table	Included Fields
Task	Class Name

In this strategy, the sys_class_name column on the consumer Task table receives entries for the parent table (task) and child tables (incident, problem, and change), and records are inserted into the respective child tables on the consumer. However, without the sys_class_name filter, the columns that are unique to each child table are not replicated.

Strategy 3: Ignore the hierarchy, and only replicate parent table data

To ignore the hierarchy and only replicate parent records, replicate the parent table and exclude the Class Name [sys_class_name] field from the **Included Fields** list. Excluding the Class Name field removes the distinction between parent and child records on the consumer instance. All replicated records on the consumer will be parent table records.

For example, if you want to replicate records from the Task table and simply consider all records as tasks for reporting or auditing purposes, specify the following:

Outbound entry

Table	Included Fields
Task	Any fields except for Class Name

In this strategy, when you replicate the Task table, all replicated records have a value of task in the sys_class_name column, and no columns belonging to the child tables are replicated.

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Upgrading legacy replication sets to V2 in Instance Data Replication

Improve message processing and replication performance by upgrading your legacy replication sets in IDR to V2.

Legacy and V2 replication sets

Important:
Legacy replication sets are deprecated in the Zurich release. To continue replicating data, you must upgrade all legacy replication sets to V2.

- Legacy replication sets use a ServiceNow Kafka message transport and delivery implementation that was created prior to the Utah release. All replication sets created prior to the Utah release are considered legacy replication sets.

  Beginning with the Washington DC release, you can no longer create legacy replication sets.

- V2 replication sets use the ServiceNow Hermes Messaging Service for Kafka message transport and delivery, which replicates data faster, at scale, and with high reliability. The Hermes Messaging Service is a ServiceNow AI Platform capability that's automatically enabled when the IDR plugin (com.glide.idr) is activated. All replication sets created after the Washington DC release are V2 replication sets.

Note:
Data sent from a V2 producer replication set is retained in the message queue for 24 hours.

Upgrading legacy replication sets

Upgrade your eligible legacy replication sets to V2 to take advantage of the benefits provided by Hermes. Upgrading replication sets from legacy to V2 is a seamless process. Active data replication from the producer to consumer continues throughout the upgrade, which means you don't need to pause replication before you begin. Replication continues using the V2 replication sets after the upgrade is finished.

You can either create new V2 replication sets or upgrade existing legacy replication sets to V2. See Upgrade legacy replication sets in Instance Data Replication.

Upgrade eligibility

Legacy replication sets are eligible for upgrade to V2 when both the producer and consumer instance are on Utah or higher. Note that some Utah legacy replication sets aren't eligible for upgrade to V2, depending on their configuration (for example, the replication set can't be bidirectional or discrete).

You can confirm upgrade eligibility by viewing the producer replication set and checking the **Upgrade Eligibility** column in the Consumer Subscriptions related list.

- If the value for each subscribed consumer is **Eligible**, you can begin the upgrade process by following the steps in Upgrade legacy replication sets in Instance Data Replication.
- If the value for a subscribed consumer is **Not eligible**, this means that either the consumer instance isn't on Utah or higher, or the consumer replication set is on Utah, but isn't eligible for upgrade to V2 because of its configuration.

For details on which types of legacy replication sets are eligible for upgrade in Utah, refer to the "Upgrading legacy replication sets to V2" topic in the Utah version of the IDR documentation.

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Compatibility

V2 producer replication sets are compatible only with V2 consumer replication sets.

If you upgrade a producer replication set to V2, you must upgrade the subscribed consumer replication sets to V2 as well to take advantage of the V2 processing improvements.

Upgrade legacy replication sets in Instance Data Replication

Replicate high volumes of data faster and more reliably by upgrading your Instance Data Replication (IDR) legacy producer and consumer replication sets to V2.

Before you begin
Role required: admin

About this task

Important:
Legacy replication sets are deprecated in the Zurich release. To continue replicating data, you must upgrade all legacy replication sets to V2.

Procedure

1. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.
2. Select a producer replication set that you want to upgrade.
3. Verify that the producer replication set is eligible for upgrade by checking the **Upgrade Eligibility** column on the Consumer Subscriptions related list.
   - If the value for each consumer is **Eligible**, you can upgrade the replication set.
   - If the value for any consumer **Not eligible**, this means that either the consumer instance isn't on Utah or higher, or the consumer replication set is on Utah, but isn't eligible for upgrade to V2 because of its configuration. See Upgrade eligibility for more information.
4. Create a V2 producer replication set.

   a. On the Producer Replication Set form, select **Upgrade**.

   b. In the dialog box, either accept the default name or enter a unique replication set name. By default, the system appends -V2 to the legacy replication set name, but you can use any valid set name to differentiate the V2 version from the legacy version.

   c. Select **OK**.

   The legacy producer replication set is copied to create a V2 producer replication set. The producer instance sends metadata to the consumer instance, which enables you to upgrade the legacy consumer replication set.
5. On the consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.
6. Select the legacy consumer replication set that's subscribed to the producer replication set you upgraded.
7. Upgrade the legacy consumer replication set.
   If the **Begin upgrade** button doesn't appear on the Consumer Replication Set form, resend the metadata from the producer replication set:

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a. Select **Begin upgrade**.

b. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.

c. Select the new V2 producer replication set.

d. Select the check box next to the consumer subscription in the Consumer Subscriptions related list.

e. Select the **Actions on selected rows** list.

f. Select **Resend Metadata**.

The V2 consumer replication set is created, and the producer instance sends metadata replication entries to the consumer instance. After all the entries are received, the **Start dry run** button appears on the Consumer Replication Set form.

8. Confirm that the consumer instance can connect to the Hermes Messaging Service and that replication succeeds by selecting **Start dry run**.
   Data is consumed from the Kafka topic by the consumer instance but not persisted in the database yet.
9. Complete the upgrade by activating the V2 consumer replication set with or without data integrity checks.
   - Ensure that the legacy and V2 topics are in sync by selecting **Finish upgrade**.

     This option ensures that IDR performs all necessary data integrity checks before activating the V2 consumer replication set. If any data integrity checks fail, the upgrade is automatically rolled back to prioritize data consistency.

   - Complete the upgrade without data integrity checks by selecting **Finish upgrade without sync**.

     This option allows you to complete the upgrade for replication sets where the consumer replication is lagging or no records have been replicated to the V2 topic. However, it may skip replicated records or attempt to duplicate replication. If you have concerns over missing or mismatched records, you can create a data comparison request to reseed those records.

   Note:
   If the **Finish upgrade** button doesn't appear on the Consumer Replication Set form, contact Customer Service and Support.

   The V2 consumer replication set is activated and the legacy consumer replication set is automatically deactivated.
10. After all subscribed consumers are upgraded to V2, deactivate the legacy producer replication set.

    Note:
    Legacy consumer replication sets stop consuming when you deactivate the legacy producer, so you must ensure all subscribed consumers are upgraded to V2 before you deactivate it.

    a. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.

    b. Select the legacy producer replication set that you upgraded.

    c. Select **Deactivate**.

    d. Confirm deactivation by selecting **OK**.

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Result
The legacy producer and consumer replication sets are upgraded to V2 and the upgrade status changes to Up to date. Data replication continues based on the last message ID that was processed by the legacy replication set.

Rolling back an upgrade in Instance Data Replication

If a problem occurs during an upgrade to V2, the upgrade is rolled back in Instance Data Replication (IDR).

Important:
Legacy replication sets are deprecated in the Zurich release. To continue replicating data, you must upgrade all legacy replication sets to V2.

If you upgrade a legacy replication set to V2 and a problem occurs with the upgrade, the upgrade is automatically rolled back to ensure data consistency. If a processing delay caused the issue, you can try the upgrade again.

For example, when the consumer instance identifies the most recent message in the legacy topic, but can't find that same message in the Hermes topic, the upgrade is rolled back. If you attempt the upgrade again and the consumer instance successfully finds the most recent message in the Hermes topic, the upgrade continues, and processing begins only from the Hermes topic.

- If the legacy consumer job is still processing records that were replicated prior to when the upgrade started replicating to both the legacy and the Hermes topics, the upgrade is rolled back. In this scenario, allow time for the consumer to process the replication backlog and then try the upgrade to V2 again. For example, if the lag persists after 30 minutes, wait another 2 hours and try again, or wait 24 hours and try again.
- If no records are being replicated from the producer to the Hermes topic after the upgrade starts, wait and retry the upgrade after allowing at least one record to replicate from the producer to the consumer. Alternatively, you can manually trigger replication by making a change to at least one record.
- If you want to complete the upgrade without data integrity checks, you can use the **Finish upgrade without sync** option after performing the dry run.

  This option allows you to complete the upgrade for replication sets where the consumer replication is lagging or no records have been replicated to the V2 topic. However, it may skip replicated records or attempt to duplicate replication. If you have concerns over missing or mismatched records, you can create a data comparison request to reseed those records.

Upgrading your instance with Instance Data Replication enabled

When upgrading your instance, IDR automatically pauses replication to maintain data replication without any manual intervention.

Upgrading your instance with Instance Data Replication (IDR) enabled is a seamless process.

- IDR doesn't consume or produce messages during an instance upgrade. IDR jobs are automatically stopped when the upgrade begins.
- The data_replication_queue tracks the timestamp of the last message sent. This ensures that replication resumes from the last change made prior to the upgrade.
- Any seeding in progress before the upgrade will be automatically paused when the upgrade starts and will resume once the upgrade is completed. To ensure that seeding completes without interruptions, avoid initiating a seeding request before an upgrade.

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- Seeding requests can't be initiated during an instance upgrade.
- Replication resumes immediately after the upgrade is completed. There is no need to make any adjustments to IDR for record replication to continue.

Replicating data with Instance Data Replication

Synchronize data between instances using Instance Data Replication (IDR).

Overview of replicating data

IDR enables you to replicate data from one instance, called the producer instance, to one or more other instances, called consumer instances. IDR offers several replication types and options for modifying replication data to suit different needs.

Set up continuous replication

Enable near-real time data replication from a producer instance to one or more consumer instances in Instance Data Replication (IDR).

Before you begin

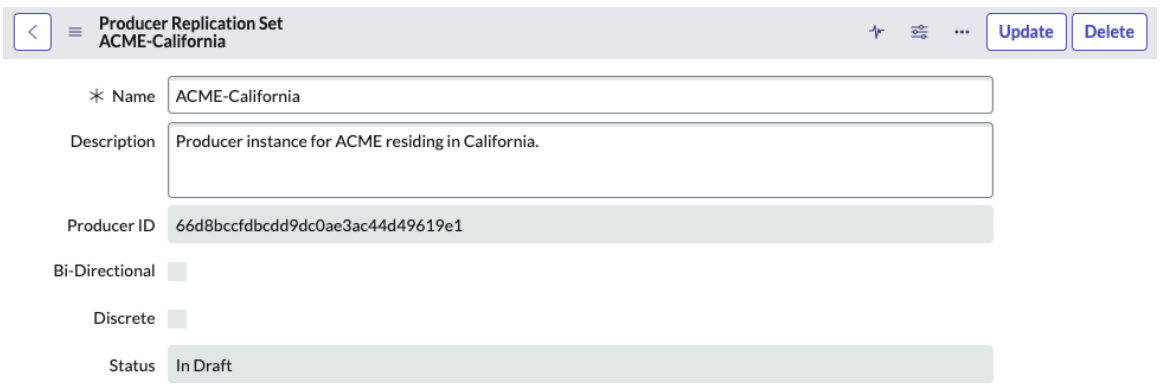
Verify that the producer and consumer instances belong to the same customer.

Plan your data replication strategy by reviewing the important considerations described in Preparing for Instance Data Replication.

Role required: idr_admin or admin

Procedure

1. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.
2. Select **New**.
3. Enter a name and description for the producer replication set.
   - The name can only contain alphanumeric characters and hyphens.
   - Avoid using a name that applies only to the producer instance. You must provide the same name in the consumer replication set, so the name shouldn't be producer-specific.
4. **Optional:** Create the producer replication set from a list of outbound entries by selecting **Entry set**.
   If you imported an update set from another instance or you created one earlier on your instance, you can choose an existing entry set.
5. Select **Submit**.
   The producer replication set is created with an auto-generated producer ID that identifies the producer instance in the system.



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6. Specify the tables and columns on the producer instance that you want to replicate.

   a. Select the Outbound Entries related list.

   b. Select **New**.

   c. On the form, fill in the fields.

Replication entry form

Field	Description
Source Table Name	Name of one of the tables on the producer instance to replicate. For example, SAN Disk [cmdb_ci_san_disk].
Filter	Filter criteria to control the records in the table that the system is replicating. ▪ Use the filter to limit the number of records in your replication set. For example, if the table has an **Active** field, add a filter condition like **[Active] [is] [True]** to replicate only active records. ▪ If you want to replicate and preserve a parent and child table hierarchy, add a filter for the sys_class_name column to each outbound entry. This ensures that all of the child table columns are replicated, and not just the parent the columns. For example, to replicate both the Task [task] parent table and the Incident [incident] child table, you must add **[Task type] [is] [Task]** as a filter in the parent table entry and **[Task type] [is] [Incident]** as a filter in the child table entry. In this example, Task type is the label for the sys_class_name column on each table. For details, see Preserving table hierarchy in Instance Data Replication.
Include Attachments	Option to replicate the files associated with the records that you are replicating.
Included Fields	Fields to include. Move table fields into the Selected column to replicate them or into the Available column to prevent replicating them. **Note:** The system must replicate some fields, such as **sys_id (Mandatory)**. The system cannot replicate some fields, such as **Edge Encrypted** and **Password1**. They do not appear in either column.
Enable Custom Coalesce	Option to enable you to choose a field other than the default **sys_id** field to coalesce IDR.
Coalesce Field	Choose a field to use to coalesce IDR. Only unique fields are available. See Custom coalescing. This field only displays if you select **Enable Custom Coalesce**.

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d. Repeat these steps for each table that you want to include in the replication set.

Note:
If a table that you select has child tables, repeat these step and add outbound entries for each child table to maintain data integrity.

7. Select **Submit**.
8. Make the producer data available for replication to consumers by selecting **Activate**.
   The producer is ready to send the data that is specified in the replication set to one or more consumer instances.
9. On a consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.
10. Select **New**.
11. On the form, fill in the fields.

Consumer Replication Set form

Field	Description
Producer Instance URL	URL of the producer instance. For example, https://<producer_instance>.servicenow.com.
Producer Replication Set Name	Name of the consumer replication set. The name on the consumer must match the name on the producer. Obtain the name from the producer administrator.
Description	Description of the purpose of the replication.

12. Select **Submit**.
    The list of all consumer replication sets on the consumer instance appears. The system sends a request to the producer replication set administrator to approve or deny the request.
13. Approve the consumer request.

    a. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.

    b. Select the producer replication set where you want to approve consumer access.

    c. Under Related Links, on the **Consumer Subscriptions** tab, select the option for the consumer replication set that you want to approve.

    d. On the Actions on selected rows list, select **Approve**.
    The approved consumer set starts receiving replicated data.

14. Activate the consumer replication set.

    a. On the consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.

    b. Select the consumer replication set that you want to activate.

    c. Select **Activate**.
    After some time, the status changes to Active Replication, and the **Partial Seeding** and **Full Seeding** buttons are displayed.

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Result
Data in the producer tables is replicated into tables and table columns of the same name on the consumer instances.

What to do next
- Seed a consumer instance
- Transform replication data
- Trigger a workflow after replication

Set up bidirectional replication

Replicate updated data on a consumer instance to the producer instance using bidirectional replication in Instance Data Replication (IDR).

Before you begin
Role required: admin

About this task
Bidirectional replication enables you to replicate data on a consumer instance to the producer instance. For example, data, such as problem requests, can be copied to consumer instances for third parties to use. The third party can update the problem issue on the consumer instance. The data can then be updated on the producer instance.

Note that seeding options are not available in bi-directional sets by design.

Procedure
1. Create a producer replication set.

   a. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.

   b. Select **New**.

   c. Enter a name and description for the producer replication set.
      - The name can only contain alphanumeric characters and hyphens.
      - Avoid using a name that applies only to the producer instance. You must provide the same name in the consumer replication set, so the name shouldn't be producer-specific.

   d. Enable changes to records that are made on the consumer instance to propagate to the producer instance by selecting **Bi-Directional**.

      Note:
      Bi-directional replication works for records that originate on the producer or consumer.

   e. **Optional:** Enable discrete mapping from a producer replication set by selecting **Discrete**. Discrete mapping distinguishes different consumer instances. For details, see Set up discrete replication.

   f. **Optional:** Create the producer replication set from a list of outbound entries by selecting **Entry set**.
   If you imported an update set from another instance or you created one earlier on your instance, you can choose an existing entry set.

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g. Select **Submit**.
The producer replication set is created with an auto-generated producer ID that identifies the producer instance in the system.

2. Specify the tables and columns on the producer instance that you want to replicate.

a. Select the Outbound Entries related list.

b. Select **New**.

c. On the form, fill in the fields.

Replication entry form

Field	Description
Source Table Name	Name of one of the tables on the producer instance to replicate. For example, SAN Disk [cmdb_ci_san_disk].
Filter	Filter criteria to control the records in the table that the system is replicating. ▪ Use the filter to limit the number of records in your replication set. For example, if the table has an **Active** field, add a filter condition like **[Active] [is] [True]** to replicate only active records. ▪ If you want to replicate and preserve a parent and child table hierarchy, add a filter for the sys_class_name column to each outbound entry. This ensures that all of the child table columns are replicated, and not just the parent the columns. For example, to replicate both the Task [task] parent table and the Incident [incident] child table, you must add **[Task type] [is] [Task]** as a filter in the parent table entry and **[Task type] [is] [Incident]** as a filter in the child table entry. In this example, Task type is the label for the sys_class_name column on each table. For details, see Preserving table hierarchy in Instance Data Replication.
Include Attachments	Option to replicate the files associated with the records that you are replicating.
Included Fields	Fields to include. Move table fields into the Selected column to replicate them or into the Available column to prevent replicating them. **Note:** The system must replicate some fields, such as **sys_id (Mandatory)**. The system cannot replicate some fields, such as **Edge Encrypted** and **Password1**. They do not appear in either column.
Enable Custom Coalesce	Option to enable you to choose a field other than the default **sys_id** field to coalesce IDR.
Coalesce Field	Choose a field to use to coalesce IDR. Only unique fields are available. See Custom coalescing.

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Field	Description
	This field only displays if you select **Enable Custom Coalesce**.

d. Repeat these steps for each table that you want to include in the replication set.

> **Note:**
> If a table that you select has child tables, repeat these step and add outbound entries for each child table to maintain data integrity.

e. Select **Submit**.

3. Make the producer data available for replication to consumers by selecting **Activate**.
The producer is ready to send the data that is specified in the replication set to one or more consumer instances.

4. Create a consumer replication set.

a. On a consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.

b. Select **New**.

c. On the form, fill in the fields.

Consumer Replication Set form

Field	Description
Producer Instance URL	URL of the producer instance. For example, https://<producer_instance>.servicenow.com.
Producer Replication Set Name	Name of the consumer replication set. The name on the consumer must match the name on the producer. Obtain the name from the producer administrator.
Description	Description of the purpose of the replication.

d. Select **Submit**.
The system sends a request to the producer replication set administrator to approve or deny the request.

5. Approve the consumer request.

a. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.

b. Select the producer replication set where you want to approve consumer access.

c. Under Related Links, on the **Consumer Subscriptions** tab, select the option for the consumer replication set that you want to approve.

d. On the Actions on selected rows list, select **Approve**.
The consumer set is approved and ready to receive replicated data.

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6. Activate the consumer replication set.
   a. On the consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.
   b. Select the consumer replication set that you want to activate.
   c. Select **Activate**.
   After some time, the status changes to Active Replication.
7. Update the Consumer Replication Entries configuration to match the configuration on the producer by selecting **Synchronize Replication Entries**.
   If you do not see this option, refresh the page.
8. In the dialog box that appears, confirm the synchronization.

Result
Data that is updated on this consumer instance automatically replicates on the producer instance, which then replicates the updates to its other consumer instances.

Set up discrete replication

Replicate data from a producer instance to specific, distinguished consumer instances in near-real time, ensuring each consumer instance receives updates independently in Instance Data Replication (IDR).

Before you begin
Plan your data replication strategy by reviewing the important considerations described in Preparing for Instance Data Replication.

Role required: idr_admin or admin

Procedure
1. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.
2. Select **New**.
3. Enter a name and description for the producer replication set.
   - The name can only contain alphanumeric characters and hyphens.
   - Avoid using a name that applies only to the producer instance. You must provide the same name in the consumer replication set, so the name shouldn't be producer-specific.
4. Distinguish replication for different consumer instances by selecting **Discrete**.
5. **Optional:** Create the producer replication set from a list of outbound entries by selecting **Entry set**.
   If you imported an update set from another instance or you created one earlier on your instance, you can choose an existing entry set.
6. Select **Submit**.
   The producer replication set is created with an auto-generated producer ID that identifies the producer instance in the system.
7. Specify the tables and columns on the producer instance that you want to replicate.
   a. Select the Outbound Entries related list.
   b. Select **New**.
   c. On the form, fill in the fields.

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Replication entry form

Field	Description
Source Table Name	Name of one of the tables on the producer instance to replicate. For example, SAN Disk [cmdb_ci_san_disk].
Discrete Field	Choose a reference field that defines the mapping for each consumer subscription. For example, if you choose the **Assigned To** field in the Incident source table, you can distinguish user assignments for specific consumers.
Filter	Filter criteria to control the records in the table that the system is replicating. ▪ Use the filter to limit the number of records in your replication set. For example, if the table has an **Active** field, add a filter condition like **[Active] [is] [True]** to replicate only active records. ▪ If you want to replicate and preserve a parent and child table hierarchy, add a filter for the sys_class_name column to each outbound entry. This ensures that all of the child table columns are replicated, and not just the parent the columns. For example, to replicate both the Task [task] parent table and the Incident [incident] child table, you must add **[Task type] [is] [Task]** as a filter in the parent table entry and **[Task type] [is] [Incident]** as a filter in the child table entry. In this example, Task type is the label for the sys_class_name column on each table. For details, see Preserving table hierarchy in Instance Data Replication.
Include Attachments	Option to replicate the files associated with the records that you are replicating.
Included Fields	Fields to include. Move table fields into the Selected column to replicate them or into the Available column to prevent replicating them. **Note:** The system must replicate some fields, such as **sys_id (Mandatory)**. The system cannot replicate some fields, such as **Edge Encrypted** and **Password1**. They do not appear in either column.
Enable Custom Coalesce	Option to enable you to choose a field other than the default **sys_id** field to coalesce IDR.
Coalesce Field	Choose a field to use to coalesce IDR. Only unique fields are available. See Custom coalescing. This field only displays if you select **Enable Custom Coalesce**.

d. Repeat these steps for each table that you want to include in the replication set.

Note:
If a table that you select has child tables, repeat these steps and add outbound entries for each child table to maintain data integrity.

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8. Map discrete values for each consumer instance.

   a. Select the **Discrete Mappings** tab.

   b. Select **New**.

   c. On the form, fill in the fields.

Field	Description
Discrete Value	This field sets a rule for what displays for the selected consumer instance within the producer replication set. For example, an **Assigned To** discrete value gives choices from a designated table of a specific user to show assignments.
Outbound Replication Entry	Select an outbound replication entry that you configured with a source table for this producer replication set.
Replication Subscription	Choose the consumer instance that displays the discrete value assignment.

   Note:
   For each consumer that subscribes to a producer replication set with discrete mapping enabled, you must configure a discrete value.

   d. Repeat these steps for each consumer that you want to subscribe to the producer replication set.

9. Select **Submit**.
10. Make the producer data available for replication to consumers by selecting **Activate**.
    The producer is ready to send the data that is specified in the replication set to one or more consumer instances.
11. On a consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.
12. Select **New**.
13. On the form, fill in the fields.

Consumer Replication Set form

Field	Description
Producer Instance URL	URL of the producer instance. For example, https://<producer_instance>.servicenow.com.
Producer Replication Set Name	Name of the consumer replication set. The name on the consumer must match the name on the producer. Obtain the name from the producer administrator.
Description	Description of the purpose of the replication.

14. Select **Submit**.

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The list of all consumer replication sets on the consumer instance appears. The system sends a request to the producer replication set administrator to approve or deny the request.

15. Approve the consumer request.
    a. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.
    b. Select the producer replication set where you want to approve consumer access.
    c. Under Related Links, on the **Consumer Subscriptions** tab, select the option for the consumer replication set that you want to approve.
    d. On the Actions on selected rows list, select **Approve**.
    e. Repeat these steps for each consumer instance.
16. Activate the consumer replication set.
    a. On the consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.
    b. Select the consumer replication set that you want to activate.
    c. Select **Activate**.
    d. Repeat these steps for each consumer instance.
    After some time, the status changes to Active Replication, and the **Partial Seeding** and **Full Seeding** buttons are displayed.

Set up scheduled replication

Replicate data from a producer to a consumer at scheduled times each day in Instance Data Replication (IDR).

Before you begin

Verify that the producer and consumer instances belong to the same customer.

Plan your data replication strategy by reviewing the important considerations described in Preparing for Instance Data Replication.

Note:
You can only create one scheduled replication sets, with only one outbound entry in that set.

Role required: idr_admin or admin

Procedure

1. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.
2. Select **New**.
3. Enter a name and description for the producer replication set.
    - The name can only contain alphanumeric characters and hyphens.
    - Avoid using a name that applies only to the producer instance. You must provide the same name in the consumer replication set, so the name shouldn't be producer-specific.
4. Schedule replication from your producer instance to one or more consumer instances.
    a. Select **Scheduled**.
    b. Select an interval in the **Schedule Interval** drop-down list.
    c. Select a date and time to begin scheduled replication.

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The schedule interval is added to the start date and time, and the resulting next run time is displayed in the **Next Schedule Run** field.

5. **Optional:** Create the producer replication set from a list of outbound entries by selecting **Entry set**.
   If you imported an update set from another instance or you created one earlier on your instance, you can choose an existing entry set.
6. Select **Submit**.
   The producer replication set is created with an auto-generated producer ID that identifies the producer instance in the system.
7. Specify the table and columns on the producer instance that you want to replicate.

   a. Select the Outbound Entries related list.

   b. Select **New**.

   c. On the form, fill in the fields.

Replication entry form

Field	Description
Source Table Name	Name of one of the tables on the producer instance to replicate. For example, SAN Disk [cmdb_ci_san_disk].
Filter	Filter criteria to control the records in the table that the system is replicating. ▪ Use the filter to limit the number of records in your replication set. For example, if the table has an **Active** field, add a filter condition like **[Active] [is] [True]** to replicate only active records. ▪ If you want to replicate and preserve a parent and child table hierarchy, add a filter for the sys_class_name column to each outbound entry. This ensures that all of the child table columns are replicated, and not just the parent the columns. For example, to replicate both the Task [task] parent table and the Incident [incident] child table, you must add **[Task type] [is] [Task]** as a filter in the parent table entry and **[Task type] [is] [Incident]** as a filter in the child table entry. In this example, Task type is the label for the sys_class_name column on each table. For details, see Preserving table hierarchy in Instance Data Replication.
Include Attachments	Option to replicate the files associated with the records that you are replicating.
Included Fields	Fields to include. Move table fields into the Selected column to replicate them or into the Available column to prevent replicating them. **Note:** The system must replicate some fields, such as **sys_id (Mandatory)**. The system cannot replicate some fields, such as **Edge Encrypted** and **Password1**. They do not appear in either column.

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Field	Description
Enable Custom Coalesce	Option to enable you to choose a field other than the default **sys_id** field to coalesce IDR.
Coalesce Field	Choose a field to use to coalesce IDR. Only unique fields are available. See Custom coalescing. This field only displays if you select **Enable Custom Coalesce**.

Note:
If a table that you select has child tables, you can create separate non-scheduled replication sets for each child table to maintain data integrity.

8. Select **Submit**.
9. Make the producer data available for replication to consumers by selecting **Activate**.
   The producer is ready to send the data that is specified in the replication set to one or more consumer instances.
10. On a consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.
11. Select **New**.
12. On the form, fill in the fields.

Consumer Replication Set form

Field	Description
Producer Instance URL	URL of the producer instance. For example, https://<producer_instance>.servicenow.com.
Producer Replication Set Name	Name of the consumer replication set. The name on the consumer must match the name on the producer. Obtain the name from the producer administrator.
Description	Description of the purpose of the replication.

13. Select **Submit**.
    The list of all consumer replication sets appears. The system sends a request to the producer replication set administrator to approve or deny the request.

Result
Scheduled replication begins on the scheduled start date and time. Until then, continuous data replication occurs. After that point, replication occurs only at each scheduled interval.

What to do next
- View scheduled replication runs in the Scheduled Replication Requests related list. Track scheduled replication progress from the producer side by viewing the **Percent Complete** and **Run Duration** columns. Track scheduled replication progress for the consumer portion by viewing the same details in the consumer replication set.
- View details for a scheduled replication run by selecting a request in the Scheduled Replication Requests related list. If a scheduled run fails, you can try replicating records using

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a partial seeding request or a data comparison request that covers the failed date range. Otherwise, contact Customer Service and Support for assistance.

- Monitor the progress of all scheduled replication sets in the IDR Monitoring Dashboard.

Cancel scheduled replication

Cancel scheduled replication by deactivating or deleting a producer replication set.

Before you begin
Role required: admin

About this task
Once set, you can't disable scheduled replication on a producer replication set; the option becomes read-only. You can either deactivate the set or delete and recreate it.

Procedure

1. Navigate to **Instance Data Replication** > **Producer Replication Sets**.
2. Select the producer replication set for which you want to stop scheduled replication.
3. Stop scheduled replication before another run occurs.
   - Pause scheduled replication indefinitely by selecting **Deactivate**. This option stops replication before the next schedule run.
   - Stop scheduled replication by selecting **Delete**. This option deletes the producer replication set. If you plan to recreate the producer replication set, record the settings you configured before you delete the replication set.

Result
Scheduled replication ends. After deactivating the producer replication set, any in progress seeding requests will complete, but pending requests will not be processed.

What to do next
If you intend to resume scheduled replication, you can sync records that weren't replicated during the deactivation period by running a data comparison request. See Comparing replicated data between instances in Instance Data Replication. Alternatively, you can replicate missing records by performing a partial seeding request from the Inbound Entries related list on the consumer replication set.

Seed a consumer instance

Seed all or some of the tables in your Instance Data Replication (IDR) replication sets depending on the needs of your consumer instance.

Before you begin
Role required: idr_admin or admin

About this task
Seeding replicates existing records from the producer instance to the consumer instance. You can initiate seeding requests on a consumer instance while you are activating a consumer replication set. Seeding options are not available in bi-directional or discrete replication sets by design.

You can select either full seeding or partial seeding.

- Full seeding replicates all existing records from a table in the producer instance. Perform a full seeding when you want to replicate all existing records.
- Partial seeding enables you to filter and replicate specific records from the producer. Perform a partial seeding when you want to replicate only some of the records from the producer.

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The producer instance handles one seeding request at a time. When the producer instance is busy with a seeding request, subsequent seeding requests are queued and initiated in the order that they are received.

- Records that exist on the producer instance and not on the consumer instance are copied to the consumer instance.
- If the sys_id on the producer matches an existing record on the consumer instance, the entire record on the consumer instance is updated to match the producer.
- The sys_id of the record identifies the record on both instances. If you use the custom coalesce option, the field you select is used to coalesce records in both instances.
- If a replication set changes and no longer includes a table, IDR does not alter the records in the corresponding table on the consumer instances.

- The maximum record size is 10 MB.
- The maximum seeding size is 3 million records.

Note:
If your replication set contains more than 3 million records, seeding cannot start. To fix this situation, break the replication set into multiple replication sets with fewer records in each or use partial seeding.

- The maximum seeding time is 7 days.

Note:
Seeding is not a replacement for cloning. Do not use IDR to clone instances.

Procedure

1. On the consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets** and click a consumer replication set.
2. On the **Inbound Entries** tab, select the entry or entries that you want to initiate seeding for.
3. To initiate a full seeding, click **Full Seeding**.
   A dialog box opens stating that the system is requesting all matching records.
4. To configure a partial seeding, click **Partial Seeding**.
   a. If you selected more than one entry, select the Replication entry that you want to configure and select **Configure Seeding**.
   b. Configure one or more Custom Filter conditions, operators, and values.
   c. To download the current field values and to replicate the files that are associated with the records, select **Include Attachments**.
   d. To download the current field values and the history of all field updates, select **Include History**.
   e. In the Included Fields columns, use the arrows to move table fields into the Selected column to replicate them or into the Available column to prevent replicating them.
   f. Click **Save Configuration**.
   g. Configure other Replication entries as needed.
   h. When you are ready to initiate seeding, click **Request Partial Seeding**.

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Note:
The Custom Filter determines which records to include in the partial seeding request.

The system must replicate some fields, such as **Sys ID**. The system cannot replicate some fields, such as **Edge Encrypted** and **Password**. They do not appear in either column.

5. To discard your seeding request before you click **Request Partial Seeding**, click **Cancel**.

Result
In a successful seeding, all selected data on a producer instance is replicated on a consumer instance. After seeding, the consumer instance maintains a history of all field updates.
If you encounter an error during seeding, see Fix seeding errors.

- Seeding continues even if errors occur on some consumer tables. You can restart seeding specifically on the tables that have errors or on all tables in a replication set.
- The maximum for a retry reseeding request is 10,000 errors. If you have more errors, perform a full seeding.

Modifying replication behavior in Instance Data Replication

Modify how data is replicated by configuring optional settings in Instance Data Replication (IDR).

Custom coalescing

Coalesce records using a different column when records on the consumer instance have a different sys_id than the same record on the producer instance in Instance Data Replication (IDR).

By default, the **sys_id** field is used to coalesce records in IDR. Beginning with the San Diego release, you can choose to use a different field.

Use the coalesce columns feature when records on the consumer instance have a different sys_id than the same record on the producer instance. For example, when a record is created by Discovery and loaded into multiple instances, the sys_id might not match. In this scenario, you can use a different unique identifier field by selecting the **Enable Custom Coalesce** option and choosing a coalesce field on the producer Replication entry form.

When you select the **Coalesce** field, you must verify the following:

- The field that you selected is in the Included Fields on the Replication Entry form on the producer instance.
- The field exists with the same name, length, and type on the consumer instance.

Note:
The **Coalesce** field can be different on the consumer instance if you create a valid transform for the field.

- The **Unique** column value for the field that you selected is set to *true* in the Dictionary Entry [sys_dictionary] table.

Don't change the value of the field after it's set as the **Coalesce** field.

To change the **Coalesce** field after it has been set, you must delete the Replication Entry on the producer instance and create a new Replication Entry.

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If the **Coalesce** field doesn't exist on the consumer instance, the following error is displayed on the Consumer Replication Set form. `The consumer instance does not recognize the <column_name> coalesce field as a valid member of the <table_name> table. Create this field or enable a transformation with this table to receive updates from the producer table to the consumer instance.`

Errors when using coalesce with transformation

If transform is enabled on the producer instance, the **Coalesce** field on the target table must have the same name, type, and length. If any of those parameters don't match, an error is displayed.

If transform is enabled on the producer instance, the mapping is invalid for the **Coalesce** field, and the consumer syncs entries, the system displays an error on the Consumer Replication Set form.

If transform is enabled for a replication entry with a valid mapping of the **Coalesce** field and then the table schema for the target table is updated so that the mapping is no longer valid, the system displays an error on the Replication Entry form.

If a replication entry attempts to enable transform and a valid mapping for the **Coalesce** field doesn't exist from the source table to the target table, the system displays an error on the Replication Entry form.

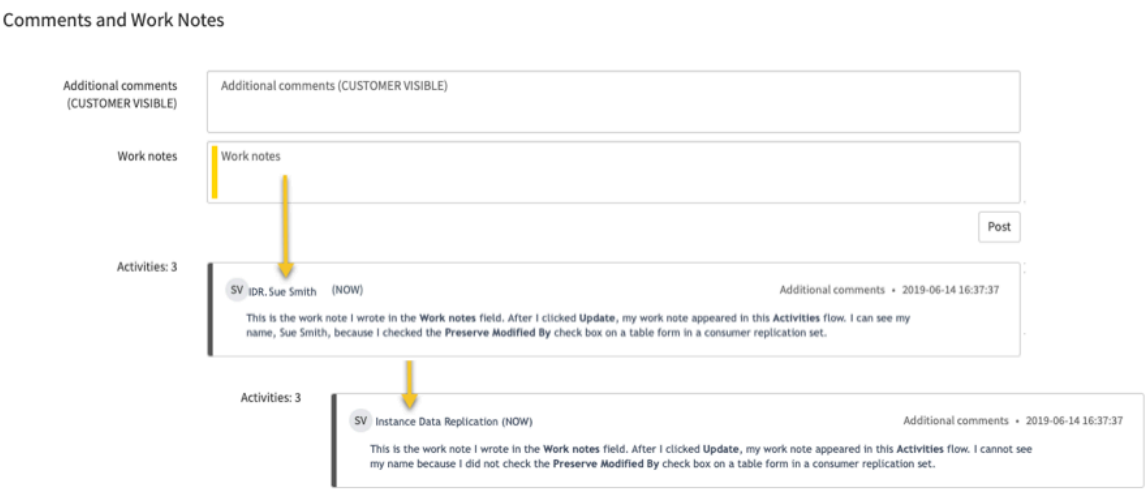
Preserving system field values

Preserve producer values in system fields when replicating data in Instance Data Replication (IDR).

To preserve the user name in an Activities entry, select the **Preserve Modified By** option on the Inbound Entry form on a consumer replication set.

For example, the **Work Notes** field is an Activity type in change request records. When a user updates a change request, the work note moves into the Activities stream.

- If you do not select **Preserve Modified By**, Instance Data Replication appears in place of the user name in the consumer records.
- If you select **Preserve Modified By**, the user who updated the change request is identified in the entry and the system prepends IDR to their name.



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When replicating changes, **Preserve modified by** affects values for the **Updated by**, **Updated**, **Created**, and **Created by** system fields:

- When **Preserve modified by** is enabled and you include system fields in the producer replication entry, producer system field values are replicated to the consumer records. If you do not include system fields in the producer replication entry, default system values from the consumer instance are used instead.
- When **Preserve modified by** is disabled, default system field values from the consumer instance are used, which means they may not match the system field values in records on the producer.

When seeding data, the **Preserve modified by** setting has no effect:

- If you include system fields in the producer replication entry, producer system field values appear in the seeded records.
- If you do not include system fields in the producer replication entry, null values appear in the system fields for seeded records.

Triggering workflows after replication

Trigger workflows after replication using platform business rules.

Inserts and updates that are replicated to a consumer instance can trigger business rules configured on the target table. A business rule is a server-side script that is associated with a table. Use business rules to trigger workflows that are associated with replications, such as sending a notification or validating the replicated data.

Business rules are part of the ServiceNow AI Platform. For more information, see Business rules.

To run a business rule after replication, select the **Run Business Rule** option on the Inbound Entry form in a consumer replication set. IDR will invoke the business rules that are associated with the specified table after replicating the data to the table.

Transform replication data

Transform producer instance data for tables or table columns that are named differently on consumer instances in Instance Data Replication (IDR).

Before you begin

- Create and activate a producer replication set.
- Create, activate, and seed one or more consumer replication sets.
- Role required: idr_admin or admin

About this task

The replicated data from producer tables and table columns goes into tables and table columns of the same name on consumer instances. You can map the producer data into any table or table column on consumer instances. If existing tables or table columns have different names, you can replicate the data to a different table or table column. Adapters modify the data before storing it on consumer instances. For example, adapters can localize data from the producer instance before it is consumed by the consumer instance.

You can also use adapters to modify the producer data during replication. For example, you can localize the data or populate the data that has been labeled differently in consumer tables.

Transformations have the following limitations:

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- sys_created, sys_created_by, sys_domain, sys_updated_by, sys_id, sys_mod_count, and other systems are automatically mapped to the consumer and can't be remapped.

  No other sys_ fields can be replicated.

- Adapters can't operate on the sys_journal field type such as Comments or Worknotes columns in a Task table.
- Calculated fields won't be transformed.

  A calculated field, such as the name field from sys_user, will replicate but cannot be transformed. Allowing a transformation breaks the calculation for the resulting field.

> **Note:**
> Calculated fields will not show as an option to transform.

Procedure

1. Choose a producer or consumer instance and navigate to the replication set.

Option	Description
Consumer Instance	Navigate to **Instance Data Replication** > **Consumer Replication Sets** and click a consumer replication set.
Producer instance	Navigate to **Instance Data Replication** > **Producer Replication Sets** and click a producer replication set.

2. Choose an inbound or outbound entry.

Option	Description
Consumer Instance	On the **Inbound Entries** tab, click an inbound entry.
Producer instance	On the **Outbound Entries** tab, click an outbound entry.

An entry appears.

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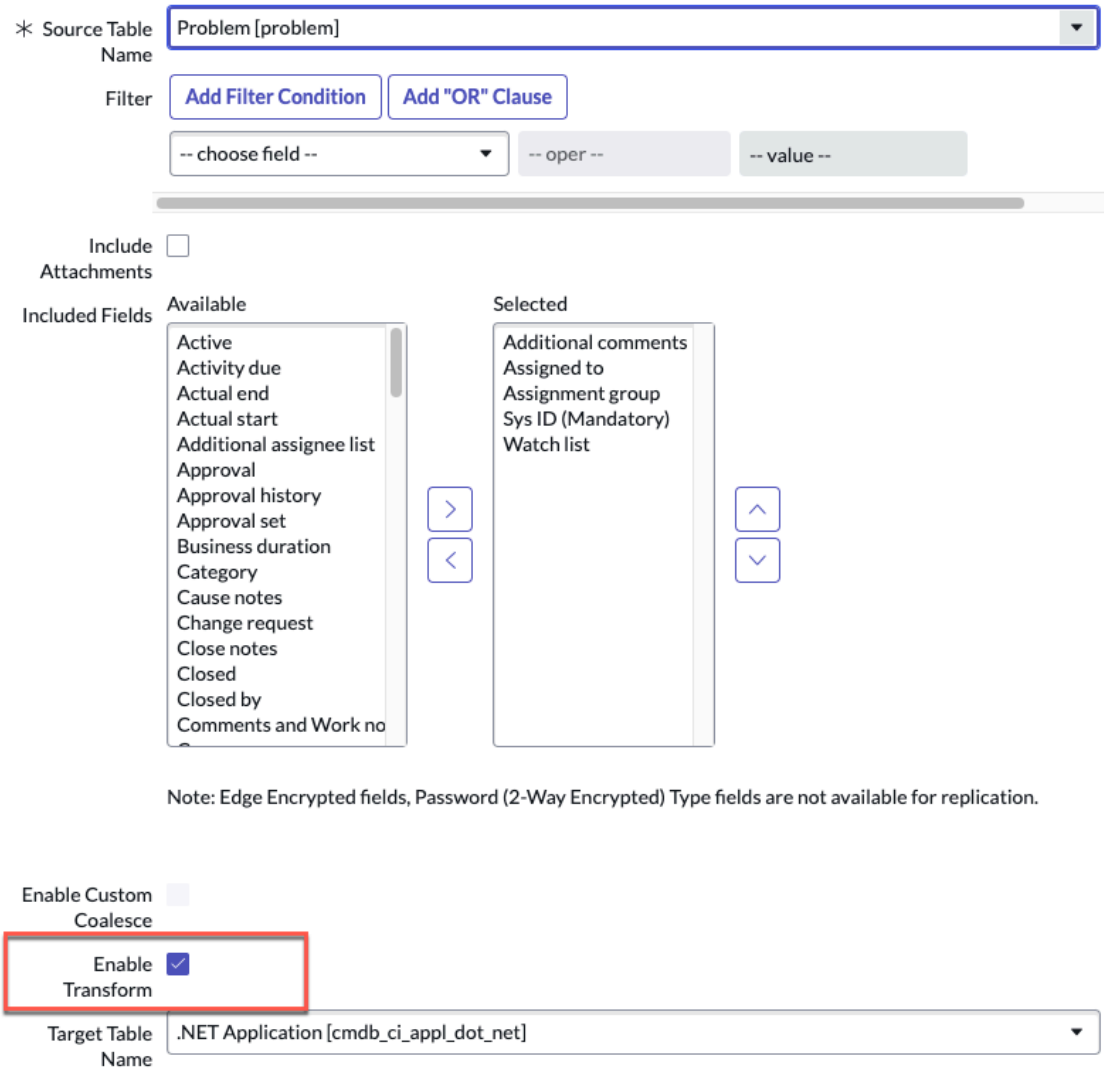

3. Select the **Enable Transform** option.
4. In the Target Table Name list, select the table into which you want to replicate the source table data and click **Update**.
5. On the **Inbound Entries** or the **Outbound Entries** tab, click the same entry.
6. Click the lock icon next to **Transform Map** to unlock it.
   The image shows a Transform Map, with the field names from the source table appearing in the left column. The middle column shows matching field names in the target table. All fields that do not have the same names in both tables appear in the – choose source field – or – choose target field – lists.

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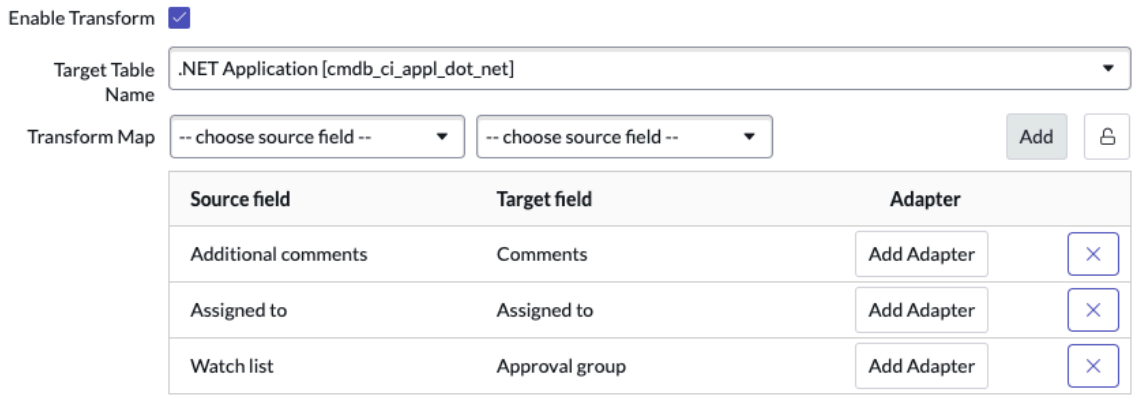
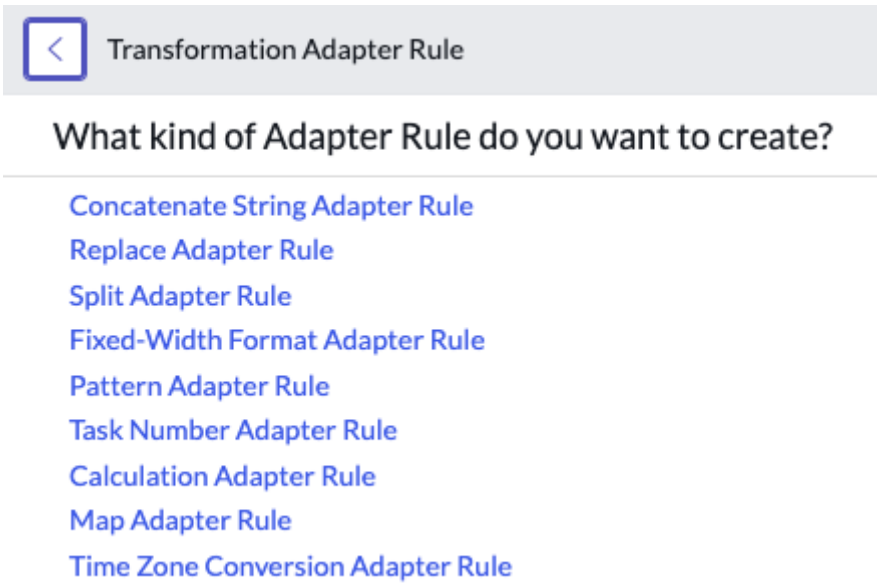


Note:
If a table in a producer replication set is not on a consumer instance, the consumer instance will fill the first column with the producer schema definition sent during synchronization.

7. Map a producer column to a consumer column that has a different name:
   a. Click **– choose source field –** and select the source field that you want to map.
   b. Click **– choose target field –**, select the target field into which you want to map the data, and then click **Add**.
   c. If you want to remove a field from replicating the producer instance to the consumer instance, click the **X** at the end of the row to delete the field.
8. To modify the producer data before replicating it in the consumer instance, click **Add Adapter**. The image shows the type of Adapter rules that you can create.



9. Click the adapter that you want to use and then configure it.
   For more information about configuring adapters, see Adapter descriptions.

Note:
Adapters do not modify the data on the producer instance.

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Warning and error messages in Instance Data Replication

Understand error and warning messages related to schema definitions. You can then troubleshoot or fix Instance Data Replication (IDR) replication issues.

Warning and Error Messages

Message	Type	Action
`The consumer instance does not recognize the [specified] table from the associated IDR schema.`	Error	The replication entry cannot process any messages. Please enable a transformation with this table to receive updates from this table to the consumer instance.
`The consumer instance does not recognize the [specified] column from the associated IDR schema.`	Warning	The replication entry cannot process any of the specified columns. Please enable a transformation with this table in order to receive updates from this column to the consumer instance.
`The consumer instance does not recognize the column type or length from the associated IDR schema for these columns: [specified columns].`	Warning	The consumer instance might lose data for those columns. Please enable a transformation with this table in order to receive updates from these table columns.

Reconfigure a replication set in Instance Data Replication

If you must change or update your original replication set, reconfigure Instance Data Replication (IDR) replication sets on the producer instance.

Before you begin

Role required: idr_admin or admin

About this task

After activating a revised producer replication set, update the producer replication set name, shared key, producer ID, and producer set ID on each consumer instance.
Note the following important information:

- Make sure that a seeding request is not in progress before you reconfigure a producer instance. Check the consumer replication sets seeding requests status.
- If you make a change to the producer replication set, you must re-synchronize the consumer replication set. On the consumer instance, click **Synchronize Replication Entries**, and then click **Activate**.

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Procedure

1. Reconfigure a producer instance:

   a. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.

   b. Select a producer replication set and make one or more of the following changes to the set:
   - To add a table to the set, on the **Replication Entries** tab, click **New**.
   - On the **Replication Entries** tab, click a replication set. In the Replication Entry form, modify the columns that are included in the replication set, and click **Update**.
   - To remove the table from the replication set, on the **Replication Entries** tab, click a replication set and click **Delete**.
   - To change the shared encryption key, click **Generate New Shared Key**.

     Only generate new shared keys when you discover that they are compromised or if you want to stop sending data to a consumer. After changing the encryption key on the producer instance, consumers that have the Consumer Approved Status of Denied must reapply for access to the producer replication set. For more information, see Grant access to replication data.

   These changes stop replication and produce this status message on the consumer instance: `Producer Replication Set configuration has been modified`.

2. Navigate to **Instance Data Replication** > **Consumer Replication Sets** and click the consumer replication set and each consumer instance that you want to update with the changes made on the producer.
   The status of the replication set is Replication Error. The following table lists the action to take according to the status message.

3. **Optional:** Discard the entire IDR configuration and start over, delete the replication set on the producer and the consumer.
   - To delete a producer replication set from the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**. Click the producer replication set that you want to delete, and click **Delete**.
   - To delete a consumer replication set on a consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**. Click the consumer replication set that you want to delete, and click **Delete**.

Administering Instance Data Replication

Perform administrative duties in Instance Data Replication (IDR).

Overview of administering IDR

After you successfully set up data replication, keep IDR running smoothly by performing important administrative tasks as needed.

Manage consumer access to replication data in Instance Data Replication

Approve a consumer's request to access replication data in Instance Data Replication (IDR).

Before you begin

Role required: admin, idr_admin

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About this task

You can review consumer access requests for all of your producer replication sets or for a specific producer replication set. The administrators of consumer sets must apply for access before they can receive the replication data.

Procedure

1. On the producer instance, navigate to **Instance Data Replication** > **Consumers Pending Approval**.
2. Select the option for each consumer replication set that you want to approve.
3. On the Actions on selected rows list, select **Approve**.
   The approved consumer sets start receiving the replicated data.

   Note:
   You can change the Consumer Approval Status to Denied to prevent the consumer from receiving the replicated data.

4. Approve a consumer access request for a specific producer replication set.

   a. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.

   b. Select the producer replication set where you want to approve consumer access.

   c. Under Related Links, on the **Consumer Subscriptions** tab, select the option for the consumer replication set that you want to approve.

   d. On the Actions on selected rows list, select **Approve**.
   The approved consumer set starts receiving replicated data.

   Note:
   You can change the Consumer Approval Status to Denied to prevent the consumer from receiving the replicated data.

Revoke access to replicated data for Instance Data Replication

Revoke a consumer's access to replicated data if you believe that consumer instance should no longer receive data in Instance Data Replication (IDR).

Before you begin

Role required: admin, idr_admin

About this task

When you generate a new, shared encryption key, approved consumer sets automatically receive the new key and data replication is not interrupted. Any consumer set with a status of Denied or Pending Approval does not receive the new encryption key, and replication ceases.

Procedure

1. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.
2. Select the producer replication set that has consumers whose access needs to be revoked.
   The instance identifies the consumers under the **Consumer Subscriptions** tab.

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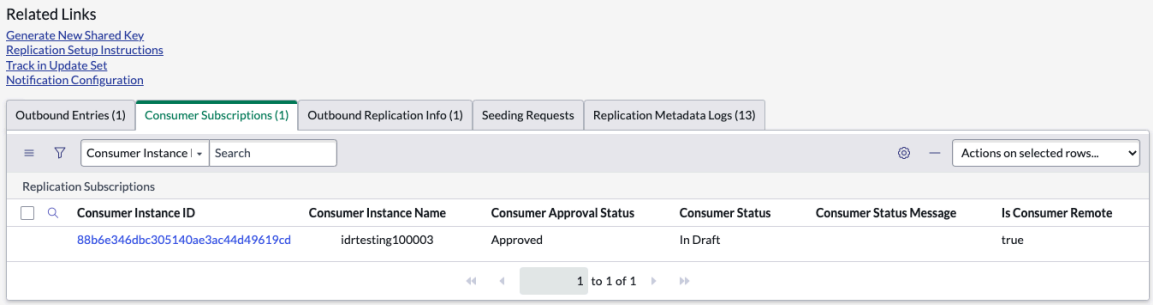

3. On the **Consumer Subscriptions** tab, select the option for the consumer instance whose permissions you want to revoke.
4. In the Actions on selected rows list, select **Revoke**.
   Instance Data Replication generates a new encryption key and shares it with all approved consumer sets. All other consumer sets stop receiving replication data. Admins of those consumer replication sets must reapply to restore access to the replication data.

Restore access to replication data for Instance Data Replication

Restore Instance Data Replication (IDR) access to replicated data by sending a request to the producer replication set admin.

Before you begin

Role required: admin

About this task

When the producer replication set administrator generates a new encryption key, consumer sets with a status of Approved automatically receive the new key and data replication is uninterrupted. Consumer sets with a status of Denied or Pending Approval do not receive the new encryption key and replication stops.

Procedure

1. On the consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.
2. Select the consumer replication set to restore access to.
3. Click the **Request Shared Key** related link.
   The system sends a request to the producer replication set administrator. If you are granted access, the consumer Approval Status changes to Approved.
4. If the producer replication set has changed, click the **Synchronize Replication Entries** related link.
5. To get the latest data in the producer replication set, on the **Inbound Entries** tab, select all the tables and click **Activate**.

Comparing replicated data between instances in Instance Data Replication

Find missing or mismatched records by comparing replication data between instances in Instance Data Replication (IDR).

IDR synchronizes data between a producer instance and one or more consumer instances. After you activate a producer replication set and subscribe at least one consumer, you can send existing records from the producer to the consumer by seeding records. After seeding is finished, IDR maintains data synchronization between the instances by replicating new and changed records from the producer to the consumer.

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If an insert fails on the consumer or when producer and consumer records don’t match after replication, you can use the data comparison feature in IDR to find these records and reseed them from the producer to the consumer.

Key benefits

- Identify records missing from the consumer instance after seeding.
- Identify mismatched records and view their differences.
- Keep data synchronized between instances by reseeding records.

Comparing transformed data

When comparing transformed data, note the following details:

- The data comparison can return mixed results if records are added to a table on the producer and then a transformation replicates to a different table on the consumer instance.
- Mapped fields with different field definitions are skipped. For example, if a field on the producer has a different column type or column length than the mapped field on the consumer, the field is skipped.
- All fields that are modified by an adapter are skipped except for modifications made by the Task number adapter. For example, if a string is appended using the Concatenate String adapter, the data comparison can't undo the concatenation and compare the data using the original string, so the field is skipped.

Compatibility

Beginning in the Washington DC release, you can compare replicated data in bidirectional replication sets, discrete replication sets, and replication sets with transformations configured on either the producer or the consumer.

When comparing data on different family releases, note the following compatibility options.

Producer to consumer compatibility

Data comparison	Producer	Consumer	Supported replication sets
Producer to consumer	Washington DC or later	Utah and earlier	None
Producer to consumer	Washington DC or later	Vancouver	Supports unidirectional replication sets, but not the following: • bidirectional replication sets • discrete replication sets • replication sets configured with transformations
Producer to consumer	Washington DC or later	Washington DC or later	All replication sets

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Consumer to producer compatibility

Data comparison	Consumer	Producer	Supported replication sets
Consumer to producer	Washington DC or later	Utah and earlier	None
Consumer to producer	Washington DC or later	Vancouver	Supports bidirectional replication sets, but not the following: • unidirectional replication sets • discrete replication sets • replication sets configured with transformations
Consumer to producer	Washington DC or later	Washington DC or later	All replication sets, but not unidirectional replication sets

Limitations

- Journal fields are excluded from the comparison due to the potential size of their content.
- Sys Audit [sys_audit] table records are excluded from the comparison.

Find missing or mismatched records in Instance Data Replication

Find records missing from the consumer instance or mismatched records after data has been replicated by creating a data comparison request in Instance Data Replication (IDR).

Before you begin

Make sure the following conditions are met:

- The producer replication set is active.
- Seeding isn't in progress.
- No other data comparison requests are running.

Role required: admin

About this task

Note the following:

- Data comparison requests are purged after three months.
- There are limitations when comparing transformed data. See Comparing replicated data between instances in Instance Data Replication.

Procedure

1. On the producer instance, navigate to **All** > **Instance Data Replication** > **Producer Replication Sets**.
2. Select an active producer replication set with replicated data that you want to compare.

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3. Create a data comparison request.

   a. Navigate to the IDR Data Comparison Requests related list.

   b. Select **New**.

   c. On the form, fill in the fields.

   IDR Data Comparison Request form

Field	Description
Replication Set	Name of the producer replication set.
Target Instance Name	Name of the consumer instance.
Target Instance URL	URL of the consumer instance.
Table Name	Name of the table in the outbound entry of the producer replication set.
Start Date	Start date and time for comparing data. Records with a sys_updated_on value after the date you select are included in the comparison.
End Date	End date and time for comparing data. Records with a sys_updated_on value before the date you select are included in the comparison.
Auto Seed	Option to automatically seed any missing or mismatched records from the producer instance to the consumer instance. You can optionally reseed missing or mismatched records at a later time. See Reseed missing or mismatched records in Instance Data Replication.

   d. Select **Submit**.

4. View a summary of the data comparison in the IDR Data Comparison Results form.
   - Determine the percentage of missing or mismatched by viewing the pie chart.
   - View the total number of missing and mismatched records in the **Mismatched Records Count** field.
5. **Optional:** Identify records that are missing from the consumer instance after seeding through the pie chart or list.
   - View the missing records by selecting the missing records portion of the pie chart.
   - View records that have a **Missing** value in the **Record Type** column in the IDR Instance Comparison Results related list.

   Tip:
   Save copies of the missing record IDs in case you need to provide them to Customer Service and Support.

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6. **Optional:** View the differences between mismatched records after data replication.

   a. Navigate to the IDR Instance Comparison Results related list.

   b. Select the check box next to any record with a **Mismatched** value in the **Record Type** column.

   c. Select the **Actions on selected rows** list.

   d. Select **Compare records**.

   e. View the highlighted differences between the records in the **Compare Record Payloads** dialog box.

      Note:
      Journal fields are excluded from the comparison due to the potential size of their content.

      Save a copy of the payload difference in case you need to provide it to Customer Service and Support.

What to do next

Reseed missing or mismatched records in Instance Data Replication.

Reseed missing or mismatched records in Instance Data Replication

Synchronize data between instances by reseeding records missing from the consumer instance or mismatched records between the producer and consumer instance in Instance Data Replication (IDR).

Before you begin

Role required: admin

About this task

Data comparison results and logs are purged after five days.

Procedure

1. On the producer instance, navigate to **All** > **Instance Data Replication** > **Producer Replication Sets**.
2. Select a producer replication set with data that you want to reseed to the consumer.
3. View the data comparison results.
   a. Navigate to the IDR Data Comparison Requests related list.
   b. Select a data comparison.
4. Synchronize the data between the producer and the consumer instance by reseeding.
   - Reseed all records by selecting **All** in the **Reseed mismatched records** field.
   - Reseed only the mismatched or missing records by selecting **Mismatched** in the **Reseed mismatched records** field.
5. Select **Reseed**.

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Result
Records are reseeded from the producer to the consumer and the results are displayed when the job is finished.

What to do next
If records are still missing or mismatched, contact Customer Service and Support for assistance.

Deploying a replication configuration from one instance to another in Instance Data Replication

Copy a replication configuration from one instance to another through an update set in Instance Data Replication (IDR).

In IDR, you can capture a snapshot of a replication configuration, including selected fields, filters, or data transformations using the **Track in Update Set** option, and then copy it to another instance using an update set.

Important:
The **Track in Update Set** option in IDR is the only supported method for capturing a replication configuration that you want to copy to another instance.

Key benefits

- Save time by defining a replication configuration once and using it as a template for new replication sets on other instances.
- Minimize potential impact to your production instance by developing a replication configuration in your sub-prod instance first.
- Verify a replication configuration in a sub-prod instance before rolling it out to a production instance.

Configuration entities

The following configuration entities are captured in an active update set when you select the **Track in Update Set** option.

Entry set

An entry set is a bundle of replication entries (like a replication set), that doesn't contain any instance-specific metadata like the Producer ID. A new Producer ID is used in the target instance when you create a producer replication set based on an entry set.

Replication options that are tracked in an entry set and their status (active or inactive) include:

- Bi-directional replication
- Discrete value mapping

Replication entries

A replication entry contains configuration settings for each table that you want to replicate. Replication entries are either outbound or inbound.

- Outbound entries from a producer instance contain the source table, filter, fields you want to replicate, and data transformation settings.
- Inbound entries from a consumer instance include the target table, the option to run business rules after replication, and data transformation settings.

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Viewing an entry set and replication entries

When you create a replication set, a new record is added to the Entry Sets [idr_entry_set] table. New records are added to the Replication Entries [idr_replication_entry] table for each outbound entry that you add to the replication set.

After selecting **Track in Update Set**, you can view the entry set and its replication entries in the current update set by navigating to **All** > **System Update Sets** > **Local Update Sets**, selecting the update set, and then viewing the **Customer Updates** tab.

Deploy a replication configuration through an update set in Instance Data Replication

Export a replication configuration from one instance and import it on another instance through an update set in Instance Data Replication (IDR).

Before you begin

Role required: idr_admin or admin

About this task

You can copy a replication configuration from one instance to another using an update set. For details on using update sets, see Get started with update sets.

Procedure

1. On the source instance, create an update set.
   a. Navigate to **All** > **System Update Sets** > **Local Update Sets**.
   b. Select **New**.
   c. Enter a name for the update set.
   d. Select **Submit and Make Current**.
   An update set is created and selected as the current update set on the source instance.
2. Capture a producer or consumer replication configuration in the update set.

   Note:
   You can capture the following types of configurations on a producer instance:
   - Producer replication (one-way)
   - Producer replication with bi-directional replication
   - Producer replication with discrete replication

   - The replication set configuration is added to the Entry Sets [idr_entry_set] table.
   - The replication entries in the replication set are added to the Replication Entries [idr_replication_entry] table.
   - The entry set and its replication entries are captured in the current update set.
3. **Optional:** Continue modifying the replication configuration as needed.
   Additional changes that you make aren't captured until you select **Track in Update Set** again.
   a. Modify the producer replication set and select **Update**.
   b. Capture the latest changes by selecting **Track in Update Set**.
   The latest changes are captured in the update set.
4. Export the update set to XML.
   a. Navigate to **All** > **System Update Sets** > **Local Update Sets**.
   b. Select the current update set.

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c. In the **State** drop-down list, select **Complete**.

d. Select **Update**.

e. In the Update Sets list, select the update set that you marked as complete.

f. Select the **Export to XML** related link.
The update set is exported to an XML file on your local machine.

5. On the target instance, import the update set.

a. Navigate to **All** > **System Update Sets** > **Update Sets to Commit**.

b. Select the **Import Update Set from XML** related link.

c. Select **Choose File** and browse to the XML file that you exported.

d. Select **Upload**.

e. In the Retrieved Update Sets list, select the update set that you imported.

f. Select **Preview Update Set**.

Note:
If you receive sys_record_transform errors during the preview, select all the error records that are listed in the **Update Set Preview Problems** tab, and then select **Accept Remote Update**. Repeat this action for any additional sys_record_transform errors that appear.

g. Exit the preview by selecting **Close**.

h. On the update set form, select **Commit Update Set**.

The update set is imported on the target instance, including the entry set and replication entries that you captured from the source instance. If you exported the configuration for a uni-directional producer replication set, a new producer replication set is automatically created on the target instance.

6. On the target instance, perform the following steps based on the type of replication set that you want to set up.

Result

The replication configuration that you exported from the source instance is imported to the target instance. A new replication set based on the exported configuration is created on the target instance.

What to do next

- If you're setting up a producer replication set, create and subscribe one or more consumers.
- If you're setting up a consumer replication set, approve the consumer's request on the producer instance, and then activate the consumer replication set on the consumer instance.
- If you're setting up a bi-directional replication set, synchronize the consumer by selecting the **Synchronize Replication Entries** related link in the connected consumer replication set.
- If you're setting up a discrete replication set, create and subscribe one or more consumers.

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Cloning options with Instance Data Replication

Ensure that certain tables are preserved or excluded to clone your database from one instance to another successfully with Instance Data Replication (IDR).

There are multiple methods for copying an IDR configuration from one instance to another.

Capture the configuration in an update set

An update set captures a group of configuration changes that you can move from one instance to another but doesn't include data that a producer replicates to a consumer. You can capture a snapshot of an IDR replication configuration, including selected fields, filters, or data transformations using the **Track in Update Set** option, and then copy it to another instance using an update set. See Deploying a replication configuration from one instance to another in Instance Data Replication.

Copy the configuration using a clone profile

Cloning your instance copies everything in the database from one instance to another, including the data and the IDR replication configuration.

Before you clone your instance, you must determine whether to exclude or include your IDR replication configuration.

For details on cloning, see .

IDR cloning use cases

You must preserve and exclude different sets of IDR tables in your cloning profile depending on your cloning use case.

Recurring clone

In this use case, you clone your source instance regularly without affecting the existing IDR configuration on the target instance.

For example, you configure IDR to replicate data from instance A to instance B. You determine that you must clone the database from instance A to another instance called instance C. Instance A and instance C both have IDR configured with different replication configurations. When you clone the database from instance A to instance C, you don't want to clone any of the IDR replication configuration from A to C.

Note:
If you regularly clone data from your source instance to your target instance, and find that you need to copy the IDR replication configuration from the source instance to the target instance, use the **Track in update set** feature to copy the IDR to the target instance.

To clone your database from one instance to another without affecting the IDR configuration on the target instance, you must update the preserve and exclude lists in your cloning profile according to the Recurring Clone use case described in KB0965218 .

True clone

In this use case, you clone your source instance to your target instance and include the complete IDR replication configuration. The target instance inherits everything from the source. After the clone is finished, you must resubscribe all consumer instances to the target instance.

For example, you decide to provision a new production instance from a non-production instance that already has IDR configured. When you clone the non-

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production instance, the new production instance inherits everything from the non-production instance. To ensure that data replicates from the production instance and not the non-production instance, you resubscribe all consumer instances to the new production instance.

To clone your database and copy the current IDR configuration to the target instance, you must update the preserve and exclude lists in your cloning profile according to the True Clone use case described in KB0965218.

Migration clone

In this use case, you clone your source instance to the target instance, including the complete IDR replication configuration from the source instance, while preserving the target instance's replication configuration.

The migration clone involves performing a true clone, but with additional steps.

1. On the target instance, you create an update set and use the **Track in update set** feature to upload the existing replication sets on the target instance into the update set.
2. Perform a true clone.
3. After performing the true clone, you import the update set to the target instances, and you set up replication sets using entry sets to preserve the configuration.

Comparing IDR cloning use cases

Use case	Description	Prerequisites	Post requisites
Recurring clone	Clone your source instance to your target instance regularly but exclude your IDR replication configuration. When complete,replication sets on the target instance should not be changed.	Verify that IDR is configured correctly, and that replication is successful on both the source and target instances.	After performing a recurring clone, you can copy the IDR replication configuration from the source instance to the target instance using the **Track in update set** feature.
True clone	Clone your source instance to your target instance and copy your IDR configuration to the target instance. When complete, entry sets from the source instance should be cloned to the target instance.	Verify that IDR is configured correctly, and that replication is successful on the source instance.	After performing a true clone, you must perform the following actions on the target instance: 1. Re-create the replication sets using the cloned entry sets from the source instance. 2. Resubscribe each consumer to the newly-provisioned producer.

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Comparing IDR cloning use cases (continued)

Use case	Description	Prerequisites	Post requisites
Migration clone	Clone your source instance to your target instance and copy your IDR configuration to the target instance, while preserving the target instance's replication configuration. When complete, entry sets from the source instance should be cloned to the target instance.	1. Capture the existing replication sets on the target instance in an update set using the **Track in update set** feature. 2. Perform a true clone.	After performing the true clone, you must perform the following actions on the target instance: 1. Import the update set. 2. Re-create the target replication sets using the entry sets captured in the update set. 3. Re-create the source replication sets using the cloned entry sets from the source instance.

Monitoring replication status in Instance Data Replication

Monitor the status of active producer and consumer replication sets, scheduled jobs, seeding requests, license usage, or scheduled replication through the Instance Data Replication (IDR) Monitoring Dashboard.

Accessing the IDR Monitoring dashboard

Users with the admin or idr_admin role can access the dashboard.

Access the IDR Monitoring dashboard in the following way:

- Navigate to **Instance Data Replication** > **Monitoring Dashboard**.
- Choose one of the following: **IDR Overall Monitoring**, **IDR License and Usage SMv2**, or **Scheduled Replication** dashboard.

IDR Overall Monitoring dashboard

The IDR Overall Monitoring dashboard monitors the following:

- Active Producer Replication Sets
- Active Consumer Replications Sets
- Suite of IDR Scheduled Jobs
- Producer Seeding Requests Within Last 7 Days
- Consumer Seeding Requests Within Last 7 Days

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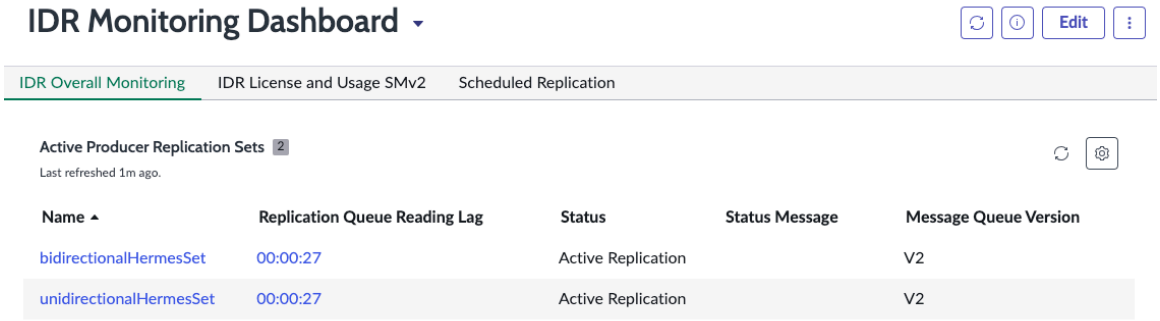
IDR overall monitoring dashboard



Active Producer Replication Sets

The Active Producer Replication Sets monitors your producer replication set status and reports the data lag time between your instance and the replication queue.

Field	Description
Name	Name of the producer replication set
Replication Queue Reading Lag	Time between a record change on the producer instance and the moment that it's sent over the outbound replication queue
Status	Status of a replication set, either active or in error
Status Message	Message that describes the error status
Message Queue Version	Version of the Message Queue. Default is V2 (Hermes).

Active Consumer Replication Sets

Active Consumer Replication Sets monitors your consumer replication set status, reports the network lag time, and reports the data lag time between the producer instance and consumer instance.

Field	Description
Name	Name of the consumer replication set.
Data Lag	Time between a record change on the producer instance and the moment that it's recorded in the consumer instance.
Network Lag	Time between a record change log in the outbound replication queue and the moment that it's recorded in the consumer instance.
Status	Status of a replication set, either active or in error.
Status Message	Message that describes the error status.

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Field	Description
Message Queue Version	Version of the Message Queue. Default is V2 (Hermes).

Suite of IDR Scheduled Jobs

The suite of IDR scheduled jobs poll for data changes, requests, and check the health of your producer and consumer instances. You can monitor the following jobs:

Jobs	Description
Hermes Metrics Collection	Collects metrics related to the Hermes Messaging Service.
Hermes Periodic Purge	Cleans obsolete cached data in the Hermes API.
Hermes Topics Util	Synchronizes topics across Hermes clusters. Initially, topics are created in a single Hermes cluster. This job detects new topics and creates the same topics in the remaining Hermes clusters.
IDRConsumerJob	Polls for record changes and seeding requests on the consumer instance in 15-second intervals.
IDRDeltaConsumerJob	Beginning in the San Diego release, when a consumer instance subscribes to a producer instance that is outside the local datacenter, the IDRDeltaConsumerJob job is created on the producer instance. The function is the same as the IDRConsumerJob. The three-letter code denotes the datacenter location.
IDRHermesDeltaConsumer	Polls for consumer record changes from the Hermes delta topic in 15-second intervals.
IDRHeartBeatJob	Updates information about the health of every active producer or consumer set.
IDRMetadataConsumerJob	Polls for metadata record changes on the consumer instance in 15-second intervals.
IDRProducerJob	Polls for new, updated, or deleted records in the data replication queue for a producer instance in 15-second intervals.
IDRSeedingProducerJob	Checks for new seeding requests coming from consumer instances.

Note:
You can set when your IDR scheduled jobs run and configure a periodic trigger that specifies how often the job runs.

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IDR Scheduled Jobs field types

Field	Description
Name	Scheduled job name.
Next Action	Date and time when the job next runs.
Trigger type	Job that you can configure to run daily, weekly, monthly, periodically, once, on-demand, or business calendar start or end date. The trigger can repeat daily, hourly, by minute, or by second.
Job ID	ID of the scheduled job.
State	State of the job, for example, ready.

Producer Seeding Request Within Last 7 Days

You can monitor the status of a producer seeding request within the last seven days.

Field	Description
Replication Set	Producer set and the consumer set.
Status	Status of the seeding request. The status can be completed, in progress, or failed.
Start Time	Time that the seeding begins.
End Time	Time that the seeding ends.
Percent Complete	Percentage of the seeding request job that is complete.

Consumer Seeding Request Within Last 7 Days

You can monitor the status of a consumer seeding request within the last seven days.

Field	Description
Replication Set	Corresponding consumer set.
Status	Status of the seeding request. The status can be completed, in progress, or failed.
Start Time	Time that the seeding begins.
End Time	Time that the seeding ends.
Percent Complete	Percentage of the seeding request job that is complete.

IDR dashboard properties

You can access the IDR dashboard properties by navigating to **Instance Data Replication** > **Properties**.

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You can change the following properties on your dashboard:

Property field	Description
Minutes of lag before the Data Lag field are highlighted in red on the IDR Monitoring Dashboard	**Data Lag** field that is part of the Active Consumer Replication set. If the actual lag time is greater than the time threshold that you set, the system highlights the field. The default is 15 minutes.
Minutes of lag before the Network Lag field is highlighted in red on the IDR Monitoring Dashboard	**Network Lag** field that is part of the Active Consumer Replication set. If the actual lag time is greater than the time threshold that you set, the system highlights the field. The default is 15 minutes.
Minutes of lag before the system highlights the Replication Queue Reading Lag field in red on the IDR Monitoring Dashboard	**Replication Queue Reading Lag** field that is part of the Active Consumer Replication set. If the actual lag time is greater than the time threshold that you set, the system highlights the field. The default is 15 minutes.

Note:
You can set the colors on the fields through the personalize list columns (v_idr_dashboard_list.do).

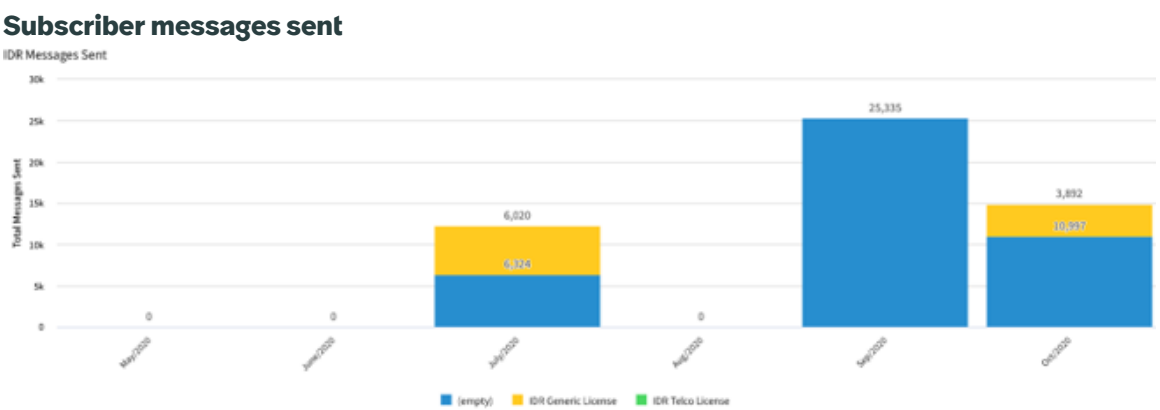
IDR License and Usage SMv2 dashboard

The IDR License and Usage SMv2 dashboard monitors the following:

- Subscriber Sent Messages
- Subscriber Received Messages
- IDR License Details
- IDR Messages Sent
- IDR Messages Received

Subscriber Sent Messages

The number of messages each subscriber instance sent, by month.



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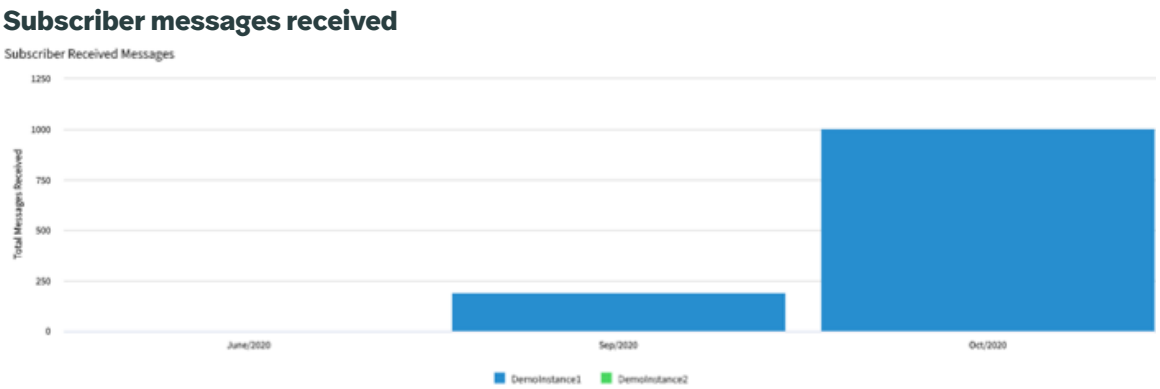
Subscriber Received Messages

The number of messages each subscriber instance received, by month.



IDR License Details

You can monitor the status of a consumer seeding request within the last seven days.

Field	Description
Name	Name of the IDR license.
Type	Type of subscription: **Per-User** for user subscriptions, **Capacity** for data driven subscriptions, or **Unrestricted User** for subscriptions capped by the maximum user count.
Category	License category: ServiceNow license or Store App license.
Start date	Start of the licensing period.
End date	End of the licensing period.
Display only	Does not support resource allocation or monitoring.
Purchased	Number of purchased licenses.
Allocated	Number of allocated licenses.

IDR Messages Sent

The number of messages sent, per license, monthly.

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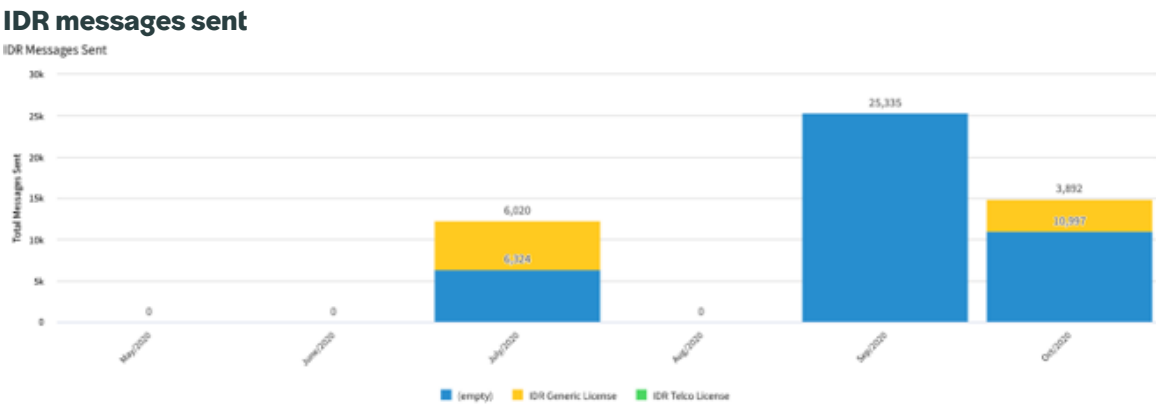
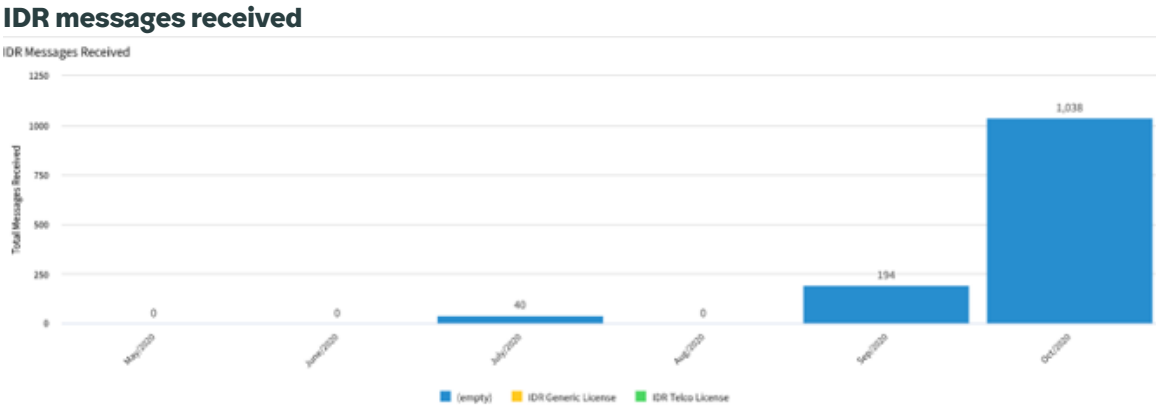


IDR Messages Received

The number of messages received, per license, monthly.



Scheduled Replication dashboard

Monitor the status of scheduled replication requests within a specific time period. For example, you might track the count of failures for a specific scheduled replication set, or compare the number of scheduled requests to the number of completed requests. You can view the following scheduled replication details:

- Scheduled Sets
- Scheduled Requests
- Completed
- Failed
- Overall Request Status
- Replication Set Status Overview

Scheduled Sets

The total count of scheduled replication sets created in the selected date range.

Scheduled Requests

The total count of scheduled request runs queued in the selected date range.

Completed

The total count of scheduled request runs that completed in the selected date range.

Failed

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The total count of scheduled request runs that failed to complete or encountered an error in the selected date range.

Overall Request Status

A donut chart showing status distribution for scheduled requests in the selected date range.

Replication Set Status Overview

A table showing the count for each status in the selected date range.

Monitoring queues in Instance Data Replication

Monitor the replication record queue, message produced queue, message consumed queue, and the messages processed for all replications sets through the Instance Data Replication (IDR) Queue Dashboard.

Accessing the IDR Queue Dashboard

Users with the admin or idr_admin role can access the dashboard.

Access the IDR Queue Dashboard by navigating to **Instance Data Replication** > **Queue Dashboard**.

IDR Queue Dashboard

The IDR Queue Dashboard enables you to monitor the following:

- IDR Queued Producer Records which are hourly records queued for all tables over a 24-hour time period.
- Outbound Messages Remaining which are messages remaining in the replication queue that are not yet sent to the message queue.
- Outbound Messages Processed which are messages produced from this instance to the message queue.
- Inbound Messages Remaining which are messages remaining in the message queue, that have not yet been processed.
- Inbound Messages Processed which are messages consumed on this instance.

In any chart, select **Last 24 Hours** or **Last 5 Days** as the time period. For the 24-hour period, the number of messages is per hour. For the 5-day period, the number of messages is per day.

Select the legend link under the chart to exclude that data source.

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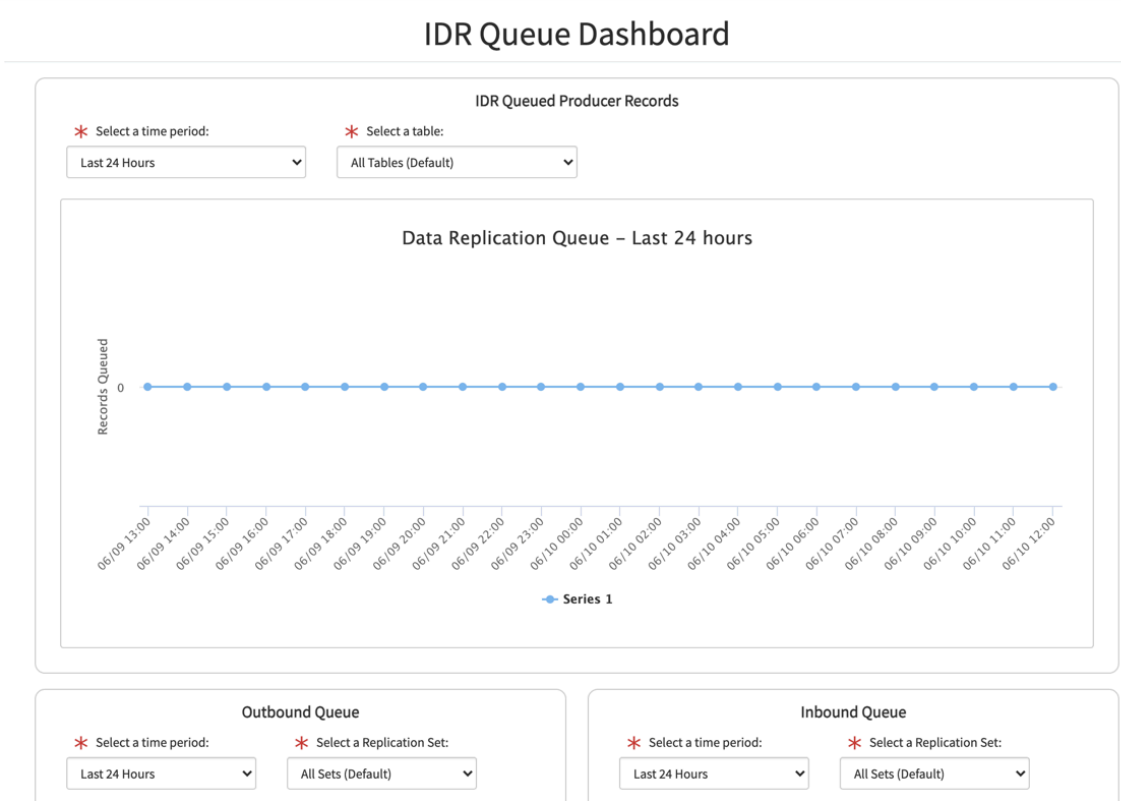
IDR Queue Dashboard



IDR Queued Producer Records

With the IDR Queued Producer Records chart, you can see the number of records queued for each table over an hourly or daily period. It shows which tables account for the highest amount of traffic within IDR over time. Use this chart to identify activity spikes that cause predictable performance lags on the consumer instance.

For example, if you see that a large spike of activity occurs every day at 3:00 a.m. due to a business rule on a table, you should expect a performance lag to occur on the consumer around that time.

Select **All Tables** or a specific table. Position your cursor over a point in the chart to see the queue count and tables for that point.

Outbound Messages Remaining

With the Outbound Messages Remaining chart, you can determine whether a producer instance is catching up to real-time replication after a large spike in activity.

When replication is working correctly, the messages remaining count should be very low. If there is a spike in activity, you can expect a large value. For example, when a business rule is changing tens of thousands of records within a minute.

You can also expect messages remaining to decrease over time as the jobs process the messages.

If the messages remaining count continues to grow without resolution, it might indicate:

- An issue processing the messages. For example, the *IDRProducerJob* is not running, or cannot send messages to the message queue.
- The instance is recording changes faster than IDR can produce them.

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Select **All Sets** or a specific set. Position your cursor over a point in the chart to see the message count and replication set name for that point.

Outbound Messages Processed

With the Outbound Messages Processed chart, you can see the flow of records from a producer instance to the message queue over time.

Trends for messages processed and the messages remaining over time indicates if replication is recovering from a lag or if there are issues sending data to the message queue.

Along with the Data Replication Queued Producer records chart, you can see if the instance is sending data. If your instance has queued records that are not being sent, it might indicate:

- The instance is not able to run the producer job. For example, due to other resource-intensive processes running on the instance and all worker threads being busy.
- There is an issue connecting to the message queue.

To see the message count and replication set name for a graph point, select **All Sets** or a specific set and position your cursor over a point in the chart.

Inbound Messages Remaining

With the Inbound Messages Remaining chart, you can determine whether a consumer instance is catching up to real-time replication after a large spike in activity.

You can expect a temporary large value when there is a spike in activity. The value normally decreases as the messages are processed.

If this value continues to grow without resolution, it might indicate:

- An issue processing the messages. For example, the *IDRConsumerJob* is not running, or cannot read messages from the message queue.
- The instance is recording changes faster than IDR can consume them.

Select **All Sets** or a specific set. Position your cursor over a point in the chart to see the message count and replication set name for that point.

Inbound Messages Processed

With the Inbound Messages Processed chart, you can see the flow of records for each consumer set over time.

Use the inbound messages chart to determine which replication sets have the most traffic and see trends for messages processed and the messages remaining.

If the producer is sending records to the message queue and the consumer is not processing them, it might indicate issues with the producer or the consumer instance.

Position your cursor over a point in the chart to see the message count and replication set name for that point.

Avoiding insert and update errors in Instance Data Replication

You can avoid insert and update failures in Instance Data Replication (IDR) by specifying a class name filter in the producer replication set.

Important:
This topic only applies to producer replication sets created prior to the Utah release.

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When you replicate a parent table and one or more child tables, you must add a sys_class_name filter to the parent table in the outbound entry of your producer replication set. If the sys_class_name filter is missing, insert and update failures appear in **Instance Data Replication** > **Replication Payload Error** in the following scenarios:

- A failed insert occurs when a record in the child table is replicated because the system attempts two inserts with the same sys_id to the parent table. Adding the sys_class_name filter to the parent prevents the unique key violation during the INSERT into the parent table.
- A new record is added to a replicated child table on the producer instance. Instance Data Replication (IDR) initially creates the record in the parent table on the consumer, but not the child table. If the child record is changed on the producer instance, during replication a failed update occurs on the child table in the consumer instance because the record only exists in the parent table.

If the table is a parent, decide if you want to replicate any of its child tables.

- If you want to replicate one or more child tables, you must identify the sys_class_name value for the parent table, and then add a corresponding sys_class_name filter to the parent table.

  For example, **Task Type** is the label for sys_class_name on the Task [task] table. To start replicating the incidents in addition to tasks, you must add **[Task Type] [is] [Task]** to the outbound entry for the Task [task] table.

- If you only want to replicate the parent table, the filter is optional.
- If the parent table is already being replicated, you must edit the parent and add the sys_class_name filter.

If the table is a child, decide if you want to replicate its parent.

- If you want to replicate the parent table as well, you must identify the sys_class_name value for the parent table, and then add a corresponding sys_class_name filter to the parent table.

  For example, **Task Type** is the label for sys_class_name on the Task [task] table. To start replicating tasks in addition to incidents, you must add **[Task Type] [is] [Task]** to the outbound entry for the Task [task] table.

- If you only want to replicate the child table, the filter is optional.
- If one or more child tables are already being replicated, you must add the sys_class_name filter to the parent.

Resolving data replication errors in Instance Data Replication

Resolve errors and monitor the status of Instance Data Replication (IDR) replication sets.

Monitoring and diagnostic checklist

When you notice that the system is not replicating data, you can use the diagnostics checks to investigate the problem. To monitor the overall health of all replication sets, see IDR Monitoring dashboard.

IDR diagnostics checks

Check	Description
Monitor	

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IDR diagnostics checks (continued)

Check	Description
Check connectivity	Test your IDR instance connectivity to determine the connectivity of your instance to the message queue.
Check IDR monitoring dashboard to see if replication jobs are active	For the dashboard to properly display replication set information, these IDR scheduled jobs must be available and running on your instance: • Hermes Metrics Collection • Hermes Periodic Purge • Hermes Topics Util • IDRConsumerJob • IDRDeltaConsumerJob-<instanceid> • IDRHeartbeatJob • IDRMetadataConsumerJob • IDRProducerJob • IDRSeedingProducerJob If any of these jobs are missing or not running, contact Customer Service and Support. **Note:** The system only creates the IDRDeltaConsumerJob-<instanceid> when a consumer instance subscribes to a producer instance that is outside the local datacenter.
Producer replication set	
Check activation of the producer replication set	If the status of your producer replication set is In Draft, click **Activate**.
Check consumer subscription approval	Review the consumer access requests for your producer replication sets. A consumer replication set must request access before it can receive replication data.
Check producer replication log errors	Identify IDR errors by viewing the metadata for messages between producer and consumer instances, payload error logs, and message logs.
Consumer replication set	
Check activation status of the consumer replication set	If the status of your consumer replication set is In Draft, click **Activate**.
Check if you need to synchronize replication sets	A synchronization issue occurs when a producer instance doesn't send data or a consumer instance doesn't receive data.

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IDR diagnostics checks (continued)

Check	Description
	Synchronization errors appear in the **Status** field on the consumer instance as **Replication Error**.
Check your consumer replication set status	Review the status of your consumer replication set and what that means for your replication.
Error and status messages	
Check replication or replication metadata log errors	Identify IDR errors by viewing the metadata for messages between producer and consumer instances, payload error logs, and message logs.
Check status messages	Review these status messages with recovery information.

Run Instance Data Replication diagnostics

Verify the status of services and the connection between your instance and the Instance Data Replication (IDR) message queue.

Before you begin

Role required: admin or idr_admin

Procedure

1. Navigate to **All** > **Instance Data Replication** > **Diagnostics**.
   The dashboard loads and the IDR diagnostic tests run automatically.
2. View the following diagnostic tests.

Option	Description
Certificate Management Service	Checks the status and setup of your certifi cate management service. **Note:** IDR requires a certificate management service to be up and running.
EJBCA Service Status	Checks the status and setup of the EJBCA service as part of the Key Management Frame work (KMF) health.
Hermes Enabled	Checks whether the Hermes Messaging Ser vice is available.
Hermes Cluster Configuration	Checks the status of the Hermes cluster.

3. Test the connection to the message queue and confirm the replicator is working by selecting **Run Message Queue Connection Test**.
   A test message is sent to and received from the Hermes cluster.

Result

The resulting messages validate enabled services or the connection to the message queue.

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Review synchronization errors in Instance Data Replication

Review the status field to check if synchronization is working correctly on the Instance Data Replication (IDR) consumer instance.

Before you begin

Before identifying synchronization errors, complete the tasks in check for common issues.

Role required: idr_admin or admin

About this task

Synchronization errors occur when a producer instance doesn't send data or a consumer instance doesn't receive data. Synchronization errors appear in the **Status** field on the consumer instance as **Replication Error**.

Procedure

1. Determine if the consumer successfully sent the synchronize request to the producer:
   a. On the consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.
   b. Select a consumer replication set.
   c. Click the **Replication Metadata Logs** related link.
   d. Sort the logs in a descending order in the Log Sequence column.
   e. Find the most recent payload with the REPL_SET_DETAIL_REQUEST type and open it.
   If you do not see this payload type, refresh the log until you see a payload with the REPL_SET_DETAIL_REQUEST type.
   f. Verify that you see the correct producer instance ID in the To column.
   If the producer instance ID is incorrect, update the ID and select **Activate**.
   g. Verify that you see Sent in the Status column.
   If you don't see Sent in the Status column, the producer didn't send any updates.
2. Determine if the producer received the synchronize request from the consumer:
   a. On the producer instance, navigate to **Instance Data Replication** > **Producer Replication Sets**.
   b. Select a producer replication set.
   c. Click the **Replication Metadata Logs** related link.
   d. Sort the logs in a descending order in the Log Sequence column.
   e. Find the most recent payload with the REPL_SET_DETAIL_REQUEST type and open it.
   If you don't see this payload type, refresh the log until you see the REPL_SET_DETAIL_REQUEST type.
   f. Verify that you see the correct consumer instance ID in the From column.

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If the consumer instance ID is incorrect, update the ID.

g. Verify that you see Received in the Status column.

Discover replication delays in Instance Data Replication

Monitor possible data replication issues by using the Instance Data Replication (IDR) Monitoring Dashboard.

Before you begin
Role required: admin

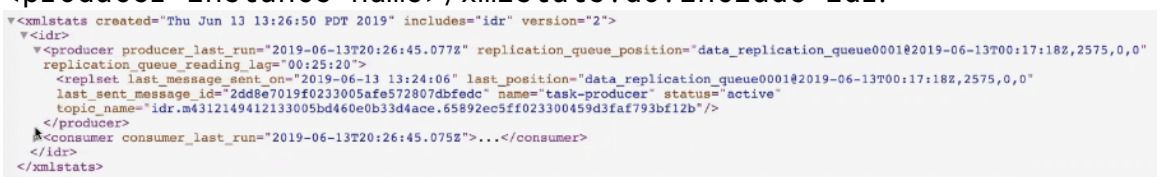
About this task

Procedure

1. To view the time lag on a producer instance, navigate to **Instance Data Replication** > **Monitoring Dashboard**, and check the Active Producer Replication Sets for the following details.

Option	Description
Name	Name of the producer replication set.
Replication Queue Reading Lag	Time between a record change on the producer instance and the moment it is sent over the outbound replication queue.
Status	Status of a replication set, either active or in error.
Status Message	Message that describes the error status.
Message Queue Version	Version of the Message Queue. Default is V2 (Hermes).

To get additional information, view the producer instance xmlstats at `https://<producer-instance-name>/xmlstats.do?include=idr`.



The xmlstats shows:

- The *producer_last_run* indicates the last time that the replication job ran on the producer instance.
- The *last_message_sent_on* indicates the last time that the producer sent updated data to consumers.

> **Note:**
> The timestamps are GMT.

2. To view the time lag on a consumer instance, navigate to **Instance Data Replication** > **Monitoring Dashboard** and check the Active Consumer Replication Sets for the following details.

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Option	Description
Name	Name of the consumer replication set.
Data Lag	Time between a record change on the producer instance and the moment it is recorded in the consumer instance.
Network Lag	Time between a record change logs in the outbound replication queue and the moment it is recorded in the consumer instance.
Status	Status of a replication set, either active or in error.
Status Message	Message that describes the error status.
Message Queue Version	Version of the Message Queue. Default is V2 (Hermes)

To get additional information, view the consumer instance xmlstats at `https://<consumer-instance-name>/xmlstats.do?include=idr`.

The xmlstats shows:

- The *consumer_last_run* indicates the last time that the consumer job ran and received changes from the producer.
- The *last_heartbeat_received_on* shows the timestamp when the consumer last received a heartbeat from the producer instance.

> **Note:**
> The timestamps are GMT.

Fix seeding errors in Instance Data Replication

Retry Instance Data Replication (IDR) seeding on tables with seeding errors, which occur from network problems and failed inserts, so that you don't have to do a full seeding.

Before you begin

Role required: idr_admin or admin

About this task

The maximum for a retry reseeding request is 10,000 errors. If you have more errors, perform a full seeding.

> **Note:**
> Seeding is not a replacement for cloning. Do not use IDR to clone instances.

Do not retry full seeding if you exceed any of the following limitations:

- Record size exceeds 10 MB
- Replication takes longer than seven days to complete

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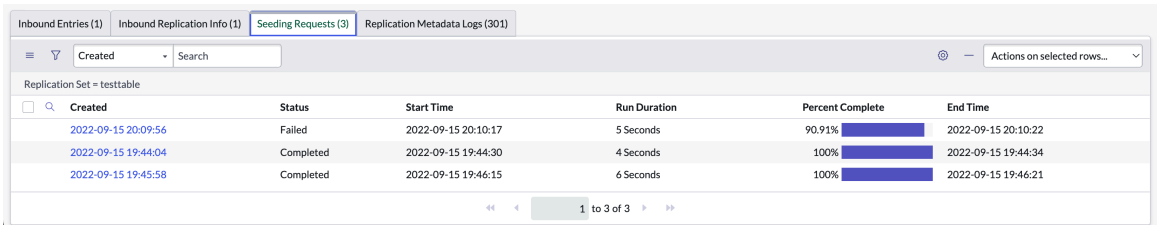
Note:
To avoid these limitations, reduce the number of tables in the seeding request, reduce the size of the records, or use partial seeding.

Procedure

1. On the consumer instance, navigate to **Instance Data Replication** > **Consumer Replication Sets**.
2. On the **Seeding Requests** tab of the Consumer Replication Set pane, select a seeding request that failed.



3. In the Seeding Request details, select the Payload Errors related list and examine the values in the Message column.
4. Retry the seeding request.Click or select specific errors, and then click **Retry Selected Errors**.
   - Retry seeding for all errors by selecting **Retry All Errors**.
   - Retry seeding for specific errors by selecting the check box next to each error and then selecting **Retry Selected Errors**.

Identify Instance Data Replication errors

Identify Instance Data Replication (IDR) errors by viewing the metadata for messages between producer and consumer instances, payload error logs, and message logs.

Before you begin
Role required: idr_admin or admin

Procedure

1. View the producer or consumer metadata logs.

Option	Description
Producer	Navigate to **Instance Data Replication** > **Producer Replication Sets**, select a producer replication set and click the **Replication Metadata Logs** related link.
Consumer	Navigate to **Instance Data Replication** > **Consumer Replication Sets**, select a consumer replication set and click the **Replication Metadata Logs** related link.

2. On either the producer instance or the consumer instance, to view transformation errors and replications that failed to load:

   a. Navigate to **Instance Data Replication** > **Replication Payload Error**.
   If the **Source** value is **Seeding**, the error occurred during seeding. If the source value is different, the error occurred during a replication set update. If any column breaks during

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transformation, transformation for the entire table breaks and data is not replicated in the table.

b. Select an error in the Created column.
The **Error Message** field on the Payload Error pane describes the payload error.

3. View the replication log on either the producer instance or the consumer instance:

a. Navigate to **Instance Data Replication** > **Replication Log**.

b. Select an entry.
The Instance Data Replication Log form shows the message and message level.

Configure error notifications in Instance Data Replication

Notify one or more users when errors occur in Instance Data Replication (IDR).

Before you begin

Role required: admin

Procedure

1. Navigate to the producer or consumer replication set for which you want to configure notifications.

2. Select the **Notification Configuration** related link.

3. In the **When to send** tab, configure when the notification is sent.

Option	Description
Record is inserted or updated	**a.** Select **Inserted**, **Updated**, or both **Inserted** and **Updated**. **b.** Configure the conditions under which this notification is sent using the condition builder. The default condition is **[Status] [is] [Replication Error]**
Event is fired	**a.** Select the event type that sends the notifi cation. **b.** Configure the conditions under which this notification is sent using the condition builder. The default condition is **[Status] [is] [Replication Error]**
Triggered	Select this option to trigger the notification from a Workflow Studio flow.

4. In the **Who will receive** tab, select the users, groups, or user groups who will receive the notification.

5. Optional: In the **What it will contain** tab, select an email template to populate the Subject and Message HTML.
The default template is Unsubscribe and Preferences. You can override the template and customize the text as needed.

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6. **Optional:** Verify that the notification contents are correct by selecting **Preview Notification**.
7. Select **Update**.

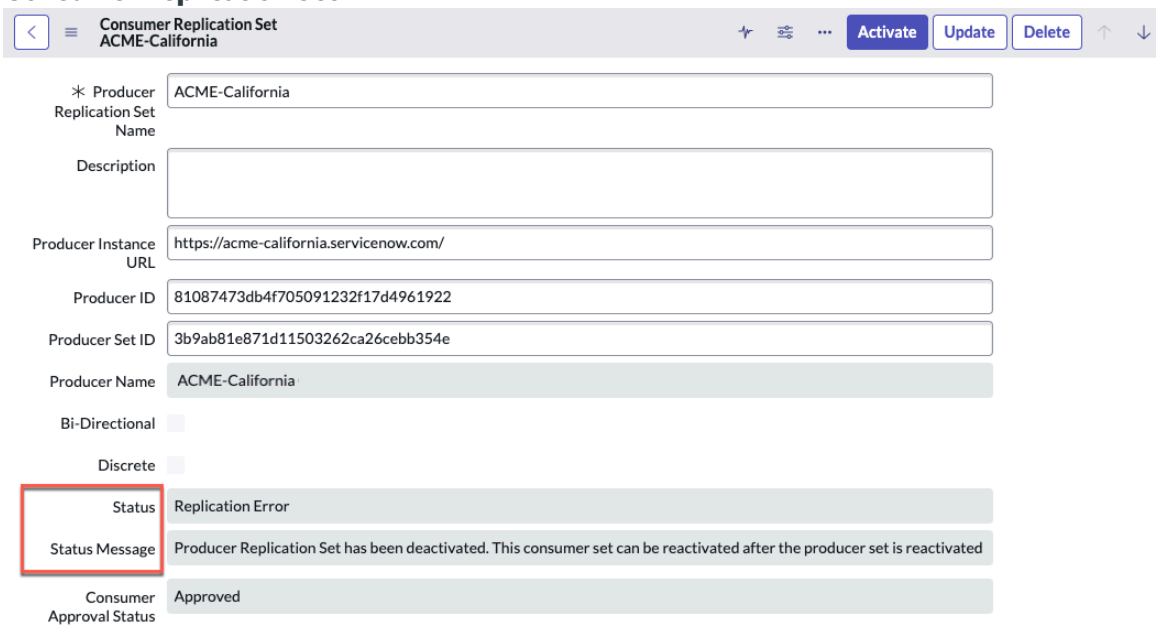
Consumer replication set status in Instance Data Replication

Review the status of your consumer replication set and research error messages to identify or fix Instance Data Replication (IDR) replication issues.

Consumer replication set status and status message

Navigate to **Instance Data Replication** > **Consumer Replication Sets** to access a consumer replication set, and view the status and status messages.

Consumer Replication Set



Status

Status	Description
In Draft	To use your consumer replication set, click **Activate**.
Activation Requested	After you initiate an activation, you must wait for the producer instance to respond to your request. If the wait time is excessive, then check the replication log for errors.
Seeding	The seeding job must complete before replication can resume.
Seeding Paused	The seeding job must resume before the seeding can continue.
Active	Normal status.
Replication Stopped	Check the Status Messages in the following table for a specific message and associated fix.

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Status (continued)

Status	Description
Replication Paused	The replication process must resume before the replication can continue.
Replication Error	Check the Status Messages in the following table for a specific message and associated fix.
Replication Deactivated	Activate the producer and consumer instances.
Subscription Requested	Approve the request for a consumer subscription on the producer instance.

Status Messages

Message	Action
`All Producer Replication Sets have been deactivated due to fatal replication error`	All consumer replication sets are moved to the error state. Contact Customer Service and Support.
`Consumer replication set received out of order messages`	Contact Customer Service and Support.
`Error while seeding data. Please refer to the Replication Payload Error table for details`	On the consumer instance, more than one record failed to seed. To recover, go to the Replication Payload Error table to find and fix the error, and then activate the consumer replication set.
`Error while seeding data. Please retry seeding this table`	To recover, reseed the table.
`Producer has encountered an error while seeding`	To recover, contact the administrator of the producer instance to determine the cause of the problem.
`Producer Replication Set configuration has been modified`	On the consumer instance, click **Synchronize Replication Entries** and then click **Activate**.
`Producer Replication Set has been deactivated due to replication error`	Contact Customer Service and Support.
`Producer Replication Set has been deactivated`	To recover, activate the producer replication set, and then activate the consumer replication set.
`Producer Replication Set has been deleted`	To recover, delete the consumer replication set.
`Producer Replication Set is inactive`	To recover, activate the producer replication set, and then synchronize and activate the consumer replication set.
`Producer Replication Set not found`	To recover, delete the consumer replication set.

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Status Messages (continued)

Message	Action
`Replication Set Paused`	To recover, click **Resume** or **Activate**.
`Replication set was in pause/ error/seeding pause state for more than 7 days`	The consumer replication set has been in the pause state, error state, or seeding pause state for more than the timeout period. The replication set is put into the disabled state. To recover, check for seeding errors and activate the consumer replication set with seeding.
`Seeding has been terminated due to timeout`	To recover, retry the seeding request or contact Customer Service and Support.
`Seeding request for a Producer Replication Set containing more than X number of records is not supported`	To recover, change the filter criteria to reduce the number of records to be seeded or use partial seeding. The default limit is 10 million records. Contact Customer Service and Support to change the default limit.
`Seeding was cancelled by a consumer admin`	To recover, activate the consumer replication set.
`Seeding was cancelled by a producer admin`	To recover, activate the consumer replication set. Only seeding requests in the queued, paused, or started states can be canceled. In this case, the consumer replication state is Replication Error.
`Shared key not matching`	The producer and consumer replication sets have different shared keys. To recover, copy the shared encryption key on the producer replication set, paste it into the consumer replication set, and activate the replication set.

Instance Data Replication XML stats

Extract Instance Data Replication (IDR)-related data from your instance to monitor replication status.

IDR XML Stats

You can view key metrics from your IDR producer and consumer instances to monitor performance and the status of IDR processing.

In a browser where the instance is running, append the following text to the instance URL: `xmlstats.do?include=idr`. The following output is an example of the IDR XML stats.

```
<idr status="enabled">
<producer producer_last_run="2020-11-06 13:45:30"
replication_queue_position="data_replication_queue0001@2020-11-0
5T22:58:32Z,2732,0,1"
replication_queue_reading_lag="00:01:00">
<replset last_message_sent_on="2020-11-06 13:44:31"
last_position="data_replication_queue0001@2020-11-05T22:58:32Z
 2731,0,1"
last_sent_message_id="f339a84ac818201050bec7cf110d4135" name="N-
2NormalStickyReplicaiton"
```

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```
status="active" topic_name="d59f4226db6680504d2bac44d49619a0.570
532d91b582010ef39fcc4cc4bcba1">
<subscriber name="persistencetestingora9" remote="false"/>
</replset>
<replset last_message_sent_on="2020-11-06 13:44:31"
last_position="data_replication_queue0001@2020-11-05T22:58:32Z,2
732,0,1"
last_sent_message_id="7f39a84ae5182010fad1a90f50fcd335"
name="N-1NormalTransformerReplication"
status="active"
topic_name="d59f4226db6680504d2bac44d49619a0.6f0572d91b582010ef3
9fcc4cc4bcb01"/>
</producer>
<consumer consumer_last_run="2020-11-11 14:22:36">
<replset data_lag="00:00:22"
 last_heartbeat_received_on="2020-11-11 14:22:36"
 last_message_received_network_time="00:00:05"
last_position="data_replication_queue0002@2020-11-11T18:50:47Z,2
12,0,1" name="N-2NormalTransformerReplication"
producer_name="byungidrorlandonightlyconsumer6" remote="false"
 status="active"
 topic_name="07f85510db93005407072f17d496196a.21247ddddb182010ed
02e3e2ca9619c9"/>
<replset data_lag="00:00:22"
 last_heartbeat_received_on="2020-11-11 14:22:36"
 last_message_received_network_time="00:00:06"
last_position="data_replication_queue0000@2020-11-10T23:28:58Z,1
374,0,1" name="N-1NormalStickyReplication"
producer_name="byungidrparis1" remote="false" status="active"
 topic_name="559cd6d2db6ad458a667cac505961973.bdc33951db9020107c
fe200c0b9619ea"/>
</consumer>
</idr>
```

IDR Metrics

Metric	Description
idr status	Shows whether IDR is enabled for your instance.
Producer instance	
producer producer_last_run	The last time that the *IDRProducerJob* scheduled job ran (GMT).
producer replication_queue_position	Position of the cursor in the replication queue.
replication_queue_reading_lag	The time between when a change is made, and when the *IDRProducerJob* scheduled job sends that change to the network.
replset last_message_sent_on	The last time data was sent to the network from this replication set.
replset last_position	The cursor position in the data_replication_queue when the last message was sent for this replication set.

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IDR Metrics (continued)

Metric	Description
last_sent_message_id	The message ID of the last sent message from the data_replication_queue.
name	The name of the replication set.
status	The replication set status.
topic_name	The topic name in the message queue for this replication set.
Consumer instance	
consumer_last_run	The last time the *IDRConsumerJob* scheduled job (local) or *IDRDeltaConsumerJob-<instanceid>* scheduled job (remote) ran (GMT).
replset data_lag	Time since the last heartbeat was received. Heartbeats should occur every minute for a replication set.
last_heartbeat_received_on	Time of the last heartbeat for this replication set.
last_message_received_network_time	For the last received message, the time difference between when it was sent to the message queue and when it was picked up by the consumer instance.
replset last_position	The cursor position in the data_replication_queue, at which the last message was sent for this replication set.
name	The name of the replication set.
status	The replication set status.
topic_name	The topic name in the message queue for this replication set.

Instance Data Replication reference

These reference topics provide additional information about data privacy in Instance Data Replication (IDR) and domain separation.

Data privacy in Instance Data Replication

The ability of replication sets to host multiple remote consumers in Instance Data Replication (IDR) means that there are potential data privacy issues to consider.

Replications sets in IDR serve multiple instances with multiple consumers. A replication set can have a single customer or can have multiple customers. A consumer could also be located within the same geographic region as the producer or located in a different geographical region.

Depending on how you configure your replication set, you can have data sharing internally, between offices of the same company, or externally, extending across multiple companies. You can also confine data sharing to a single location or region, or you can share data across all regions.

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An active replication set occurs after the producer instance administrator approves a consumer subscription. An active replication set involves data transfer, which could include transfer of personal data, between geographical regions. The data transfer between different geographical regions could subject the data to differing personal data regulations.

During the approval process, if IDR determines that the consumer and producer instances are in different geographical regions, it alerts the producer before activation. This alert should make administrators aware of the potential for differing data transfer regulations between regions.

Once a replication set is active, a replication set with multiple consumers might have specific discrete rules which direct specific data to specific consumers. Any modification of a discrete rule on an active replication set which spans multiple consumers has the potential to expose data. This data exposure can include personal data, which might be viewable by unintended consumers that subscribe to the replication set.

If you set bi-direction between a producer and consumer instance, the consumer can originate data that shares back to the producer instance. This data can also potentially reach any other consumer that is part of the replication set.

Adapter descriptions for Instance Data Replication

Adapters modify the producer data before inserting the data on consumer instances in Instance Data Replication (IDR).

Adapter fields

Each adapter has **Name** and **Description** fields. The name appears in the Adapter column. Use the **Description** field to explain the purpose of the data conversion.

Calculation adapter

Use the calculation adapter on the producer data to specify the operation and the value that is used in the operation.

Parameter examples

Parameter and value	Source data	Adapter output
Operation: Multiply **Constant Value**: 1.08	10	10.80
Operation: Max **Constant Value**: 1000	1020	1000
Operation: Floor **Constant Value**: 0	5.5	5

Max specifies the highest and **Min** specifies the lowest possible values. Values above or below those limits are set to those limits. Value types such as **int** and **long** have maximum and minimum values. Values above or below those limits cause precision errors.

Concatenate String adapter

Use the concatenate string adapter to append a specified string to the source data.

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Parameter example

Parameter and value	Source data	Adapter output
String: _v2	Patch10236	Patch10236_v2

Fixed-width format adapter

Use the fixed-width format adapter to reformat fixed-width input data. Use `#` to represent any positive integer, `@` to represent any character, and `\` as the literal escape character.

Parameter examples

Parameter and value	Source data	Adapter output
Match: ########## **Output**: (###) ###-####	7605551212	(760) 555-1212
Match: ##### **Output**: ###.##	10000	100.00
Match: ##\,### **Output**: #####	10,000	10000

Map adapter

Use the map adapter for comma-separated pairs of literals to map source-to-target conversions. Matches must be exact. For example, PRB=TASK would not convert PRB1000 to TASK1000.

Parameter examples

Parameter and value	Source data	Adapter output
Map: PRB=TASK, done=complete	PRB	TASK
Map: PRB=TASK, done=complete	done	complete
Map: PRB=TASK, done=complete	PRB1000	(no mapping)

Pattern adapter

Use the pattern adapter for regular expressions to identify input patterns. Use parentheses in the **Regex** to identify groups. In **Output Pattern**, use `$` to specify groups. `$0` represents the entire input, `$1` represents the first group, `$2` represents the second group, and so on. You can also insert, prefix, and append literal characters, including spaces so they appear in the adapter output.

Parameter examples

Parameter and value	Source data	Adapter output
Regex: (*),(*)	Smith, John	John Smith

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Parameter examples (continued)

Parameter and value	Source data	Adapter output
Output pattern: $2 $1		
Regex: (ABC[a-zA-z][a-zA-z])(ABC[a-zA-z][a-zA-z]) **Output pattern**: $1 $0	ABCDEABCFG	ABCDE ABCDEABCFG
Regex: (ABC[a-zA-z][a-zA-z])(ABC[a-zA-z][a-zA-z]) **Output pattern**: $1 release $0	ABCDEABCFG	ABCDE release ABCDEABCFG

In the second example, the match is ABC followed by two letters, followed by ABC and two letters. `$1` of this input is ABCDE. `$2` of this input is ABCFG. `$0` is the entire input string. So `$1 $0` is ABCDE ABCDEABCFG.

Replace adapter

Use the replace adapter to replace a specified input string or substring with a specified string. Use `$` to replace only some of the occurrences of the string. `$1` replaces only the first occurrence; `$2` replaces only the second. Use curly braces to replace the first N occurrences. For example, `${3}` replaces the first three occurrences.

Parameter examples

Parameter and value	Source data	Adapter output
Find: London **Replace**: Madrid	The product is London. The product is London. The product is London.	The product is Madrid. The product is Madrid. The product is Madrid.
Find: $2 London **Replace**: Madrid	The product is London. The product is London. The product is London.	The product is London. The product is Madrid. The product is London.
Find: ${2} London **Replace**: Madrid	The product is London. The product is London. The product is London.	The product is Madrid. The product is Madrid. The product is London.

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Split adapter

Use the split adapter to break a string into two or more strings using a specified delimiter made up of letters, numbers, or special characters (no spaces). In **Output Pattern**, use `$` to specify groups. `$0` represents the entire input, `$1` represents the first group, `$2` represents the second group, and so on. You can repeat a group in an output pattern, for example, `$2, $1, $1`. Multiple instances of a delimiter in source data create three or more groups.

Parameter examples

Parameter and value	Source data	Adapter output
Delimiter: - **Output Pattern**: $2, $1	John-Smith	Smith, John
Delimiter: - **Output Pattern**: $2, $1, $1	John-Harry-Smith	Harry, John, John
Delimiter: - **Output Pattern**: $3	John-Harry-Smith	Smith

Task number adapter

Use the task number adapter to add a prefix or suffix to a task number or replace the task number's prefix.

Parameter examples

Parameter and value	Source data	Adapter output
Modification: Replace **Number Prefix**: PRB **New Number Prefix**: STRY	PRB80899	STRY80899
Modification: Add Prefix **Prefix**: STRY	08099	STRY80899

Time zone conversion adapter

Use the time zone conversion adapter to convert one time zone to another.

Parameter example

Parameter and value	Source data	Adapter output
Output time zone: PDT	07:00:00 am GMT	00:00:00 am PDT

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Excluded tables in Instance Data Replication

You can't replicate certain tables in Instance Data Replication (IDR). Child tables of tables in the exclusion list are also excluded.

Excluded tables

These tables are excluded from IDR:

- Tables with the prefixes V_PREFIX, SYSX_, sys, ts_, ua_, usageanalytics_, wf_, ecc_, clone_, jrobin_, rrd_, imp_, pf_, pfd_, idr_

  sys_domain is an exception.

- Rotated tables, including syslog, sys_querystat, ecc_queue, ecc_event, cmdb_metric, sysevent
- Tables without a sys_id
- sso_federation
- saml2_update1_properties
- sso_properties
- digest_properties
- Instance

Child tables that extend these tables are also excluded from IDR and should not be included in replication sets because replication fails if they are included. For example, sc_cat_item extends sys_metadata, which is an excluded table. This makes sc_cat_item an excluded table due to inheritance.

Tables to avoid replicating:

- cmdb
- cmdb_ci

If you determine the CMDB tables must be replicated, you must use conditions to constrain the count of replicated records and ensure all required columns are included in the replication set.

Domain separation and IDR

Instance Data Replication (IDR) functions at the data level, which means it does not explicitly support domain separation.

For a typical use case, data moves from a producer instance to a consumer instance and back without regard to which domain the instance is in. You can use IDR to filter data, enabling you to segregate specific data between instances. If you must go beyond the IDR record-level filtering capability, you can use business rules to convert data from one domain to another. For more information, see Before Query business rules.

Instance Data Replication system properties

These system properties control the behavior of the Instance Data Replication (IDR) application.

To set IDR system properties, navigate to the System Properties [sys_properties] table and add the property.

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IDR data comparison properties

Property	Description
The record batch size for data comparison results `idr.instance.comparison.batch.size`	If the data comparison results exceed 1 million records within the given date range, the request is divided into batches of 10,000 records. • Type: integer • Default value: 10,000
The maximum runtime `idr.instance.comparison.max.runtime`	The maximum amount of time allowed for running a data comparison. • Type: integer • Default value: 15 minutes
Fields to skip `idr.dct.comparison.skip.fields`	The list of fields to skip when comparing records between instances. • Type: string • Default value: caller_id,sys_created_on,sys_created_by,sys_updated_on,sys

System properties

Property	Description
Stop replication if an out-of-order issue occurs `idr.message.gap.order_enforcement.enabled`	By default, IDR stops replication if an out-or-order issue occurs on the consumer. You can change the default behavior when an out of order issue occurs on the consumer by adding this property and setting it to `false`. This automatically re-queues and replicates missing messages using the most recent record details from the producer without stopping replication. • Type: string • True: Stop replication • False: Don't stop replication and re-queue **Note:** Each producer and consumer instance must be on the same family version to use this property. Both instances must be on Vancouver or higher.
Set attachment size limit `idr.cdc.replication.table.reader.attachment.size`	By default, IDR doesn't restrict the size of attachments.

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System properties (continued)

Property	Description
	You can change the default behavior by adding this property and entering a maximum size for attachments. • Type: integer (size in bytes) • Default value: 100,000,000
The maximum number of records allowed in a seeding request `idr.max.seeding.limit`	If this property isn't set or present, there's no limit on the number of records for seeding requests in V2 replication sets. • Type: integer • Default value:

Instance Data Replication roles

Instance Data Replication (IDR) is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

IDR administrator [idr_admin]

Admin role for accessing all IDR tables.

Contains Roles

List of roles contained within the role: idr_rest.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

IDR read [idr_read]

Read role for reviewing IDR tables.

Contains Roles

List of roles contained within the role: idr_rest.

Groups

List of groups this role is assigned to by default.

None.

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Special considerations

None.

IDR rest [idr_rest]

Role required for making a diagnostic request.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

MetricBase

The MetricBase application stores time-series data, which is data that is sampled at regular intervals. You can graph the stored data or use it with triggers to execute Workflow Studio flows.

Get started

Explore	Configure	Define and collect data
Learn about MetricBase features and concepts	Set up MetricBase and create a time-series specification	Create a time-series definition, access MetricBase data, and detect anomalies using predictive models.

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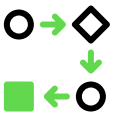
Trigger flows	Manage	Reference
		
Create triggers that execute Workflow Studio flows.	Manage the health and performance of MetricBase	Access developer resources and learn about domain separation with MetricBase

Exploring MetricBase

Collect, retain, analyze, and act on time-series data using MetricBase.

MetricBase overview

MetricBase helps you work with large amounts of data by using a smaller summary of that data that is stored in the MetricBase database.

- Integrate MetricBase seamlessly with ServiceNow IoT-based applications that monitor or act on large amounts of machine-generated data.
- Trigger flows in Workflow Studio based on time-series data in MetricBase.
  - Generate an email if the average CPU usage is more than 85% in the last 5 minutes.
  - Generate an email if MetricBase detects a gap in data submitted for 10 minutes or more.
  - Generate an alert if the average of the collected data is less than 10 or greater than 500 in the last 5 minutes.
  - Generate an alert if memory usage is likely to exceed 90% in the next 10 minutes.
- Visualize MetricBase data using time-series charts.
- Use the Reporting application to graph the time-series data that is stored in MetricBase.
- Detect anomalies by training a machine language model and execute a Workflow Studio trigger when an anomaly is detected.

MetricBase works with:

- An instance that stores machine-generated data
- A server that has the MetricBase application and database

MetricBase users

Users

User	Description
Administrator	An administrator collects, retains, analyzes, and acts on time-series data using MetricBase.

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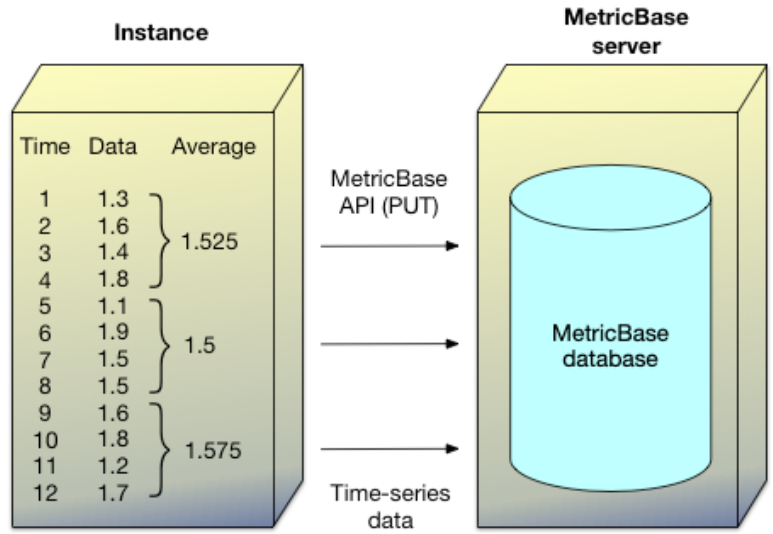
MetricBase workflow

The following figure shows that machine-generated data is sampled every 4 seconds. You send the average of the values in each sampling period to the MetricBase database, which stores the data until its expiration date.

Storing time series data



1. The administrator specifies a metric to store and how often to collect it by creating a time-series definition in MetricBase.
2. The administrator sends data from the instance to the MetricBase server using the MetricBase REST or JavaScript APIs.
3. The administrator configures trigger definitions that execute flows based on time-series data in MetricBase.
4. The administrator configures and trains predictive models in MetricBase to detect anomalies and execute flows when new data is significantly different than the trained data.
5. The administrator monitors collected data using time-series charts in MetricBase. Time-series data remains in the MetricBase database for a prescribed amount of time, after which MetricBase deletes the data.

MetricBase benefits

MetricBase benefits

Benefit	Feature	Users
Store time series summary of a large collection of data	Create a time-series definition in MetricBase	Administrator
Insert and retrieve time-series data from the MetricBase database	Developer resources	Administrator
Access and visualize time-series data in the MetricBase database	Accessing MetricBase data	Administrator
Trigger flows when new data is significantly different than the trained data	Detecting anomalies in MetricBase data	Administrator

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MetricBase benefits (continued)

Benefit	Feature	Users
	using predictive models	
Trigger flows that can log incidents, send emails, and create other alerts	Triggering flows using MetricBase data	Administrator

What to explore next

To learn more about configuring and using MetricBase, see:

- Configuring MetricBase
- Defining and collecting MetricBase data
- Triggering flows using MetricBase data
- Managing MetricBase
- MetricBase reference

Configuring MetricBase

Plan and configure your MetricBase implementation.

Requesting the MetricBase product

The MetricBase plugin [com.snc.clotho] requires a separate subscription and must be activated by ServiceNow personnel. Be sure to also request the MetricBase Demo plugin [com.snc.clotho.demo], which includes sample tables, metrics, triggers, and data.

To purchase a subscription, contact your ServiceNow account manager. The account manager can arrange to have the plugin activated on your organization's production and subproduction instances, generally within a few days.

When ServiceNow personnel install the MetricBase Demo plugin, they also connect your instance to the server that contains the MetricBase database. A MetricBase database can connect with only one other instance. For example, a clone of the original instance can't talk to the same database as the original instance.

Working with MetricBase demo data

Familiarize yourself with MetricBase by exploring the MetricBase demo.

Overview of the MetricBase demo

With the MetricBase Demo plugin, you can experiment with MetricBase without configuring it or knowing much about it. The demo plugin is separate from the MetricBase plugin. Make sure to request both.

Use the MetricBase demo to explore MetricBase before you set it up for production purposes.

- Visualize sample time-series data.
- Access sample metrics, triggers, and a scheduled job that collects and stores data.
- Test the functionality of included triggers. The plugin includes scheduled time-series data updates, as if they had been received from an instance.
- Experiment with the MetricBase JavaScript APIs using the Data Explorer.

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In the demo, a fictional fleet of drones has been outfitted with sensors that broadcast their metrics, including their speed, altitude, and battery life over time.

View demo data in MetricBase

After ServiceNow personnel install the MetricBase and MetricBase Demo plugins, you can use the demo to get familiar with MetricBase.

Prerequisites

- MetricBase and the MetricBase demo plugins must be installed by ServiceNow personnel.
- Role required: admin

1. Navigate to **MetricBase Demo** > **Drones** to see the name, model, length, width, altitude, and speed for all drones in the fleet.

Name	Model	Camera Model	Fleet	Length (cm)	Width (cm)	Height (cm)	Altitude (m)	Speed (kph)	Remaining Battery (%)
ASF-KP-IG3-1	Kingfisher Phantom	Imesity G3	ASF	37	37	13	165.21455	71.22602	84.44444
ASF-WT7-IC2-1	Warbler T7	Imesity C2	ASF	40	45	8	120.973076	66.827896	17.777779
ASF-WT7-IC2-2	Warbler T7	Imesity C2	ASF	40	45	8	138.80995	68.61613	26.666666

2. Select **MetricBase Demo** > **Metrics** to see how the metrics are defined. In the Time Series Metrics list, the column values specify the table where the drone's time-series metrics are stored, the names of all the metrics that are stored for each drone, and the retention policy for each metric. The retention policy specifies how frequently measurements are taken, and how long MetricBase retains that data.

All > Table name = mb_demo_drone

Table name	Metric field name	Retention policy	Application name
mb_demo_drone	mb_demo_mt_altitude	Dense	MetricBase Demo
mb_demo_drone	mb_demo_mt_external_humidity	Dense	MetricBase Demo
mb_demo_drone	mb_demo_mt_external_pressure	Dense	MetricBase Demo
mb_demo_drone	mb_demo_mt_external_temperature	Dense	MetricBase Demo
mb_demo_drone	mb_demo_mt_rem_battery	Dense	MetricBase Demo
mb_demo_drone	mb_demo_mt_rem_disk	Coarse	MetricBase Demo
mb_demo_drone	mb_demo_mt_speed	Dense	MetricBase Demo

Now that you've seen the drone data and learned how to find it, let's see how the data was collected using a retention policy.

3. Select a retention policy. The Retention Policy form shows the definition for the policy. In the following example, this metric is measured once a minute for the first 8 days, then once every 10 minutes for the following 94 days, and then once an hour for the following 397 days. After that, the system discards the data.

Retention Policy Schedules | for text | Search | Actions on selected rows... | New

Retention Policy = Dense

Retention Duration	Sampling Period
94 Days	10 Minutes
397 Days	1 Hour
8 Days	1 Minute

1 to 3 of 3

See MetricBase retention policies.

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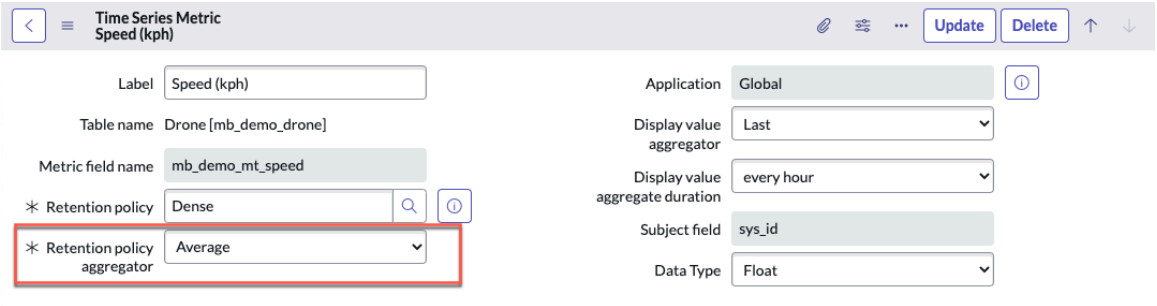
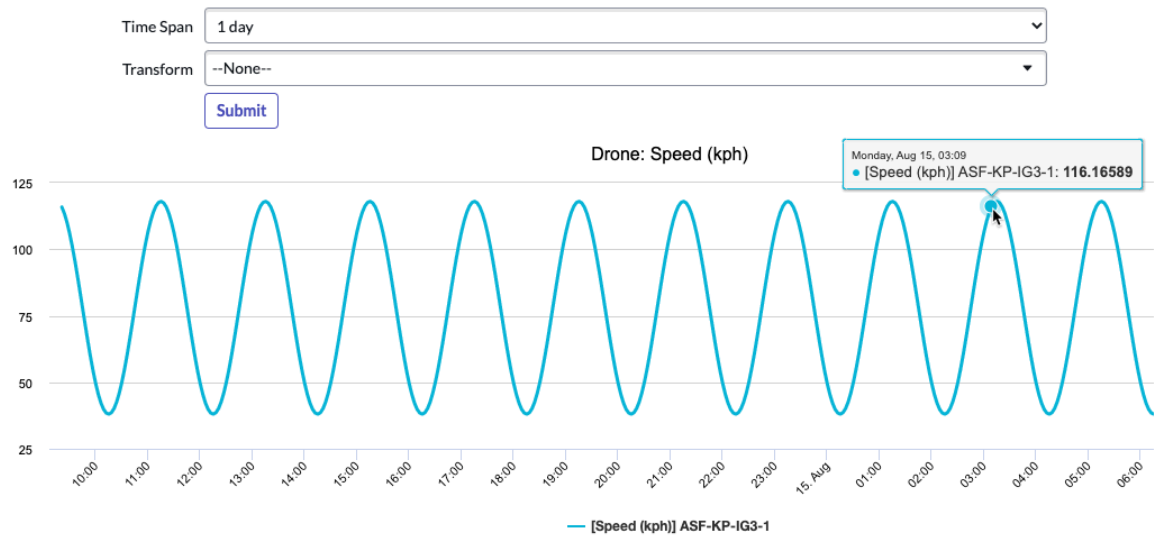
4. To see how the data is aggregated during the Retention Durations, select the left arrow (<) at the top of the Retention Policy Schedules window to return to the Time Series Metrics list.
5. Select a table name. The Time Series Metric definition shows the **Retention policy aggregator**. This aggregator summarizes the data as, for example, the average, maximum, or minimum value in the aggregation period. In the following example, the admin clicked the table for the speed metric. The result is that MetricBase stores the speed averages during each sampling period in the MetricBase database.



Now that you understand how the data was collected using retention policies, let's see how to display the data in lists and graphs.

6. Notice the parameter fields that start with **Display**. In this example, they mean that the speed values that are displayed in the list view of drones are the last speeds recorded in every hour interval for each drone. These **Display** fields control what appears in the list view of the drones only. They have nothing to do with the retention policy.
7. Display the list view of a table by entering `<table-name>.list` in the **Field navigator** field. For example, `mb_demo_drone.list`. All drone data appears. In the example from the previous step, the speed column would contain the **Last** value of the sampling period.
8. Select **MetricBase Demo** > **Drones** and look at the speed (kph) column. From the previous step, you know that these values are the last speeds recorded for each drone up to an hour ago. The values are the same as you would get by using the *`.list`* command.
9. Select the speed value of the first drone. The following graph shows the speed of the drone that was measured hourly.



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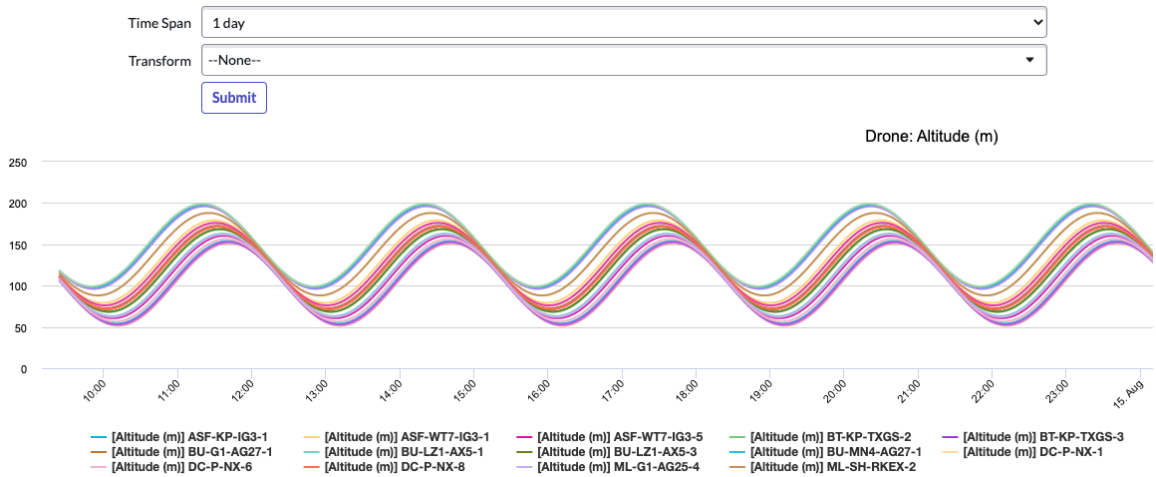
Note:
You might need to select a different **Time Span** field value to get a clearer graph. For example, try **1 Day**. The speed is a sine wave because it's artificially generated. Hover over the sine wave to see the actual measurements.

10. Select the left arrow (<) to return to the list of drone metrics, right-click on one drone type (**Model** column), and select **Show Matching**. Only the drones of the selected type appear.
11. Select the menu icon next to the Altitude column heading and select **Time Series Chart**. You see a graph that shows the altitude measurements of the Warbler-T7-type drones.



You might like to change the **Time Span** value for a clearer graph.

12. Select the left arrow (<) to return to the list of drone metrics.

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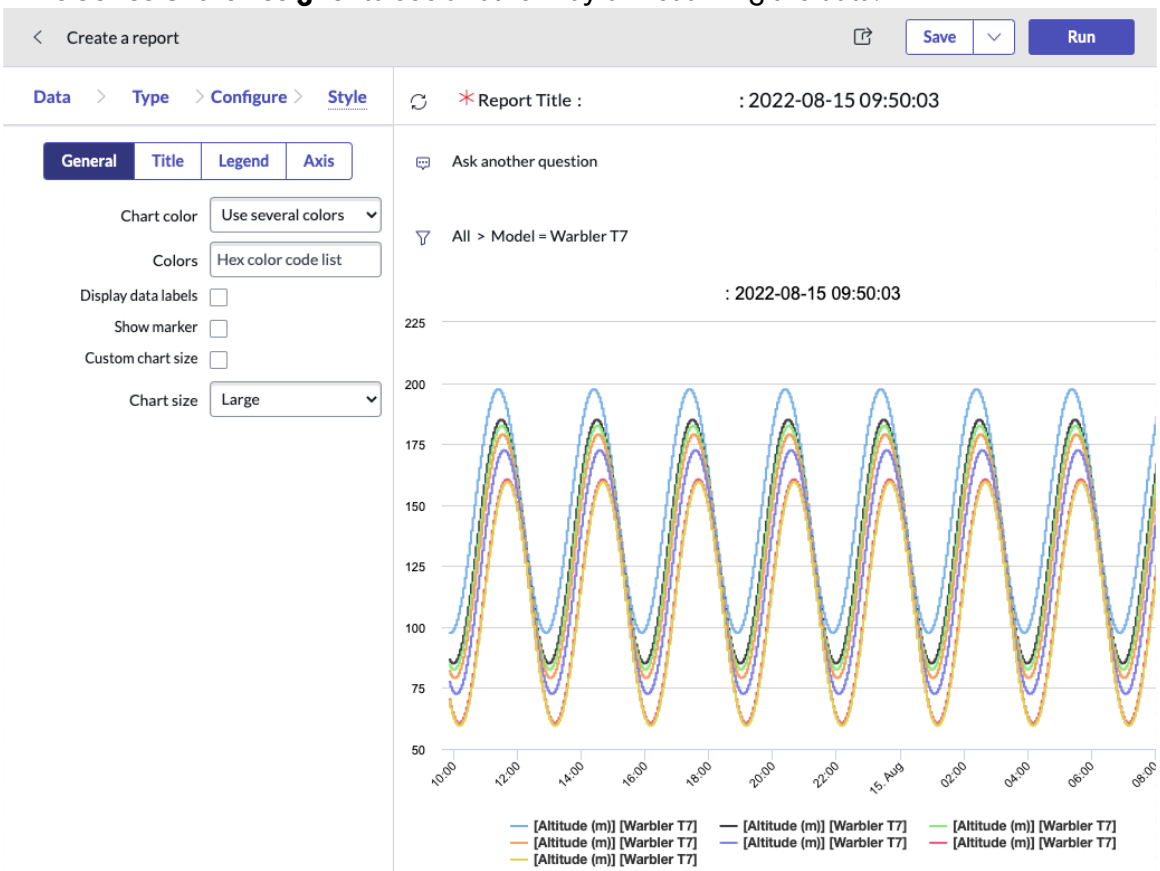
13. Click the menu icon next to the Altitude column heading and select **Time Series Chart Designer** to see another way of visualizing the data.



14. In the Create a Report page that displays in the Reporting application, vary the graph parameters.

> **Note:**
> In the following steps, to stay on the same page, select **Run**. To advance to the next page when designing the graph, select **Next**.

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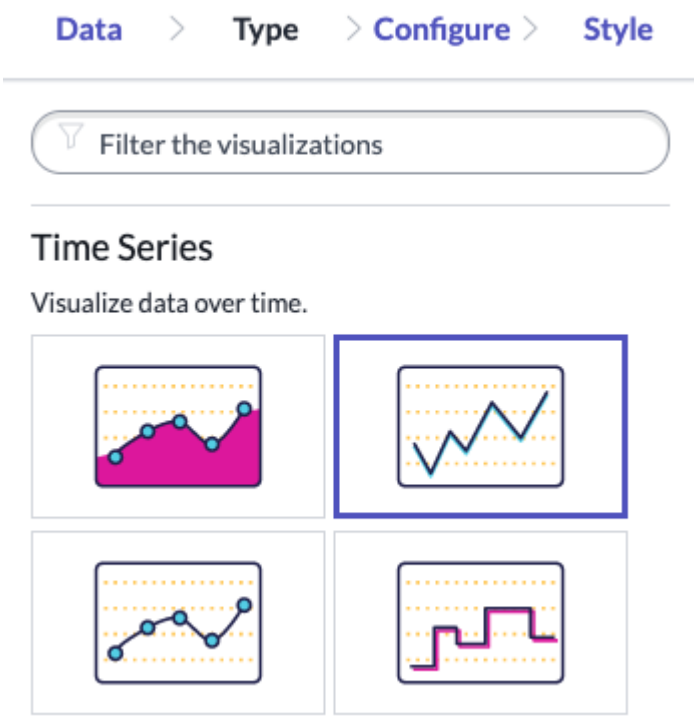
a. In the Type pane, select the kind of graph to display, and then click **Next**.



b. In the Configure pane, try changing the parameters. Click **Run** to view the results with each change.

- Change the **Report Title** to Warbler Altitude.
- Apply a condition to filter the view. For example, **[Model] [is] [Warbler T7]**.
- Change the **Last** value to **1** day.
- Select **Envelope** in the **Transform** list. You see the minimum and maximum (envelope) altitudes for the fleet of Warbler T7 drones over time.
- select the time line to display on the graph using the **Time range** list.

> **Note:**
> **Relative** uses the **Last** timespan relative to the present time. For example, if **Last** is 1 hour, the time line in the graph always spans the previous hour. You can add this report to your dashboard to show the metrics in the previous hour.

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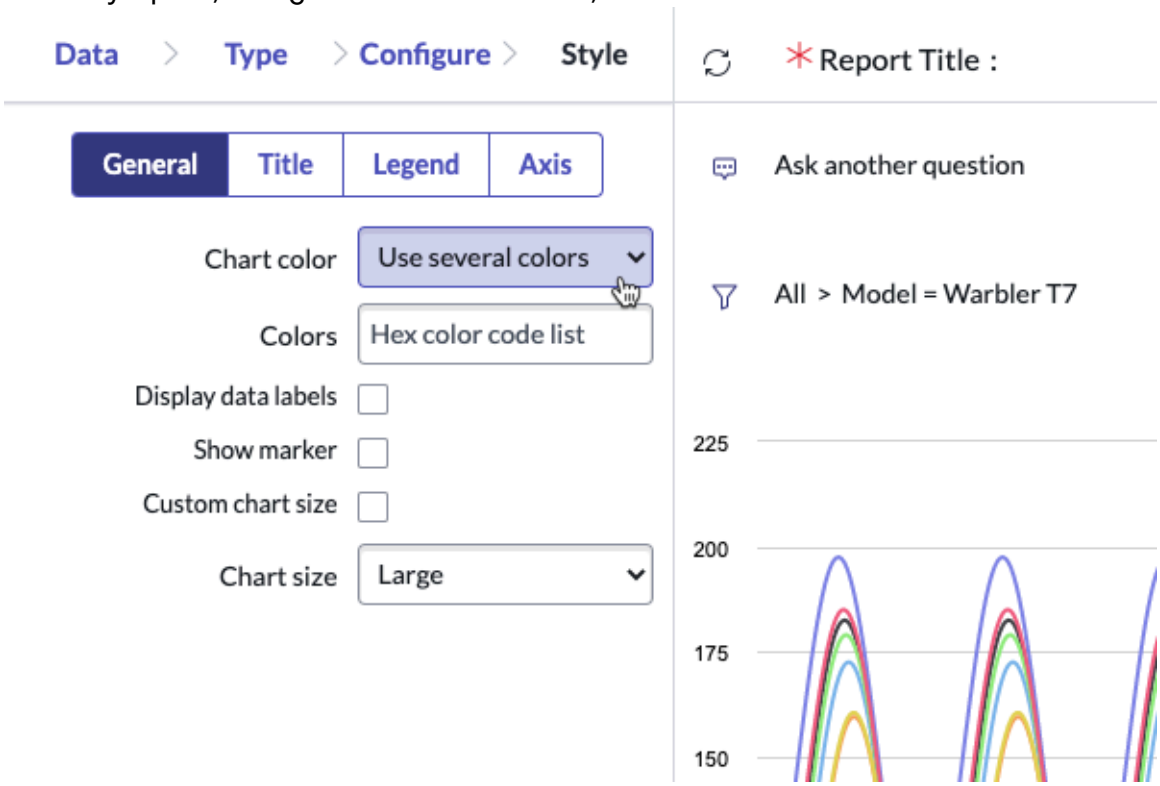
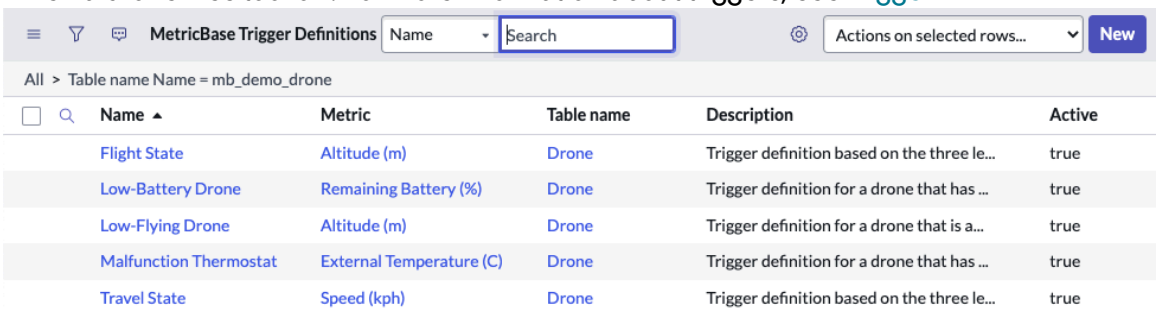
c. In the Style pane, change the **Chart color** value, and then click **Run**.



You've displayed drone data in lists and graphs. Now, let's define a trigger that executes when data that you monitor reaches a threshold value.

15. Select **MetricBase Demo** > **Trigger Definitions**. The MetricBase Trigger Definitions list shows the name (**Name**) of the trigger, the metric (**Metric**) the trigger monitors, the table (**Table name**) the metric that it is in, the trigger description, and whether the trigger is active. Triggers kick off flows when metrics meet trigger thresholds. An example is when a drone flies too low. For more information about triggers, see Trigger Workflows.



Name	Metric	Table name	Description	Active
Flight State	Altitude (m)	Drone	Trigger definition based on the three le...	true
Low-Battery Drone	Remaining Battery (%)	Drone	Trigger definition for a drone that has ...	true
Low-Flying Drone	Altitude (m)	Drone	Trigger definition for a drone that is a...	true
Malfunction Thermostat	External Temperature (C)	Drone	Trigger definition for a drone that has ...	true
Travel State	Speed (kph)	Drone	Trigger definition based on the three le...	true

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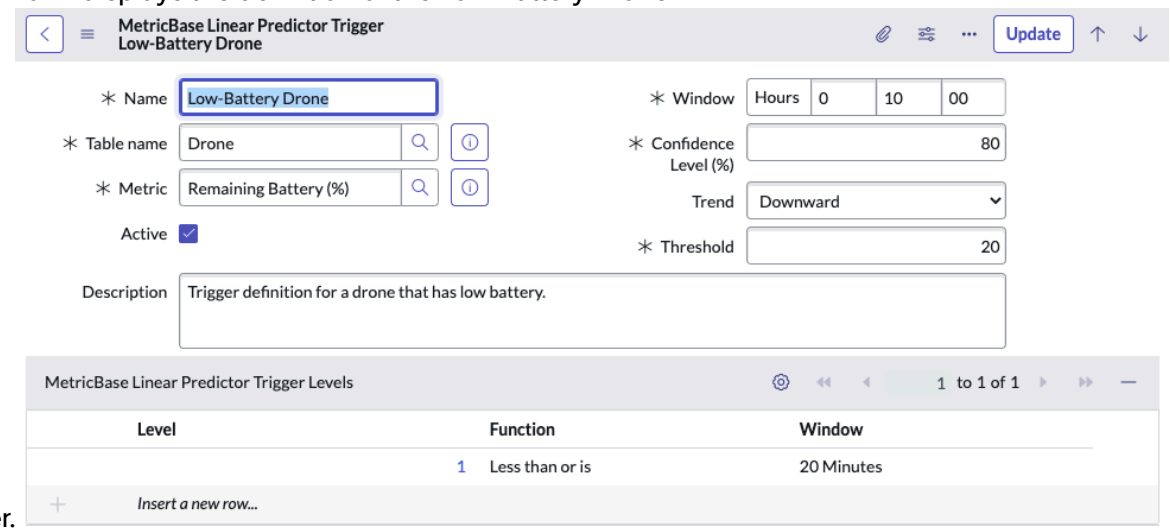
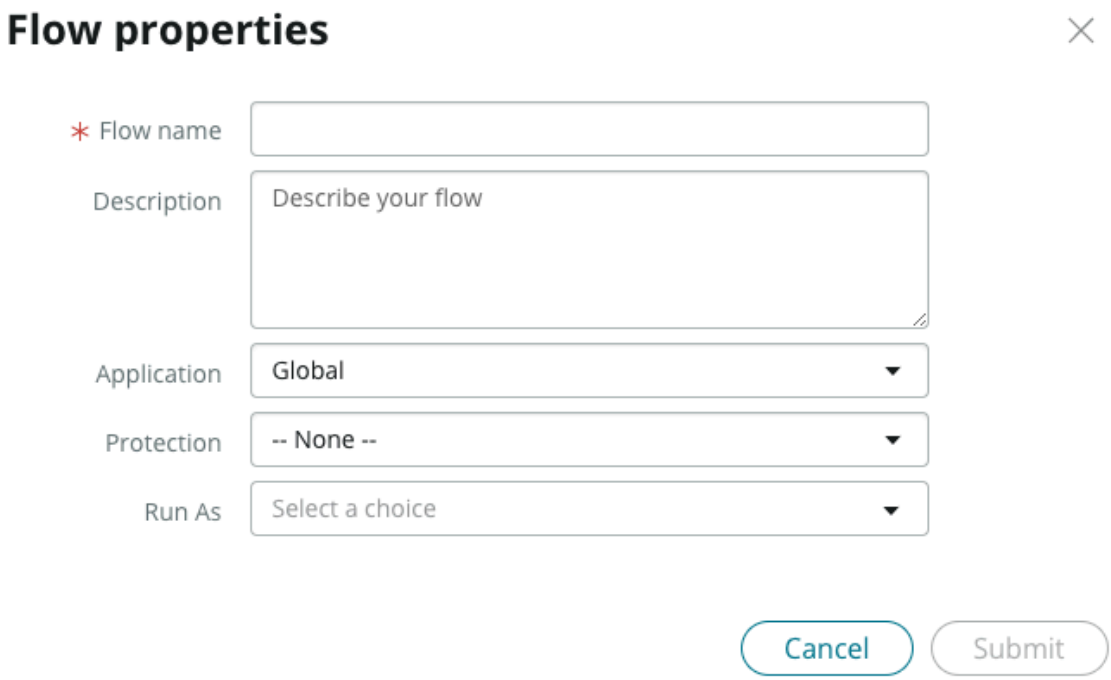
16. Select **Low-Battery Drone**. The MetricBase Linear Predictor trigger form displays the definition of the Low-Battery Drone trigger.



In this example, the trigger monitors the **Remaining Battery (%)** metric (**Metric**) in the Drone table (**Table name**) every 10 minutes (**Window**). If the battery life is trending downward (**Trend**) and is 80% likely (**Confidence Level**) to reach 20% (**Threshold**) within 20 minutes (under **Window** for **Level** 1), the trigger executes. Although it fires, nothing happens until you associate this trigger with a flow. The flow defines the actions to take.

17. Select **MetricBase** > **Trigger Flows**.
18. Select **New flow** to associate a trigger that is defined in the system to a flow.
19. In the **Flow name** field, name the flow and select **Submit**.



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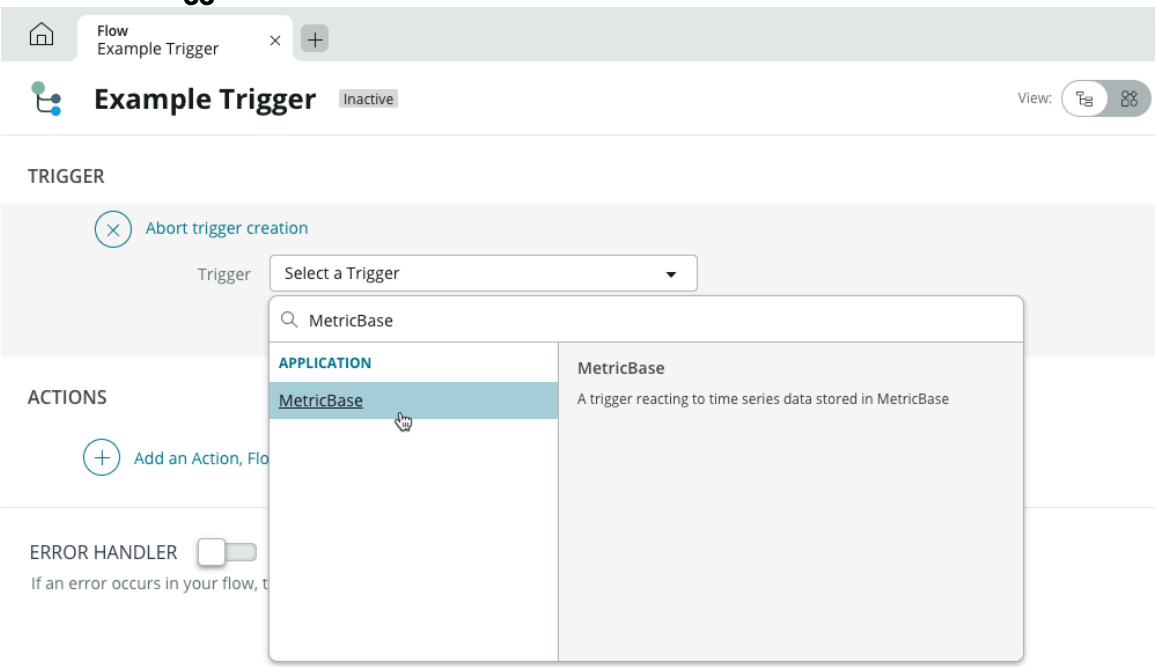
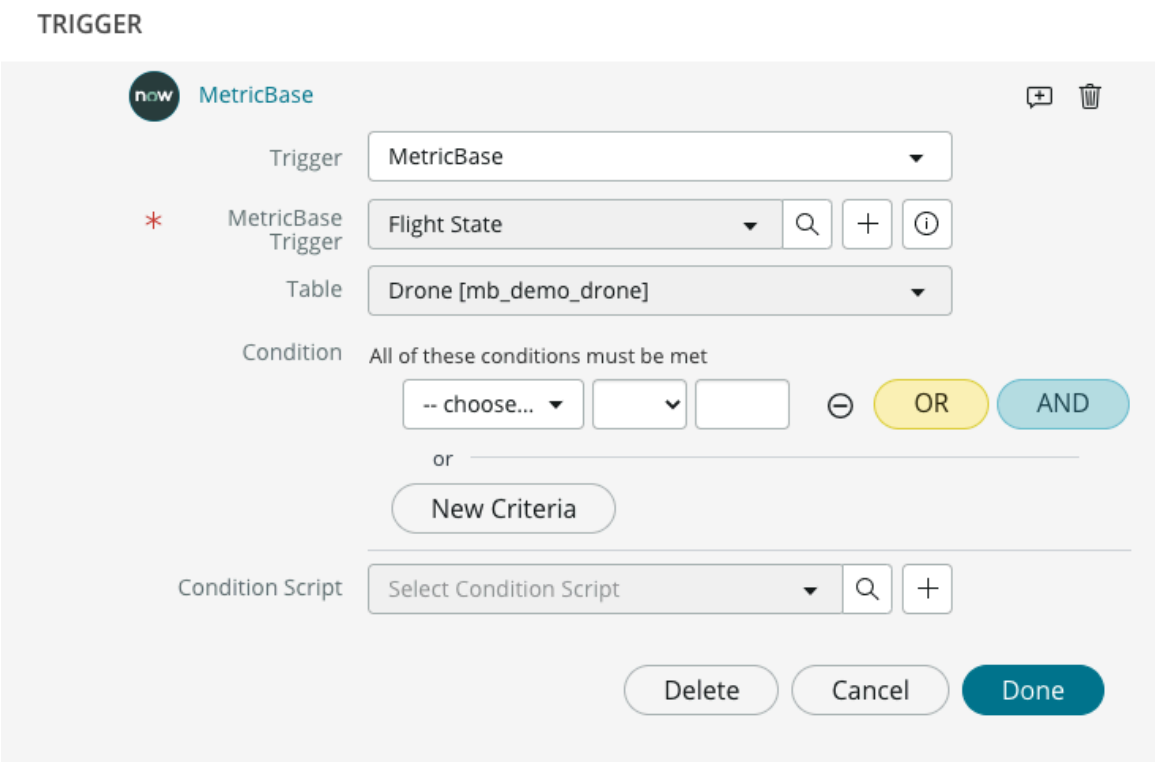
20. Click **Add a Trigger** and select **MetricBase** in the list.



21. In **MetricBase Trigger**, select a trigger that already exists and select **Done**. Alternately, select the plus sign to the right of **MetricBase Trigger** to create a new trigger.



22. Select **Add an Action, Flow Logic, or Subflow**.
23. Select **Action** to specify the actions to take when the trigger fires. The Action dialog box appears.

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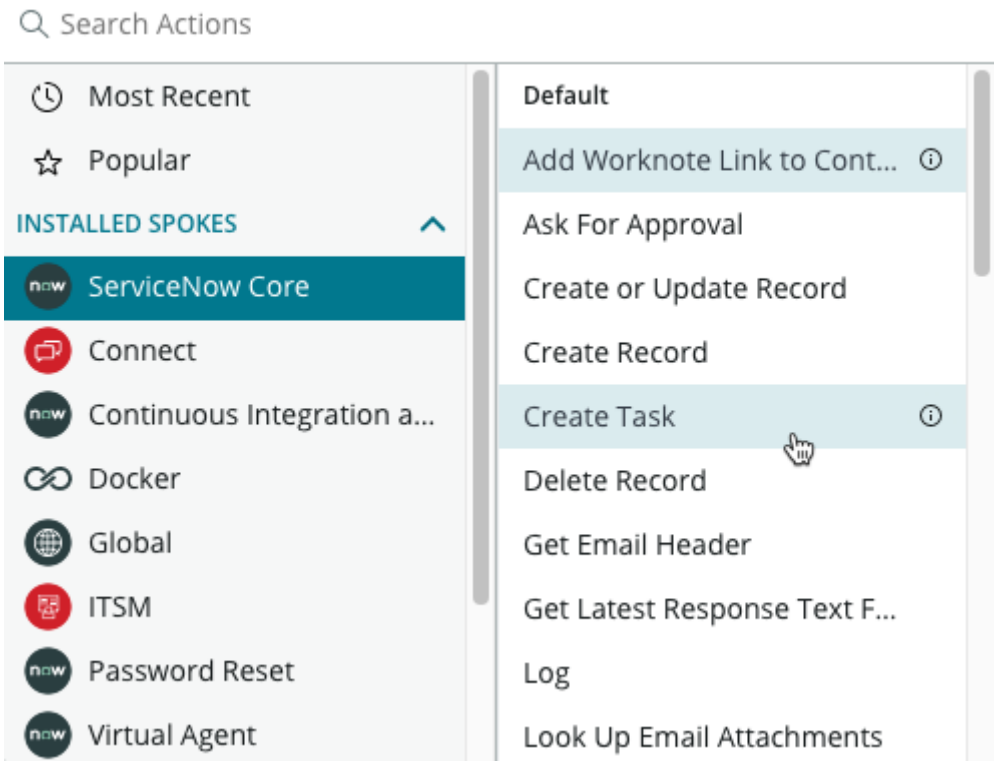

24. Select a domain of actions from the left column and the specific action to take in the right column.
25. Select **Save** and **Activate**. The flow doesn't execute unless it is activated. For more information about Workflow Studio, see Workflow Studio.

The following table summarizes the modules in the MetricBase demo.

MetricBase demo modules

Module	Description
Drones	Table that keeps metrics on drones, such as speed and altitude. Each record is a different drone. You can add records.
Fleets	Table that maintains metrics about groups of drones. Each record is a different fleet. You can add records.
Data Generators	Table that defines how data is created for the drone records. This field is provided for informational purposes. You cannot change or add records.
Metrics	List of metrics that are defined in the system. This list is the same table as **MetricBase** > **Time Series Metrics**. You can add metric fields.
Scheduled Jobs	Scheduled job that is created for the demonstration application. The job runs every five minutes to add data to the demo tables in the MetricBase database. You can change the schedule.
Trigger Definitions	List of triggers that are defined in the demo. This list is the same table as **MetricBase** > **MetricBase Triggers** > **Trigger Definitions**. You can create additional triggers.

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MetricBase demo modules (continued)

Module	Description
Anomaly Logs	List of logs that result from triggers firing. The **Low-Flying Drone** trigger creates the anomaly logs.
Data Explorer	Widget that enables you to experiment with MetricBase JavaScript APIs using the demonstration application data. See Get Familiar with MetricBase APIs for more information.

Get familiar with MetricBase APIs

Experiment with MetricBase APIs using Data Explorer that is part of the MetricBase Demo application. Data Explorer uses the data installed with the MetricBase Demo application.

Before you begin

Role required: clotho_admin

About this task

Data Explorer is a playground where you can see and edit example scripts that visualize data included with the MetricBase Demo application. The example scripts use the MetricBase JavaScript APIs. For information on the MetricBase JavaScript APIs, see Client, Data, DataBuilder, Transformer, TransformPart, TransformResult.

Note that the now/v1/clotho/transform/topic API endpoint is reserved for internal use only.

Example scripts use either:

- Transforms, which use the Transformer method.
- Machine Language, trained models that predict expected behavior. All the scripts without "Transform" in their title use Machine Language.

Procedure

1. Navigate to **All** > **MetricBase Demo** > **Data Explorer**.
   The **Data Explorer** displays.

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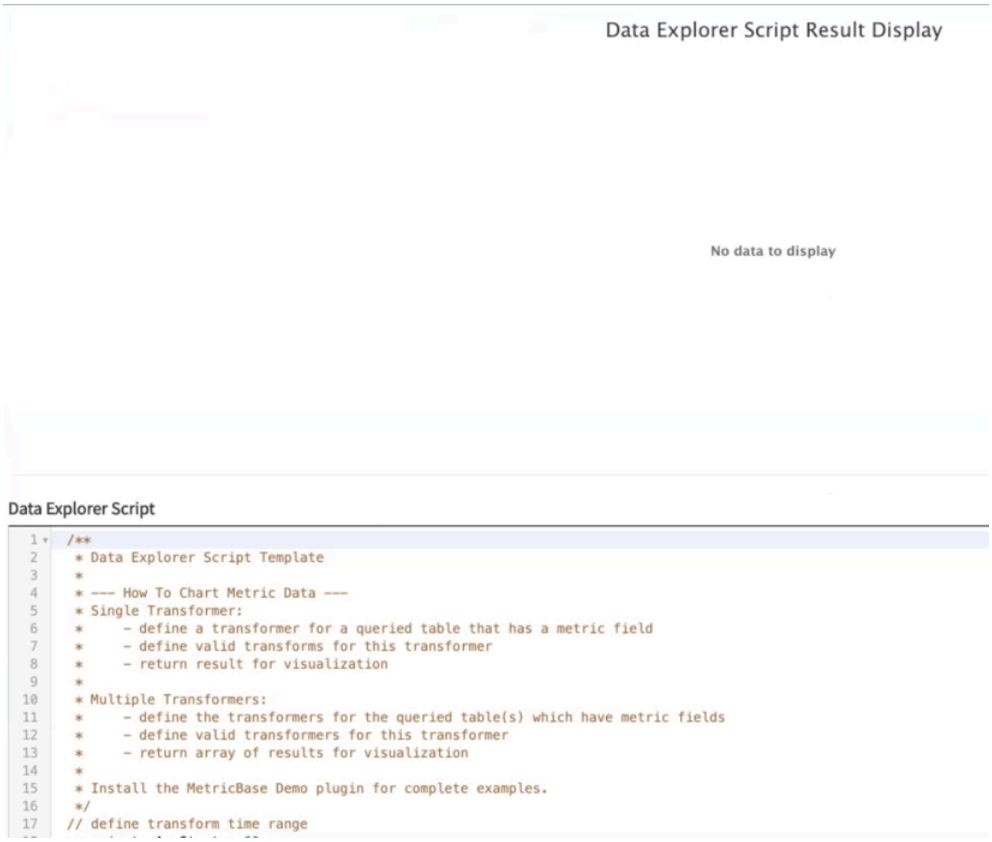

When you run a script, the data visualization appears under **Data Explorer Script Result Display**.

2. Select one of the sample scripts to run in the **Example Script** menu.

3. Click **Load Example**.
4. Click **Run**.
   The script displays the data visualization under **Data Explorer Script Result Display**.
5. **Optional:** Change the values or statements in the script or write an entirely new script and click **Run**.

   Note:
   If you want to save the changes you made in the script, click **Save**.

6. Under **Server Output**, look at the server's response that might include error information.

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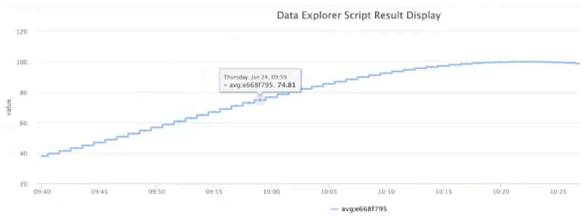
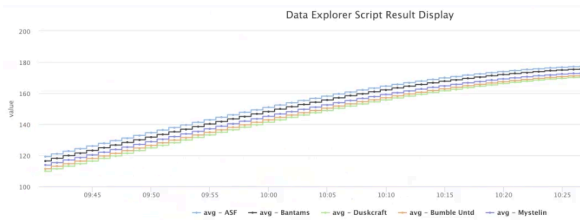
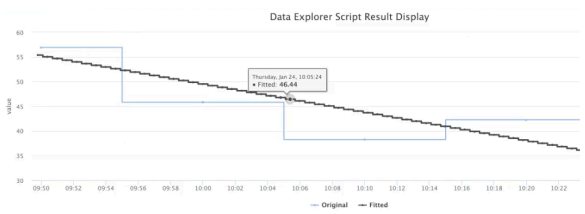
Example:

Example scripts

Example script	Definition and visualization
Simple Transform	Uses the transformer API to display a single time-series metric, the average speed of the drones: `transformer.metric('mb_demo_mt_speed').avg()`. 

Simple Transform with Grouping	Uses the transformer API to display a group of time-series metrics, the average altitude of the fleet of the drones:
	`transformer.groupBy("fleet").metric("mb_demo_mt_altitude").`
	`avg().label('avg - %g:fleet:')`
	 

Normal Model	Models normal data, which approximates a bell-shaped or Gaussian curve for distributed values.

Linear Model	Creates a line to summarize the current data and predict future values. This example, about the remaining charge in drone batteries, graphs both the trained model values and the average of the values.
	`var builder = new sn_clotho.Transformer(drones);`
	`var fit = builder.metric("mb_demo_nt_rem_battery").resample(100).`
	`fit({model:"linear"}).label("Fitted");`
	`builder.metric("nb_demp_mt_rem_battery").avg().label("Original")`
	 

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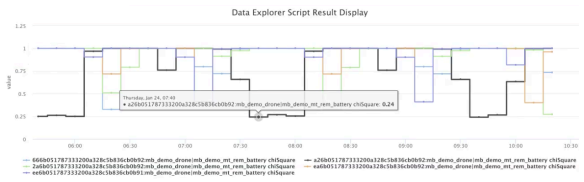
Example scripts (continued)

Example script	Definition and visualization

Seasonal Trend Decomposition Model	Uses a seasonal trend model so that data can be subtracted to reveal non-seasonal trends. This model is similar in purpose to the Holt Winters model but arrives at the result using different algorithms.
	`var builder = new sn_clotho.Transformer(drones);`
	`var metric = "nb_demo_mt_rem_battery";`
	`var fit = builder.metric(metric).fit({model:"STL", periodicity:"PT2H", innerCycles:1, outerCycles:10})`

Holt Winters Model	Uses the Holt Winters, seasonal trend model so that data can be subtracted to reveal non-seasonal trends. This model is similar in purpose to the Seasonal Trend Decomposition model but arrives at the result using different algorithms.
ARIMA Model	The most general class of models for predicting time-series data that has no trend, meaning all the data has the same value or the values fluctuate sinusoidally around the mean.

Deviation Model	Uses chisquare model to show the differences between the real data and the model's prediction.
	`var metric = "nb_demo_mt_rem_battery";`
	`builder.metric(metric).deviation(model, "chiSquare");`
	 

Defining and collecting MetricBase data

Store time-series summaries of much larger data collections.

Overview of creating a time-series definition

In MetricBase, you specify the metric that you want to store and how often to collect it. You can also determine how long to store it in the MetricBase database. Then, you send the data from an instance to the MetricBase server at the rate that you define using MetricBase REST or JavaScript APIs. In this way, you can monitor a much larger data collection with MetricBase summaries of it.

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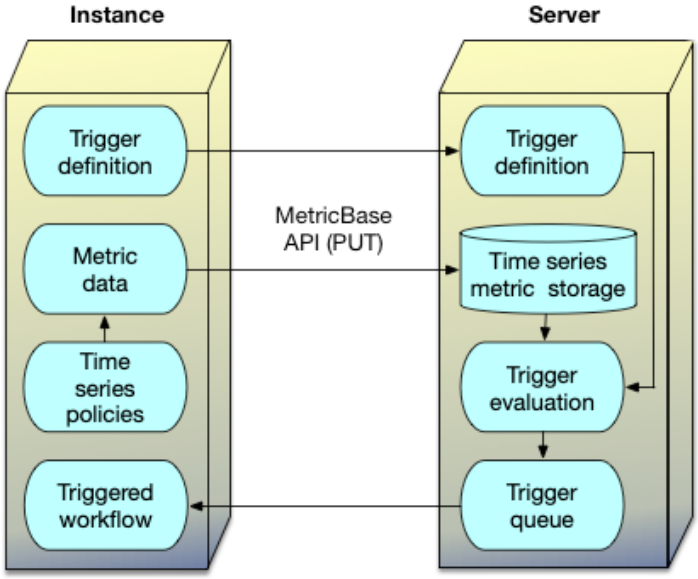
MetricBase collects the metrics of how often you send data and what the aggregation of that data is, for example, maximum, minimum, average, or last. This data is called time-series data. For example, if you collect drone speeds on an instance, you can send the average drone speed for every two minutes to the MetricBase database. You can also collect altitude and battery life. MetricBase stores each metric as a column in its database.

Sending information from an instance to a MetricBase server



- Create a time-series definition in MetricBase

  Specify the metric that you want to store, how often to collect it, and how long to store it in MetricBase.

- MetricBase retention policy schedules

  Specify how long MetricBase stores the time-series data in the MetricBase database.

- MetricBase retention policies

  Retain data in MetricBase according to retention policies.

- Accessing MetricBase data

  Access the time-series data that you sent to the MetricBase database in the way that is convenient to you.

- Detecting anomalies in MetricBase data using predictive models

  Distinguish normal data from anomalous data using predictive models.

Create a time-series definition in MetricBase

Specify the metric that you want to store, how often to collect it, and how long to store it in MetricBase.

Before you begin

- Install MetricBase
- Role required: clotho_admin

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Procedure

1. Navigate to **MetricBase** > **Time Series Metrics**.
2. Select **New**.
3. On the form, fill in the fields.

Time series metric form

Field	Description
Label	Intuitive name for the **Metric field name**. For example, altitude could be the label for the metric field name, mb-altitude.
Table name	Name of the table to add the metric to in the MetricBase database. For example, in the MetricBase Demo, the mb_drone table stores the drone data. Each column in the table is a different metric, for example, altitude, length, and speed.
Metric field name	Name of the time-series metric that records. For example, mb-altitude. You can think of it as the name of a column in the MetricBase database table.
Retention policy	Sampling frequency and how long MetricBase keeps the values in the database. You cannot customize the value. For a definition of the values, click the magnifying glass and then a policy. The coarser the sampling rate, the less data that stores. Use the coarsest sampling rate that works for your dataset. For example, do not collect data every minute if collecting it once an hour suffices. See MetricBase retention policies for a description of the policies you can select.
Retention policy aggregator	Operator that aggregates the data in a sampling period. For example, last, minimum, maximum, and average.
Display value aggregator	The aggregation method in use when using *<table-name>.list* where <table-name> is a table in the MetricBase database. This value is unrelated to the retention policy. For a definition of the options, see MetricBase transforms.
Display value aggregate duration	Duration that is used to calculate the aggregation only when using the list view. For example, *<table-name>.list* where <table-name> is a table in the MetricBase database. This value is unrelated to the retention policy.
Subject field	You can select a unique table column as your subject for the metric. The unique column must be designated on the table before you select it. For example, if your metric tracks temperatures in different houses, you can make the house address column the subject of your metric. The house address column on your table must be unique before you set the subject field. **Note:** The sys_id column is the default unique column.
Data Type	You can specify the data type of the subject field.

4. Select **Submit**.

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Result
You've created a time-series specification for a metric that you want to track.

What to do next
Sample the data according to the time-series specification and send it from an instance to the MetricBase database server.

Use the REST or JavaScript APIs to send the data to the MetricBase database at the rate that is prescribed by the time-series definition. See Developer resources.

Important:
Send the data at the rate that the time-series definition prescribes. If you send the data at a different rate or for a different duration, you receive an error. Make sure to aggregate the data according to the time-series metric definition. Also, the MetricBase database only stores values of data type float.

MetricBase retention policy schedules

Specify how long MetricBase stores the time-series data in the MetricBase database.

To create, edit, or delete retention policy schedules, navigate to **MetricBase** > **Retention Policy Schedules**.

When creating a retention policy schedule, the following limitations apply:

- Maximum retention duration: 26 months (794 days)
- Maximum sampling period: 1 day
- Maximum data points (calculated as retention duration * sampling period): 160,000 data points

In addition, the retention duration must be a multiple of the sampling period.

MetricBase retention policies

Retain data in MetricBase according to retention policies.

Retention policies include multiple retention schedules with coarser granularity the longer that the data is kept. For example, the Coarse retention policy stores sampled data every:

- Hour for one week (7 Days per 1-hour period)
- Two hours for one month (31 days per 2-hour period)
- Day for 13 months (397 Days per 1-day period)

In this policy, the specified metric is measured every hour for the first 7 days. It is then measured every other hour for the next 31 days, and once a day for the next 397 days. MetricBase deletes data that is older than 435 days.

To see the list of all supported retention policies, navigate to **MetricBase** > **Retention Policies**.

MetricBase Retention Policies

Policy	Description
Coarse	This policy retains data for 1 week at 1-hour period, 1 month at 2-hour period, and 13 months at 1-day period.

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MetricBase Retention Policies (continued)

Policy	Description
	This policy is suitable for metrics that change less often or metrics that do not require high resolution, such as disk usage.
Dense	This policy retains data for 8 days at 1-minute period, 94 days at 10-minute period, and 13 months at 1-hour period. This policy is suitable for metrics that require higher resolution for longer terms.
High	This policy retains data for 1 week at 1-minute period, 1 month at 10-minute period, and 13 months at 1-hour period. This policy is suitable for metrics that require higher resolution for longer terms.
Medium	This policy retains data for 1 week at 10-minute period, 1 month at 30-minute period, and 13 months at 2-hour period. This policy is suitable for metrics that change less often such as job processing throughput.
Medium High	This policy retains data for 13 months at 1-hour period.
Operational Intelligence	Operational Intelligence (OI) policy retains data for 8 days at 1-minute period, 94 days at 10-minute period, and 13 months at 1-hour period.
Sparse	This policy retains data for 13 months at 1-day period.
Ultra Dense	This policy retains data for 1 day at 10-second period, 3 months at 1-minute period, and 1 year at 1-hour period.

Accessing MetricBase data

Access the time-series data that you sent to the MetricBase database in the way that is convenient to you.

You can access and visualize time-series data in the MetricBase database by using:

- Reporting application

  You can generate reports and graphs from the time-series data that is stored in the MetricBase database. For more information, see Create reports from MetricBase time-series data.

- Table lists using the `.list` command

  For more information, see View MetricBase data using the list command.

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- REST or JavaScript APIs

  For more information, see Retrieve MetricBase data using REST and JavaScript.

Access MetricBase data using the list command

Use the list command on a table in the MetricBase database to view time-series data. The data reveals the behavior of the entity that supplies the data.

Before you begin
Role required: admin

Procedure

1. On the MetricBase instance, in the **application navigator**, type `<table-name>.list`, and press the Enter key.
   <table-name> is the name of the table in the MetricBase database that contains the metric you want to view.
2. Click the menu icon ( ) above the metric column, and select **Time Series Chart**.
3. Change the **Time Span** and **Transform** fields to evaluate the data.
4. **Optional:** Adjust the data:

   a. Select one of the transforms: **Add**, **Multiply**, or **Divide**.

   b. In the **Value** field, enter the number to add, multiply, or divide the metric data by and click **Submit**.

   Note:
   The adjusted data is not saved in the MetricBase database.

Retrieving MetricBase data using REST and JavaScript

Use JavaScript or REST APIs to insert and retrieve time-series data from the MetricBase database and to run transforms on the data. The transformations enable you to visualize time-series data in a variety of ways.

For more information about MetricBase time-series data transformations, see MetricBase transforms.

Using REST

For information about the MetricBase REST APIs that return time-series data from the MetricBase database, see MetricBase Time Series API.

Using JavaScript

For information about the MetricBase JavaScript APIs that return time-series data from the MetricBase database, see:

- Client — Execute transforms on the MetricBase database and receive the results.
- Data — Return the object that contains the result of a transform.
- DataBuilder — Create a series of data points for a metric.
- Transformer — Manipulate time-series data to prepare the data for evaluation and analysis.

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- TransformPart — Specify details of the transform to be done.
- TransformResult — Return the object that contains the result of the transformation.

Experiment and get familiar with the JavaScript APIs by using the MetricBase Data Explorer that comes with the MetricBase Demo.

Detecting anomalies in MetricBase data using predictive models

MetricBase creates a model by training a representative sample of your time series data to determine the model parameters. The training process determines the model parameters that best fit your data, to distinguish normal data from anomalous data.

MetricBase supports the following model types:

- Probabilistic Exponentially Weighted Moving Average (PEWMA), a moving average algorithm that uses a probability factor to determine how it reacts to change in data
- Autoregressive Integrated Moving Average (ARIMA), a moving average algorithm that factors in previous errors and values
- Seasonal Trend decomposition using Loess (STL), a seasonal algorithm for decomposing time series data into seasonal and trend components
- Holt-Winters (HW), a seasonal algorithm that decomposes the trend and seasonal components to determine the level

Note:
MetricBase selects the most appropriate model type when you select *`Find Best Fit Model`* from the model class list.

After you have a model trained from your data, you can trigger flows when new data is significantly different than the trained data.

Create and train a predictive model

Use statistical models to determine significant anomalies in real-time using MetricBase triggers. You will need to train a model using representative data that has already been stored in MetricBase.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Models**.
2. Select **New**.
3. On the form, fill in the fields.

Model New Record form

Field	Description
Model name	Name of the model. The name can be any combination of alphanumeric characters. This model name is not the same as the model class. In general, the name relates to the value in **Group by**.
Table name	Name of the table that contains the training data.

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Field	Description
Metric	Name of the metric that you use to train the model. The metric must belong to the table.
Created	Date that you trained the model.
Filter	Filters that you use to exclude some of the data in the dataset. **Note:** When choosing data to train your model, try to select data that demonstrates an expected behavior to reduce anomalies in the training set.
Group by	You can use **Group by** as a discriminator field for your model data. For example, if you want to create a data model over a group of production servers whose performance differs by role (such as database or application server roles) then you would choose role as the **Group by** field. The training process creates one model per role in the group of records selected by the filter. You do not have to manually create a model for each role.
Model Class	The algorithm to use when training data. Select a moving average algorithm (PEWMA, ARIMA), a seasonal algorithm (STL, HW), or choose **Find Best Fit Model**. The default is **Find Best Fit Model**, which tries each algorithm and selects the one which appears to have the best fit over the training set.
Training Dataset Start Date	MetricBase time series data for the metric starting with this date.
Training Dataset End Date	MetricBase time series data for the metric ending with this date.
Valid until	Date that serves as a reminder to consider retraining the model. If the model is performing well, there's no need to retrain it. The model can continue working past this date.
Active	Option to use the trained model. Once the model is active it becomes available for use as a Workflow Studio trigger.

4. Click **Submit and Train**.
   MetricBase trains the model. When complete, the model appears on the **MetricBase Model Instances** tab.
5. Click the model name.
   The modeling data appears as does the model string with the parameters optimized by the training.

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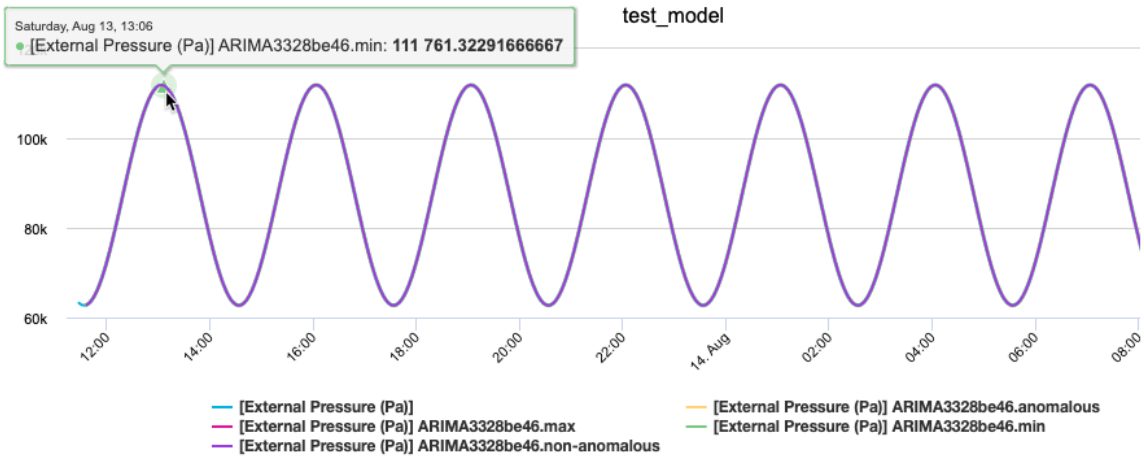

6. **Optional:** Click the model name and then click **Set Model** to change the model parameters. You can edit the model parameters when you want to override the settings for training your model. The graph does not update, you are saving the revised model string.

What to do next

You can create a Workflow Studio trigger for this model. For more information, see Create a model trigger.

Triggering flows using MetricBase data

Time-series data that is stored in the MetricBase database can trigger Workflow Studio flows. These triggers can log incidents, send emails, and create other alerts.

Overview of implementing triggers

A trigger definition is a set of conditions that automatically executes a Workflow Studio flow. When you create a trigger definition in MetricBase and associate it with a flow, the trigger definition transfers from your instance to the MetricBase server. After you activate the trigger and flow, MetricBase monitors time-series data in the MetricBase database. When time-series data matches the initial triggering condition, and then transitions from one condition to the next, a transition trigger is generated and added to the queue. The instance polls the queue, processes the transition trigger, and then executes the Workflow Studio flow.

For more information about time-series policies, see Create a time-series definition in MetricBase.

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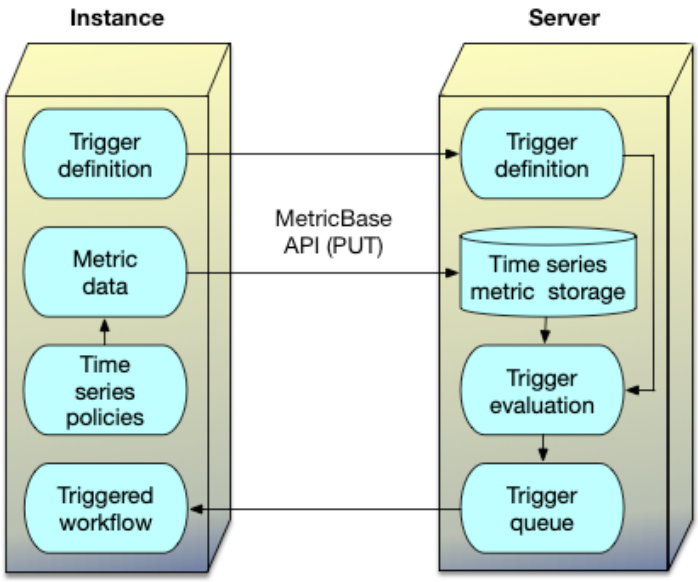
Trigger workflow



1. Define one or more triggers on an instance.

   Create a MetricBase band trigger

   Triggers when a metric value falls within a range of values.

   Create a MetricBase linear predictor trigger

   Triggers when a series of values trend toward and are expected to reach a specified value.

   Create a MetricBase gap trigger

   Triggers when values are not received for a specified period.

   Create a MetricBase model trigger

   Triggers when a trained model detects anomalous behavior.

2. Execute triggers conditionally

   Create a trigger condition to add additional requirements for a trigger to execute a flow. For example, data often fluctuates over time. Small fluctuations can cause unwanted, duplicate triggering events. A Condition Script can prevent that erroneous duplication.

3. Assign a trigger to a flow

   Associate the trigger with the flow it executes using Workflow Studio.

4. Test the trigger and workflow.
5. Activate the trigger.

Deleting triggers

If a trigger is associated with a flow, you can't delete it in MetricBase. To delete a trigger, you must first delete the flow in Workflow Studio and then you can delete the trigger in MetricBase.

Legacy triggers

Legacy triggers are deprecated. You can't create legacy triggers; you can only carry forward legacy triggers that exist.

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Create a MetricBase band trigger

Create a MetricBase band trigger that detects when a metric value falls within a range of values.

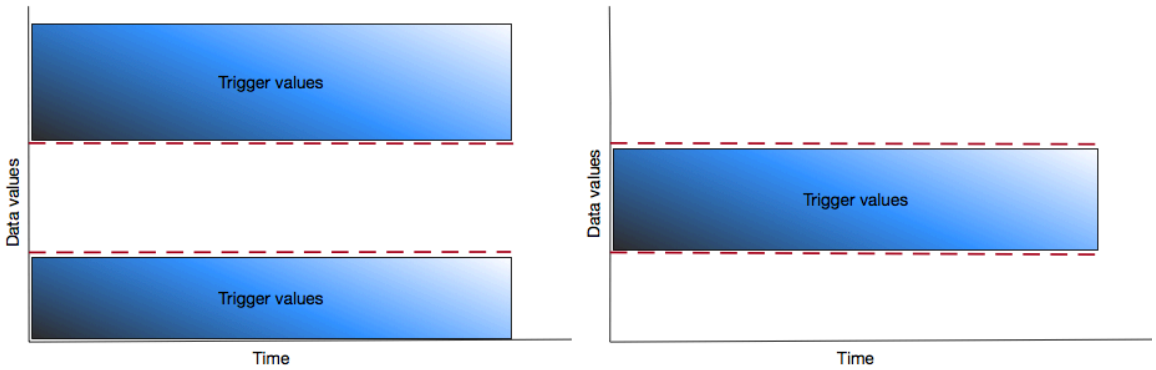
Before you begin

Role required: admin

About this task

Band triggers execute when metrics fall outside of or within a range of values.

Band trigger values



Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Triggers** > **Trigger Definitions**.
2. Select **New**.
3. On the **MetricBase** Trigger Creation form, select the **Band Trigger** option.
4. On the form, fill in the fields.
   The trigger levels are not initially visible on this form. You configure the levels later.

MetricBase Band Trigger form

Field	Description
Name	Name of the band trigger.
Table name	Table in the MetricBase database that contains the metric that you want to monitor. The only tables that appear when you click the search icon are the tables that you specified in the time-series metrics. If you select a metric before you select a table, only tables that have that metric appear in the **Table name** dialog box.
Metric	Table metric that you want to monitor that is specified by the **Table name**. The only metrics that appear when you click the search icon are the metrics in that table. If you select a metric before you specify a **Table name**, the metrics in all your time-series metrics appear. After you select a

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Field	Description
	metric, only the tables that contain that metric appear when you click the search icon that is next to the **Table name**.
Active	Option to activate the trigger.
Description	Description of the trigger.
Aggregator	Aggregation value that you select: **None**, **Max**, **Min**, or **Average**. **None** means that you use the last value in the collection period.
Window	Length of time used to calculate the aggregation function. For example, assume the **Window** is 1 hour and the aggregator is **Min**, and a new data point is added to the series. The system calculates the new minimum using the new data window (the last hour of data including the new data point). The new minimum is compared to the different trigger levels to determine whether to execute the trigger.

5. Select **Save**.
   A new record is created.
6. In the MetricBase Band Trigger Levels section on the record you just created, double-click each cell to add values that specify trigger parameters.

MetricBase Band Trigger Levels

Field	Description
Level	Numbers that indicate increasing severity. For example, you might define the altitude for level 1 to be less than 50 meters, but above 25 meters, and the altitude for level 2 to be less than or equal to 25. Each level should trigger a different flow. **Level** is often used in Condition Scripts. See Execute triggers conditionally.
Function	Function that makes the **Value** the maximum or minimum of the lower end of the band. Therefore, the function defines whether trigger values are inside or outside of the band. For example, if the **Function** is **Less than**, the trigger executes when the metric goes below the band value.
Value	Lower end of the band. See the following image.
Band Function	Function that makes the **Band Value** the maximum or minimum value of the upper end of the band. Therefore, the band function defines whether trigger values are inside or outside of the band. For example, if the

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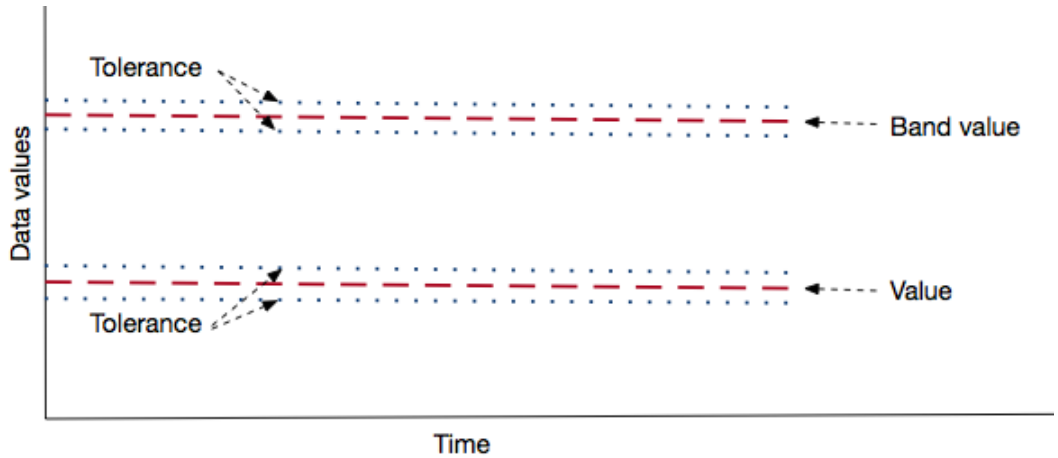
Field	Description
	Band Function is **Greater than**, the trigger executes when the metric goes above the band value. See the following image.
Band Value	Upper end of the band. See the following image.
Tolerance	Sets tolerance margins around the **Value** and **Band Value** to prevent repeatedly executing a trigger for small fluctuations in the data. After a trigger executes, the data must exceed the tolerance to execute the trigger again. See the following image.



For example, assume the **Function** is **Greater than**, the **Value** is 25, and the **Band Value** is 50.

- If the **Tolerance** is 0, the trigger executes for all values that are less than 50 and greater than 25.
- If the **Tolerance** is 5, the ranges are 50 ± 5 (45-55) and 25 ± 5 (20-30).
- If the last two data points in order were 51 and 49, the trigger executes because 49 is below the **Band Value**.
- If the next two data points in order are 51 and 49, the trigger doesn't execute again because the values are within the tolerance range since the last trigger execution.

7. Add one or more rows to the table to create multi-layered triggering behavior.

   Note:
   You must define at least two levels in a band trigger so that there are levels to transition between.

   Typically, each additional row (level) indicates a more severe condition. The Workflow Studio flow associated with the level should warn with increasing severity.

8. Select **Update**.
9. **Optional:** Add a triggering condition that determines whether a trigger executes a Workflow Studio flow.
   See Execute triggers conditionally.

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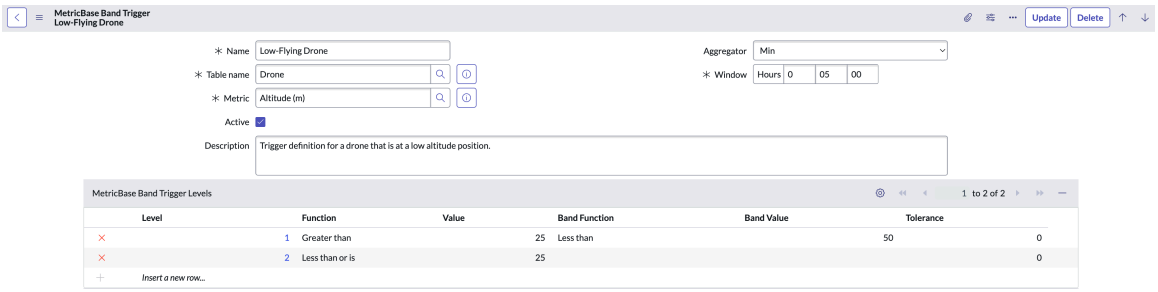
Example: Band Trigger form



What to do next

Associate this trigger with a Workflow Studio flow. For more information, see Assign a trigger to a flow.

Create a MetricBase linear predictor trigger

Create a MetricBase linear predictor trigger to detect when a metric is likely to cross a specified threshold within a specified period of time.

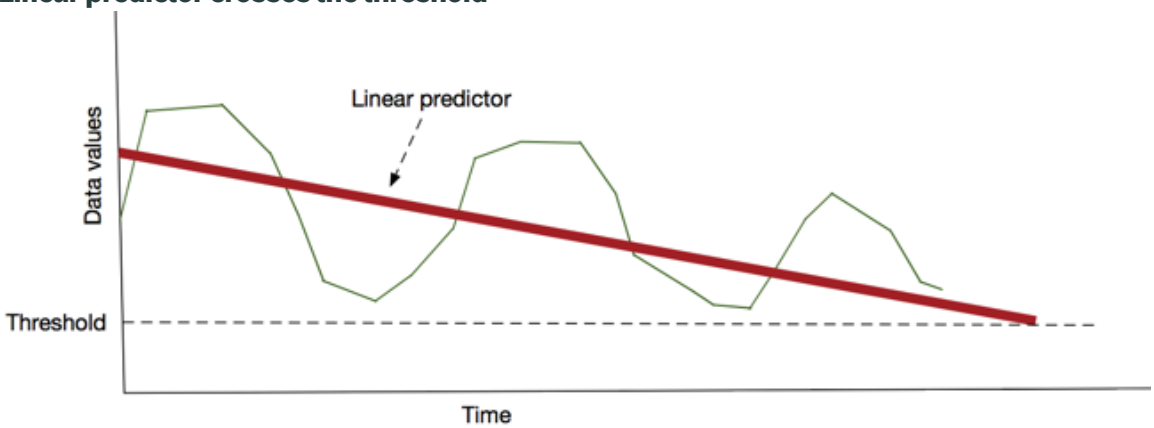
Before you begin

Role required: admin

About this task

The linear predictor trigger uses past data to generate a line that predicts future values. When MetricBase predicts that the linear value reaches a threshold, the trigger executes.

Linear predictor crosses the threshold



If the most recent data point reaches the threshold, the trigger executes regardless of the linear prediction.

Trigger parameters include how much past data to use in the calculation of the prediction, how far ahead to look, and the level of confidence that you accept.

Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Triggers** > **Trigger Definitions**.
2. Select **New**.
3. On the **MetricBase** Trigger Creation form, select the **Linear Predictor Trigger** option.
4. On the form, fill in the fields.
   The trigger levels are not initially visible on this form. You configure the levels later.

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MetricBase Linear Predictor Trigger form

Field	Description
Name	Name of the linear predictor trigger.
Table name	Table in the MetricBase database that contains the metric that you want to monitor. The only tables that appear when you click the search icon are the tables that you specified in the time-series metrics. If you select a metric before you select a table, only tables that have that metric appear in the **Table name** dialog box.
Metric	Table metric that you want to monitor that is specified by the **Table name**. The only metrics that appear when you click the search icon are the metrics in that table. If you select a metric before you specify a **Table name**, the metrics in all your time-series metrics appear. After you select a metric, only the tables that contain that metric appear when you click the search icon that is next to the **Table name**.
Active	Option to activate the trigger.
Window	Length of time used to calculate the line that predicts the future course of the value. For example, you might want to use the last 10 minutes of data to calculate the linear predictor. If the value is too long, the line does not reflect current trends. If the value is too short, the line might follow the raw values too closely and not accurately reflect the overall trend of the values. The value must be at least 10 times the sampling period that is defined by the sampling rate of your **Metric**. **Warning:** Do not confuse this value with the **Window** value in the trigger level. That value specifies how far into the future that you want the linear predictor to look to see if the **Metric** is likely to cross the **Threshold**.
Confidence Level (%)	A measure of how closely the real data fits the linear prediction of the data. A confidence level of 95% means that the real value must be within 5% of the predicted value to execute a trigger. If you only want to trigger when the real values are close to the predicted values, choose a high confidence percentage. If you are willing to accept real data that varies more significantly from the predicted values as being valid, select a lower confidence level, for example, 80%.
Trend	Direction of the trend: upward or downward. For example, the value is increasing or decreasing toward the **Threshold**.
Threshold	Target value that the metric is expected to reach before the trigger executes.
Description	Description of the trigger.

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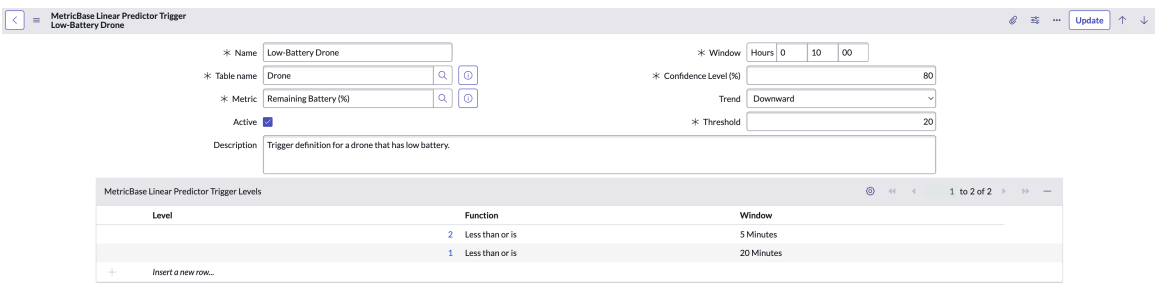
5. Select **Save**.
   A new record is created.
6. In the MetricBase Linear Predictor Trigger Levels section on the record you just created, double-click each cell to add values that specify trigger parameters.

MetricBase Linear Predictor Trigger Levels

Field	Description
Level	Numbers that indicate increasing severity. Each level should trigger a different flow. For example, you might define the following: **Level 1** Battery is predicted to reach 20% in 30 minutes. **Level 2** Battery is predicted to reach 20% in 5 minutes. **Level** is often used in Condition Scripts. See Execute triggers conditionally.
Function	Comparative function to use on the threshold value. **Less than or is** is the only available option. For example, battery life **Less than or is** 30 minutes.
Window	How far into the future that you want the linear predictor to look to see if the metric is predicted to cross the threshold. **Warning:** Do not confuse this value with the **Window** value in the trigger definition form. That value specifies how much data to use (measured in time) to calculate the slope of the predictor line.

7. **Optional:** Add rows to the table to create multi-layered triggering behavior.
   Typically, each additional row (level) indicates a more severe condition. The Workflow Studio flow associated with the level should warn with increasing severity.
8. Select **Update**.
9. **Optional:** Add a triggering condition that determines whether a trigger executes a Workflow Studio flow.
   See Execute triggers conditionally.

Example: Linear Predictor form



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What to do next
Associate this trigger with a Workflow Studio flow. For more information, see Assign a trigger to a flow.

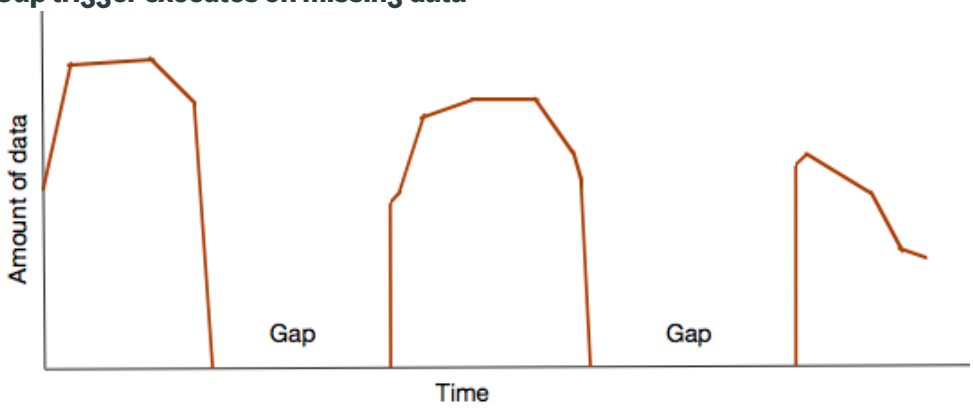
Create a MetricBase gap trigger

Create a MetricBase gap trigger to alert you when MetricBase stops receiving data.

Before you begin
Role required: admin

About this task
Gap triggers execute when MetricBase stops receiving data for a specified period.

Gap trigger executes on missing data



You can define multiple trigger levels to indicate different severities. For example, you can set a gap of 10 minutes as level 1, a gap of 20 minutes as level 2, and so on. Each level should trigger a different Workflow Studio flow. The difference between gap durations on different levels must be at least 10 minutes. For example, if you set level 1 to a gap of 10 minutes, you must set level 2 to a gap of 20 minutes or more.

Note:
If you make the gap durations between levels less than 10 minutes, MetricBase displays an error message and deletes the level that you added.

Polling frequency is calculated using the difference between gap durations on different levels and dividing by 2 (rounded down). For example, given the following:

- Level 1 triggers after 5 minutes of missing data
- Level 2 triggers after 30 minutes of missing data

The polling frequency is 12 minutes, because Floor((30-5)/2) = 12 minutes.

The maximum polling frequency is every 5 minutes, and the minimum frequency is every 30 minutes. If a trigger has only one level, the polling frequency is 30 minutes.

MetricBase searches through the data that is stored in the MetricBase database, not through incoming data. Therefore, a gap trigger might execute after the gap when data is missing. For example, if MetricBase polls every 10 minutes and the gap is 30 minutes of missing data, the trigger might execute as late as 40 minutes after the data was last received.

Procedure

1. Navigate to **All** > **MetricBase** > *Workflow Studio* > **Trigger Definitions**.
2. Select **New**.

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3. On the **MetricBase** Trigger Creation form, select the **Gap Trigger** option.
4. On the form, fill in the fields.
   The trigger levels are not initially visible on this form. You configure the levels later.

MetricBase Gap Trigger form

Field	Description
Name	Name of the trigger.
Table name	Table in the MetricBase database that contains the metric that you want to monitor. The only tables that appear when you click the search icon are the tables that you specified in the time-series metrics. If you select a metric before you select a table, only tables that have that metric appear in the **Table name** dialog box.
Active	Option to activate the trigger.
Metric	Table metric that you want to monitor that is specified by the **Table name**. The only metrics that appear when you click the search icon are the metrics in that table. If you select a metric before you specify a **Table name**, the metrics in all your time-series metrics appear. After you select a metric, only the tables that contain that metric appear when you click the search icon that is next to the **Table name**.
Description	Description of the trigger.

5. Select **Save**.
   A new record is created.
6. In the MetricBase Gap Trigger Levels area on the record you just created, double-click each cell to add values that specify trigger parameters.

Field	Description
Level	Numbers that indicate increasing severity. For example, you might define level 1 to be no data for 10 minutes. Level 2 might be no data for 20 minutes. Each level should trigger a different flow. **Level** is often used in Condition Scripts. See Execute triggers conditionally.
Function	Function, **Greater than or is**, which means that this trigger executes when the gap in received data is greater than the value that you specify in the **Window** field. There is only one option for the function, and it cannot be left empty or MetricBase displays an error message.
Window	Length of time that no data has been received that executes the trigger. The format is hours:minutes:seconds. For example, 00:20:00 means that this trigger executes after 20 minutes of missing data.

7. **Optional:** Add rows to the table to create multi-layered triggering behavior.

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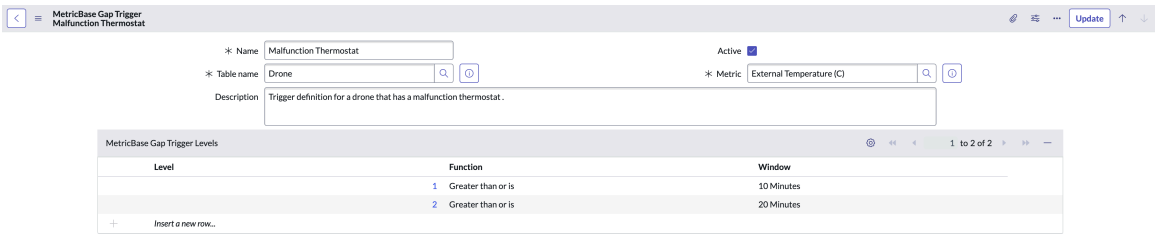
Typically, each additional row (level) indicates a more severe condition. The Workflow Studio flow associated with the level should warn with increasing severity.

8. Select **Update**.
9. **Optional:** Add a triggering condition that determines whether a trigger executes a Workflow Studio flow.
   See Execute triggers conditionally.

Example: Gap Trigger form



What to do next

Associate this trigger with a Workflow Studio flow. For more information, see Assign a trigger to a flow.

Create a MetricBase model trigger

Model triggers execute when the time-series data deviates from expected values.

Before you begin

Role required: admin

About this task

There are four model types supported: autoregressive integrated moving average (ARIMA), probabilistic exponentially weighted moving average (PEWMA), Holt-Winters, and seasonal trend decomposition using Loess (STL).#MetricBase #uses the model to create a definition of expected, normal values.

Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Triggers** > **Trigger Definitions**.
2. Select **New**.
3. On the **MetricBase** Trigger Creation form, select the **Model Trigger** option.
4. On the form, fill in the fields.

   The trigger levels are not initially visible on this form. You configure the levels later.

Field	Description
Name	Name the model trigger.
Model	Trained model this trigger uses. See Create and train a predictive model.
Metric	Table metric that you want to monitor. This value is set automatically based on the model, which means you cannot set it yourself.

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Field	Description
Table name	Table in the#MetricBase #database that contains the metric that you want to monitor. This value is set automatically based on the model, which means you cannot set it yourself.
Active	Option to activate the trigger.
Description	Description of the trigger.
Spike Direction	Specify whether you want to trigger only on anomalies that occur above predicted values (upward), below predicted values (downward), or both (either).

5. Select **Save**.
   A new record is created.
6. In the MetricBase Model Trigger Levels area on the record you just created, double-click each cell to add values that specify trigger parameters.

Column	Description
Level	Numbers that indicate increasing severity. For example, you might define level 1 to be 2 standard deviations from the mean. Level 2 might be 4 standard deviations. Each level should trigger a different Workflow Studio flow. **Level** is often used in Condition Scripts. See Execute triggers conditionally.
Function	Always **Greater than or is**, meaning that in order to trigger, the time-series metric must be greater than or equal to the number of standard deviations from the mean specified in **Number of Standard Deviations**.
Number of Standard Deviation	Float value specifying the number of standard deviations the time-series metric must be away from the mean to trigger an alert at this level.

7. **Optional:** Add rows to the table to create multi-layered triggering behavior.
   Typically, each additional row (level) indicates a more severe condition. The Workflow Studio flow associated with the level should warn with increasing severity.
8. Select **Update**.
9. **Optional:** Add a triggering condition that determines whether a trigger executes a Workflow Studio flow.
   See Execute triggers conditionally.
10. Test your model and trigger on real data before deploying to production.

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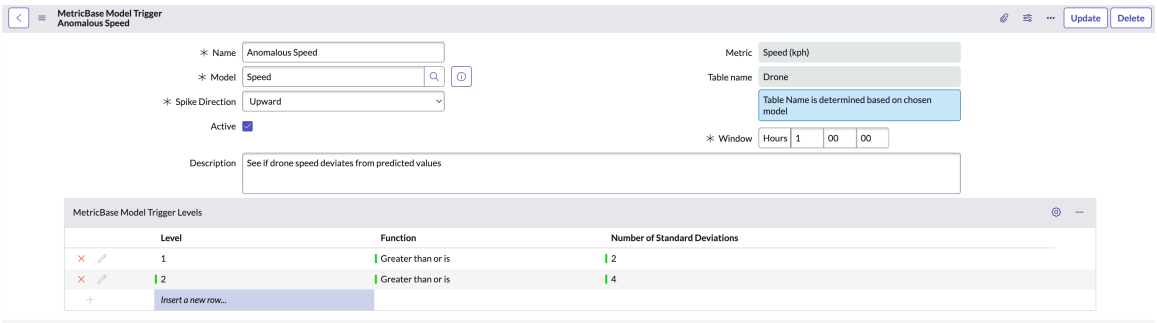
Example: Model Trigger form



What to do next

Associate this trigger with a Workflow Studio flow. For more information, see Assign a trigger to a flow.

Execute triggers conditionally

MetricBase triggers execute based on a single metric. Condition Scripts impose additional requirements that determine whether a trigger kicks off a flow.

Before you begin

Role required: admin

About this task

Condition Scripts execute when conditions for a trigger are met but before the trigger executes a Workflow Studio flow. In that way, Condition Scripts can prevent triggers from executing flows even when trigger conditions are met. For example, data often fluctuates over time. Small fluctuations can cause unwanted, duplicate triggering events. A Condition Script can prevent that erroneous duplication.

Condition scripts are sometimes also referred to as moderator scripts.

Condition Scripts always return `true` (trigger) or `false` (do not trigger). To learn how to write these scripts, see Scripting in ServiceNow Fundamentals. To experiment with scripts, see Get familiar with MetricBase APIs.

Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Triggers** > **Trigger Condition Script**.
2. Select **New**.
3. On the form, fill in the fields.

Field	Description
Name	Name for the Condition Script.
Application	Scope of the Condition Script. The value, **Global**, means that the action applies to all applications.
Description	Explanation of what the Condition Script does. When does it return True or False?
Script	Field to enter the JavaScript. Make it returns `true` to execute a flow.

4. Write the Condition Script.

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When writing a script, think about the conditional statements (what cases it should execute for and what cases it shouldn't). If all evaluate *true*, the script returns *true* and the flow executes, otherwise it does not. The following example script triggers a flow when a drone is traveling too fast at a low altitude (defined by level 1). The example shows a typical approach to writing a condition script.

a. Get the trigger definition, passed in as a filter function parameter.

b. Get the record (*current*) that is causing the triggering event, passed in as a filter function parameter.

c. Get the time from the record that the trigger conditions were satisfied, passed in as a filter function parameter.

d. Get the trigger level, passed in as a filter function parameter.

e. Use these parameters to return *true* if the level 1 trigger conditions are met and *travel_state* equals traveling or speeding.

```
function filter(/*GlideRecord*/
 triggerDefinition, /*GlideRecord*/
 current, /*GlideDateTime*/ start, /*int*/ level) {
 // retrieve current travel state of drone
 var travel_state = String(current.travel_state);

 // the drone is traveling at a significant speed, and the
 altitude just went below the threshold
 if (((travel_state === 'traveling') || (travel_state ===
 'speeding')) && (level === 1)){
  return true; //process this trigger
 }

 return false; // don't process this trigger
}
```

Note:
Condition Scripts must execute quickly.

5. Select **Submit**.

What to do next

Use Workflow Studio to associate a flow with a trigger. When configuring a flow, you can select a Condition Script you created.

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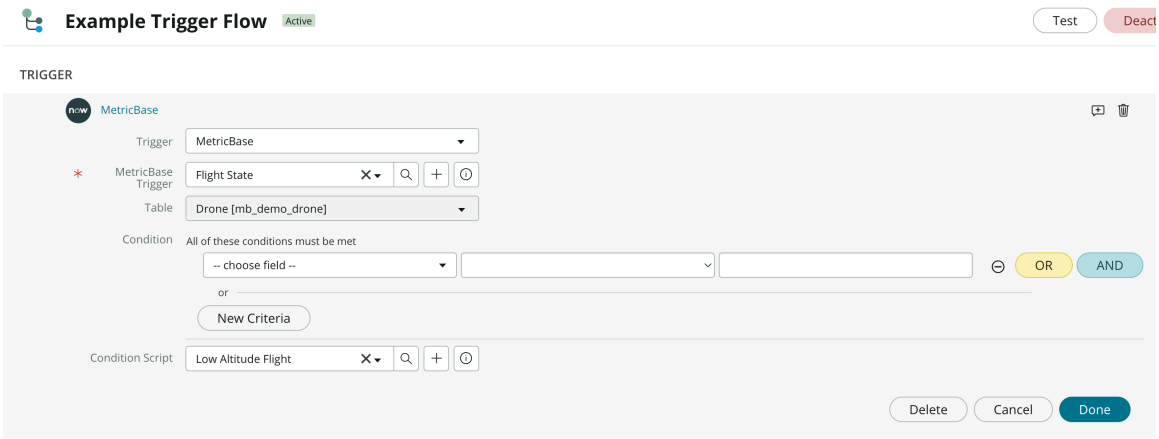
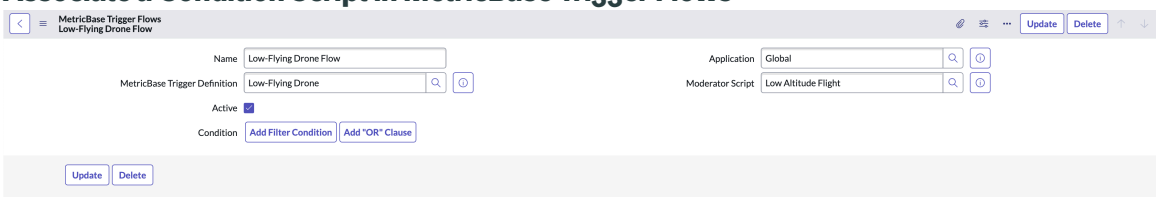
Add a Condition Script to a trigger definition in Workflow Studio



You can also associate a condition script with a trigger flow in the MetricBase Trigger Flows [sys_flow_metric_trigger] table. If you associate a condition script with a trigger flow here, it won't appear in Workflow Studio, but it will still execute with the trigger.

Associate a Condition Script in MetricBase Trigger Flows



Assign a trigger to a flow

Now that you created a trigger, use Workflow Studio to specify the flow a trigger executes. The flows can provide alerts for unexpected behavior.

Before you begin

Role required: admin

About this task

Triggers, by themselves, execute nothing. After defining a trigger in MetricBase, you use Workflow Studio to associate the trigger with a flow.

Procedure

1. Navigate to **All** > **MetricBase** > **Trigger Flows.**.
2. Select **New Flow**.
3. Fill in the fields.
4. Select **Submit**.
5. Select **Add a trigger** to specify the trigger that kicks off this flow.
6. In the dialog box that appears, scroll, and select MetricBase for the trigger type.
7. Under **TRIGGER**, fill in the form to define the trigger to associate with this flow.
   a. In the **MetricBase Trigger** list, select a trigger by either selecting the magnifying glass to select an existing trigger or selecting the plus sign (+) to define a new trigger.
   b. **Optional:** Add requirements for the flow to execute by adding filter conditions.

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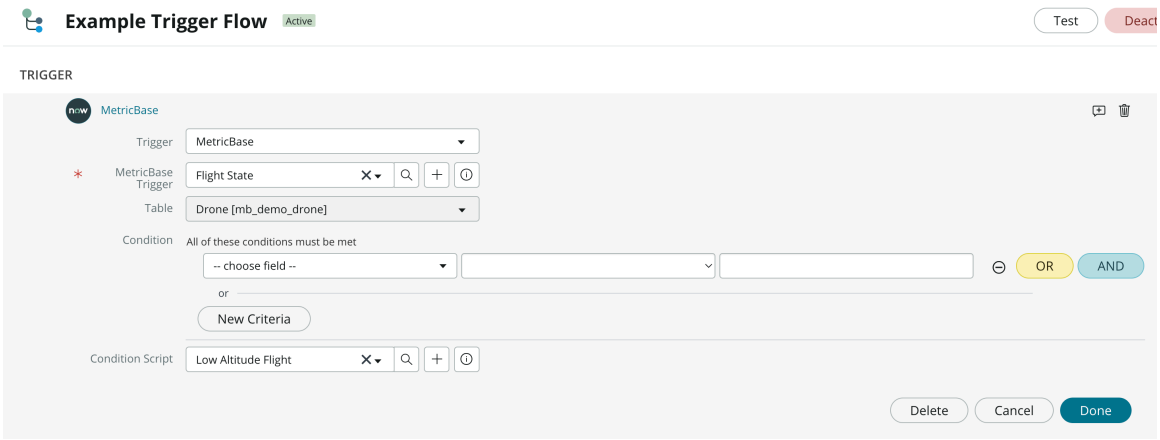
c. **Optional:** Beside **Condition Script**, select the magnifying glass to select a Condition Script or click the plus (+) to create a script.
Condition scripts add additional requirements for a trigger to execute a flow.

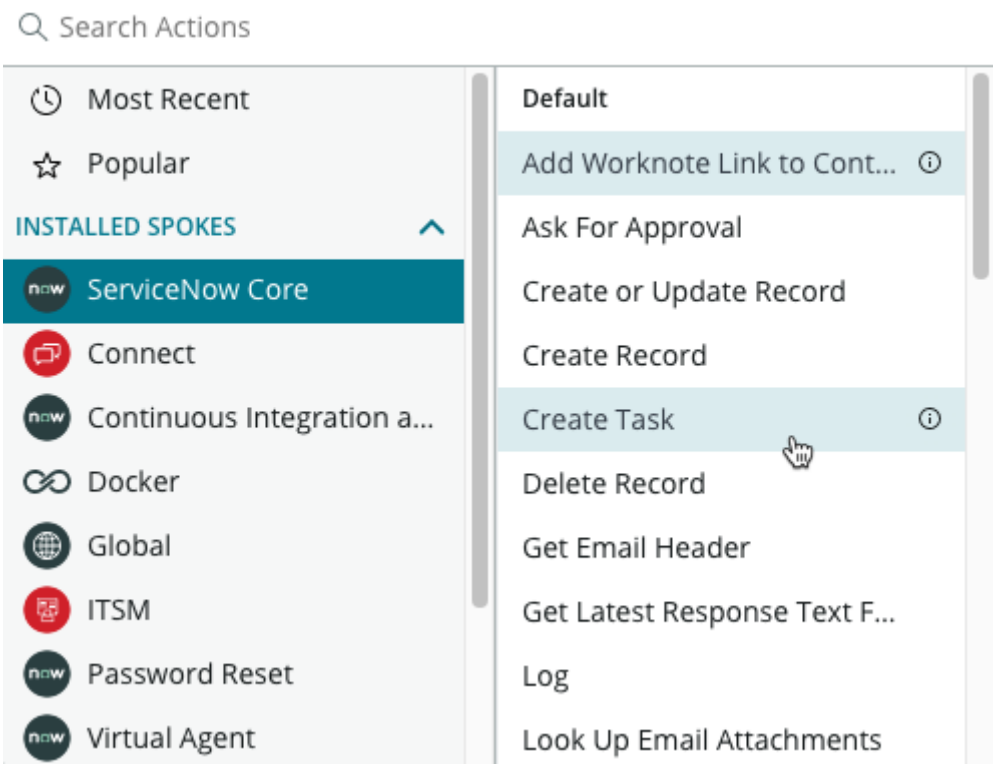


8. Under **ACTIONS**, select **Click to add an Action, Flow Logic, or Subflow**

   a. When selecting an action, select an action category in the first column of the dialog box, and a flow action in the second column.

   b. Create combinations of different actions, flow logics, and subflows to get the desired behavior.

   c. Select **Done** to complete each part of the flow action.



9. Select **Save**.

10. Test the flow.

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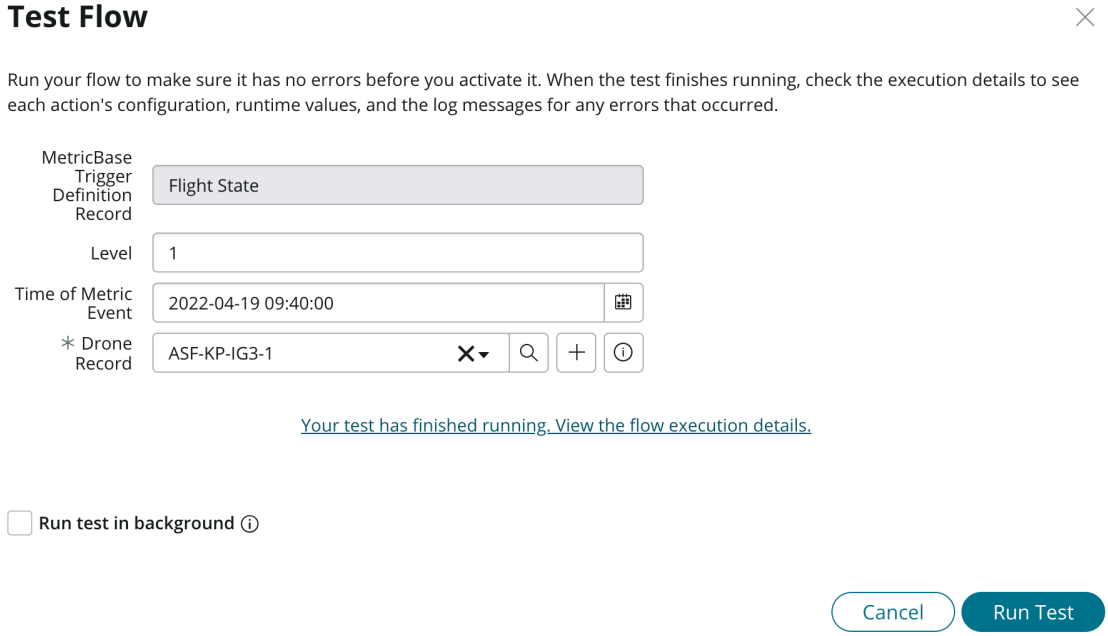
a. In the flow tab in Workflow Studio, select **Test**.

b. Select the trigger **Level** to test, provide the **time of metric event**, and what **record** is triggering.
Different triggers may execute different flows.



Note:
When you test a flow, the system does not execute the trigger, and therefore does not create a record. By selecting a record in the Test flow dialog box, the system acts as if that record was just created. For more information, see Test a flow.

c. Select **Submit**.
The test completes. Select the message to view the flow execution details. Edit the settings if necessary, save again, and then retest.

11. Select **Activate** to activate the trigger.
The flow does not execute unless you activate it.

View trigger logs

Trigger logs show different levels of trigger malfunctions.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Triggers** > **Trigger logs**.
2. Click one of the trigger logs.
3. Under **Related Links**, click **Show Log Entries**.
4. **Optional:** Change the default values in the **Enter parameters for log file entries to browse** form to select the log entries to view and click **Submit**.

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Managing MetricBase

View the overall health and performance of MetricBase, and debug its triggers and scripts.

Overview of managing MetricBase

View MetricBase database status

View the status and health of the connection to your MetricBase database.

Before you begin
Role required: clotho_admin

Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Health Dashboard**.
2. In the list, select **Health**.
3. View the status of the database connection.
   If the database is offline, contact Customer Service and Support.
4. Monitor the lag time between your instance and the database by viewing the **MetricBase Lag Statistics** value.
   If the lag time is reported in multiple seconds, contact Customer Service and Support.
5. **Optional:** Select **Refresh** to view the latest status.

View MetricBase data usage and efficiency

Monitor the usage and efficiency of your MetricBase time series data.

Before you begin
Role required: clotho_admin

Procedure

1. Navigate to **All** > **MetricBase** > **MetricBase Health Dashboard**.
2. In the list, select **Series**.
   The MetricBase Series Information page displays the Total Series Count, which is the total number of series registered in MetricBase.
3. Determine whether any series aren't being used by calculating the stale series ratio.
   This ratio is the percentage of series that haven't received a value within a specified number of days.
   a. Enter the number of days (greater than or equal to 1) in the **Staleness Time Period** field.
   b. Select the Refresh icon ( ).
   The closer the ratio is to 0%, the fewer unused series there are within the given time period. You determine your own threshold for an acceptable stale series ratio. To lower the ratio, adjust the metric's sampling schedule or remove unused metrics or series. For help with removing a stale series, contact Customer Service and Support.
4. Determine how efficiently your time series data is used by viewing the **Data Utilization Efficiency** value.
   The value is the percentage of data points per metric that have a non-null value. The closer this value is to 100%, the fewer null data points there are. To increase the efficiency, review each metric to ensure that data is being posted at a similar rate to the first schedule of its retention policy. See MetricBase retention policies for more information.

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5. Determine how often values are published to MetricBase by viewing the **Average Unutilized Data Gap** value.
   The gap value is the average number of entries between two non-null data points. To decrease the gap value, change the metric's schedule to publish data more often or update the metric's sampling period in its retention policy. See MetricBase retention policies.

View MetricBase statistics and metrics

You can view the status of the MetricBase database.

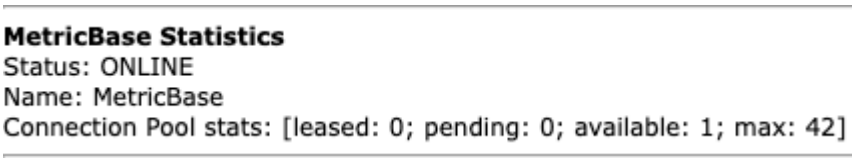
Before you begin
Role required: admin

Procedure

1. View the status of the MetricBase instance.

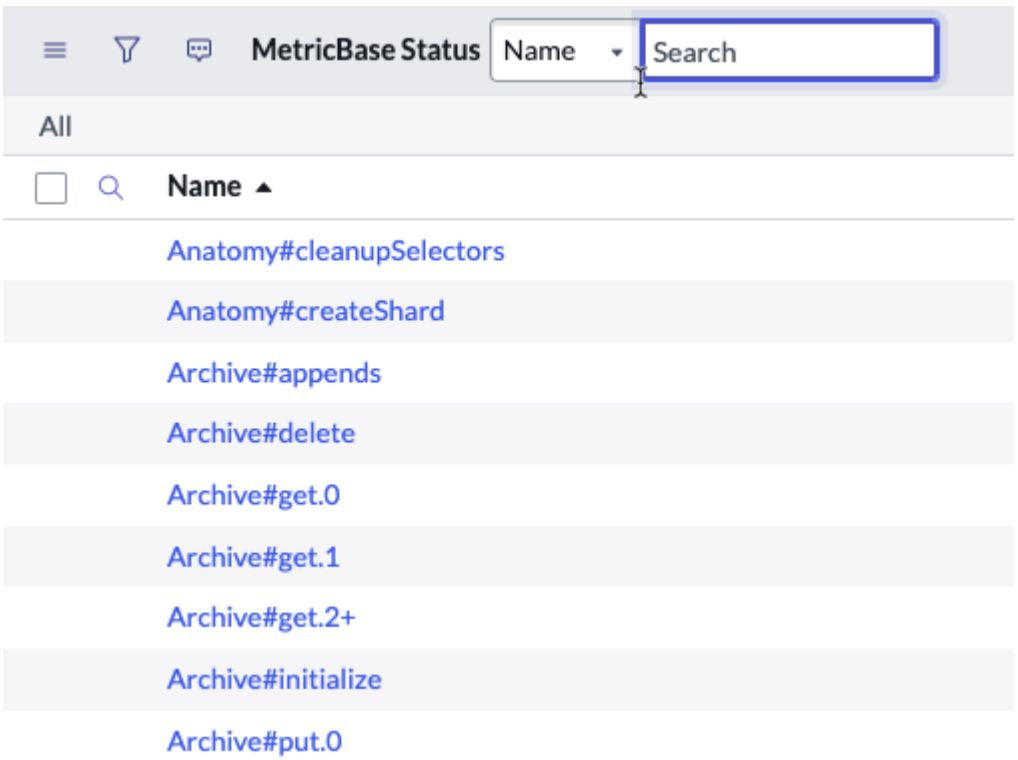
   a. Navigate to **System Diagnostics** > **Stats** > **Stats**.

   b. Scroll down to find **MetricBase Statistics**



2. View the metrics monitored by MetricBase and statistics about them.

   a. Click **MetricBase** > **MetricBase Status**
   The MetricBase Status page displays all of the metrics tracked in MB.



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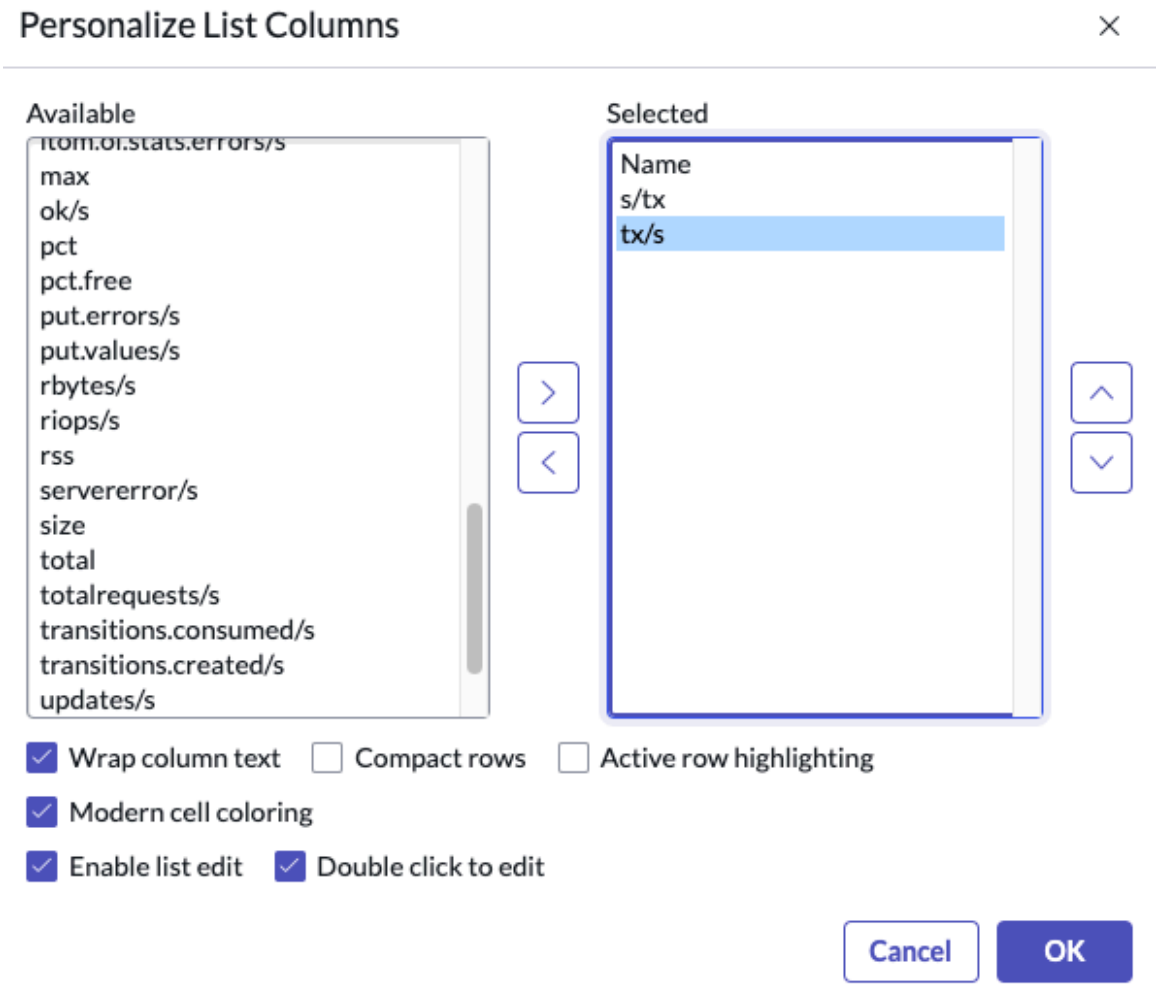
b. Click the gear icon.
The Personalize List Columns dialog box displays.



c. Select and move metrics from the **Available** column to the **Selected** column to display the metric and click **OK**.
The metrics display on the MetricBase Status page.

Name ▲	s/tx	tx/s
Anatomy#cleanupSelectors		0
Anatomy#createShard		0
Archive#appends		
Archive#delete		0
Archive#get.0	6.0E-5	0
Archive#get.1		0
Archive#get.2+		0
Archive#initialize		0

Debug MetricBase

You can display the results of debugging scripts in MetricBase.

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Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Diagnostics** > **Session Debug** > **Debug** *MetricBase*.
   When the page you are on submits queries to MetricBase, you see the transforms and how long they took on the bottom of the page. Submitting a lot of MetricBase queries may slow down the page load time significantly.
2. To view a history of the debug script's execution, click **available here**.
3. Click **Update**.
   Session debug tracking for MetricBase activities starts and the MetricBase Status page displays.

MetricBase reference

These reference topics provide additional information about MetricBase developer resources and domain separation.

Developer resources

Developers can use JavaScript or REST APIs to insert and retrieve time-series data from the MetricBase database and to run transforms on the data. The transformations enable you to visualize time-series data in a variety of ways.

REST APIs

For information about the MetricBase REST APIs that return time-series data from the MetricBase database, see MetricBase Time Series API.

JavaScript APIs

For information about the MetricBase JavaScript APIs that return time-series data from the MetricBase database, see:

- Client — Execute transforms on the MetricBase database and receive the results.
- Data — Return the object that contains the result of a transform.
- DataBuilder — Create a series of data points for a metric.
- Transformer — Manipulate time-series data to prepare the data for evaluation and analysis.
- TransformPart — Specify details of the transform to be done.
- TransformResult — Return the object that contains the result of the transformation.

Transformations

For more information about MetricBase time-series data transformations, see MetricBase transforms.

Data Explorer

Experiment and get familiar with the JavaScript APIs by using the MetricBase Data Explorer that comes with the MetricBase Demo.

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Domain separation and MetricBase

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

Support level: Basic

- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

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

Related topics

Domain separation for service providers

MetricBase roles

MetricBase is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

MetricBase administrator [clotho_admin]

Administrative role for time series-related functionality.

Contains Roles

List of roles contained within the role.

- flow_designer
- clotho_rest_accumulate
- clotho_rest_put

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

MetricBase plus reader [mbplus_reader]

Lets users query MetricBase plus data.

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Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

MetricBase plus writer [mbplus_writer]

Lets user modify tables in MetricBase plus.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

MetricBase REST accumulate [clotho_rest_accumulate]

MetricBase REST accumulate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

MetricBase REST put [clotho_rest_put]

MetricBase REST PUT role.

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Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

MID Server

The Management, Instrumentation, and Discovery (MID) Server is a Java application that runs as a Windows service or UNIX daemon on a server in your local network. The ServiceNow® MID Server enables communication and the movement of data between a ServiceNow instance and external applications, data sources, and services.

MID Server overview

Explore Learn about MID Server deployment and uses.	Configure Prepare your network, then install and configure MID Servers.
Secure Secure and encrypt your MID Server's data.	Reference Get information about MID Server upgrades, issues, system requirements, and properties.

Exploring MID Server

MID Server acts as the mediator between the network and the instance. MID Servers are used by other applications to connect to the instance.

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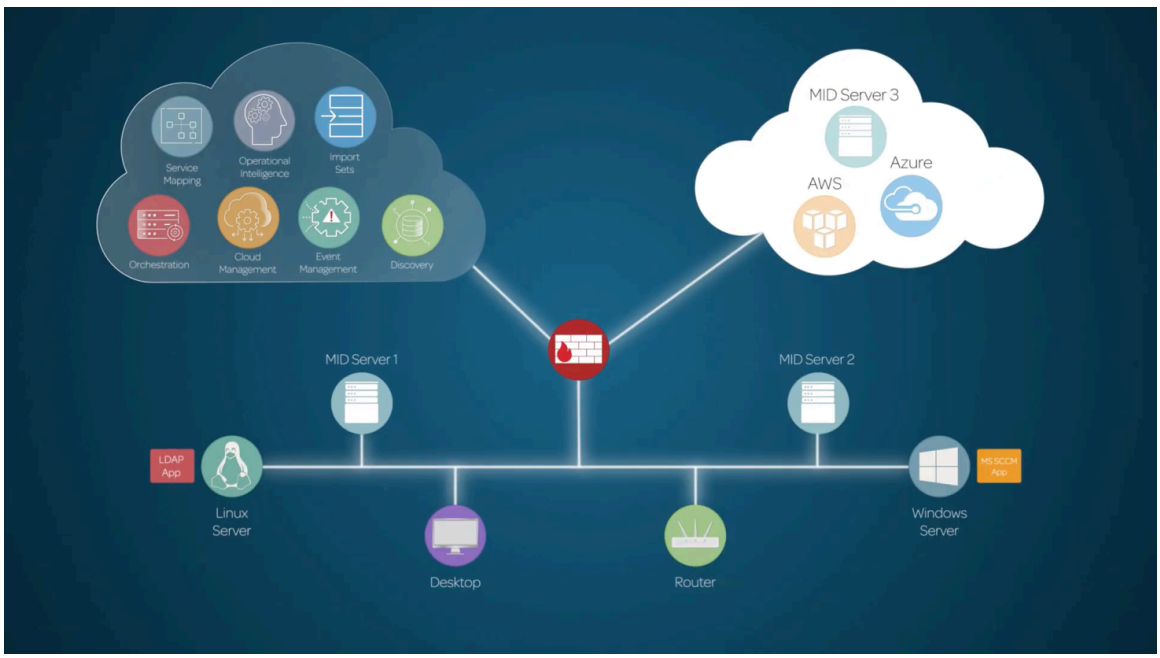
MID Server overview

MID Servers are installed on hosts in a network by administrators, and the MID Servers are used by other applications to communicate with the instance or function within the network. For example, a MID Server configured with Discovery scans items in the network from that MID Server host. Once it collects the Discovery data, the MID Server securely transfers the data through the network firewall to the instance.

To set up a MID Server, the network must be prepared to access the instance and download site. There are several installation procedures depending on the host operating system and scale of deployment. Once installed, MID Servers can be configured with many capabilities and features to support applications.

After configuring your MID Server, you can add security by encrypting MID Server parameter values in the `config.xml` file. Encryption protects data that the MID Server returns to the ECC Queue. Other available security options include the authorization of SOAP requests, restricting access to the MID Server configuration file, and establishing secure socket layer (SSL) connections.



Upgrading the MID Server

The MID Server checks with the instance periodically to see if an upgrade is necessary. If the MID Server detects that a new version is available for upgrade, it downloads the installer from `install.service-now.com` and runs the package automatically. You can also elect to upgrade the MID Server manually. See MID Server upgrades for details.

Resolving MID Server issues

You can search the HI Knowledge Base for troubleshooting articles or monitor the MID Server status and track active issues from within the instance. Many articles on resolved MID Server issues have been collected on Servicenow MID Server Landing page [KB0960404]. For more information about common resolution procedures, see Resolving MID Server issues.

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ServiceNow applications that use the MID Server

- Discovery
- Orchestration
- Service Mapping
- Event Management
- Operational Intelligence
- Cloud Management
- IntegrationHub
- Cloud Cost Management
- Agent Client Collector

External applications that use the MID Server

- Import Sets
- Microsoft SMS/SCCM
- LANDesk Maintenance Suite
- Microsoft System Center Operations Manager (SCOM)
- Microsoft MIIS

Begin MID Server installation

Continue to Configuring MID Server to find procedures on preparing the network, installing MID Servers, and configuring them.

Configuring MID Server

Before MID Server installation can begin, the network must be prepared to access the instance and download site. There are several installation procedures depending on the host operating system and scale of deployment. Once installed, MID Servers can be configured with many capabilities and features.

Prepare network connections for MID Servers

Before you install the MID Server, perform the necessary prerequisites that it needs to connect to elements inside and outside your network. This includes network privileges and security considerations.

Security considerations

Sometimes computers or devices have additional security measures configured, and these measures may interfere with the MID Server's ability to run commands or queries on those systems.

For example, a Linux server might be configured to allow only certain IP address to connect to it via SSH. Similarly, a network router might be configured to allow only certain IP address to query SNMP on it. To allow access in such cases, use one of the following methods:

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- Update the configuration of those computers or devices to allow the desired MID Server to run commands or query them. For example, a network router may be configured to only allow the network management systems to query SNMP on it. In that case, add the MID Server as though it were another network management system.
- Install a MID Server on a computer that already has access to the computers or network devices with such restrictions. For example, to use Discovery within a DMZ (where communication from outside the DMZ will be severely restricted), install a MID Server on a computer that is already in the DMZ.

Credential spray

The MID Server uses its host's Windows Server Message Block (SMB) client and configuration to connect to other Windows machines. If Windows is configured to use legacy protocols, the connection is vulnerable to man-in-the-middle attacks that can result in weak password disclosure and remote code execution.

Use the following host configuration to limit the impact of an attacker with a man-in-the-middle vantage point:

- Ensure that SMB Signing is configured to be **Required** on the client MID Server to limit potential attacks on the integrity.
- Ensure that SMB Signing is required by all SMB servers within the environment.
- Use strong passwords to limit offline dictionary attacks if the host machine must support legacy authentication protocols such as NetNTLM.
- Use a unique account for each relevant host to limit the impact of compromised credentials on the end systems.

External connectivity requirements

These requirements are specifically for the use of MID Servers with the ServiceNow® Discovery and Orchestration products.

The MID Server communicates securely on port 443 to the instance and requires no inbound connections. In some cases, it might be necessary to allow this communication through the firewall if the MID Server fails to register on the instance. To determine if the application or a network security restriction is to blame for connection failure, attempt to telnet to the instance on port 443 from the server that is hosting the MID Server application. If this connection fails, then the problem could be a web proxy (since 443 is an https connection) or a Firewall rule preventing external TCP connections from that host. Contact network security personnel for the proxy information to add to the config.xml file, or request that the firewall be configured to allow access using one of the following syntaxes:

- `<source IP> to <any>`
- `<source IP> to <ServiceNow> any established`
- `<source IP> to <instance_name.service-now.com> 443`

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Important:
The MID Server host computer must have access to the ServiceNow download site at `install.service-now.com` to upgrade automatically. If you have a self-hosted ServiceNow environment that blocks access to the download site, you must import the MID Server installer package into your MID Server hosts manually. For instructions, see KB0760123 in the Self-Hosted knowledge base.

Internal connectivity requirements

These methods are used for discovering various devices on a network and are specifically for the use of MID Servers with the Discovery and Orchestration products.

- **SSH**: For UNIX-like machines, Discovery and Orchestration use SSH protocol, version 2 to access target machines. SSH is a network protocol that allows data to be exchanged using a secure channel between two networked devices. SSH communicates on port 22 within an encrypted datastream and requires a login to access the targets using two available methods of authentication: a user name and password combination and a user name and shared private key. Specify SSH authentication information and type in the **Credentials** module. If multiple credentials are entered, the platform tries one after the other until a successful connection is established or all are ultimately denied. To provide for application relationships a limited number of SUDO commands must be available to be run. Additional details to these requirements can be found in UNIX/Linux commands requiring root privileges for Discovery and Orchestration.
- **WMI**: For Windows machines, Discovery uses the Windows Management Instrumentation (WMI) interface to query devices. Due to security restrictions for WMI, the MID Server application executing the WMI queries must run as a domain user with local (target) administrator privileges. When Discovery detects activity on port 135, it launches a WMI query. The response from the Windows device is sent over a Distributed Component Object Model (DCOM) port configured for WMI on Windows machines. This can be any port. Ensure that the MID Server application host machine has access to the targets on all ports due to the unique nature of the WMI requirements.
- **Windows PowerShell**: PowerShell is built on the Windows .NET Framework and is designed to control and automate the administration of Windows machines and applications. Orchestration uses PowerShell to run Workflow activities on Windows machines. PowerShell must be installed on any MID Server that executes these activities. MID Servers using PowerShell must be installed on a supported Windows operating system. ServiceNow supports PowerShell 3.0 to 5.1. Orchestration activities for PowerShell require a credentials **Type** of Windows.
- **SNMP - Network**: For network devices, Discovery uses an SNMP scan to get device specific MIBs and OIDs. SNMP is a common protocol used on most routers, switches, printers, load balancers and various other network enabled devices. Use a community string (password) for authentication when scanning a device via SNMP. Many devices have a default community string of **public** which Discovery uses by default when querying a target. Define additional community strings in the SNMP credentials form which are tried in succession, along with **public**, until a successful query returns. In addition to the credentials, the platform also requires the ability to make SNMP requests on port 161 from the MID Server to the target. If Access Control Lists (ACLs) are in place to control the IP addresses that can make these queries, ensure that the IP address of the MID Server is in the ACL. Discovery supports SNMP versions 1, 2c, and 3.
- **WBEM:** Web-Based Enterprise Management (WBEM) defines a particular implementation of the Common Information Model (CIM), including protocols for discovering and accessing each CIM implementation. WBEM requires either of two ports, 5989 or 5988 and uses the HTTP transport protocol. WBEM supports SSL encryption and uses CIM user name/password credentials. Discovery launches a WBEM port probe to detect activity on the target ports and to append gathered data to a classification probe that explores CIM Servers.

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Configure MID Server network connectivity

Prepare the network for MID Servers to connect with the instance and access the download site. The network must be prepared before installing or configuring the MID Server. If computers or devices have additional security measures, that security may interfere with MID Servers on those systems.

Before you begin

Role required: admin

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Ensure that the MID Server can connect to elements inside and outside your network
3. Configure MID Server security
4. Configure your MID Server
5. Download and install the MID Server on a Linux or Windows host
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Make sure that the host machine meets the requirements specified in the MID Server system requirements.

About this task

The MID Server host computer must have access to the ServiceNow download site at `install.service-now.com` to upgrade automatically. If you have a self-hosted ServiceNow environment that blocks access to the download site, you must import the MID Server installer package into your MID Server hosts manually. For instructions, see KB0760123 in the Self-Hosted knowledge base.

Firewalls and proxy configurations may block calls to the OCSP Entrust and DigiCert servers, which prevents the MID Server from working. You may need to change your firewall permissions so that the OCSP traffic goes through. For more information and resolutions, see the HI Knowledge Base article [KB1216223].

The host machine must have these network privileges:

- Firewall access: Configure any firewalls between the MID Server and the target devices to allow a connection. If your network uses a DMZ, and if your network security protocols limit port access from within the network to the DMZ, you might have to deploy a MID Server to a machine within the DMZ to probe the devices there.
- Network access: Configure target devices to allow the MID Server probe to connect. If network security prevents you from configuring new machines that can connect to the targets, install the MID Server on an existing machine with connection privileges.
- Network account: Install the MID Server with the proper account, either local or domain administrator.

Additionally, for the MID Server to access your ServiceNow instance, satisfy these prerequisites:

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- Network access to the ServiceNow instance: Configure the network that the MID Server uses to allow traffic over TCP port 443.
- A MID user: Create a ServiceNow user record for the MID Server to use. This user record must have the mid_server and import_admin roles.

Note:
Verify that the baseline public page **InstanceInfo** is active for the MID Server to connect to the instance.

Procedure

1. Configure the network to allow MID Server network connectivity to the ServiceNow instance over TCP port 443.
2. Configure basic authentication for SOAP communications with the ServiceNow instance.
3. Navigate to **System Web Services** > **Scripted Web Services** > **Scripted SOAP Services**.
4. Confirm that the following web services are active:
   - GetMIDInfo
   - InstanceInfo
   - MIDAssignedPackages
   - MIDFieldForFileProvider
   - MIDFileSyncSnapshot
   - MIDServerCheck
   - MIDServerFileProvider
5. Type **sys_public.list** in the navigation search field and press **Enter**.
   The Public Pages record list appears.
6. Verify that the **InstanceInfo** public page is active, to allow the MID Server to validate its version.
7. Ensure that the MID Server host computer can access the download site at `install.service-now.com`.

What to do next

After the network is prepared, proceed to Installing the MID Server.

Installing the MID Server

Download and install the MID Server on the host machine, test the connection, and then validate the MID Server. Use the manual procedures or the guided setup. Set up multiple MID Servers for load balancing and domain separation. These procedures prepare it for use with any application.

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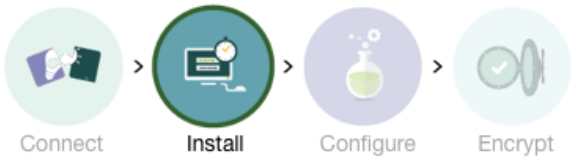

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Prerequisites: Ensure the MID Server system requirements and MID Server connection prerequisites are met before you install the MID Server manually or use the guided setup utility.

MID Server manual installation

The manual process requires these setup tasks, performed in the order shown here:

1. Create the MID Server user account and grant the appropriate role to this user.
2. Download the installer file for the host machine.
3. Install the MID Server on a Linux or Windows host.
4. Validate the MID Server to ensure that it is trusted to access credentials used by the instance for automations.
5. Test connectivity between the MID Server and the instance for automatic upgrades.
6. Optionally, deploy multiple MID Servers in your network for load balancing or when domain separation is enabled.

MID Server guided setup

Alternatively, the MID Server Guided Setup streamlines the process and allows you to set up a basic MID Server quickly.

Create the MID Server user and grant the role

To communicate with the instance, MID Servers need a user ID and the appropriate role. Create the user ID for a MID Server and grant the ID the **mid_server** role. To prevent MID Server validation failure, the system runs business rules to monitor the settings selected for MID Server users.

Before you begin
Role required: admin

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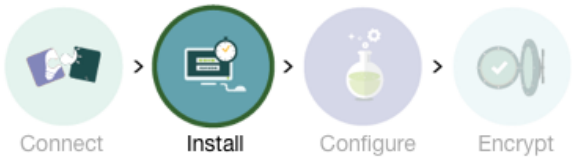

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

The MID Server connects to an instance by using the SOAP web service. To allow authentication with the instance, create a separate user account for each MID Server or share the same account across multiple MID Servers. Grant each MID Server user the mid_server role, which is required for the MID Server user on any instance on which basic authentication is enabled. The mid_server role allows the MID Server to access protected tables when strict SOAP security is in place. The system adds the necessary SOAP roles automatically with this role.

Note:
The strict SOAP security feature, enabled by default for any instance that uses basic authentication, protects all tables with Access Control Lists (ACL).

If multiple MID Servers are using the same logged in user, an issue record is created when more than one is **Up** at a time. It is recommended that MID Servers use a unique logged in user. See (KB1552863) MID Server Unique Logged In User for more information and remediation steps.

Procedure

1. From the instance, navigate to **User Administration** > **Users**.
2. Click **New**.
3. Complete the fields in the form.

Field	Description
User ID	User name for the MID Server user. This name is specified in the *mid.instance.username* parameter of the configuration file that the MID Server installer creates. For details, see MID Server parameters. **Note:** Avoid using the same MID Server logged in user across multiple MID Servers.

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Field	Description
First name	The user's first name.
Last name	The user's last name.
Password	Password for the MID Server user. This password is specified in the *mid.instance.password* parameter of the configuration file that the MID Server installer creates.

4. Right-click the header and select **Save**.
5. Under the **Roles** related list, click **Edit**.
6. Select the **mid_server** role for this user.
   Each MID Server account must have this role to access protected tables.
7. Click **Save**.
8. Confirm that the MID Server account was created successfully and the account has connectivity to the instance.

   a. On the host machine where you intend to install the MID Server, open a browser and navigate to the instance.

   b. Use your new MID Server user credentials to log in.
   If the login is successful, then any MID Servers you install on that host will be able to connect to the instance.

MID Server role validation

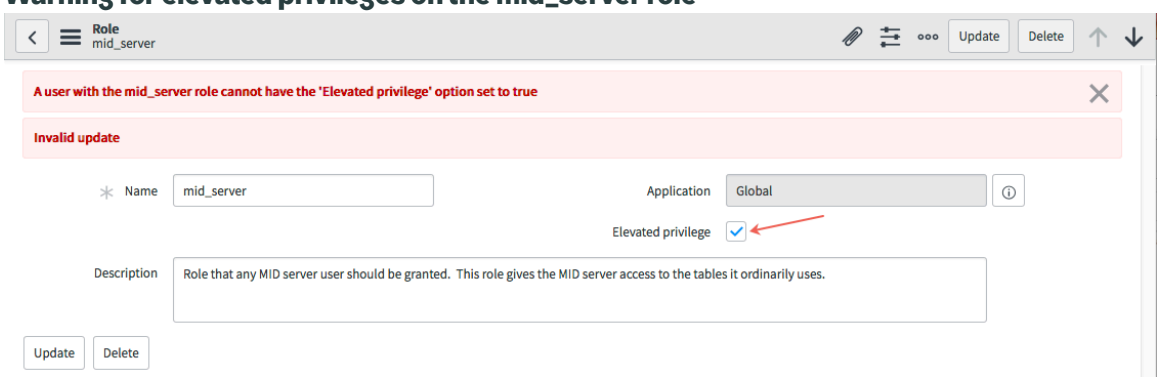
Real-time system validation of MID Server role assignments prevents incompatible settings.

To prevent MID Server validation failure and ensure that your MID Server is configured correctly, the system runs several business rules that monitor the roles and settings you select for your MID Server user. The instance displays a warning and blocks the change when you attempt to save an incompatible configuration.

Elevated privileges not permitted

The mid_server role cannot be configured for elevated privileges. The **Invalid MID Server settings** business rule runs on the Role [sys_user_role] table and prevents the **elevated_privileges** field from being set to true for the mid_server role.

Warning for elevated privileges on the mid_server role



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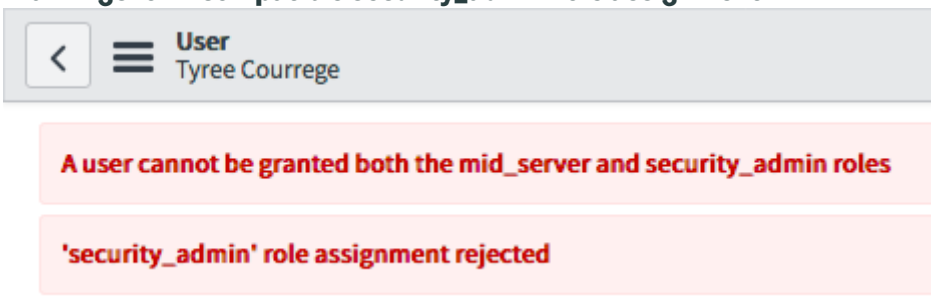
Relationship table protection

The User Role [sys_user_has_role] table creates the relationship between the User [sys_user] and the Role [sys_user_role] tables.

- **Incompatible role**

  The mid_server and security_admin roles are incompatible and cannot be assigned to the same user. The system determines the user's current role and runs the **Security Admin incompatible with MID** business rule on the User Role [sys_user_has_role] table. This rule prevents an administrator from adding the security_admin role for a user who currently has the mid_server role.

  Warnings for incompatible security_admin role assignment

- **Incompatible user role and user record settings**

  The **Incompatible MID Server user role** business rule runs on the User Role [sys_user_has_role] table to protect its data from incompatible configurations. Validation for this related table ensures that an administrator cannot assign the mid_server role to a user who already holds the security_admin role.

What to do next

Download the MID Server files for your operating system.

Download the MID Server files

Download the MID Server installer package through the instance and make it available for installation on the host. Allow the local network to access the authorized IP addresses to ensure that you can download the installation package and receive automatic upgrades.

Before you begin

Role required: admin

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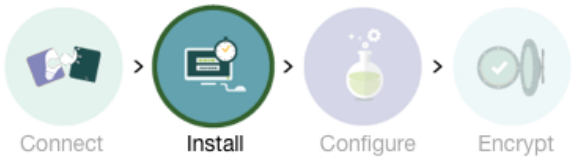

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

The IP address of the MID Server download site (`install.service-now.com`) can change without notice. To ensure that you can download the MID Server installation package and receive automatic MID Server upgrades, allow local network access to these IP addresses:

- 149.96.5.98
- 149.96.6.98

A maint user can change the MID Server download site URL with the MID Server system property **mid.install_server.base_uri**. The MID Server downloads the update files from the new URL instead. Users with closed environments can direct MID Servers to update through hosts in their environment. See MID Server properties and [KB1546609] Configure Custom MID server Upgrade URL for more information.

Note:
Download the MID Server first and then enable Discovery, Orchestration, or any integration that requires the use of the MID Server.

Procedure

1. On the ServiceNow instance, navigate to **Mid Server** > **Downloads**.
2. Select and download the MID Server for the appropriate operating system.
   For the best performance, install the 64-bit MID Server for your operating system.

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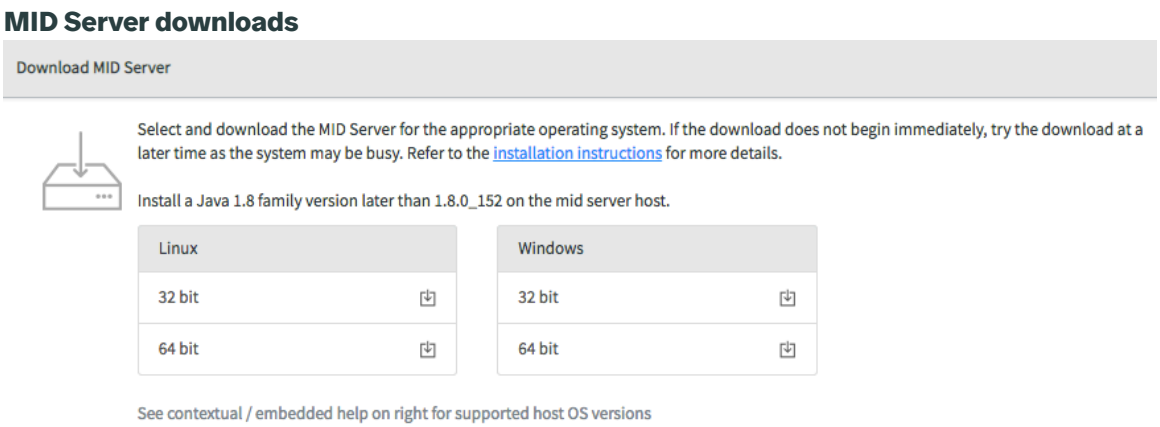
Note:
ServiceNow no longer supports new installations of 32-bit MID Servers or upgrades to version Rome. New MID Server installation are blocked through RPM and MSI installer on the following operating systems:

- CentOS 7
- Windows server 2008
- Windows server 2008 R2
- Windows 8
- Windows 10

MID Servers can be manually installed to any operating system with the ZIP file, however Windows 10 is unsupported. Unsupported MID Servers auto-upgrading to Rome create an issue record in MID Server Issues (ecc_agent_issue). For more information, see Supported platform changes for MID Server [KB0863694].



3. Save the download file to a temporary file on the local drive.
4. Move the file into the designated MID Server folder you create for your operating system and run the installer from that location.

What to do next
You can manually verify the signature of an installation package with the jarsigner tool to ensure its authenticity. For more information about verifying the signature, see the MID Server upgrades section on manual verification.

Install the MID Server on the host computer.

- Linux
- Windows

Install a MID Server on Linux

Install MID Servers with the MID Server installer and verify it is active. The package includes an installer that automatically configures JRE to run in the environment. The MID Server can use an existing JRE rather than the provided JRE. Uninstall the MID Server to redeploy it.

Before you begin
Verify that the host computer satisfies the MID Server system requirements.

Role required: admin, mid_server

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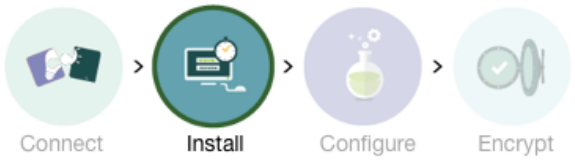

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5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

To install Linux on MID Server, the RedHat/CentOS systems require RPM while Debian (Ubuntu) systems require DEB. The default installation location is `/opt/servicenow/mid`. Installing DEB in user defined directories is not supported.

To improve security, this procedure installs and run the MID Server service as a non-root user. Root privilege is required to deploy and configure a MID Server on a Linux server. A non-root user can manage a service only if they have the required permissions. For more details, see PolicyKit issues with Linux MID Servers using non-admin accounts [KB0815542].

Note:
ServiceNow no longer supports new installations of 32-bit MID Servers or upgrades to version Rome. New MID Server installation are blocked through RPM and MSI installer on the following operating systems:

- CentOS 7
- Windows server 2008
- Windows server 2008 R2
- Windows 8
- Windows 10

MID Servers can be manually installed to any operating system with the ZIP file, however Windows 10 is unsupported. Unsupported MID Servers auto-upgrading to Rome create an issue record in MID Server Issues (ecc_agent_issue). For more information, see Supported platform changes for MID Server [KB0863694].

Java 17.0.12 is bundled with the MID Server installer package and is installed on the host for all new MID Servers. The installer automatically configures Java 17.0.12 to run in your environment. No additional configuration is required. This version supports both 64-bit Windows MID Servers and 64-bit Linux MID Servers. The MID Server requires a minimum JRE version 17.0.10, and recommended version 17.0.12. If you are using a lower version than 17.0.10, you may see encryption related issues.

Note:
Linux MID Servers require glibC version 2.17. The library must be updated for JRE 11. On 64-bit Linux systems, you must install the 32-bit GNU C library (glibc). The installation command for CentOS is: `yum install glibc.i686`

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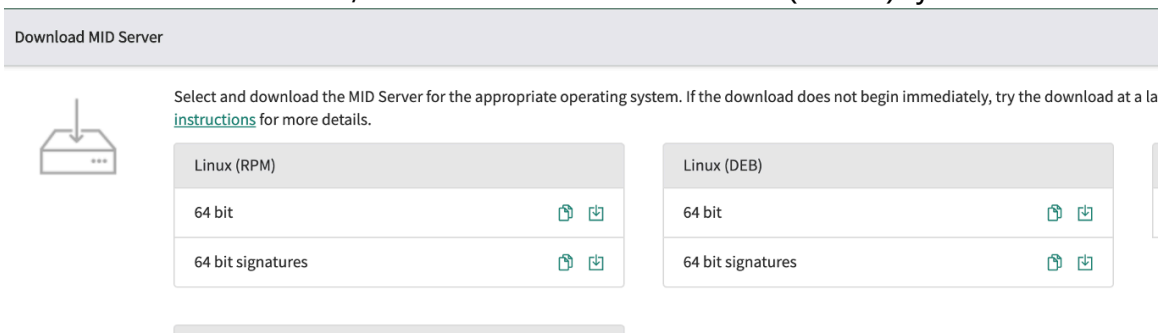
Testing showed that the MID Server works as expected with Oracle Java 11 version 17.0.10. If you need to upgrade the JRE to a different version, then coordinate with the appropriate account representative for support.

Procedure

1. On the instance, navigate to **MID Server** > **Downloads** and download either the MID Server installer RPM file for RedHat/CentOS or the DEB file for Debian (Ubuntu) systems.



Note:
Use the copy link button to copy the download link and use the following `wget` command to directly download the installers in Linux machines.

```
wget <copied link of the installer>
```

2. **Optional:** Manually verify the authenticity and integrity of the downloaded file.

   a. Download the signature ZIP files for RPM/DEB.

   b. Run the following commands for either RPM or DEB.

   (Optional) **RPM**

   - Extract the public key, `ServiceNow_Digicert_DGST.pem`, and signature file from the downloaded signature zip file.
   - Run the following command to verify the signature of the RPM file.

```
openssl dgst -sha256 -verify <Extracted .pem file>
 -signature <Extracted bin file path> <RPM file path>
```

   DEB

   - Extract the public key, `ServiceNow_Digicert_Public.gpg`, from the downloaded signature zip files.
   - Import the public key and verify the signature of the DEB file with the following commands.

```
gpg --import <public key>
dpkg-sig --verify <DEB file path>
```

3. Use the following commands to install either the RPM or DEB installer:

   RPM

   - Install the RPM package for RedHat systems with the following command:

```
sudo rpm -ivh --nodeps package_name.rpm.
```

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- Install the RPM package for RedHat systems in a user defined location with the following command:

```
sudo rpm -ivh --nodeps package_name.rpm
 --prefix=/path/to/user/directory.
```

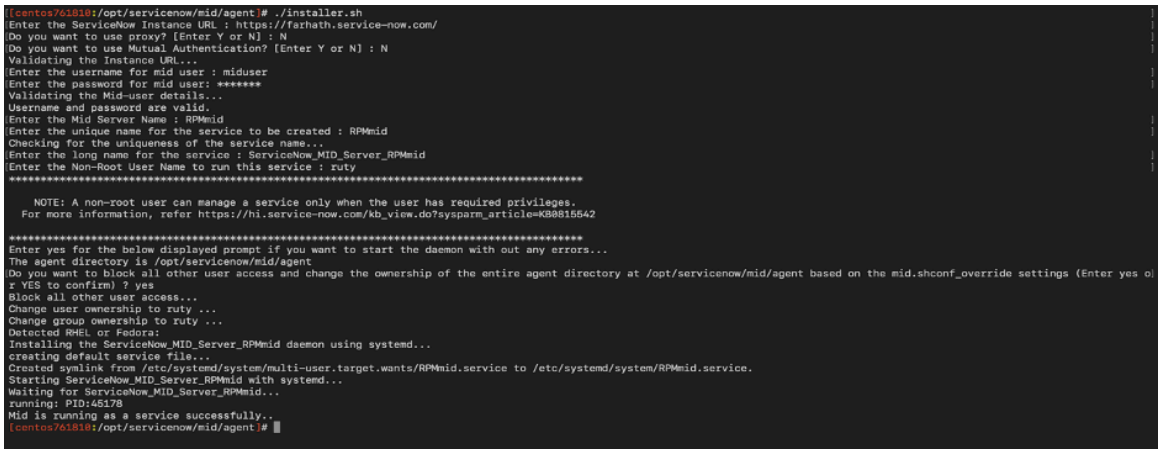
DEB

Install the DEB package for Debian systems with the following command:

```
sudo dpkg -i package_name.deb.
```

4. To configure the MID Server service, run the following command from the agent folder as a user with root privilege and provide the required inputs.

```
./installer.sh
```



5. The **installer.sh** script takes the following inputs.

Instance URL

Enter the full URL of your instance, for example: `https://mycompanyinstace.service-now.com`

MID-Server Username

Enter the user name of the MID Server user that you already created. The MID Server user must have the mid_server role.

MID-Server Password

Set the password for the current MID Server user.

MID-Server Name

Set the name of the MID Server.

Proxy Server Information (optional).

mid.proxy.use_proxy

Enables the MID Server to use a web proxy to access the ServiceNow instance.

mid.proxy.host

Set this parameter to define the web proxy's host.

mid.proxy.port

Set this parameter to define the web proxy's port.

mid.proxy.username

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If the web proxy requires a user name, set this parameter to define that username.

mid.proxy.password

If the web proxy requires a password, set this parameter to define that password.

The MID Server can bypass proxy servers whose DNS/IP address is listed in the configuration parameter **mid.cloud.discovery.proxy.exclusion.list**. See MID Server property for more information.

To run a MID Server as a daemon service, the following properties are also required.

app_name

Set a unique name for the current MID Server

app_long_name

Set a unique long name for the MID Server.

run_as_user

Set the username to run the service as a non-root user.

Result

Once all the inputs are entered, the MID Server automatically runs as a daemon service and starts the service.

Linux MID Server silent installation

Silently installing the MID Server uses predefined parameters and requires no user input after it is initiated. You can use silent installation on several machines at once to quickly set up a network and to ensure all MID Servers have the same installation settings.

To perform a silent installation with the Linux installer, run the following command:

```
./installer.sh -silent -INSTANCE_URL
 https://instance_name.service-now.com -MUTUAL_AUTH
 N -MID_USERNAME username -MID_PASSWORD password
 -USE_PROXY N -MID_NAME mid -APP_NAME mid -APP_LONG_NAME
 ServiceNow_MID_Server_Mid -NON_ROOT_USER nonrootuser
```

The following fields can be passed through the command line:

INSTANCE_URL

Enter the URL of your instance, for example: `https://mycompanyinstance.service-now.com`

MUTUAL_AUTH

Set this value to Y to use mutual authentication instead of basic authentication. Otherwise, set it to N.

> **Note:**
> If **MUTUAL_AUTH** = Y then provide the path to the certificate with **CERTIFICATE_PATH**.

CERTIFICATE_PATH

If mutual authentication is enabled, provide the path to the certificate.

MID_USERNAME

Enter the user name of the MID Server user that you already created. The MID Server user must have the mid_server role.

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MID_PASSWORD

Enter the password for the user.

USE_PROXY

Set this value to Y if your MID Server communicates through a proxy to connect to the instance.

Note:
If **USE_PROXY** = N then skip the other proxy details.

PROXY_HOST

Enter the proxy server host name or IP address. Do not include the protocol in the host name. For example: `proxyserver.domain.com` is correct, but `https://proxyserver.domain.com` is incorrect.

PROXY_PORT

Enter the port the proxy server uses to communicate. If this value is blank, the installer uses the proxy server's default port number.

PROXY_USERNAME

Enter the username that has administrator rights to the proxy server.

PROXY_PASSWORD

Enter the password for the username.

MID_NAME

Enter the MID Server name.

APP_NAME

Provide the service name. It must be unique for the current MID Server.

APP_LONG_NAME

Provide the service long name.

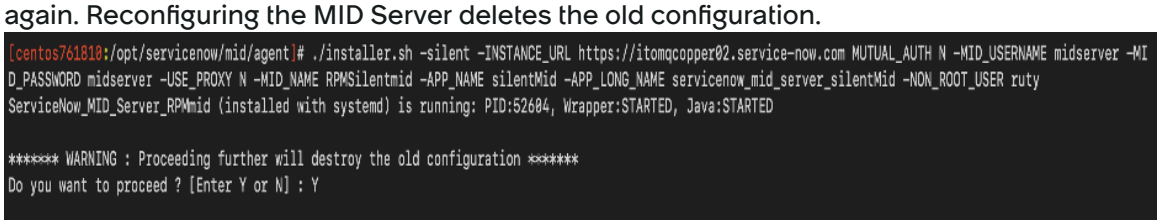
NON_ROOT_USER

Provide the username to run the service as a non-root user.

The following is an example command for a MID Server which uses a proxy and mutual authentication:

```
./installer.sh -silent -INSTANCE_URL
 https://instance_name.service-now.com MUTUAL_AUTH Y
 -CERTIFICATE_PATH <path-to-certificate> -USE_PROXY Y
 -PROXY_HOST <ip> -PROXY_PORT <port> -PROXY_USERNAME <username>
 -PROXY_PASSWORD <password> -MID_NAME proxymid -APP_NAME
 proxymid -APP_LONG_NAME servicenow_proxy_mid -NON_ROOT_USER
 nonrootuser
```

Note:
To reconfigure the MID Server, run the `installer.sh` command again. Reconfiguring the MID Server deletes the old configuration.



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Run Linux MID Servers as non-root users

Run MID Servers as non-root user on a Linux machine to improve security. Multiple MID Server can be installed as services so they can start by themselves after system reboots.

Before you begin

Role required: root

This process is only applicable if you installed the MID Server manually using the ZIP file. If you installed the MID Server with the procedure in Install a MID Server on Linux, then the MID Server is already running as a non-root user.

Supported versions for this procedure are Linux Red Hat 6 or newer, Ubuntu 1404 or newer, and CentOS 6 or newer.

Procedure

1. Stop any MID Server running on the host with the command **bin/mid.sh stop**.
2. Remove any MID Servers on the host with the command **bin/mid.sh remove**.
3. Edit the file `mid.shconf_override`.

```
#########################################################################
# To put any changes into effect, re-install the service using the commands
# bin/mid.sh stop then bin/mid.sh remove followed by bin/mid.sh install
#########################################################################

# Uncomment the lines below and set some name for the current MID server.
# This allows multiple MID Servers to run as a service on the same host.
#APP_NAME="this_mid_app_name"
#APP_LONG_NAME="this_mid_long_app_name"

# Put a username here to run the service as a non-root user.
# The specified user will be the owner of the entire agent directory.
# If left empty, the owner is unchanged.
RUN_AS_USER=

# Put a group name here that will be the group owner of the entire agent directory.
# If left empty, the group is unchanged.
GROUP_NAME=

# Set a flag to control whether the script will prompt for confirmation before
# changing the owner or group of the agent directory
PROMPT_BEFORE_OWNERSHIP_CHANGE=true
```

4. Add the MID Server's name using the lines **APP_NAME=** and **APP_LONG_NAME=** to run it as a service.
   To prevent errors, the **APP_NAME** of each MID Server must be unique.
5. **Optional:** To run multiple MID Servers as services on the same host, add an **APP_NAME** and **APP_LONG_NAME** for each instance.

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```
[root@CentOS6 ~]# cat /opt/midservers/mid_centos6_1/bin/mid.shconf_override
APP_NAME="mid_centos6_1"
APP_LONG_NAME="ServiceNow MID Server MID_CENTOS6_1"

[root@CentOS6 ~]# cat /opt/midservers/mid_centos6_2/bin/mid.shconf_override
APP_NAME="mid_centos6_2"
APP_LONG_NAME="ServiceNow MID Server MID_CENTOS6_2"
```

6. Add the name of the non-root user to operate the account using the line **RUN_AS_USER=**.
7. **Optional:** Add the name of the group to own the entire agent directory using the line **GROUP_NAME=**.
8. Set the line **PROMPT_BEFORE_OWNERSHIP_CHANGE=** to **true** to prompt the user for confirmation before any changes to file permissions are applied.
   The file permission change is applied to the entire agent folder and everything inside recursively. The changes include blocking other users' the access to the entire agent folder, changing the owner to **$RUN_AS_USER** if specified, and changing the group to **$GROUP_NAME** if specified.
9. Reinstall the MID Server with the command **bin/mid.sh install**.

Note:

To prevent errors, make sure to stop and remove any existing MID Server services before starting new ones. During the first installation, a root user is required to call **bin/mid.sh install**. Reinstalling the MID Server applies the changes in `mid.shconf_override`. Then the non-root user specified in `mid.shconf_override` is able to start/stop/restart the service without elevated privileges.

What to do next

For more information about managing the allow list and file permission enforcement, see File permission enforcement for Windows MID Servers. Running a Linux MID Server with a non-root account may result in issues with PolicyKit in some systems. See PolicyKit issues with Linux MID Servers using non-root accounts for more information.

Configure a Linux MID Server to use an existing JRE

You can choose to use an existing JRE for your MID Server rather than the OpenJDK provided with the MID Server installer.

Before you begin

Ensure that your JRE version is supported. See MID Server system requirements for details.

Role required: admin

About this task

By electing to use your own JRE, you are responsible for upgrading it as necessary. For a detailed procedure and cautions regarding changing the JRE, see KB0778272.

Procedure

1. Navigate to this file in the MID Server installation directory:
   `agent/conf/wrapper-override.conf`
2. To specify the existing Java executable that you want to use, add this line to the file:
   `wrapper.java.command={your_java_executable}`

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For more information, see the Java service wrapper property documentation.

3. Save the file.

Uninstall a Linux MID Server

The MID Server runs as a stand-alone service. You can remove a stand-alone MID Server service to accommodate such tasks as redeploying the MID Server to another host machine or changing the unique name of a MID Server when deploying multiple MID Servers.

Before you begin

Role required: admin

Procedure

Run the **uninstall.sh** script in the agent folder to remove the service and uninstall the RPM/DEB.

```
[[centos761810:/opt/servicenow/mid/agent]# ./uninstall.sh
Uninstalling MID Server RPM package : agent-19.itomqcopper.0.268-172.el7.x86_64
Preparing packages...
Running 'mid.sh remove' to uninstall MID server
Detected RHEL or Fedora:
Stopping servicenow_mid_server_silentMid...
Waiting for servicenow_mid_server_silentMid to exit...
Stopped servicenow_mid_server_silentMid.
Removing servicenow_mid_server_silentMid daemon from systemd...
Removed symlink /etc/systemd/system/multi-user.target.wants/silentMid.service.
agent-19.itomqcopper.0.268-172.el7.x86_64
[centos761810:/opt/servicenow/mid/agent]#
```

Result

The MID Server service is uninstalled.

What to do next

Validate the MID Server to prepare it for use.

Install a MID Server on Windows

Install MID Servers with the MID Server guided Windows installation package. The package includes an installer that automatically configures OpenJDK to run in the environment. The MID Server can use an existing JRE rather than the provided OpenJDK. Uninstall the MID Server to redeploy it.

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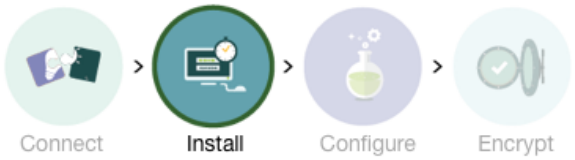

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- Verify that the host computer satisfies the MID Server system requirements.
- The MID Server requires the minimum PowerShell version 3.0 and supports versions up to PowerShell 5.1.
- Ensure that the Microsoft Application Experience Lookup Service is enabled on the MID Server host. If this service is disabled, the MID Server auto-upgrade might fail, causing the MID Server to go down. For information on managing issues with the Application Experience service, see KB0597552.

Java 17.0.12 is bundled with the MID Server installer package and is installed on the host for all new MID Servers. The installer automatically configures Java 17.0.12 to run in your environment. No additional configuration is required. This version supports both 64-bit Windows MID Servers and 64-bit Linux MID Servers. The MID Server requires a minimum JRE version 17.0.10, and recommended version 17.0.12. If you are using a lower version than 17.0.10, you may see encryption related issues.

Note:
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MID Servers can be manually installed to any operating system with the ZIP file, however Windows 10 is unsupported. Unsupported MID Servers auto-upgrading to Rome create an issue record in MID Server Issues (ecc_agent_issue). For more information, see Supported platform changes for MID Server [KB0863694].

Testing showed that the MID Server works as expected with Oracle Java 11 version 17.0.10. If you need to upgrade the JRE to a different version, then coordinate with the appropriate account representative for support.

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Upgraded MID Servers might use different Java versions depending on their operating system versions.

- MID Servers upgraded from earlier versions use the OpenJDK provided with the MID Server installer. This version of the OpenJDK was tested and certified for use with these MID Servers.
- MID Servers upgraded on any other operating system versions also automatically upgrade the JRE to the version provided with the installation package.

Install a MID Server on Windows with guided installation

Install MID Servers with the MID Server guided Windows installation package. The package includes an installer that automatically configures OpenJDK to run in the environment.

Before you begin

Role required: admin or mid_server

About this task

The MID Server guided native Windows installer configures the MID Server with provided settings. The installer creates the MID Server Service and assigns it to the provided user. The installer sets the file permissions on the MID Server Install folder. The installer allows for the configuration of proxy settings. Optionally, the installer can start the MID Server automatically.

Procedure

1. On the instance, download the MID Server installation .msi file from **MID Server** > **Download**.
2. Log in to the Windows host machine where you want to install the MID Server.
3. Place the installer .msi on the desired MID Server host.
4. Open the installer with Administrator level privileges.
5. Use the installer to enter the following information.

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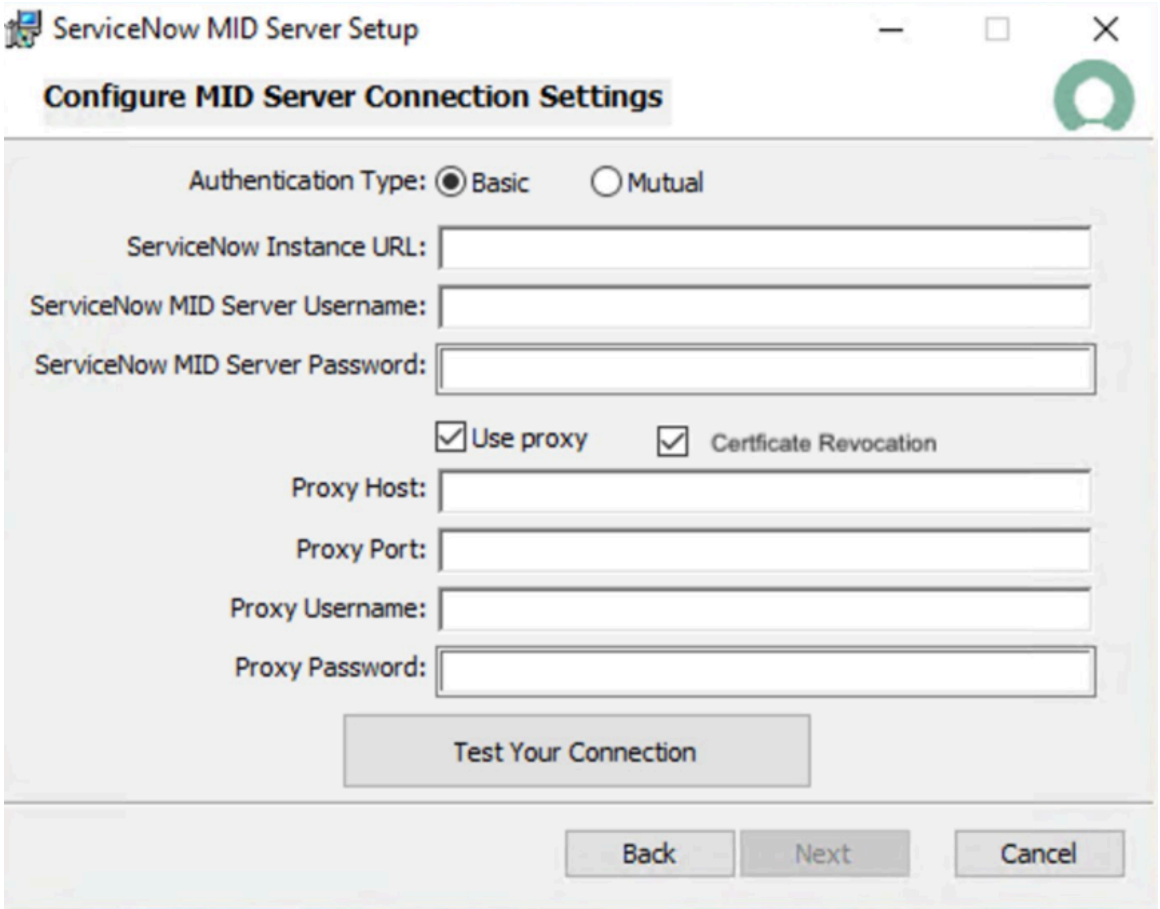

Field	Description
Authentication Type	**Basic** Username and password based authentication. **Mutual** Client certificate based authentication. See MID Server unified key store for more information on mutual authentication. **Note:** Selecting mutual authentication disables the MID Server username and password fields. The disabled fields are not written to **config.xml**.
ServiceNow instance URL	Enter the full URL of your instance, for example: `https://mycompanyinstace.service-now.com`

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Field	Description
ServiceNow MID Server username	Enter the name of the MID Server user that you already created. The MID Server user must have the mid_server role.
ServiceNow MID Server password	Enter the password for the user in the **ServiceNow MID Server username**.
Certificate Revocation	This check box is selected by default to enable certificate revocation policies to improve security. For more information on certificate revocation, see MID Server certificate check policies. When testing a connection with certificate revocation enabled, the installer checks if OCSP port 80 is open and the entrust page is accessible. If the connection test fails due to the certificate revocation check, the error must either be corrected and re-tested or the certificate revocation check must be disabled. The certificate revocation check is not required for successful installation.
Use proxy	Select this check box if your MID Server communicates through a proxy to connect to the instance. **Note:** Your proxy server must use Basic Authentication for the MID server to connect to the instance. The MID Server can bypass proxy servers whose DNS/IP address is listed in the configuration parameter **mid.cloud.discovery.proxy.exclusion.list**. See MID Server property for more information.
Proxy Host	Enter the proxy server host name or IP address. Do not include the protocol in the host name. For example, enter `proxyserver.domain.com`, not `https://proxyserver.domain.com`.
Proxy Port	Enter the port through which the proxy server communicates. If you leave this field blank, it should use the proxy server's default port number.
Proxy Username	Enter the username for the proxy server.
Proxy Password	Enter the password for the user name.

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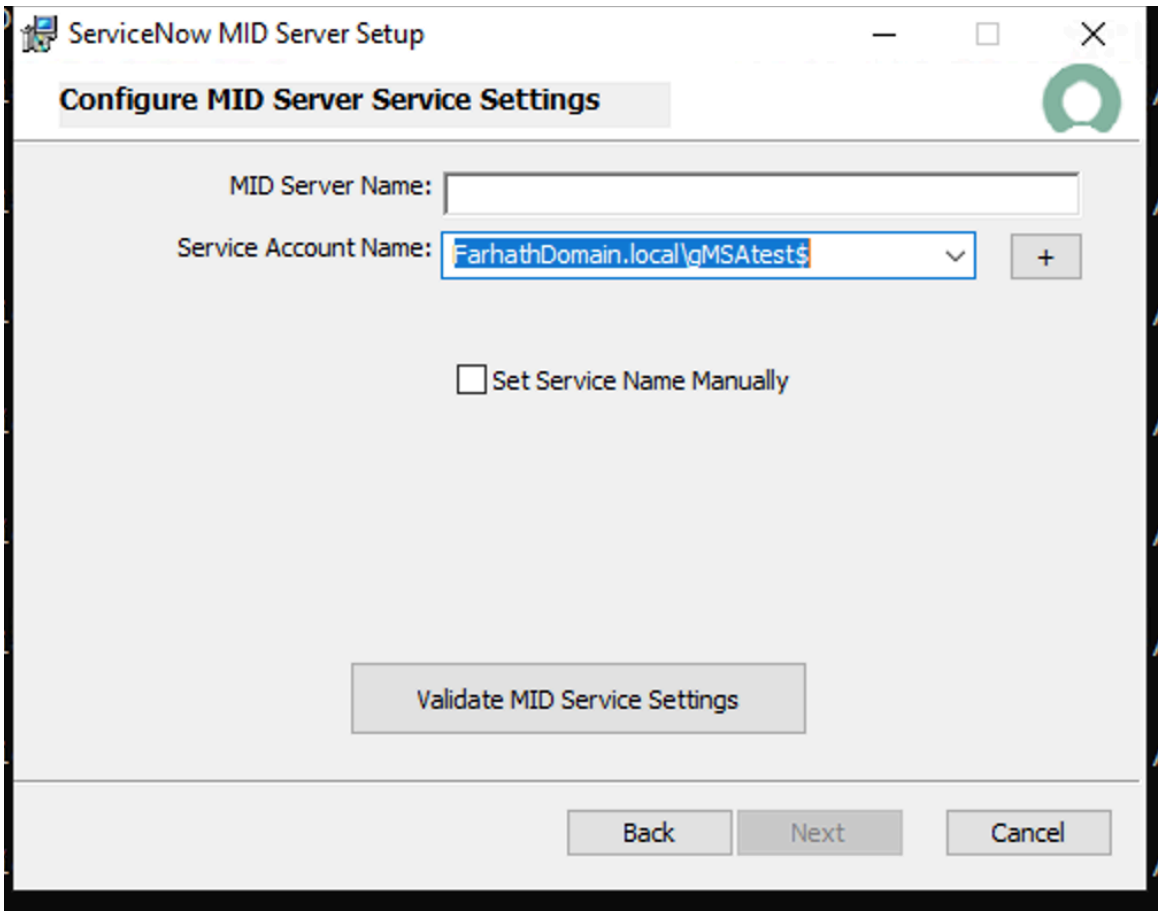
Note:
If your proxy server doesn't require authentication, leave the **Proxy Username** and **Proxy Password** fields blank.

6. Select **Test your connection** to validate the credentials and instance information.
   If you encounter any errors, verify the information that you input.
7. Select **Next**.
8. Configure the MID Server name and Service Account parameters (see table).



Field	Description
MID Server name	Enter a MID Server name. **Warning:** MID Server names cannot begin with **mid.server**.
Service Account Name	Username of the service account that will be used to run the MID Server service. For information on creating service accounts, see Create a Windows service account with "Log on as Service" [KB0867669]. The Service Account Name field is an editable drop-down menu. Either select a

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Field	Description
	value from the drop-down or type a new value in the text field. Only the accounts with *log on as service* policy are displayed in the drop-down. Group Managed Service Accounts (gMSA) that inherit the *log on as service* policy from their groups are not displayed in the drop-down. However, you can install the MID Server service using those accounts by manually entering the service account name in the editable drop-down. The name can follow three formats. **a.** If the service account is local to the computer, you can give just the name. Example: My_Local_Service_Account **b.** If the service account is local to the computer, you can provide "." as the domain name for the account. Example: .\My_Local_Service_Account **c.** Any account can follow the format {domain}\{username}. Example: MY-COMPUTER-DOMAIN \My_Domain_Service_Account Add a new local service account by selecting the **+** button. This button opens the **Configure New Local User** window, which has three fields. ○ **Service Account Name:** Enter the name of the new service account. ○ **Service Account Password:** Enter the password of the new service account. ○ **Re-enter Password:** Confirm the password of the new service account. When a group Managed Service Account (gMSA) user is selected, the password field is removed because passwords for gMSA users are managed by the Active Directory.

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Field	Description
	Note: The provided service account credentials must meet the following requirements in addition to being a valid account. ○ The user cannot be a local system or an administrator level account (local admin, domain admin, etc.) ○ The service account provided has the *`log on as service`* right, which is required for an account to be used as the *`log on user`* for a service.
Service Account Password	Password of the service account that will be used to run the MID Server service.
Set Service Name Manually	Select this check box if you want to manual set the service name and display name for your MID Server. Note: Your proxy server must use Basic Authentication for the MID server to connect to the instance.
MID Service wrapper name	Modify this field if necessary. It is populated automatically by prefixing `snc_mid_` to the MID Server name. In most cases, you do not need to modify this.
MID Server wrapper display name	Modify this field if necessary. It is populated automatically by prefixing `ServiceNow MID Server_` to the MID Server name. In most cases, you do not need to modify this.

9. Select **Next** and select a destination folder for the installation.

   Users can manually enter an existing, valid file path, or use the “Change” button to open up a browsing page where they can choose the install location.

10. Select **Next** to view the summary.

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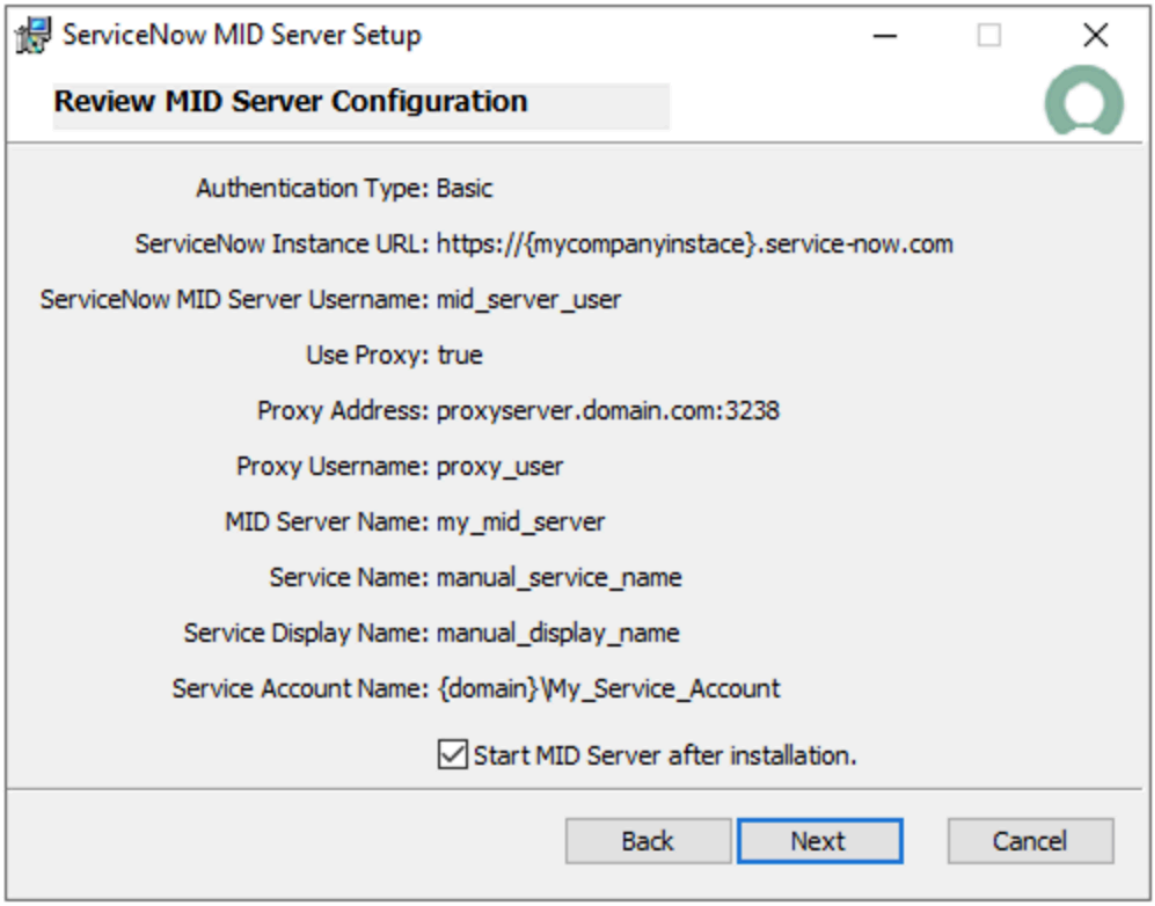

Select **Start MID Server after installation** if you want to start the MID Server immediately after installation. If you want to make additional configuration changes, before starting the MID server, leave this box unchecked. If mutual authentication was selected, the MID Server username and password fields are removed.

Note:
If the MID Server fails to start, the cause might be a duplicate name or multiple services that point to the same executable path. This can happen when you have MID servers previously not installed through the installer. See MID Server fails to start for details.

11. Select **Mid Servers List Page**.
    The installer opens the MID Server list from your instance.
12. Select the MID Server name from the list.

Note:
It may take a few seconds for the MID Server time to establish a connection with your instance.

The system displays the MID Server record.

13. From **Related Links**, select **Validate**.
    The MID Server **Validated** changes to **Yes**.

What to do next

To upgrade the MID Server, see MID Server upgrades for procedures and requirements.

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Uninstall a Windows MID Server with the guided installer

The MID Server guided native Windows installer also supports guided uninstallation of the MID Server.

Before you begin

Role required: admin

There are three ways to uninstall a MID Server after installing it with the guided native Windows installer.

Procedure

1. On the MID Server host, navigate to the **Control Panel** > **Programs** > **Programs and Features** > **Uninstall a program**.
   a. Uninstall the program with the MID Server's name.
2. **Optional:** Alternatively, navigate to **Settings** > **Apps**
   a. Uninstall the program with the MID Server's name.
3. **Optional:** The MID Server can also be uninstalled with the silent uninstall script.
   This is useful for uninstalling multiple MID Servers. For more information, see Windows MID Server silent installation and uninstallation

Configure Windows MID Server service credentials

MID Server service credentials are required to manage the MID Server service on the host machine, including its ability to successfully auto-upgrade.

Before you begin

Role required: admin

About this task

If you installed the MID Server using the native installer, you will not need to complete this procedure. However, to change the service user after the installation for any reason, use this procedure.

Windows service credentials control the level of privilege on the device. The user should not be a local system or an administrator level account (local admin, domain admin, etc.) The service account provided should have the **log on as service** right, which is a requirement for an account to be used as the **log on user** for a service.

Note:

Windows service credentials are not the same as the MID Server user credentials, which allow communication between the MID Server and the instance. You must configure both of these credentials separately. See Create the MID Server user and grant the role for instructions on MID Server user credentials.

Procedure

1. Open the Windows Services console.
2. Double-click the `ServiceNow <MID Server name>` service for each MID Server.
3. Select the **Log On** tab.
4. Choose a non-admin user and provide the password for that user.
5. In the **General** tab, set the **Startup type**.
   The field is set to **Automatic** by default.
6. Click **OK**.

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7. Restart the ServiceNow <MID Server name> service, and make sure that ServiceNow\<MID Server name>\agent\logs\agent0.log does not have error messages.
   If the MID Server does not start, see the ServiceNow knowledge article Review the agent log for MID Server errors (article KB0535148).
8. On the instance to which this MID Server is connected, navigate to **MID Server** > **Servers**.

   If Discovery is installed, alternately navigate to **Discovery** > **MID Servers**. All MID Servers connected to this instance are listed.
9. Make sure that the Status of the MID Server that you just installed is **Up**.

Windows MID Server silent installation and uninstallation

Silently installing the MID Server uses predefined parameters and requires no user input after it is initiated. You can use silent installation on several machines at once to quickly set up a network and to ensure all MID Servers have the same installation settings.

MID Server silent installation

Note:
All silent install/uninstall commands must be run with administrator level privileges.

To silently install the MID Server on a Windows system, download the script attached to the Knowledge Base article Windows MID Server silent installation and uninstallation. Place the file on the target MID Server host machine and run the following command from the command prompt. You can also run the script directly from powershell.

```
powershell -command ".\SilentInstall.ps1 -<parameter_name1>
 '<value for parameter1>' -<parameter_name2> '<value for
 parameter2>' etc..."
```

The script checks the following mandatory parameters:

- *MSI_FILE_NAME*: the name of the MSI file used for the installation.
- *INSTALL_LOCATION* : the location to install the MID Server.
- *INSTANCE_URL*: the target ServiceNow instance the MID Server will connect to.
- *MID_USERNAME*: the instance account name.
- *MID_PASSWORD*: the instance account password.
- *MID_NAME*: the name of the MID Server.
- *SERVICE_ACCOUNT_NAME*: the name of the service account.
- *SERVICE_ACCOUNT_PASSWORD*: the password of the service account.

The following parameters are optional:

- *LOG_NAME*: enables logging and puts logs into the file named by this parameter.
- *START_MID*: sets the MID Server to start automatically after the installation finishes.
- *USE_PROXY*: enables the use of a proxy. If you choose this command, the following parameters become mandatory.
  - *PROXY_HOST*: the name of the proxy host.
  - *PROXY_PORT*: the port number of the proxy.
  - *PROXY_USERNAME*: the proxy username. If there is no username, input `' '`.
  - *PROXY_PASSWORD*: the proxy password. If there is no password, input `' '`.

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- *MANUAL_SERVICE_NAME*: the service name. If you choose this command, the following parameters become mandatory:
  - *SERVICE_NAME*: the service name.
  - *SERVICE_DISPLAY_NAME*: the service display name.
- *MUTUAL_AUTH*: enables mutual authentication. If this switch is enabled, *MID_USERNAME* and *MID_PASSWORD* are not required. See MID Server unified key store for more information.

Note:
The parameters *START_MID*, *USE_PROXY*, *MUTUAL_AUTH*, and *MANUAL_SERVICE_NAME* are switches. They use the format **-<switch_param_name>** and are not followed by a value.

After the script runs, verify the MID Server files, service, and entry in Programs and Features are installed. If you enabled logging, verify the log info in the file specified by the *LOG_NAME* parameter.

An example MID Server silent installation command:

```
powershell -command ".\SilentInstall.ps1 -MSI_FILE_NAME
 'MID-Installer.msi' -INSTALL_LOCATION 'C:\Users\Administrator'
 -INSTANCE_URL 'https://my-instance-name.service-now.com'
 -MID_USERNAME 'mid_server' -MID_PASSWORD 'mid_password'
 -MID_NAME 'Silent_Install_MID' -SERVICE_ACCOUNT_NAME
 'DOMAIN\My_Service_Account' -SERVICE_ACCOUNT_PASSWORD
 'Service_Account_Password' -LOG_NAME 'Silent_Install_Log.txt'"
```

An example command using the *START_MID* switch:

```
powershell -command ".\SilentInstall.ps1 -MSI_FILE_NAME
 'MID-Installer-Wix.msi' -INSTALL_LOCATION
 'C:\Users\Administrator' -INSTANCE_URL
 'https://my-instance-name.service-now.com' -MID_USERNAME
 'DOMAIN\My_Service_Account' -MID_PASSWORD 'mid_password'
 -MID_NAME 'Silent_Install_MID' -SERVICE_ACCOUNT_NAME
 'DOMAIN\My_Service_Account’ -SERVICE_ACCOUNT_PASSWORD
 'Service_Account_Password' -LOG_NAME 'Silent_Install_Log.txt'
 -START_MID"
```

MID Server silent uninstallation

To silently uninstall the MID Server on a Windows system, download the script attached to the Knowledge Base article Windows MID Server silent installation and uninstallation. Then run the script using the command prompt. It can also be run directly from powershell.

```
powershell -command “.\SilentUninstall.ps1 -MID_NAME ‘<value
 for MID_NAME>’ -LOG_NAME ‘<value for LOG_NAME>’”
```

The script requires the mandatory parameter *MID_NAME*, which is the name of the MID Server you want to uninstall.

The optional parameter *LOG_NAME* enables logging of the uninstallation and puts logs into the file named by this parameter.

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After the script runs, verify the MID Server files, service, and entry in Programs and Features are uninstalled. If you enabled logging, verify the log info in the file specified by the *LOG_NAME* parameter.

An example MID Server silent uninstall command:

```
powershell -command ".\SilentUninstall.ps1 -MID_NAME
 'silent_install_cmd' -LOG_NAME
      'uninstall.txt'"
```

Manually install a MID Server on Windows

Install MID Servers with the ZIP file installation package and verify it is active.

Before you begin

Role required: admin or mid_server

About this task

Click this link to view the installation video: Installing the MID Server on Linux

MID Servers can be configured to run using non-administrative accounts. Using non-admin accounts in conjunction with file permission enforcement can improve security by restricting access to MID Server files. sIf you choose to run a MID Server with a non-admin account, there are limitations that change the behavior of other applications. The following behavior changes can occur:

- The MID Server account needs appropriate credentials to run a Discovery schedule. If the credentials are insufficient, the MID Server falls back to the user account's privileges. A non-admin user account may not have the necessary privileges to access the Discovery target.
- Enhanced Application Dependency Mapping (ADME) and File Based Discovery (FBD) may not work by default. To correct this issue, non-admin users need to be given permission to read/write to the Admin Share folder.

Procedure

1. Log in to the Windows host machine where you want to install the MID Server.
2. Create a folder for the MID Server on the top level of the drive such as `ServiceNow\MID Server1`.
3. Download the MID archive file into the new folder.
4. Right-click the archive and select **Extract All**.
5. Navigate to the `service-now\`<mid server name>`\agent` folder that was created when the file was extracted.
6. To configure the MID Server manually, edit the `config.xml` file with a text editor such as WordPad:

   a. Find the element *<parameter name="url" value="https://YOUR_INSTANCE.service-now.com" />* element and change the value to the URL of your instance.

   b. Enter the MID user credentials in the `mid.instance.username` and `mid.instance.password` parameters.
   By default, the MID Server, uses basic authentication for SOAP messages. The password value is also encrypted authentication.

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c. **Optional:** Find the *<parameter name="name" value="YOUR_MIDSERVER_NAME_GOES_HERE" />* element and change the value for the MID Server name.

d. **Optional:** Enter connection information for the proxy server.
Remove the appropriate comment tags from the proxy configuration information.

Example
For example, you can configure these parameters:

- *mid.proxy.use_proxy*
- *mid.proxy.host*
- *mid.proxy.port*
- *mid.proxy.username*
- *mid.proxy.password*

7. **Optional:** If you want to install the MID Server as a non-admin user, follow these steps.

a. Edit the `.\conf\wrapper-override.conf` file.

b. Uncomment the `wrapper.ntservice.account` property and specify the Service Account Name.

c. Either uncomment `wrapper.ntservice.password.prompt`, or uncomment `wrapper.ntservice.password` and provide a password.
Enabling `wrapper.ntservice.password.prompt` prompts for a password when installing the service. Enabling `wrapper.ntservice.password` sets a password immediately but is less secure.

d. Uncomment the `wrapper.ntservice.permissions.1.account` and specify the Service Account Name.

e. Uncomment `wrapper.ntservice.permissions.1.allow` but do not edit it.

f. Uncomment `wrapper.name` and specify the desired service name, and uncomment `wrapper.displayname` and specify the desired display name.
The `wrapper.name` must be unique on the host and no other service can share the same name.

8. Run `start.bat` to start the MID Server.
If `wrapper.ntservice.password.prompt` was set in step 7c, enter the password when prompted. If there is no password, proceed without entering one.
9. On the instance, in the **Related Links**, select **Validate**.
The MID Server **Validated** changes to **Yes**.

Uninstall a Windows MID Server after manual installation

The MID Server runs as a stand-alone service. You can remove a stand-alone MID Server service to accommodate such tasks as redeploying the MID Server to another host machine or changing the unique name of a MID Server when deploying multiple MID Servers.

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Before you begin
Role required: admin

This procedure is only for users who install the MID Server using the ZIP file.

Procedure

1. Stop the running MID Server service, using either of these procedures:
   - **Windows command line**: From the MID Server home (`agent`) directory, run `stop.bat`.
   - **Windows Services console**: From the Windows Services console, right-click the **ServiceNow** *`MID Server name`* and then select **stop**.
2. From a command prompt, go to the `\agent\bin` directory in the MID Server installation directory and double-click the `UninstallMID-NT.bat` file.

What to do next
Validate the MID Server to prepare it for use.

Configure a MID Server on Windows to use an existing JRE

You can choose to use an existing JRE for your MID Server rather than the OpenJDK provided with the MID Server installer.

Before you begin
Ensure that your JRE version is supported. See MID Server system requirements for details.

Role required: admin

About this task
By electing to use your own JRE, you are responsible for upgrading it as necessary. For a detailed procedure and cautions regarding changing the JRE, see KB0778272.

Procedure

1. Navigate to this file in the MID Server installation directory:
   `agent/conf/wrapper-override.conf`
2. To specify the existing Java executable that you want to use, add this line to the file:
   `wrapper.java.command=`{your_java_executable}

   For more information, see the Java service wrapper property documentation.
3. Save the file.

Validate the MID Server

You must manually validate the MID Server after it is installed to enable it to execute automation tasks. You can invalidate a MID Server you suspect has been compromised to prevent it from accessing automation credentials in the instance or executing outbound ECC probes.

Before you begin
Role required: agent_admin, admin

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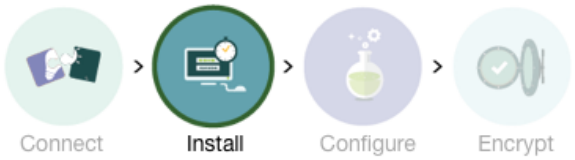

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Make sure that the MID Server version is compatible with the instance.

About this task

Validation restricts access to automation credentials to trusted MID servers only.

When you validate a MID Server, you specify the capabilities it can use, the applications that use it, and the IP ranges it is allowed to explore. You will be prompted to set the initial selection criteria when you validate MID Servers that do not already have capabilities, applications, or IP ranges already configured. You do not have to set the initial selection criteria to actually validate the MID Server. See MID Server selection for more information on capabilities, applications, and IP ranges.

Note:
When you upgrade, MID Servers that are already configured in your instance are automatically validated. This prevents the interruption of automation tasks that MID Servers might be performing. See MID Server upgrades for more information.

Procedure

1. Navigate to **All** > **MID Server** > **Servers**.
2. Open the new MID Server you created from the list of MID Servers.
3. Under **Related Links** click **Validate**.
   The Set Initial Selection Criteria window appears if there are no records in the Supported Applications, IP Ranges, or Capabilities related lists.
4. On the Set Initial Selection Criteria window, use the switches to enable or disable selection criteria for this MID Server:
   - **Allow ALL capabilities**: Allow all capabilities for Orchestration and Event Management to use this MID Server.

     Note:
     Service Mapping and Event Management alert aggregation and RCA, which used capabilities in previous releases, rely on the application for MID Server selection.

   - **Allow ALL applications**: Allow all applications that use MID Servers to use this MID Server.
   - **Allow ALL IP ranges**: Make all IP ranges valid for this MID Server, meaning that it can target any IP address.

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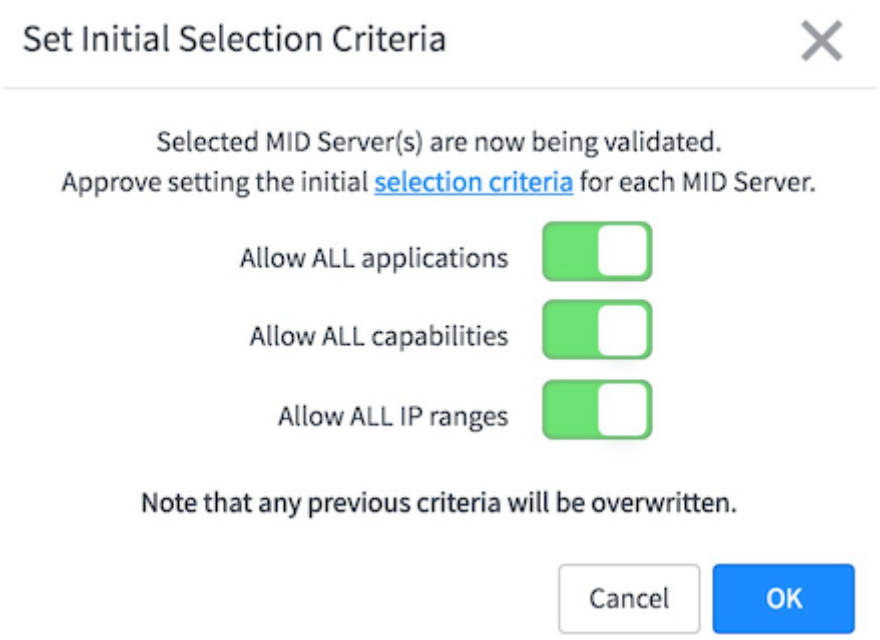
Setting initial selection criteria



If you click **Cancel**, the validation continues but none of the capabilities, applications, or IP ranges are added.

5. Click **OK**.

   The **Validated** field on the dashboard is set to **Validating**, and then set to **Yes** after the validation completes.

6. To invalidate a MID Server, open the record for the MID Server you suspect has a security issue.
7. Under **Related Links**, click **Invalidate**.
   Invalidating a MID Server forces it to clear its memory and restart. The MID Server generates a new keypair on restart.

What to do next

Test network connectivity to ensure that the MID Server can upgrade automatically.

Related topics

Rekey a MID Server

Test MID Server connectivity

Confirm that the MID Server host is able to communicate with the instance. Resolve any issues with the network connectivity such as conflicts with firewalls, access control lists, and routing errors. Successful communication is necessary for automatic upgrades.

Before you begin

Role required: admin

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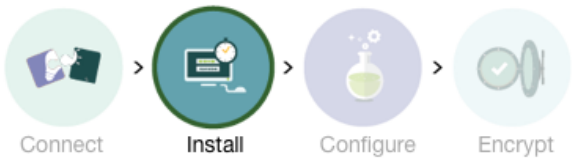

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

The computer that hosts the MID Server must be able to access one of these URLs to upgrade automatically:

- HTTPS: `https://install.service-now.com on the default HTTPS port (443)`
- HTTP: `http://install.service-now.com on the default HTTPS port (80)`

Procedure

1. Use PING to test connectivity with the host on the network (ping<host IP>).
2. If no ping response is returned, use TRACEROUTE to see where traffic might be stopped (traceroute<host>).
3. Use TELNET to connect to any of the TCP ports (telnet<host> <port>).
4. Use an SNMP scanning tool to determine if a potential network device is responsive.
5. Resolve the most likely issues around network connectivity:
   - *Routing:* Confirm that the MID Server host has network access to the IP ranges you are attempting to discover.
   - *Firewalls:* Confirm access to the physical firewalls that protect a large environment such as the Data Center. Confirm access to any logical firewalls that protect an individual computer. MID Server communications are initiated inside the firewall and therefore do not require any special firewall rules or VPNs.
   - *Access Control Lists (ACL):* Confirm that ACLs contain the IP addresses based list on SNMP network devices that allows communication to a particular target.
   - *Resolve all issues with your network teams to better understand your topology.* Deploy additional MID Servers if necessary to help keep your network secure. Configure access from your existing MID Server host to networking components.
6. Verify that the MID Server service is running on the host:
   - *Windows*: In the Windows Services console, locate the **ServiceNow [MID Server name]** and confirm that each MID Server has the **Started Status** value.
   - *Linux*: Ensure that the `agent0.log.0.lck` appears in the `/servicenow/ MID Server name]/agent` folder.

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7. After each MID Server restart, open the `agent0.log.0` and address all error messages.
8. From the ServiceNow instance, navigate to **MID Server** > **Servers**.
9. Review and verify that all MID Servers that are connected to the instance are listed.
10. Verify that the **Status** is **Up** for the MID Servers.

What to do next

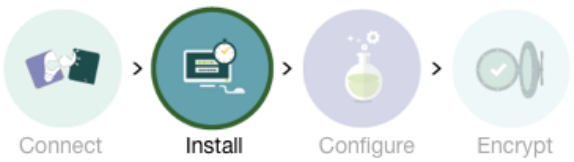
This concludes the installation of a single MID Server. If necessary, continue to deploy multiple MID Servers from a single host in your network. Otherwise, begin configuring your MID Server.

Install multiple MID Servers on a single system

Install multiple MID Servers on the same host computer. Multiple MID Servers can support each other with load balancing, as well as use domain separation. The number of MID Servers required is determined by factors like network policies, security restraints, and the reliability of the host computer.

Before you begin

Role required: admin, mid_server



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

You can install multiple MID Servers on a Linux or Windows host or on a virtual machine. Installing multiple MID Servers may involve other setup steps depending on your network configuration.

Important:
Only one MID Server service can be a daemon on a Linux host. This is a limitation of the Tanuki wrapper service.

Procedure

1. Log in to the host system or virtual machine where you want to install multiple MID Servers.
2. Create a directory for each MID Server on the top level of the drive.

   Make sure you create a unique and descriptive name for each MID Server, such as MIDServer_SMS_Int or MIDServer_Disc1.

3. Extract the downloaded MID Server archive file into each MID Server directory.

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When the extract completes, there should be a directory path similar to the following for each MID Server: `ServiceNow<MID Server name>\agent`.

4. For each MID Server, run the installer appropriate to the host's operating system.

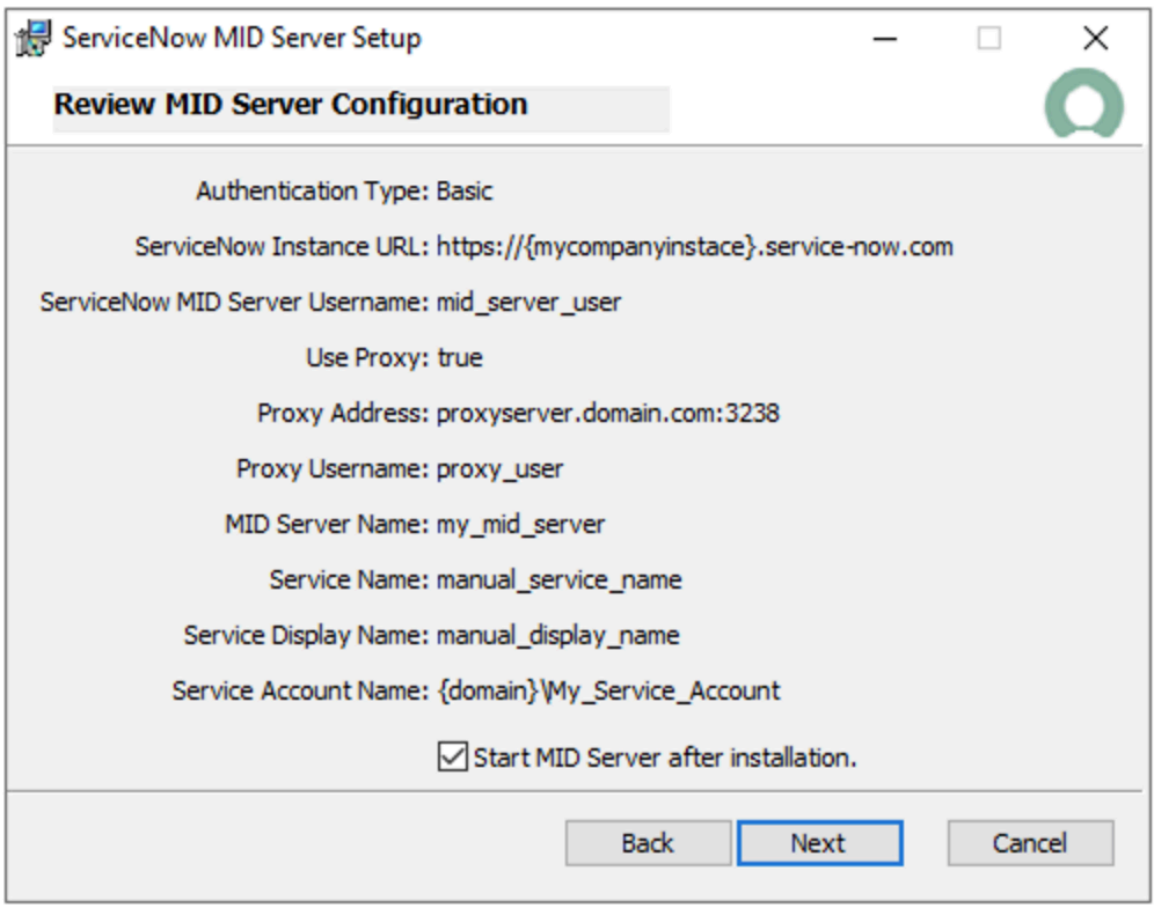
MID Server installers

Operating System	Installer path
Windows	`/agent/start.bat`
Linux	`/agent/installer.sh`

5. Use the installer to enter the following information.
   - URL to your instance
   - User credentials to run the MID Server
   - Proxy server connection details
   - MID server name
   - MID server service wrapper name and display name (Windows systems only)

Note:
The MID Server user must have the mid_server role.

6. From the installer, click **Start MID Server**.



The local host starts the MID Server.

7. Click **Mid Servers List Page**.

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The installer opens the MID Server list from your instance.

8. Select the MID Server name from the list.

   Note:
   It may take a few seconds for the MID Server time to establish a connection with your instance.

   The system displays the MID Server record.

9. From **Related Links**, click **Validate**.
   The MID Server **Validated** changes to **Yes**.

What to do next

All MID Server installation procedures are complete. Proceed to configure your MID Server.

Multiple MID Server deployments

Depending upon how you use the MID Server (for an external integration, Discovery, Service Mapping, or Orchestration) and the load placed on it, you might find it necessary to deploy multiple MID Servers in your network.

Factors determining the number of MID Servers your network will require to support external applications that integrate with ServiceNow include the following:

- The security constraints in your network.
- Your network policies.
- The amount of traffic between ServiceNow and the integrations.
- The reliability of the MID Server machines.

Network policies and security

Security policies in your network (firewalls between network segments, for example) might make direct communication impossible between your instance and an integration's data source (JDBC, LDAP, etc.). To retrieve data for the instance, you can install a MID Server that has access to both the data source and the instance.

These network policies can determine if you need to install multiple MID Servers in your environment:

- **Access control lists (ACL)**: If your security policy controls access to network devices (e.g. switches and routers) with an ACL, it might be necessary to install one or more MID Servers on a machine in the network that is already on the ACL.
- **DMZ**: Your network policy might require you to install one or more MID Servers in your DMZ to probe the devices there. This is common in networks that tightly regulate the ports that are opened on the inside firewall.
- **Probe types**: If you are conducting probes of different operating systems, your network policy might require a separate MID Server for each type of probe (e.g., one MID server for Windows WMI probes and another for SSH probes on UNIX).

Load balancing

Deploy multiple MID Servers where capacity is an issue, as when Discovery has to gather information about thousands of configuration items quickly. In a high volume environment, it might be necessary to deploy multiple MID Servers as load balancers for certain transactions. For example, JDBC data transfers can tie up the resources of a MID Server, making it unable to respond to other requests. The following operations between an integration might require separate MID Servers in a busy network:

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- File exports
- Running scripts
- JDBC data sources
- Reading files

High availability model

Avoid installing MID Servers for critical integrations on a machine that might experience any type of planned outage or an outage caused by overloaded processes. If necessary for reliability, consider deploying these types of MID Servers to dedicated machines for high reliability

Note:
Do not integrate with an external application on a MID Server provisioned for ServiceNow Discovery or Orchestration.

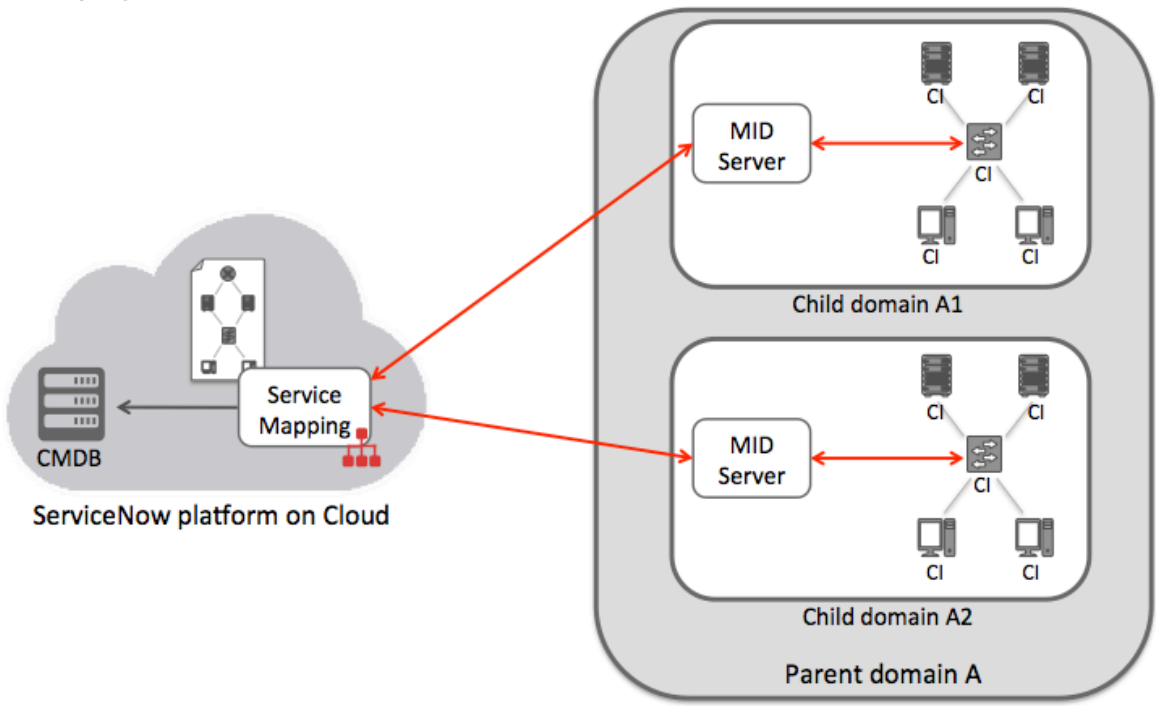
Wide area network (WAN)

When determining where to deploy MID Servers in a WAN, consider the bandwidth available between your local area networks. In most cases, install a MID Server on each LAN to probe devices locally, rather than deploying MID Servers that must probe devices across slow WAN connections. An alternative to this type of deployment is to install MID Servers that probe other LANs via VPN connections that take advantage of fast Internet connections. If the bandwidth of your WAN connections is comparable to that of your Internet connection, then there is no performance impact in running MID Server probes across WAN connections.

Domain separation

In deployments where domain separation is enabled and domains are configured to form a hierarchy, place the MID Servers at the lowest domain level.

Deploying MID Servers with domain separation



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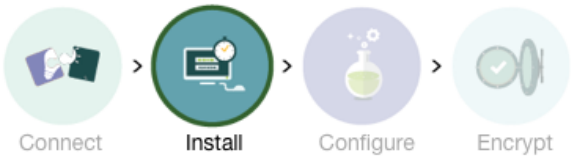
Use MID Server guided setup

MID Server guided setup provides a sequence of tasks that help you install a MID Server with the proper user account and validate the MID Server. If you are setting up a MID Server for the first time, this is a good way to get one up and running in your environment quickly.

Before you begin

Role required: admin



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

You are guided through a series of configuration activities that create a fully qualified MID Server. A progress indicator on each screen allows you to monitor your progress on each task.
Each configuration activity provides the following resources to help you:

- Contextual embedded help.
- Links to comprehensive documentation on the ServiceNow product documentation site.

Important:
You must complete MID Server configuration before you can launch any other IT Operations Management guided setup.

Procedure

1. Navigate to **All** > **Guided Setup** > **ITOM Guided Setup**.
   The IT Operations Management Guided Setup welcome screen appears.
2. Take one of the following actions:
   - If none of the MID Server installation and configuration tasks are complete, select **Get Started**.
   - If you have completed any of the MID Server installation and configuration tasks, select **Continue** to return to the task list.

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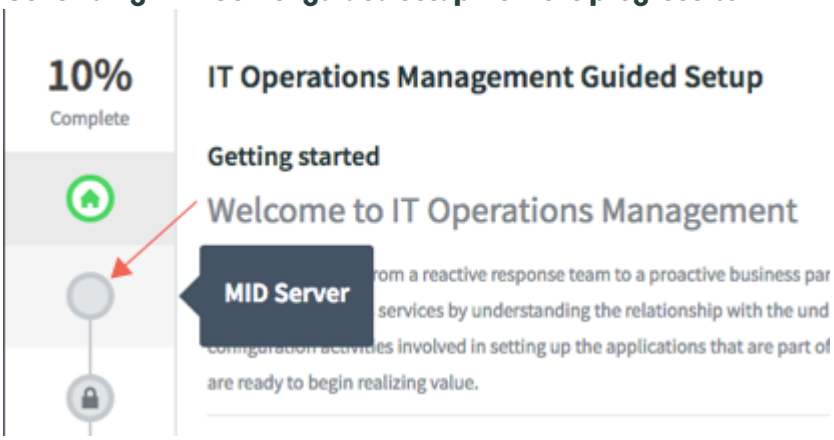
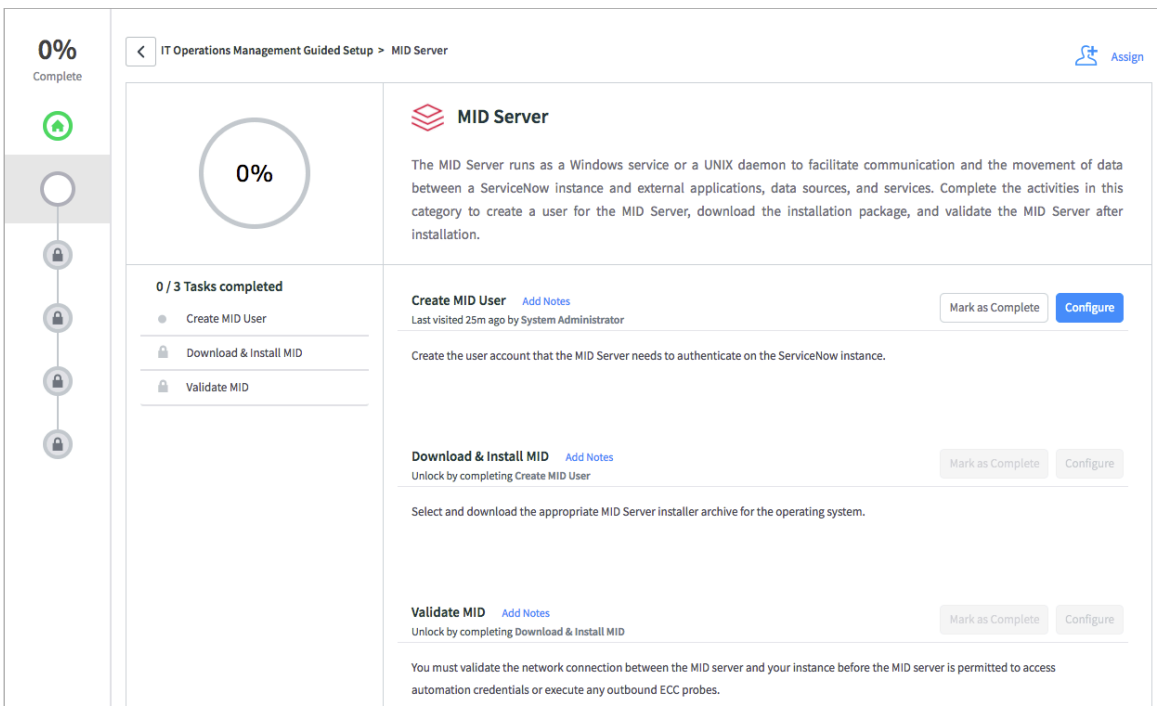
- Select the MID Server icon in the progress bar on the left side of the category screen to display the MID Server category pane at any time.

Continuing MID Server guided setup from the progress bar



3. Select **Continue**.
   The IT Operations Management Guided Setup category screen appears. The controls for starting the MID Server tasks are at the top of the list. Complete these tasks before setting up other applications that rely on the MID Server.

4. In the MID Server pane, select **Get Started**.
   The MID Server task list appears with a description of each task.



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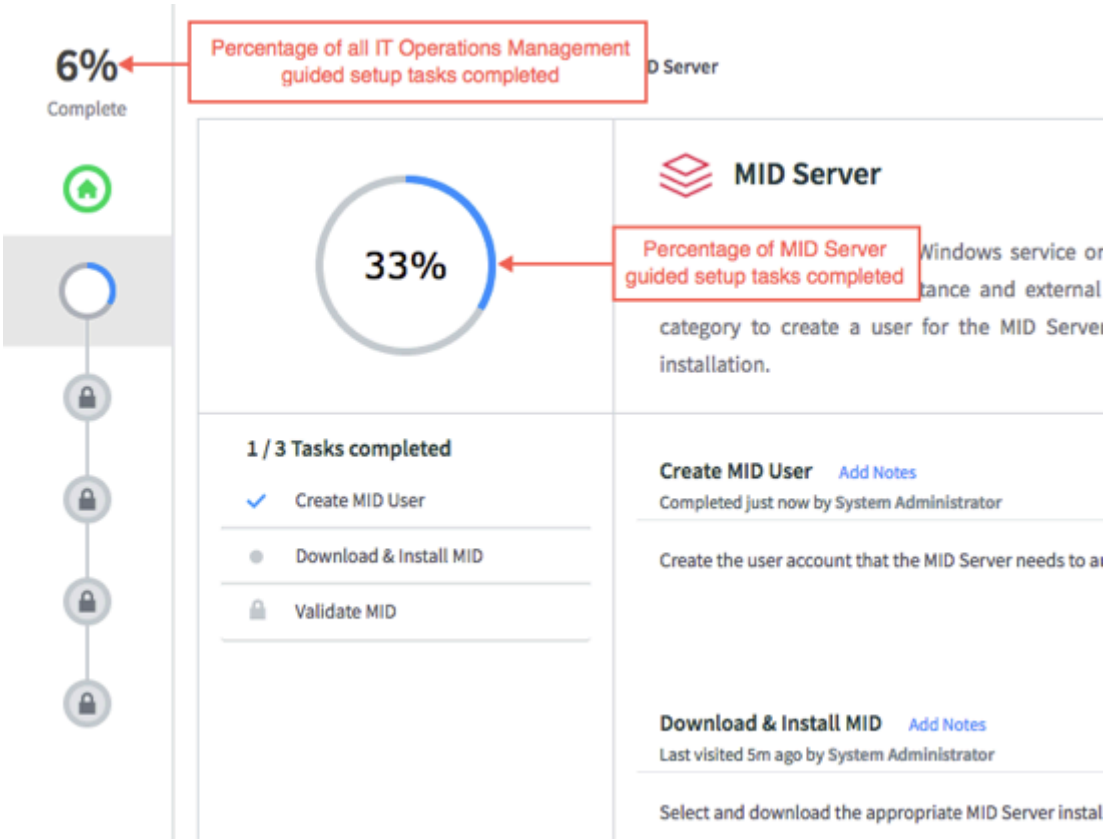
5. Select **Configure** to create the MID Server user and follow the instructions in the help pane that appears on the right side of the screen.

> **Important:**
> If you configured MID Servers manually before starting Guided Setup, select from that information to complete each specific task.

6. When you have provided the requested information for the MID Server user, select **Submit**, and then select **Mark as Complete** at the bottom of the help pane.
The view returns to the task list. Notice that the circular progress indicator for the category shows 33% of the MID Server configuration complete. The progress indicator on the left side of the screen shows the completion percentage for all the IT Operations Management tasks.



7. Select **Configure** for the next task, **Download & Install MID**.

   - Java 17.0.12 is bundled with the MID Server installer package and is installed on the host for all new MID Servers. The installer automatically configures Java 17.0.12 to run in your environment. No additional configuration is required. This version supports both 64-bit Windows MID Servers and 64-bit Linux MID Servers. The MID Server requires a minimum JRE version 17.0.10, and recommended version 17.0.12. If you are using a lower version than 17.0.10, you may see encryption related issues.

   - For information about the system requirements to host MID Servers, see MID Server system requirements

8. Validate your new MID Server.

What to do next

If necessary, deploy multiple MID Servers from a single host in your network. Otherwise, proceed to configure your MID Server.

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Configuring MID Servers

After installing and validating your MID Servers, ensure that they have access to sufficient system resources, probe the proper targets, and communicate with the instance as expected. Configure MID Server selection criteria, create clusters for failover protection, and set up MID Servers in different domains to protect data.

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Some of these configuration procedures rely on data found in the MID Server references home page. See that page for links to the parameters, properties, and privileged commands you need to fine tune the behavior of your MID Servers. You can apply controls to individual MID Servers or to all the MID Servers in your environment. Remember to restart the MID Server after any configuration change for those changes to take effect.

MID Server selection

MID Servers are selected for use based on three criteria: applications, IP address or range, and capabilities. You can designate specific applications for a given MID Server, such as Discovery or Orchestration. You can specify an IP address or a range that a MID Server is allowed to work within. Some applications require specific capabilities, and so are restricted to MID Servers with those capabilities.

MID Server selection

Configure the way your instance selects a MID Server, either by application, IP address ranges, network capability, or behavior.

MID Server capabilities

Create capabilities that define the specific functions of a MID Server within an IP address range.

MID Server IP range auto-assignment

Configure the system to automatically assign a qualified MID Server to a subnet by that subnet's IP address range.

Map an IP address to a DNS name

Map host server DNS names to IP addresses if your MID Server manages resources within defined IP ranges.

Configure MID Server as WinRM trusted host

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Add servers, which are part of WinRM, as trusted hosts on all MID Servers that Discovery or Service Mapping use for discovery.

File permission enforcement for Windows MID Servers

To improve security, Windows MID Servers will enforce Windows file permission restrictions. This will prevent compromised accounts from accessing unauthorized files by restricting their permissions to the minimum necessary for their role.

MID Server clusters

MID Server clusters are groups of MID Servers which provide support to each other in the forms of load balancing and fail-over protection. Work sent to a MID Server that is part of a cluster is automatically balanced between all the MID Servers in that cluster. MID Servers in a fail-over cluster each have a configured order that the platform uses to determine which MID Server to use next in case of failure.

Create a MID Server cluster

Create a MID Server cluster for load balancing and fail-over protection.

Set thread use

Set the number of threads your MID Server uses for the desired MID Server speed, based on hardware capabilities and competing applications running on the host.

Domain separation

Domain separation segregates MID Servers based on the records they can access. The credentials configured in a MID Server's config.xml file determine which records that MID Server can read, update, or create. You can specify MID Server policy records that only MID Servers from the same domain can use.

MID Server domain separation

Set up your MID Servers in different domains to restrict the records and credentials that a MID Server can access.

Synchronize a JAR file to MID Servers

Upload a JAR file to an instance and synchronize it to all MID Servers connected to that instance. Use JAR file synchronization to create policies that only a MID Server from the same domain can use.

MID Servers used for credential-less Discovery

MID Servers that are used for credential-less Discovery require special configuration to run Network Mapper (Nmap) commands on target computers.

Install and uninstall Nmap on a MID Server

You must install Nmap on each MID Server running on a Windows host. When given the proper capability, those MID Servers can discover some basic information about CIs in your network if normal authentication fails.

MID Server extensions

vCenter event collector

The vCenter event collector listens for vCenter-related events and updates the CMDB accordingly. The event collector allows the CMDB to be updated with changes to virtual machines (VMs), in addition to the updates detected by Discovery. A change to a VM is sent as an event from the vCenter server to the vCenter event collector. When an event is received, the CMDB is updated

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accordingly. Full vCenter Discovery does not need to rerun. For some events, such as powered on and powered off events, Discovery does not need to run again at all. For most events, Discovery runs only on the necessary vCenter resource.

SNMP trap collector extension

The SNMP trap collector is a MID Server extension that listens for SNMP traps from the devices on your network. Upon receiving a trap, the MID Server sends the trap to the instance for further processing by Event Management. If Event Management is not active, traps are not processed and are discarded by the instance.

MID Server selection

You can configure MID Server selection by application, IP address ranges, network capability, or behavior. Specific MID Servers can be assigned to particular tasks, or the MID Server can be selected automatically. MID Servers can use domain separation to limit the scope of discoveries and event management.

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

The MID Selector used by most applications has three modes to select a MID Server:

- **Auto-select MID Server**: Selects from MID Servers based on MID Server criteria, regardless of whether they are members of a cluster.
- **Use specific MID Server**: Automatic reassignment to another MID Server is not supported.
- **Use specific MID Server cluster**: Automatic reassignment to another MID Server only selects from members of the specified cluster.

For Agent Client Collector, refer to Automatic MID Server selection.

MID Server criteria

MID Servers offer these types of criteria that help an application determine which MID Server to use:

- **Application**: The application that you specify on the MID Server. You can designate these applications for a specific MID Server:
  - Discovery
  - Orchestration
  - Service Mapping

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- Event Management
- Operational Intelligence
- Cloud Management

An **ALL** application option is also available. By default, this option includes all applications. You can configure which applications are included in the **ALL** designation.

- **IP address or range**: The IP address or the IP ranges that the MID Server is allowed to work within. You can specify an IP address or IP range in the application, such as on a Discovery schedule or an Orchestration activity, and for the MID Server. If the IP configured in the application matches the IP address or falls within the allowable IP range configured on the MID Server, a match is possible, and that MID Server passes this criteria. To have the instance automatically assign IP ranges (subnets) to available MID Servers, see Using MID Server IP range auto-assignment.
- **Capabilities**: The network capability an application needs to use, such as the PowerShell Orchestration activity or the Workflow Studio PowerShell step. Some applications, like Cloud Management, require a specific capability.

> **Note:**
> Discovery and Service Mapping can also use behaviors, which determine the type of port probes used during the port scan phase of Discovery. Both Discovery and Service Mapping use a behavior to discover Create a discovery behavior for Unix-based load balancers. Other applications do not use behaviors. Behaviors are not used for auto-selection, default MID Servers, or specific MID Servers as described below. See Discovery behaviors for more information.

How an application selects a MID Server

If you do not specify a specific MID Server for an application to use, the application tries to select one. Each application relies on different criteria to select an appropriate MID Server.

Application	Supported Application on the MID Server	IP address range	Capability
Discovery (Select **Auto-Select MID Server** on the Discovery schedule)	The **Discovery** or **ALL** application must be specified on the MID Server.	Discovery uses IP ranges that you configure on the Discovery Schedule form to see if they fall within the IP ranges that you configure on the MID Server, or the **ALL** IP ranges option must be selected on the MID Server.	N/A **Note:** Any configured behaviors are ignored.
Orchestration	The **Orchestration** or **ALL** application must be specified on the MID Server.	The target IP address that you configure in an Orchestration activity must fall within the IP ranges that you configure on the MID Server, or the **ALL** option must be selected on the MID Server.	The capability that is required for an Orchestration activity must match the capabilities you configure on the MID Server, or the MID Server capability must be set to **ALL**.

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Application	Supported Application on the MID Server	IP address range	Capability
Service Mapping	The **Service Mapping** or **ALL** application must be specified on the MID Server.	The endpoint IP address must fall within the IP range that you configure on the MID Server, or the **ALL** option must be selected on the MID Server.	One of the supported Service Mapping capabilities (for new installs) must be configured on the MID Server, or the MID Server capability must be set to **ALL**.
Event Management	The **Event Management** or **ALL** application must be specified on the MID Server.	The IP configured in the event connector instances, such as Configure event collection from HPOM, must fall within the IP range configured on the MID Server.	
Cloud Management	N/A	N/A	The **Cloud Management** or **ALL** capability must be added.

Mode: Auto-select MID Server

During initial work assignment to a MID Server, or when failing over existing work from a down MID Server to another MID Server, the MID selector picks a set of suitable MID from a given status level by traversing the steps below once. If at any step it finds at least one server, all remaining steps are skipped.

1. Suitable MID Servers with status = Up.
2. Default MID Server (if it was defined) with status = Up.
3. Suitable MID Servers with status = Upgrading or Paused.
4. Default MID Server (if it was defined) with status = Upgrading or Paused.
5. Suitable MID Servers with status = Upgrade Failed, Draining, Drained, Drain Failed, or Down.
6. Default Mid Server (if was defined).

All steps which are below an application's minimum status level are skipped. Many applications (such as Discovery) allow Up or Degraded MID Servers, other applications only allow Up MID Servers.

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Mode: Use specific MID Server cluster

During initial work assignment to a MID Server, or when failing over existing work from a down MID Server to another MID Server, the MID selector picks a set of suitable MID from a given status level by traversing the steps below once. If at any step it finds at least one server, all remaining steps are skipped.

1. Suitable Mid Servers with status = Up.
2. Suitable Mid Servers with status = Upgrading or Paused.
3. Suitable Mid Servers with status = Upgrade Failed, Draining, Drained, Drain Failed, or Down.

All steps which are below an application's minimum status level are skipped. Many applications (such as Discovery) allow Up or Degraded MID Servers, other applications only allow Up MID Servers.

A MID server is picked from set of MID servers at the highest status level as follows depending on cluster type:

- **Load Balance Cluster**: picks a MID Server within the status level randomly.
- **Fail-over Cluster**: picks a MID Server with best cluster records' order number (0 = best).

Mode: Use a specific MID Server

Discovery and Event Management can use a MID Server that you specifically call out.

Note:
Selecting a specific MID Server is not the same as specifying the default MID Server for an application. A specific MID Server is always used. If it is **Down** or not validated, the application does not execute commands against the MID Server. A default MID Server is fallback that is used when the auto-selection of MID Servers does not find any eligible MID Server.

Application	How you specify a specific MID Server	Criteria that the default MID Server must mee
Discovery	Choose the MID Server on the Discovery schedule. **Note:** You can also specify a cluster of MID Servers.	If you select a MID Server without the **Disc** **ALL** application, it automatically adds the I application.
Orchestration	N/A	N/A
Service Mapping	N/A	N/A
Event Management	Choose one or more MID Servers on the connector instance event collection, such as Configure event collection from HPOM.	N/A
Cloud Management	N/A	N/A

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Note:
If a MID Server manages resources within defined IP ranges for Orchestration, you must map the fully-qualified domain name (FQDN) of a server with its IP address to run certain activities, such as Exchange activities.

Domain separation

If you are using domain separation, you can configure MID Servers to be in separate domains. The domain that the MID Server is in affects how the application selects the domain:

Discovery and Service Mapping: On the Discovery schedule, the MID Servers and clusters that available for selection are limited to the same domain of the user who is configuring the schedule. This also applies to the auto-selection option: only MID Servers in the same domain as the user can be automatically selected.

MID Server selection test for Service Mapping

If Service Mapping is active, you can preview which MID Server that Service Mapping uses for a specific target device or computer. To do this, navigate to **Service Mapping** > **MID Servers** and click **MID Selection Test**. Enter the IP address and an optional application and capability, and then click **OK**. The name of the MID Server that Service Mapping will use appears in the window.

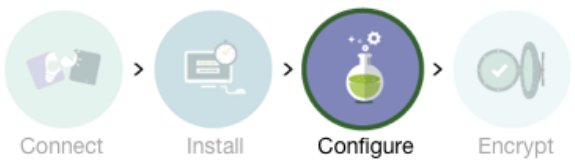
Related topics

Configure a default MID Server for each application

You can configure a default MID Server that an application can use if all other possible MID Servers are unavailable. You can narrow down the list of applications that are included in the definition of ALL.

Before you begin

Role required: agent_admin or admin



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8. Configure MID Server security

About this task

Applications are only available when their respective plugins are activated.

The default MID Server is used when applications fail to find a suitable MID Server that matches configured criteria during auto-select. The default MID Server for the **ALL** application is used if the default MID Server for the specific application is not available. Some applications also offer a property to set the default MID Server.

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Important:
If you configure a MID Server for ALL IP ranges (type **Include**) and also create an IP range of type: **Exclude** for the same MID Server, the system ignores the excluded IP range for that MID Server.

The default MID Server does not need to meet any criteria (application, IP range, behavior, or capability) to be used. Specifying a default MID Server is optional, and you can use a MID Server as the default for more than one application.

Application	Additional notes
Discovery	Discovery attempts to use the default MID Server when the Discovery schedule specifies **Auto-Select MID Server** and Discovery cannot find any MID Servers with the correct application and IP range.
Orchestration	Orchestration attempts to use the default MID Server when it cannot find any MID Servers with the capabilities that you define in the Orchestration activity. You can also specify a default MID Server. The value in that property automatically synchronizes with the default MID Server you select in the Orchestration application.
Alert aggregation and RCA	Not applicable. The MID Server is selected if it has the RCA capability. Route to right MID by domain.
Service Mapping	If there are no MID Servers with matching application, capability, or IP range, Service Mapping uses the default MID Server.
Event Management	You can specify a default MID Server for Event Management using the mid.server.connector_default system property. Event Management does not use the default MID Server in the application record.
Cloud Management	N/A

Procedure

1. Navigate to **All** > **MID Server** > **Applications**.
   The list of installed applications that can use MID Servers appears.
2. Click the name of an installed application.
3. Select a MID Server from the list in the **Default MID Server** field.
4. To select additional MID Servers for this application, click **Edit** in the **MID Servers** related list and select alternate MID Servers that this application is allowed to use.
5. Click **Update**.

Select applications to include in the definition of ALL for a MID Server

You can narrow down the list of applications that are included in the definition of ALL.

Before you begin
Role required: agent_admin or admin

About this task
You can specify the ALL application for a MID Server, which means that the MID Server is allowed to work with any of the applications that require MID Servers, such as Discovery, Event Management, Service Mapping, and so on. But you might not want all applications to be included

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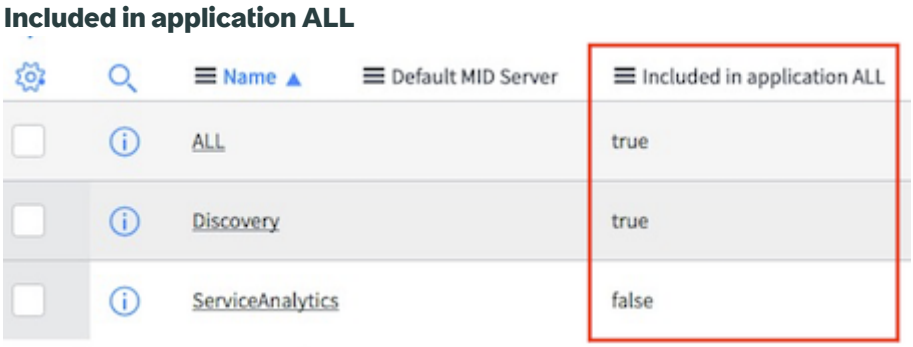
in the definition of ALL. For example, you might want to exclude Service Mapping from the ALL definition if you already have a dedicated MID Server to work with Service Mapping.

Procedure

1. Navigate to **All** > **MID Server** > **Applications**.
   The list of installed applications that can use MID Servers appear.
2. If you do not see the **Included in application ALL** column, you can personalize the list and add it.



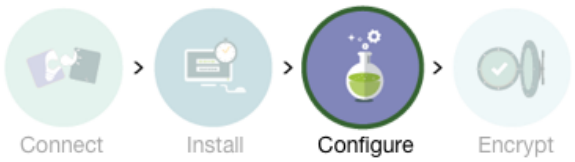
3. For each application, double-click the value in the **Included in application ALL** column.
4. Change the value to **true** (to include) or **false** (to exclude).

Configure an IP address range for the MID Server

You can manually configure an IP address range for the MID Server to explore.

Before you begin

Role required: agent_admin or admin



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

Applications, such as Discovery and Orchestration, can specify an IP range or the specific IP address of a target. When the application looks for a MID Server to use during auto-selection, it chooses a MID Server whose IP range includes the application's range or specific IP address. Applications also use other criteria, such as the MID Server's supported application or capability. See MID Server selection for more information.

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Note:
This is a manual configuration procedure. To learn how the system can assign IP address ranges to selected MID Servers automatically, see Using MID Server IP range auto-assignment.

These applications use IP ranges as follows:

- **Orchestration**: Use the IP address of the target machine (together with the capability) to select the correct MID Server for Orchestration activities. See the procedure in this topic to configure the IP address.
- **Service Mapping**: Select the MID Server whose IP address range matches the IP in the discovery request. See MID Server configuration for Service Mapping for more information.
- **Discovery**: Can select an IP address range using the same criteria as Service Mapping. Discovery can also use a quick IP range that you specify in the Discovery schedule.

Tip:
You can also use the **ALL** IP range, which allows the MID Server to be used with any range of IP addresses that an application specifies. This only allows the MID Server to access IP ranges, it does not mean that the MID Server can actually reach all of the IP ranges. To function with an application, the MID server must have access to the IP ranges that the application needs.

Valid IP address ranges can be as follows:

An IP address in dotted decimal or hexadecimal format. The hexadecimal format can be explicitly prefixed with 0x, this is not mandatory. Here are examples:

- 10.11.144.155
- 0x0A0B909B
- 0A0B909B

An IP address range in dotted decimal or hexadecimal format. Here are examples:

- 10.11.144.150-10.11.144.160
- 0x0A0B9096-0x0A0B90A0
- 10.11.144.150-0x0A0B90A0

An IP network address with the net mask specified after a slash (/) in regular notation (0-32 inclusive) or in IP address notation. Here are examples:

- 10.11.144.0/24 10.11.144.0/255.255.255.0
- 10.11.144.0/0xFFFFFF00
- 0x0A0B9000/24
- 0x0A0B9000/0xFFFFFF00

Procedure

1. Navigate to **All** > **MID Server** > **IP Ranges**.
2. Click **New**.
3. Complete the form, using the fields in the table.

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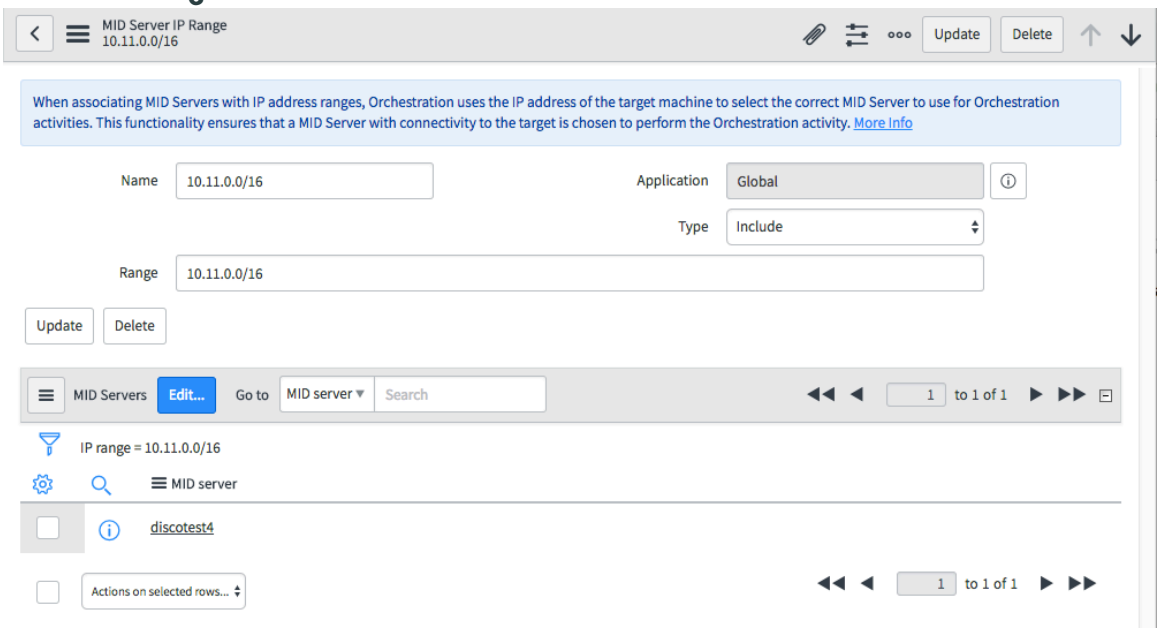
IP address ranges



Field	Description
Name	Enter a descriptive name.
Application	Application scope for this IP range. The default is **Global**.
Type	Select the type of range: ○ **Include**: Include the specified IP range. ○ **Exclude**: Exclude the IP address range. **Note:** If a MID Server is configured for **ALL** applications, any IP addresses configured for exclusion are ignored by the system. If your goal is to configure default MID Servers for separate applications in your system, see Configure a default MID Server for each application.
Range	Enter the range in a valid format.
Related list	
MID Servers	The MID Servers that can use this IP address range.

4. Click **Save**.

Important:
IP ranges assigned manually prior to using auto-assignment in the Discovery Quick Start are affected as follows:

- Individual IP ranges are retained and appended to the ranges assigned automatically by the system for the designated MID Server.
- If the MID Server was configured with the **ALL** ranges selection, the auto-assignment feature overwrites that designation with the ranges it finds.

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What to do next
Open the **ALL** IP range record and configure the MID Servers that you want to use with any set of IP addresses.

Override the MID Server selection filter

Use the override feature to write your own filter condition that overrides the normal MID Server selection criteria for an application. An override has precedence over the default filter and can be defined for a specific selection condition.

Before you begin
Before attempting to create an override filter, be sure you understand the criteria the platform uses to select MID Servers. See MID Server selection for details.

Role required: admin

---

1. Ensure that the MID Server can connect to elements inside and outside your network
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3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

Note:
The override feature is intended for Cloud Management and Cloud Discovery only. The **Override by capability** filter is provided by default.

There are four MID Server selection filters included in the base ServiceNow system. These filters are applied to all MID Servers in order until the system finds a matching condition:

- Status Filter
- App Filter
- Capability Filter
- IP Filter

Important:
The override feature allows multiple filter types but only one override filter for each filter type. The **Override selector** filter type overrides all other filters and takes complete control of the MID Server selection. If this type is active, it is the only filter applied.

Procedure

1. Navigate to **All** > **MID Server** > **Mid Selector Override**.
   The list of MID Server overrides appears.

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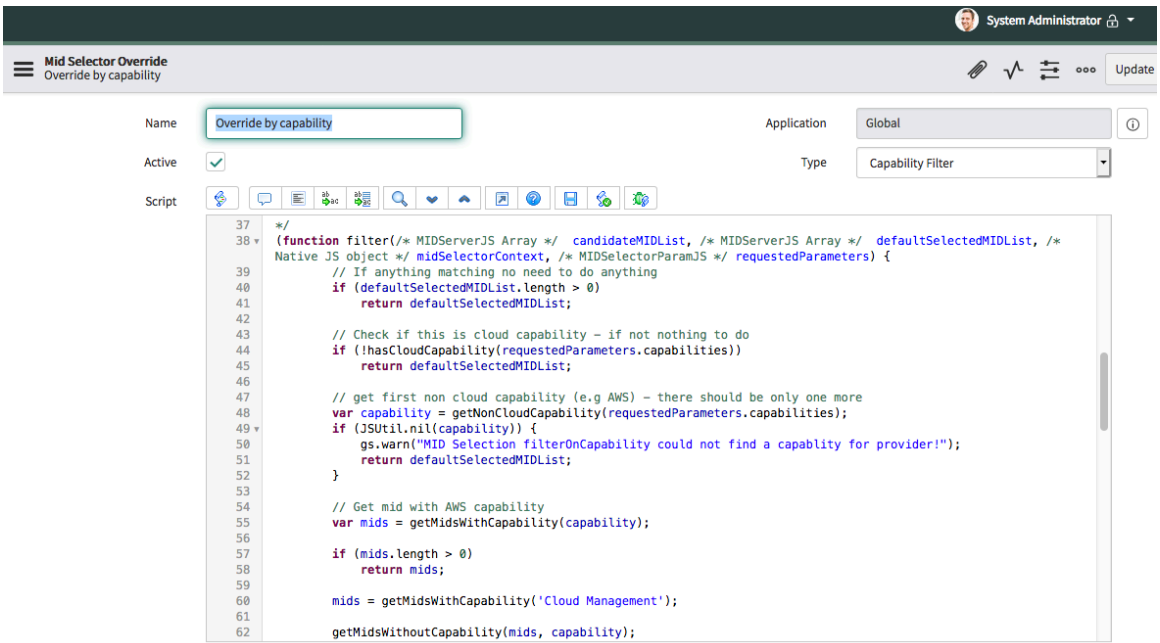
2. Select **New** to create a new filter.
3. Complete these fields:
   - **Name**: Unique name for this override. Ensure that you can identify the override type by the name.
   - **Script**: Condition for this filter. Create the MID Server selection logic for your override in this field, using the directions provided in the function template. Look at the **Override by capability** filter as an example before starting to create your filter.
   - **Type**: Type of override being configured. Select one of the four default filters to override with your condition, or select **Override selector** to create a filter that overrides all the others.
4. Select **Submit**.



Example:
The Cloud Discovery schedule selects MID Servers based on Applications and Capabilities. To select different MID Servers for different service accounts, you can customize the **MID Selector Override**. After the line `(function filter(/* MIDServerJS Array */ candidateMIDList, /* MIDServerJS Array */ defaultSelectedMIDList, /* Native JS object */ midSelectorContext, /* MIDSelectorParamJS */ requestedParameters)` { add the following code with your information:

```
var result = [];

 if (JSON.parse(midSelectorContext).service_account_id ==
 '[example-account-id]') {
  for (var mid in defaultSelectedMIDList) {
   if (defaultSelectedMIDList[mid].sysId == '[example-MID-1]' ||
 defaultSelectedMIDList[mid].sysId == '[example-MID-2]')
    result.push(defaultSelectedMIDList[mid]);
  }
  return result;
 }
```

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Using MID Server IP range auto-assignment

Discovery Quick Start can automatically assign ranges of IP addresses, called subnets, to qualified MID Servers. This subnet auto-assignment requires SNMP credentials for read-only access to routers Discovery uses. The Automation Status Set form shows summary details of subnet Discoveries and the IP range assignments for associated MID Servers.

1. Ensure that the MID Server can connect to elements inside and outside your network
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5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

To be automatically assigned to a subnet, a MID Server must be:

- In a running **(Up)** state.
- Successfully validated.
- Able to access one or more subnets in your network.

The subnet assignments that the instance makes for your MID Servers are stored in the Automation Status Set [automation_status_set] table. For details about MID Server auto-assignment, see Discovery Quick Start.

Important:
You must auto-assign at least one MID Server to create a schedule automatically.

Required SNMP OIDs for MID Server IP range auto-assignment

Customers who use network service providers must request specific SNMP access to use MID Server IP range auto-assignment.

IP range auto-assignment requires SNMP credentials for read-only access to all routers that Discovery uses to identify subnets. In addition, your service provider must grant the following SNMPWALK access:

- iso.org.dod.internet.mgmt.mib-2.ip.ipRouteTable (1.3.6.1.2.1.4.21)
  - ipRouteDest (1.3.6.1.2.1.4.21.1.1)
  - ipRouteNextHop (1.3.6.1.2.1.4.21.1.7)
  - ipRouteType (1.3.6.1.2.1.4.21.1.8)
  - ipRouteMask (1.3.6.1.2.1.4.21.1.11)
- iso.org.dod.internet.mgmt.mib-2.ip.ipForward.ipCidrRouteTable (1.3.6.1.2.1.4.24.4)

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- ipCidrRouteDest (1.3.6.1.2.1.4.24.4.1.1)
- ipCidrRouteMask (1.3.6.1.2.1.4.24.4.1.2)
- ipCidrRouteNextHop (1.3.6.1.2.1.4.24.4.1.4)
- ipCidrRouteType (1.3.6.1.2.1.4.24.4.1.6)

View automation status sets and IP range assignments

The Automation Status Set form shows summary details of a subnet Discovery and the subsequent IP range assignments for MID Servers selected for automatic subnet assignment.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **MID Server** > **Automation Status Sets**.
2. Select a status record for a subnet Discovery you want to view.
   The form contains read-only status information about the selected Discovery, the subnets found, and the range assignment process for the MID Servers you selected for auto assignment.

> **Important:**
> IP ranges assigned manually prior to using auto-assignment in the Discovery Quick Start are affected as follows:
>
> - Individual IP ranges are retained and appended to the ranges assigned automatically by the system for the designated MID Server.
> - If the MID Server was configured with the **ALL** ranges selection, the auto-assignment feature overwrites that designation with the ranges it finds.

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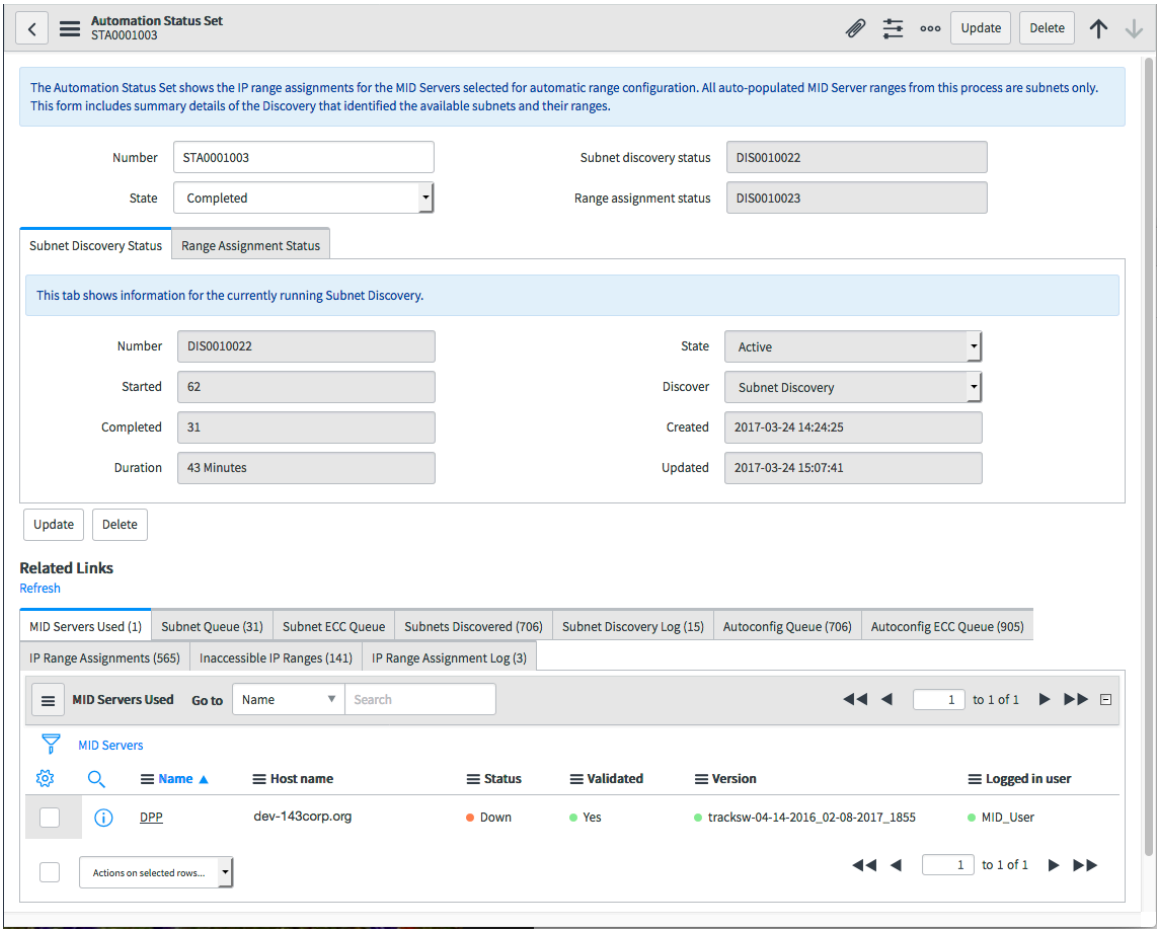
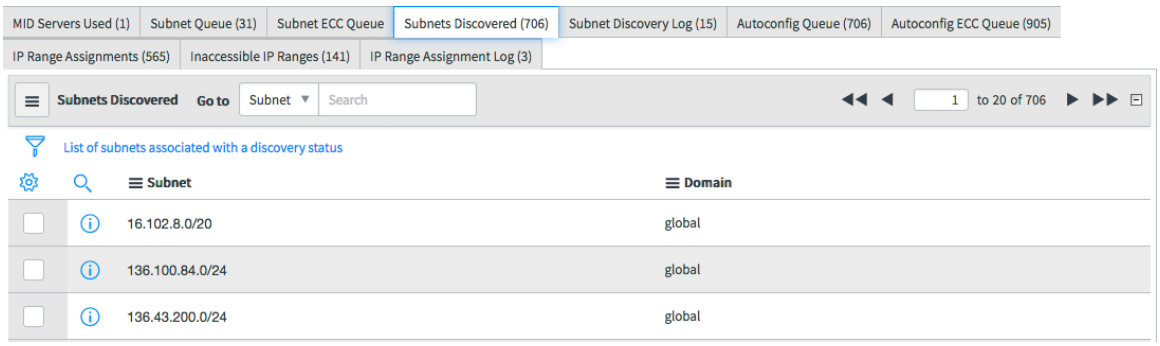
Automation Status Set form



3. Select the **Subnets Discovered** related list to view the list of subnets available for assignment.



4. Select the **IP Range Assignments** related list to view the IP ranges that were assigned to a MID Server.

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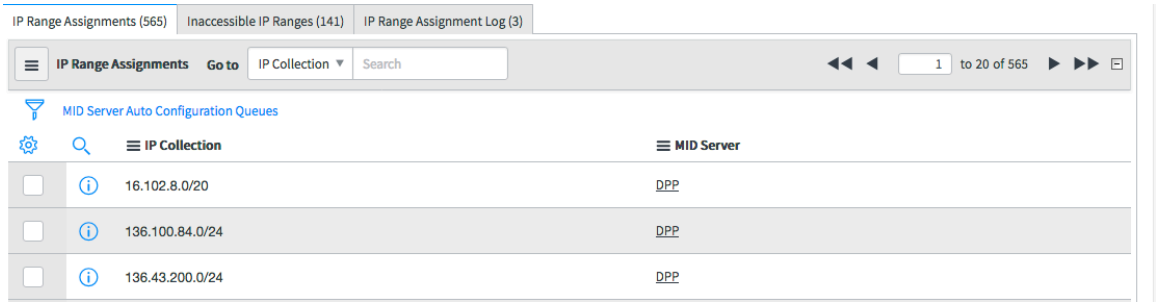
Warning:
IP ranges identified by Discovery are stored in the IP collection [ip_address_collection] table, which is only used for MID Server IP range auto-assignment in the Jakarta release. This table is intended for future development and **should not** be used in any customizations, including column additions, business rules, or scripting actions.



File permission enforcement for Windows MID Servers

To improve security, Windows MID Servers enforce Windows file permission restrictions. The enforcement limits access to the MID Server files to a restricted allow list of users and groups.

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

File permission enforcement for Windows MID Servers goes into effect on the MID Server on start up in Orlando. By default the agent folder is locked to four user accounts and groups: the local admin group, the system account, creator owner, and the user account the Windows MID Server is using. The list of permitted user accounts is managed by a allow list, which is controlled by the MID Server parameter *`mid.windows_host.file_permissions.allow_list`*. This parameter takes a string of comma separated group names, user names, and security identifiers (SID). Group and user names must follow SAM account naming requirements. Domain accounts must be specified by using the SID.

Roll back file permission changes

Changes to the file permissions are recorded, and the last used settings are saved in the `/etc` folder as a backup. The file is `fileperm.aclsave`. Open a command prompt and run the command `icacls <agent_folder> /restore <agent_folder>/etc/fileperm.aclsave` where <agent_folder> is name of your agent folder.

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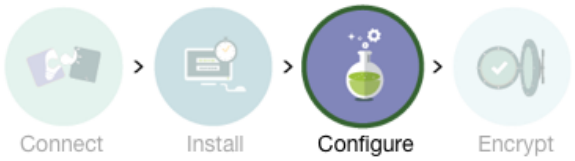
Run a MID Server as a non-admin

To run a MID Server as a non-admin user, it must first be installed using an admin account. Then add the non-admin user to allow list and restart the MID Server. Once the new enforcement rules run, the MID Server can be switched to the non-admin service account. See Manually install a MID Server on Windows for more information on setting up non-admin Windows MID Servers, or Run Linux MID Servers as non-root users for Linux MID Servers.

Map an IP address to a DNS name

Associate the IP address to a DNS name to ensure the appropriate MID Server is selected. The IP Address range configuration determines which MID Server is selected. If the MID Server manages resources within defined IP ranges, all host servers must have their DNS names mapped to an IP address.

Before you begin
Role required: admin



1. Ensure that the MID Server can connect to elements inside and outside your network
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7. Configure your MID Server
8. Configure MID Server security

The association of an IP address to a DNS name ensures that the appropriate MID Sever is selected based on the IP Address range configuration. If this is not done, Orchestration reverts to the default MID Server.

If Discovery cannot discover the server and resolve the DNS name to an IP address, you must create the mapping manually.

Important:
The platform does not map **localhost** to 127.0.0.1 automatically. You must create that mapping using this procedure.

Procedure

1. Enter **cmdb_ci_dns_name.list** in the navigation filter.

   A list of DNS names appears.

2. Check the list for your host server.

   If the server does not appear in the list, continue with this procedure.

3. Click **New**.

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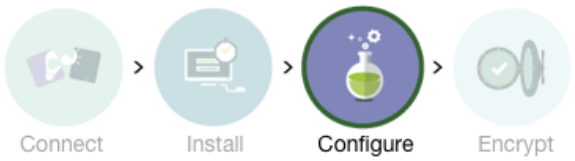
4. Enter the fully-qualified domain name (FQDN) of the host server in the **Name** field.
5. Right-click in the form header and select **Save** from the context menu.
6. In the **IP Address** related list, click **New**.
7. In the **IP Address** field, enter the IP address of your host server.
8. In the **Nic** field, select **eth0** or your preferred network interface controller.
9. Leave the **Netmask** field blank.
10. Click **Submit**.

Configure MID Server capabilities

MID Server capabilities define the specific functions of a MID Server within an IP address range, allowing an application to select the most appropriate MID Server. Configure capabilities on MID Servers for applications like Orchestration, Cloud Management, and Service Mapping.

Before you begin

Role required: admin or sm_admin



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6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

Several applications use capabilities, IP ranges, and MID Server selection to narrow the pool of MID Servers the applications need.

Note:
At least one capability is required for each MID Server used by Orchestration. See MID Servers for Orchestration for more information.

The following capabilities are available by default with Discovery:

All	IBM	Resolve DNS
Ansible	JDBC	REST
AWS	NetApp	SNMP
Azure	Nmap	SOAP
Chef	OpenStack	SSH

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Cloud Management	PowerShell	VMware
Google	RCA	WMI

Procedure

1. Navigate to **All** > **MID Server** > **Capabilities**.
2. Select an existing capability or select **ALL** to include all capabilities.

   Note:
   Ensure that each IP address range has MID Servers with the necessary capabilities to complete the Orchestration activities on that network segment.

3. Create a new capability:

   a. Select **New**.

   b. Configure the value for a custom capability.

   Example
   An example is a capability for **DOMAIN**, with a value of **service-now**.

   c. Select **Submit**.

4. Select **Edit** in the MID Servers related list to add MID Servers to the capability.
5. Select one or more MID Servers for this capability from the **Available** list.
6. Select **Save**.

   The capability defined here also appears in the primary record for this MID Server.

MID Server capabilities

MID Server capabilities define the specific functions of a MID Server within an IP address range.

Nmap capability

The **Nmap** capability is only assigned to MID Servers for which the Network Mapper (Nmap) scanner has been installed for credential-less Discovery. This capability cannot be added to or removed from any MID Server manually. For instructions on installing or uninstalling Nmap, see Install and uninstall Nmap on a MID Server

MID Server capability values

Capabilities provided in the base system do not have a defined value string. The capability value can be blank, a single value, or a * (wildcard). A MID Server configured to use a capability that has no value can locate any device using that capability's protocol. If a capability has a defined value, the MID Server using that capability finds only those devices using that protocol that match the value string exactly. The exception to this is the Resolve DNS capability, which is configured to resolve any DNS name into an IP address using a partial string match. The * (wildcard) will match a request capability specifying any non-blank value.

Starting with the Madrid release, the **[capability name]:[value]** combination appears in the slushbucket when you add a capability to a MID Server. This combination allows you to see all the capabilities that have different values, even if the capability name is the same. For example, if you are using the Cloud Management capability, and you use the value field to specify the us-

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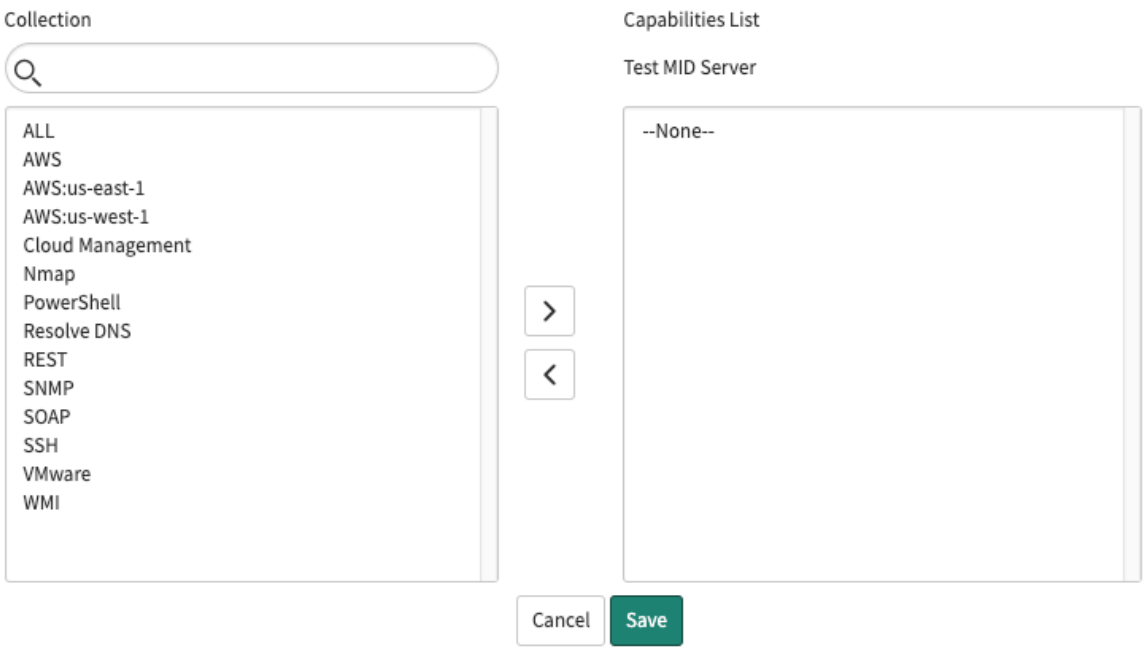
west logical datacenter on one of the capability records, you can see the combination in the **Collection** list.



MID Server selection

The MID Server is selected using an algorithm based on the capabilities available. The selector produces a list of suitable MIDs using filters in the following order: **server status** > **applications** > **IP range** > **capabilities**. The algorithm searches the capabilities in the following sequence and, if a step finds at least one MID server, the remaining steps are skipped:

1. **Exact value match:** Find each MID Server containing capabilities with name/value pairs with an exact match to all requested capability name/value pairs. Blank is a valid value. * (wildcard) values are ignored.
2. **Wildcard value match:** The same as an exact value match, but also allows a non-blank request value to match MID server capability records containing value *.
3. **Special capability name ALL:** Find each MID Server containing the special capability name ALL, ignoring capability's value field.

Note:
If the requested capability name does not exist in the ecc_agent_capability table, **BadArgumentException** is thrown rather than falling back to the ALL capability.

Scripted MID Server capability value matching

You can use value tests to create capabilities that find devices using values without requiring exact string matching. Action on these values is controlled by a user-defined script.

The Resolve DNS capability is provided in the base system and is configured to resolve DNS names into IP addresses for devices whose names end with a specified domain name. The capability **Value** entered is automatically prefaced with a dot during processing to match domain syntax. This value can contain one or more sub-domains, but must include the end of the domain string. Matching devices must end with the identical syntax. The script for the Resolve DNS capability determines if a device name matches the criteria defined by **Value**. If a match exists, the platform performs the address resolution automatically. For example, if the value for the Resolve DNS capability is `service-now.com`, the MID Server with this capability finds `lnxlab01.sandiego.service-now.com` and `dbsrv101.sanjose.service-`

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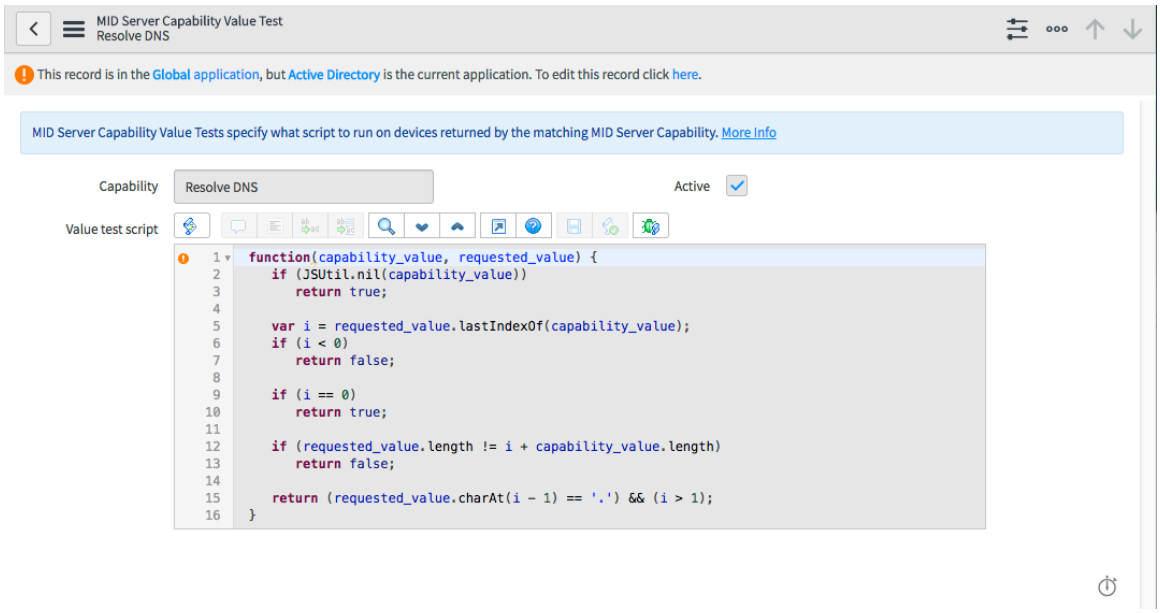
now.com. If the value is changed to `sandiego.service-now.com`, then the MID Server finds only `lnxlab01`.

Note:
If **Value** in the Resolve DNS capability is blank, then all domains match.

To view the script for evaluating this capability, navigate to **MID Server** > **Capability Value Tests** and select **Resolve DNS** from the list.



Configure a MID Server cluster

Group multiple MID Servers to form clusters, then configure clusters for fail-over protection or load balancing. Load-balancing clusters automatically balance work between each MID Server to improve stability and performance, as well as handle fail-over. Fail-over clusters have a configured order used to determine which MID Server to use next if a failure occurs.

Before you begin

Ensure that all MID Servers in the cluster have the same capabilities (Supported Applications, IP Ranges, and Capabilities). A MID Server should not belong to more than one cluster.

Role required: admin

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1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

Create a new cluster or edit an existing cluster.

Procedure

1. Navigate to **All** > **MID Server** > **Clusters**.
2. Click **New** to create a new cluster, or open an existing cluster's record to edit.
3. Name the cluster and select the cluster type: **Failover** or **Load Balance**.
4. Right click in the header bar and select **Save** from the context menu.
5. Click **Edit** in the **Includes MID Servers** Related List.
6. Select appropriate MID Servers for this cluster from the slushbucket.

MID Server clusters

MID Server clusters enable multiple MID Servers with the appropriate capabilities to be grouped together for load balancing and fail-over protection.

External data sources

For performance and reliability reasons, these data sources should not be used with MID Server clusters. These external data sources should only be used with dedicated MID Servers.

- LDAP
- Export sets
- JDBC data sources

Note:
If a MID Server in a cluster fails, the fail-over MID Server starts over at the beginning of the ECC queue task even if much of the information from the JDBC data source was already returned. This can result in duplicate data. For more details, see the Using MID Server clusters for JDBC data sources can cause duplicate and out-of-date data [KB0727739] article in the HI Knowledge Base.

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How clusters work

MID Servers in clusters must be able to connect to the instance and to all the devices with which they are expected to communicate. If all MID Servers in a cluster are down, the discovery is canceled. Make sure all the MID Servers are added to any Access Control List (ACL) in use. MID Server clusters are managed by a business rule called MID Server Cluster Management, which checks to see if the MID Server assigned to a job in the ECC Queue belongs to a cluster.

Load balancing

If the cluster business rule determines that a MID Server is part of a load balancing cluster, the application using the MID Server automatically balances the work between the MID Servers in that cluster. It is good practice to put MID Servers with the same capabilities in a load balancing cluster.

Fail-over protection

MID Servers in a fail-over cluster each have a configured order that the platform uses to determine which MID Server to use next in case of failure. MID Servers in a fail-over cluster work independently and do not load balance with other MID Servers in that cluster (although they might also be members of load balancing clusters). When a MID Server fails, the MID Server Cluster Management business rule selects the highest available MID Server in the order to take over the work. The selected MID Server checks the ECC Queue and starts with jobs that are either Processing or Ready.

Note:
MID Server clustering does not support the ECC queue topics `Command` or `SystemCommand`. If these commands are received, the clustered MID Servers do not redirect the ECC queue to another MID Server. The ECC queue records stay on the ECC queue without being processed.

Configure a fail-over MID Server with at least the same capabilities as the MID Server it is intended to relieve.

Note:
If a MID Server fails while the Shazzam probe is running and auto-selection is configured, failover is not available. The Shazzam discovery stops. Discovery does not automatically choose another MID Server.

MID Server cluster event

The following event is triggered when the platform cannot find a MID Server with the appropriate capabilities to replace a MID Server in a fail-over cluster. Use this event to create an email to notify appropriate users that the cluster has failed.

MID Server cluster event

Event	Table	Description	Business Rule
mid_server.cluster.down	MID Server Cluster [ecc_agent_cluster]	A MID Server cluster has failed	MID Server Cluster Management

Specifying a specific MID Server cluster

You can specify a specific MID Server cluster for a Discovery schedule. The discovery process uses that cluster only. You cannot chain clusters or specify a single MID Server that belongs to multiple clusters.

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Distributed MID Server clusters for Operational Intelligence

The distributed MID Server cluster type is used exclusively in Operational Intelligence, which analyzes Event Management events and generates anomaly alerts. These MID Servers communicate with one another to distribute and balance the workload. For details, see MID Server distributed clusters for Operational Intelligence

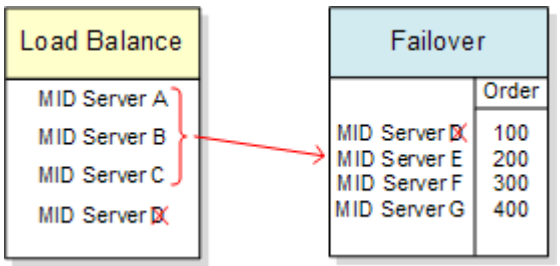
Smart Workload Manager

Using Smart Workload Manager, an application assigns jobs to MID Servers based on true load. The application may used cluster based MID Server selection. In cases where some MID Servers in the cluster slow in processing jobs, the MID Servers which are processing records faster are assigned more jobs.

The instance is aware of individual MID Servers in the cluster and their work load capacity. Work assignments are dynamically distributed based on the real-time performance and metric data of each MID Server. By considering key factors such as current task queue size, processing speed, and system load, tasks will be assigned more efficiently to prevent overloading any single server and enhance overall system stability. MID Servers with lower workload and higher processing speed receive more tasks.

Combining legacy clusters

Combining MID Server Clusters is only for use with legacy selection methods. A MID Server can be added to both types of clusters at the same time. This diagram shows a scenario in which a MID Server from a load balancing cluster (MID Server D) is also present in a fail-over cluster. If MID Server D fails, MID Server E in the failover cluster is available to the load balancing cluster to perform the tasks previously assigned to MID Server D.



Set MID Server thread use

Change the number of threads used by the MID Server according to performance requirements. MID Servers which compete with other programs for CPU time can use fewer threads than the default. MID Servers which need more speed, and have a host computer powerful enough, can use more threads.

Before you begin
Role required: admin

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About this task

The three parameters define the maximum numbers of worker threads that can run simultaneously in each pool: *threads.interactive.max*, *threads.expedited.max*, and *threads.max*. Changing the thread parameters can affect the MID Server performance.

The interactive thread pool is designed for executing interactive messages including system commands and heartbeats. They are typically lightweight, so usually there is no need to change the default value. The expedited thread pool is designed for executing messages that have higher priority than the standard ones but less than interactive ones. Unless you have applications that produce a lot of expedited messages, there is no need to change the default value for *threads.expedited.max*.

The standard thread pool is the busiest pool. Most probes are using it and they can take a lot of system resources such as CPU, memory, and so on. You can set the MID Server to use as few as five threads without issue. To increase the speed of the MID Server if the host is powerful enough or lightly loaded with other programs, you can increase the threads setting.

The threads setting depends on the limitation of the CPU speed, memory, and operating system of the host machine. You might have to experiment to find the optimal threads count that works best when the MID Server is busy so it does not exhaust the host machine's hardware limitations. This means you may have to refine the thread count to best meet your situation. The following general observations may be useful:

- PowerShell is resource intensive and threads may not scale linearly.
- Most MID Server tasks require file handles to do their job.
  - Windows: On the Windows operating system, file handles are available in a fixed quantity. If you configure too many MID Server threads on a Windows host, the MID Server can consume all the file handles before approaching maximum CPU usage. This situation appears as an *Out of file handles* error in the MID Server log and indicates that the MID Server is trying to use too many threads.
  - UNIX and Linux: UNIX and Linux hosts have a much different scheme for allocating file handles. Generally, you can increase MID Server thread use on these operating systems until the CPU of the host is overloaded. See your OS documentation for monitoring CPU usage.
- Each thread on the MID Server requires some memory. Exactly how much memory varies considerably from task to task and depends on the equipment being discovered. To increase

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the number of threads, you might have to increase the amount of memory that Java uses. If you configure insufficient memory, an *Out of memory* error appears in the MID Server log.

- You can set threads.max as high as 200, however, this setting may need to be changed depending on the OS. For example, Windows-based MID Servers running Discovery uses Powershell which is resource intensive. In this case, you may exhaust the CPU power of the host machine with just 50 threads count.

Follow the steps below to change the `config.XML` file. Alternatively, use the `threads.max` connection parameter. See MID Server Connection parameters for more details.

Procedure

1. Open the **\agent\config.xml** file using any text editor.
2. Locate the following lines:

```
<!-- MID Server Threads --><parameter name="threads.max"
 value="25"/>
```

3. Edit the value.
   Keep in mind the cautions described above.
4. Save the record.
5. Restart the MID Server service.

Install and uninstall Nmap on a MID Server

If you decide to use credential-less Discovery in your network, you must install Nmap on each Windows MID Server that you want to use for this purpose. Self-hosted customers whose network security does not permit downloads from `install.service-now.com` must use a specific manual process to install and configure Nmap.

Before you begin

Role required: agent_admin

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

- Assign MID Server IP ranges to all deployed MID Servers. The quickest and most reliable way to do this is with the Using MID Server IP range auto-assignment feature available in the Discovery Quick Start wizard. This method ensures that the set of MID Servers configured to access an IP address range is comprehensive.

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- Identify the IP ranges you want to explore with credential-less Discovery. Ensure that these ranges can only be accessed by MID Servers with Nmap installed, running on supported Windows hosts.
- Use the **All** option for selecting IP ranges and observe these requirements:
  - Restrict the use of this feature to Windows MID Servers only.
  - Ensure that Nmap is installed on each of these MID Servers.
  - Ensure that the MID Servers can access the entire customer network.
- When you create a Discovery schedule with Nmap enabled, observe these requirements for the MID Server selection options:
  - **Specific MID Cluster**: Verify that Nmap is installed on all MID Servers in the cluster, where each MID Server in the cluster is configured to access the same set of IP ranges.
  - **Auto-Select Mid Server**: When running horizontal Discovery, verify that Nmap is installed on at least one of the MID Servers that can access the Discovery schedule's configured MID Server IP ranges.
  - **Specific MID Server**: Verify that Nmap is installed on each MID Server that can access the schedule's configured MID Server IP Ranges.

Note:
To use credential-less Discovery for Service Mapping, install Nmap on all MID Servers that can access the Discovery schedule's configured MID Server IP ranges.

Role required: agent_admin

About this task

The Discovery - IP Based [com.snc.discovery.ip_based] plugin provides connection to the installer for Nmap and the programming elements that allow a Windows MID Server to run approved scripts on target CIs for credential-less Discovery. MID Servers on which Nmap is installed can execute an Nmap command configured to perform reverse DNS name resolution, discover MAC addresses, or gather OS information on target CIs without using credentials. The Discovery - IP Based plugin is activated automatically when the Discovery [com.snc.discovery] or Event Management and Service Mapping Core [com.snc.service-watch] plugins are activated.

Service Mapping and Nmap

Service Mapping does not check for the presence of the **Nmap** capability and selects the MID Server based on the IP address only. To ensure that Service Mapping does not select a MID Server without the **Nmap** capability, install Nmap on all MID Servers assigned to the IP address ranges for which you want credential-less Discovery to be available. If Service Mapping selects a MID Server for credential-less Discovery that does not have Nmap capabilities, this error message appears in the map at the site of the CI being discovered: `Nmap is not installed on MID Server. Verify all MIDs configured to handle selected IP Address have Nmap Capability. Nmap root directory path does not exist: <path>`

Amazon Web Service AWS

Running Nmap scans to or from any resource within the Amazon Web Service AWS environment is tightly regulated and requires the permission of AWS through the AWS Vulnerability/Penetration Testing Request form. AWS only permits testing of EC2 and RDS instances that you own. Tests against any other AWS services or AWS-owned resources are prohibited. In addition, any Nmap scan of a permitted instance must be performed within an approved time window. For these reasons, credential-less Discovery within an AWS environment is not appropriate, and if a violation of their policy occurs, could result in expulsion from the service.

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Supported operating systems

Nmap is supported on all editions of these operating systems, including virtual machines and 64 bit systems:

- Windows 2012
- Windows 2016

MID Server requirements

Nmap can be installed on MID Servers that meet these requirements:

- Status is **Up**.
- MID Server is validated.
- MID Server does not already have the **Nmap** capability.
- MID Server must be logged in as a local admin if Nmap is not already installed. Administrative privleges are only necessary for the installation process. Once Nmap is installed, non-admin users can use and run credential-less discovery.

Note:
If there are multiple MID Servers installed on the same host machine and one of them has already installed Nmap using an admin user, the other MID Servers can enable credential-less discovery using a non-admin user.

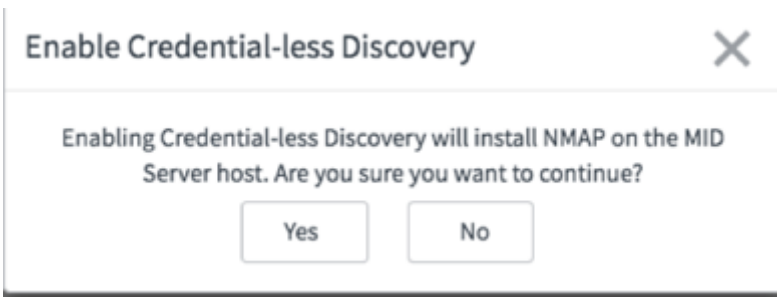
Warning:
The MID Server installation path must not contain the following characters:

- **( )**
- **{ }**
- **[ ]**

The Nmap installer replaces these characters with spaces. This prevents the installer from finding the correct path, and the installation fails. An example of a path that will fail is `C:\MIDServers\MID(1)\agent`.

Procedure

1. Navigate to **All** > **MID Server** > **Servers**.
2. Open the desired MID Server record.
3. Under **Related Links**, select **Enable Credential-less Discovery**.
   A confirmation dialog box appears.



4. Click **Yes** to continue with the installation.

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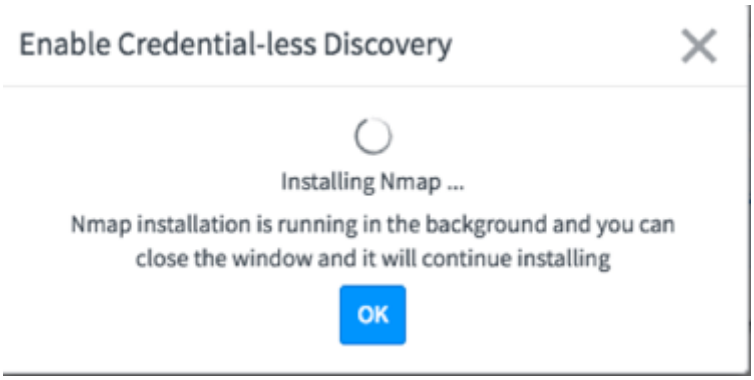
The instance runs the Nmap installer from `https://install.service-now.com`, a site within a ServiceNow datacenter that contains installers for the platform. This progress notice appears during installation:



The **Logs** tab in the MID Server record shows the message: `Running system command: installNmap`.

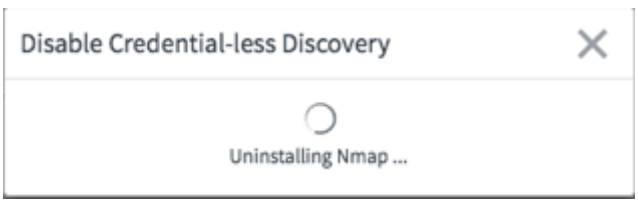
5. Click **OK** if you want to hide the dialog box while the installer continues to run in the background.
   Installing Nmap also installs Npcap on the host, if it is not already installed. Npcap is Nmap's packet capture library for Windows that allows Nmap to perform port scans quickly and to identify the family of the operating system running on the target. Npcap is installed once on the host and can be used by any other application that requires it, such as Wireshark.

   Note:
   If a more recent version of Npcap is already installed on the Windows MID Server host, Nmap is installed without Npcap. If an older version of Npcap is installed on the host, the Nmap installer upgrades it to the newer version.

   The installation process has either of these outcomes:

   - **Success**: These conditions indicate a successful installation:
     - The version of Nmap that is installed appears in the **Nmap version** field in the MID Server record
     - The **Related Link** changes to **Disable Credential-less Discovery**.
     - The **Nmap** capability is assigned to the MID Server and appears in the **Capabilities** tab of the MID Server record.
   - **Failure**: If the installation fails, an error message is logged to the MID Server Issue [ecc_agent_issue] table. If you run the installer again with success, the issue is marked as **Resolved**.

6. To uninstall Nmap for a selected MID Server, select **Disable Credential-less Discovery** under **Related Links** in the MID Server record.
   This dialog appears during the uninstallation process:



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The **Logs** tab in the MID Server record shows the message: `Running system command: uninstallNmap`.

> **Important:**
> Because Npcap can be used by other applications, uninstalling Nmap does not automatically uninstall Npcap. You must uninstall Npcap manually, after determining that no other dependencies exist.

Related topics

Credential-less Discovery

Install Nmap on a self-hosted system

Use this procedure to install Nmap on MID Server host machines in a self-hosted environment that does not allow network access to the ServiceNow® `install.service-now.com` download site.

Before you begin
Role required: admin, maint

About this task
You must install Nmap manually on each MID Server host and then configure the instance to execute credential-less Discovery.

> **Note:**
> This procedure does not apply to self-hosted customers whose MID Server hosts can access `install.service-now.com` from within their network.

Procedure

1. Navigate to **All** > **MID Server** > **Properties** (MID Server Property [ecc_agent_property] table) and open the record for the *`mid.nmap.version`* property.
   This property contains the version of Nmap that you must install. Record the version number.
2. Download the correct installer executable from one of these URLs:
   - https://nmap.org/dist/: If the Nmap version in the property is 7.94, the executable you need is `https://nmap.org/dist/nmap-7.94-setup.exe`.
   - `https://install.service-now.com/glide/distribution/builds/package/thirdparty/nmap/nmap-setup-xxx-windows.exe`. If the Nmap version in the property is 7.94, the executable you need is `https://install.service-now.com/glide/distribution/builds/package/thirdparty/nmap/nmap-setup-7.94-windows.exe`
3. Create a folder called `nmap` in the MID Server `agent` folder of every MID Server you want to use for credential-less Discovery.

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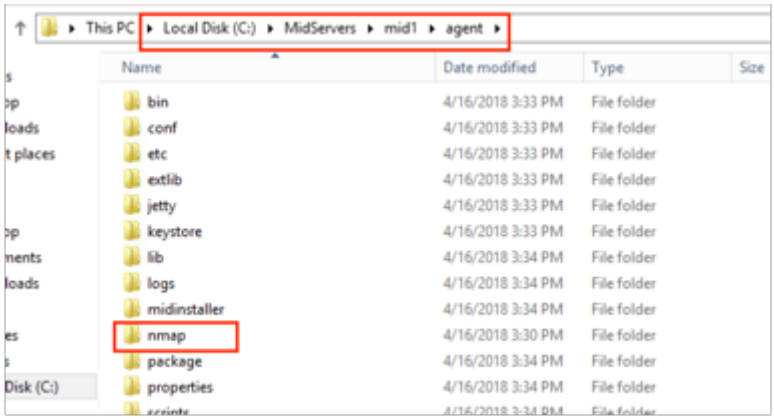
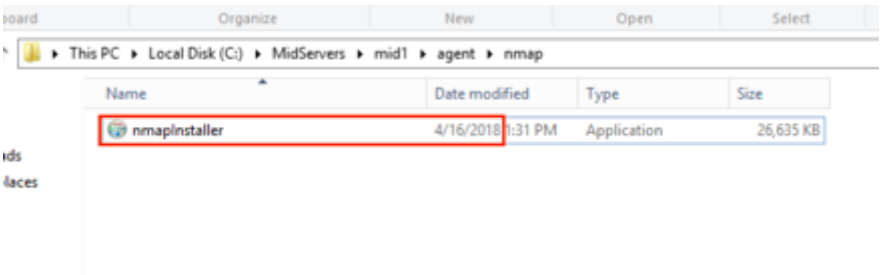
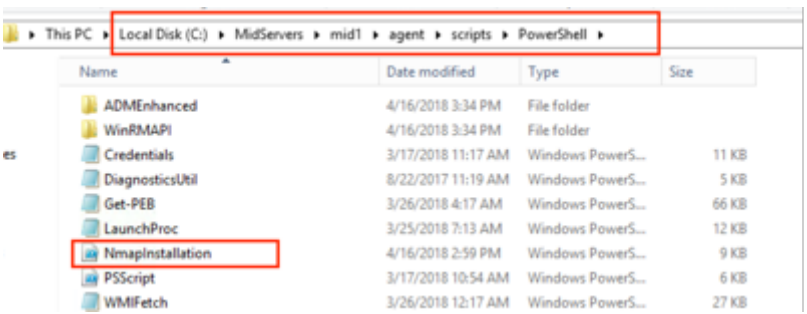


4. Copy the Nmap installer file that you downloaded to the `nmap` folder and rename it to `nmapInstaller.exe`.



5. Run the `agent\scripts\PowerShell\NmapInstallation.ps1` script and pass it the following parameters in the order in which they appear.
This script runs the `nmapInstaller.exe` file.



   a. *$operation*: Task that `NmapInstallations.ps1` will process. To install Nmap, the task is **install**.

   b. *$nmap_root_path*: Complete path for the `nmap` folder that you create in step 4.

   c. *$nmap_self_installer*: Complete path for `nmapInstaller.exe` file that you copied in step 5.

   d. *$nmap_command*: Complete path for the Nmap install command. The `NmapInstallations.ps1` script installs Nmap in the `nmap` folder created in step 4. This parameter is *$nmap_root_path*|*nmap.exe*.

   e. *$nmap_uninstall_command*: Complete path for the Nmap uninstall command. This command is *$nmap_root_path*|*Uninstall.exe*.

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f. *$nmap_npcap_version*: The Npcap version installed with Nmap. This value must be the same as the value of the *mid.nmap.npcap.version* property in the MID Server Property [ecc_agent_property] table.

g. *$nmap_safe_scripts*: List of safe scripts that Nmap uses. You can retrieve this list from the *mid.nmap.safe.scripts* property in the MID Server Property [ecc_agent_property] table.

6. Set up the parameters in the `NmapInstallation.ps1` script in this order: *./NmapInstallations.ps1 $operation $nmap_root_path $nmap_self_installer $nmap_command $nmap_uninstall_command $nmap_npcap_version $nmap_safe_scripts*

   For example, the script might look like this:

```
PS
 C:\MidServers\mid1\agent\scripts\PowerShell> .
\NmapInstallation.ps1 "install"
"C:\MidServers\mid1\agent\nmap"
 "C:\MidServers\mid1\agent\nmap\nmapInstaller.exe"
"C:\MidServers\mid1\agent\nmap\nmap.exe"
"C:\MidServers\mid1\agent\nmap\Uninstall.exe" "0.91"
"allseeingeye-info.nse,amqp-info.nse,db2-das-info.nse,drda-info
.nse,freelancer-info.nse,
ike-version.nse,mcafee-epo-agent.nse,mqtt-subscribe.nse,openloo
kup-info.nse,oracle-tns-version.nse,
quake1-info.nse,quake3-info.nse,rfc868-time.nse,rpcinfo.nse,snm
p-info.nse,ventrilo-info.nse,
weblogic-t3-info.nse,xmpp-info.nse"
```

7. After installation is complete, add the **Nmap** capability to each MID Server you want to use for credential-less Discovery.

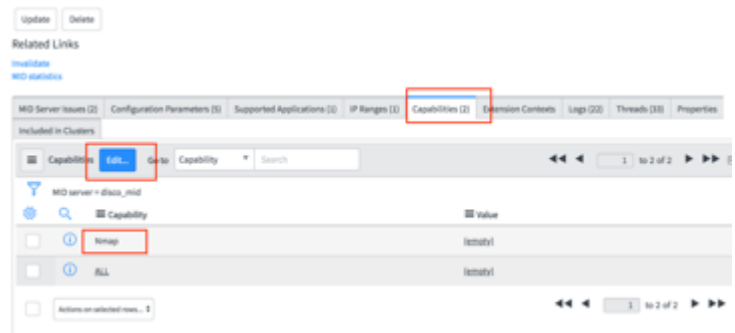
> **Important:**
> Only a **maint** user can add the **Nmap** capability to a MID Server. Contact Customer Service and Support to request temporary **maint** access to your instance.

a. On the instance, open the MID Server record.

b. Select the **Capabilities** related list.

c. Click **Edit**.

d. Select **Nmap** from the list of available capabilities and click **Save**.



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Uninstall Nmap on a self-hosted system

Use this procedure to uninstall Nmap in a self-hosted environment that does not allow network access to the ServiceNow `install.service-now.com` download site.

Before you begin
Role required: admin, maint

About this task
Nmap must be manually uninstalled from each MID Server host machine and then disabled on the ServiceNow instance.

Procedure

1. Run *`Uninstall.exe`* in the `nmap` folder on each MID Server host configured for credential-less Discovery.
2. After uninstallation is complete, delete the `nmap` folder from the `agent` folder.
3. Remove the **Nmap** capability from each MID Server record.

> ⚠ **Warning:**
> Only a **maint** user can remove the **Nmap** capability from a MID Server. Contact Customer Service and Support to request temporary **maint** access to your instance.

   a. On the instance, open the MID Server record.
   b. Select the **Capabilities** related list.
   c. Click **Edit**.
   d. Remove **Nmap** from the active capabilities list and click **Save**.

Configure MID Server as WinRM trusted host

In environments using Windows Remote Management (WinRM), Discovery or Service Mapping can discover servers using the WinRM protocol. Add servers, which are part of WinRM, as trusted hosts on all MID Servers that Discovery or Service Mapping use for discovery.

Before you begin
Role required: mid_admin

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

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About this task

MID Server cannot access servers using the WinRM protocol unless these servers are configured as trusted hosts for this MID Server.

Perform this procedure on each MID Server used by Service Mapping or Discovery.

Procedure

1. On the MID Server, open the command-line shell.
2. To add all servers to the TrustedHosts lists, run the following command:
   `winrm s winrm/config/client '@{TrustedHosts="*"}'`

   The command requires different syntax depending on the shell: use single quotation marks around `@{TrustedHosts="*"}` in Windows PowerShell, and do not use quotation marks in Command Prompt.
3. To add specific servers to the TrustedHosts list, run the command with the comma-separated hosts instead of the asterisk (*), for example:
   `winrm s winrm/config/client '@{TrustedHosts="serverA,serverB,serverC"}'`

MID Server domain separation

Use the MID Server user role to configure MID Servers to access separate domains. The credentials in the `config.xml` file of a MID Server determine which domains it can access. Specific MID Server policy records can be restricted for use only by MID Server from the same domain.

---

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

The records that can be read, updated, or created by a MID Server are determined by the credentials configured for that MID Server in the `config.xml` file. These are the user credentials that a MID Server uses to access the instance and specify which domain's records that MID Server can access.

You can create versions of these specific MID Server policy records that only a MID Server from the same domain can use. This process separation is supported for records in tables that extend MID Server Synchronized Files [ecc_agent_sync_file]:

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- MID Server MIB File [ecc_agent_mib]
- MID Server JAR File [ecc_agent_jar]
- MID Server Script File [ecc_agent_script_files]

Note:
Attachments on MIB or JAR file records might not appear as they did in a non-domain separated environment. The attachments do not appear because the **Attachments** [sys_attachment] table is data separated. When data is separated between domains, a record in a child domain cannot access records in a parent domain.

Set up domain separation for MID servers

Set up domain separation through the MID server user role and the MID Server configuration file.

Before you begin
Role required: agent_admin or admin

Procedure

1. Configure a MID Server user within a specified domain with the proper *mid_server* role.
2. Specify this user within the MID Server **config.xml** file.
   When you set the MID Server user credentials in the `config.xml` file, make sure they are in the proper domain.

What to do next
If you must change the MID Server domain:

1. Stop the MID Server and delete the ecc_agent record.
2. Update the MID Server `config.xml` with the new user in the new domain and restart the MID Server service.

If you need to create versions of specific MID Server files that only MID Servers in your domain can use:

1. Open or create a record in one of these MID Server modules:
   - **SNMP MIBs**
   - **JAR Files**
   - **Script Files**
2. Update an existing domain policy or submit a new record.

Note:
Attachments on MIB or JAR file records might not appear as they did in a non-domain separated environment. The attachments do not appear because the **Attachments** [sys_attachment] table is data separated. When data is separated between domains, a record in a child domain cannot access records in a parent domain.

Configure a multi-domain MID Server

You can create a MID Server in the global domain that can explore targets in other domains.

Before you begin
Before configuring a multi-domain MID Server:

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- Activate the Domain Support - Domain Extensions Installer [com.glide.domain.msp_extensions.installer] plugin.
- Ensure that your instance is domain separated.

Role required: admin

Procedure

1. Type **sys_properties.list** in the navigation filter and press **Enter**.
2. Locate the **glide.ecc.enable_multidomain_mid** property.
3. Set the value of the property to **true**.

> **Note:**
> Enabling this property has no effect on existing MID Servers. MID Servers in a domain prior to setting this property, remain in that domain.

4. Create a MID Server in the global domain.
   A MID Server created in the global domain after this property is set to **true** can explore any domain for which it has the credentials. However, this MID Server is restricted to trying only the credentials for the target domains requested by ECC Queue inputs.

> **Warning:**
> If you reset the **glide.ecc.enable_multidomain_mid** property to **false** after creating a multi-domain MID Server in the global domain, that MID Server writes all the data it receives to the global domain and not to the correct domains.

Synchronize a JAR file to MID Servers

You can upload a JAR file to an instance and synchronize it to all MID Servers, or write custom probes that use the synchronized JAR file.

Before you begin

Role required: admin, agent_admin

---

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

The MID Server JAR File [ecc_agent_jar] table is domain separated. You can create versions of these policies that only a MID Server from the same domain can use. For instructions, see Set up domain separation for MID servers.

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Warning:
Synchronizing a JAR file with this procedure causes all MID Servers connected to the instance to restart automatically.

Procedure

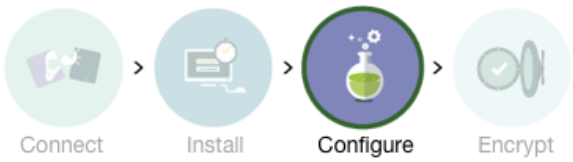
1. Navigate to **All** > **MID Server** > **JAR Files**.
2. Click **New**.
3. Complete the following fields:
   - **Name:**A unique and descriptive name for identifying the file in the instance.
   - **Version:** A version number for the file, if one is available.
   - **Source:** Location of the JAR file for reference purposes. Source information is not used by the system.
   - **Description:** Short description of the JAR file and its purpose in the instance.
4. Click the paper clip icon in the banner.

5. In the Attachments dialog box, click **Browse** and select the file you want to attach.

   The platform attaches the JAR file to the record and restarts the MID Servers to synchronize the file. It is not necessary to update the record to attach the file.

vCenter event collector

The vCenter event collector is a MID Server extension that listens for vCenter-related events and updates the CMDB accordingly.



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4. Configure MID Server security
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6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

The event collector allows the CMDB to be updated with changes to virtual machines (VMs), in addition to the updates detected by Discovery. A change to a VM is sent as an event from the vCenter server to the vCenter event collector. When an event is received, the CMDB is updated accordingly. Full vCenter Discovery does not need to rerun. For some events, such as powered on and powered off events, Discovery does not need to run again at all. For most events, Discovery runs only on the necessary vCenter resource.

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For example, if a VM is turned off, the vCenter server sends the event `VmPoweredOffEvent`. The vCenter event collector receives and processes the event and the CMDB is updated to reflect that the state of the corresponding VM is set to **off**.

Important:

With this extension, Discovery can only modify the state of a VM which exists in the CMDB. When an event with "CreatedEvent" occurs in its name, such as VmCreatedEvent, Discovery scans that VM and then creates the CI using the data it collects. When a new event occurs involving that CI, Discovery can update the existing record without launching another scan.

vCenter event collector supports domain separation by inheriting the domain of the specified Mid Server in the event collector context. However, it does not support multi-domain Mid Server configuration.

See Discovery for VMware vCenter for supported versions of vCenter.

How vCenter events are processed

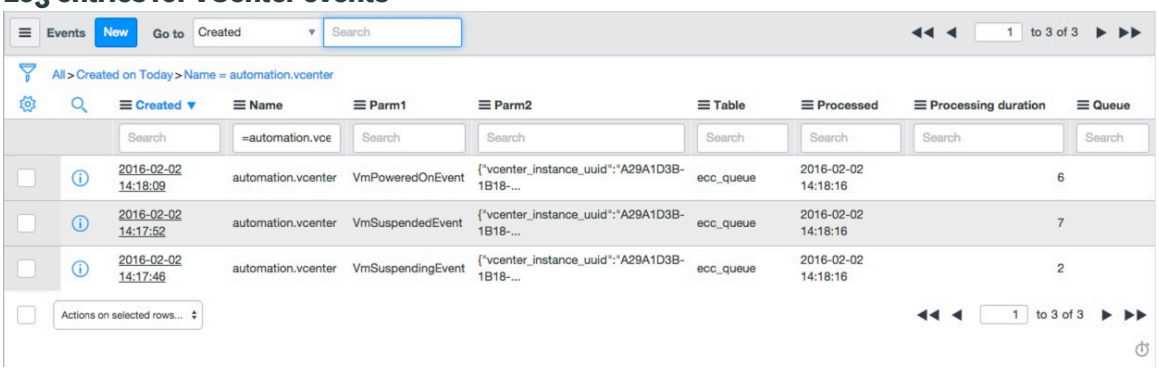
The MID Server listens for the vCenter events configured in the vCenter Event Collector form. When one of these events is returned from vCenter, the instance parses the payload with a business rule that converts the vCenter event into a system event (sysevent). The instance then uses that sysevent to perform tasks, such as email notification.

Note:
If the MID server is paused when a vCenter event occurs, the MID server still processes the event. In this case, it is possible for the event collector to display a status of **Started**.

The resulting sysevents contain these values:

- **Name**: Name of the system event created from the vCenter event. This value is always *`automation.vcenter`*.
- **Parm1**: vCenter event that was returned. This event must be associated with an event collector record.
- **Parm2**: Event data provided by vCenter, in JSON format.

Log entries for vCenter events



Supported vCenter events

The following events are the only vCenter events handled by the base system when Discovery is activated. If you have upgraded your instance from an earlier version, you might not have the default events added with later releases. To use the missing events, manually add them.

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vCenter events

Event name	Description	Launches probe
VM events		
VmPoweredOnEvent	The VM has been powered on from the powered off state or resumed from the suspended state. This event is sent when the VM is powered on. It does not account for the time it may take to boot the host operating system.	None
DrsVmPoweredOnEvent	The VM has been powered on by a distributed resource schedule (DRS), which balances workload between available resources.	None
VmRestartedOnAlternateHostEvent	The VM was restarted on another host because the original host failed.	None
VmPoweredOffEvent	The VM has been powered off. If the host OS is shut down, this event is sent after the host OS shuts down and the VM enters the powered off state.	None
VmPowerOffOnIsolationEvent	The VM has been powered off on an isolated host in an HA cluster.	None
VmShutdownOnIsolationEvent	The VM has been shut down on an isolated host in an HA cluster.	None
VmSuspendedEvent	The VM is suspended. This event is sent after the VM suspension is complete.	None
VmRelocatedEvent	The VM has been relocated while offline (either suspended or powered off). A VM migration of the VM to a different host, or the migration of any storage used by the VM triggers the event. Moves relationships.	None
VmMigratedEvent	One or both of the following occurs: • The VM has been hot-migrated, with vMotion, to another ESX server. • The storage for the VM has been hot migrated.	None

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vCenter events (continued)

Event name	Description	Launches probe
	Only Updates relationship and Deep Discovery.	
DrsVmMigratedEvent	Migration of a VM recommended by a DRS. Moves relationships.	None
VmRemovedEvent	The VM instance has been deleted from vCenter.	None
VmClonedEvent	The VM was cloned successfully. Creates new records and performs Quick Discovery.	VMWare - vCenter VMs
VmCreatedEvent	The VM was successfully created. Creates new records and performs Quick Discovery.	VMWare - vCenter VMs
VmDeployedEvent	The VM was deployed successfully. Creates new records and performs Quick Discovery.	VMWare - vCenter VMs
VmDiscoveredEvent	The vCenter successfully discovers the VM. Creates new records and performs Quick Discovery.	VMWare - vCenter VMs
VmRegisteredEvent	The VM was successfully registered. Creates new records and performs Quick Discovery.	VMWare - vCenter VMs
VmReconfiguredEvent	The VM was reconfigured. Creates new records and performs Quick Discovery.	VMWare - vCenter VMs
VmInstanceUuidAssignedEvent	A new instance UUID was assigned to the VM. Updates VM instance UUID.	None
VmRenamedEvent	The VM was successfully renamed. Changes the name.	None
VmUuidAssignedEvent	A new BIOS UUID was assigned to the VM. Adds the UUID of the VM.	None

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vCenter events (continued)

Event name	Description	Launches probe
VmMacAssignedEvent	A new MAC address was assigned to the VM. Assigns MAC address to event and triggers VMware-VM nics probe.	VMWare - vCenter VM NICs
VmMacChangedEvent	The MAC address of a VM was changed. Assigns MAC address to event and triggers VMware-VM nics probe.	VMWare - vCenter VM NICs
VmGuestShutdownEvent*	The guest VM shut-down.	None
VmStoppingEvent	The VM stopped.	None
VmResettingEvent	The VM reset.	None
Cluster events		
ClusterCreatedEvent	A cluster was created.	VMWare - vCenter Clusters
ClusterReconfiguredEvent	A cluster was reconfigured.	VMWare - vCenter Clusters
ClusterDestroyedEvent	A cluster was destroyed.	None
Datastore events		
DatastoreRenamedEvent	A datastore was renamed.	None
VMFSDatastoreCreatedEvent	A VM File System (VMFS) datastore was created.	VMWare - vCenter Datastores
DatastoreDiscoveredEvent	A host was added to VirtualCenter and datastores were discovered.	VMWare - vCenter Datastores
NASDatastoreCreatedEvent	An Network Attached Storage (NAS) datastore was created.	VMWare - vCenter Datastores
LocalDatastoreCreatedEvent	A local datastore was created.	VMWare - vCenter Datastores
VMFSDatastoreExpandedEvent	A datastore was expanded.	VMWare - vCenter Datastores
DatastoreDestroyedEvent	A datastore was removed from VirtualCenter.	None
Network events		
DVPortgroupCreatedEvent	A port group was created.	VMWare - vCenter Networks
DVPortgroupRenamedEvent	A port group was renamed.	None
DVPortgroupDestroyedEvent	A port group was destroyed.	None
Resourcepool events		
ResourcePoolDestroyedEvent	A resource pool was destroyed.	None
ResourcePoolCreatedEvent	A resource pool was created.	VMWare - vCenter Clusters
ResourcePoolMovedEvent	A resource pool was moved.	VMWare - vCenter Clusters

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vCenter events (continued)

Event name	Description	Launches probe
ResourcePoolReconfiguredEvent	A resource pool was reconfigured.	VMWare - vCenter Clusters
DVS events		
DvsCreatedEvent	A distributed virtual switch was created.	VMWare - vCenter Networks
DvsRenamedEvent	A distributed virtual switch was renamed.	None
DvsDestroyedEvent	A distributed virtual switch was destroyed.	None
Datacenter events		
DatacenterCreatedEvent	A datacenter was created.	VMWare - vCenter Datacenters
DatacenterRenamedEvent	A datacenter was renamed.	None

Configure and run the vCenter event collector extension

Configure the vCenter event collector extension in the MID Server module, and then add or remove supported events.

Before you begin

Before configuring event collectors, perform these tasks:

- Deploy and start a MID Server.
- Ensure that the MID Server has access to the vCenter.
- Run discovery on the vCenter.

Role required: agent_admin, admin

About this task

Multiple MID Servers can listen to the same vCenter instance, and you can add multiple Event Collectors for different vCenters to a single MID Server. Make sure you configure the events on the event collector record that specify the correct MID Server.

Note:
You can add events to the vCenter event collector. However, not every event is supported by the base system event handlers. If you want to handle events other than those supported in the base Discovery system, you must create a script action to process the events. For instructions, see Script actions. As a reference, the instance processes the vCenter events in the base system with a script action called `Discovery: Process vCenter events`. Do not edit or delete this script action.

To configure the vCenter event processor extension:

Procedure

1. Navigate to **All** > **MID Server** > **Extensions** > **vCenter Event Collectors**.
2. Click **New** or open an existing extension.
3. Fill in the fields, as appropriate from the table.

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4. Right-click in the header bar and click **Save** in the context menu.
   The **vCenter Event** related list appears, containing the default events that the system is configured to handle.
5. To select a different vCenter event, click **Edit** in the **vCenter Event** related list and browse for the event.

   The slushbucket does not display all the available events in the opening list. Use the filter to browse for events not displayed.

6. Under **Related Links** click **Start** to save the events in this collection and start the collector.
   The Related Links in this form work as follows:

Commands available in the vCenter event processor extension

Related Link	Description
Start	Starts the collector if it is not running. The extension connects to the specified vCenter server by enumerating the VMware credentials in the credential set until a connection can be made. Next, the extension tells the vCenter server to supply the events specified in the Collector Context.
Stop	Stops the running collector on the configured MID Server. No action is taken if the extension is not running.
Restart	Stops, then starts the collector on the configured MID Server.
Test	Tests the parameters for validity. If the IP address, hostname, and the set of events is valid then the test returns a successful status. If any of the parameters are incorrect, an error is shown. Running a test does not affect any extensions that are currently running.
Update parameters	Sends updated parameters to the collector. Any changes you make to the collector while the MID Server is running do not take effect immediately when they are saved. If you click this control when the collector is not running, no update is made. In the case of the vCenter extension, the collector first tests the parameters for validity. If the parameters are valid, the extension disconnects from the vCenter server and reconnects with the new parameters.

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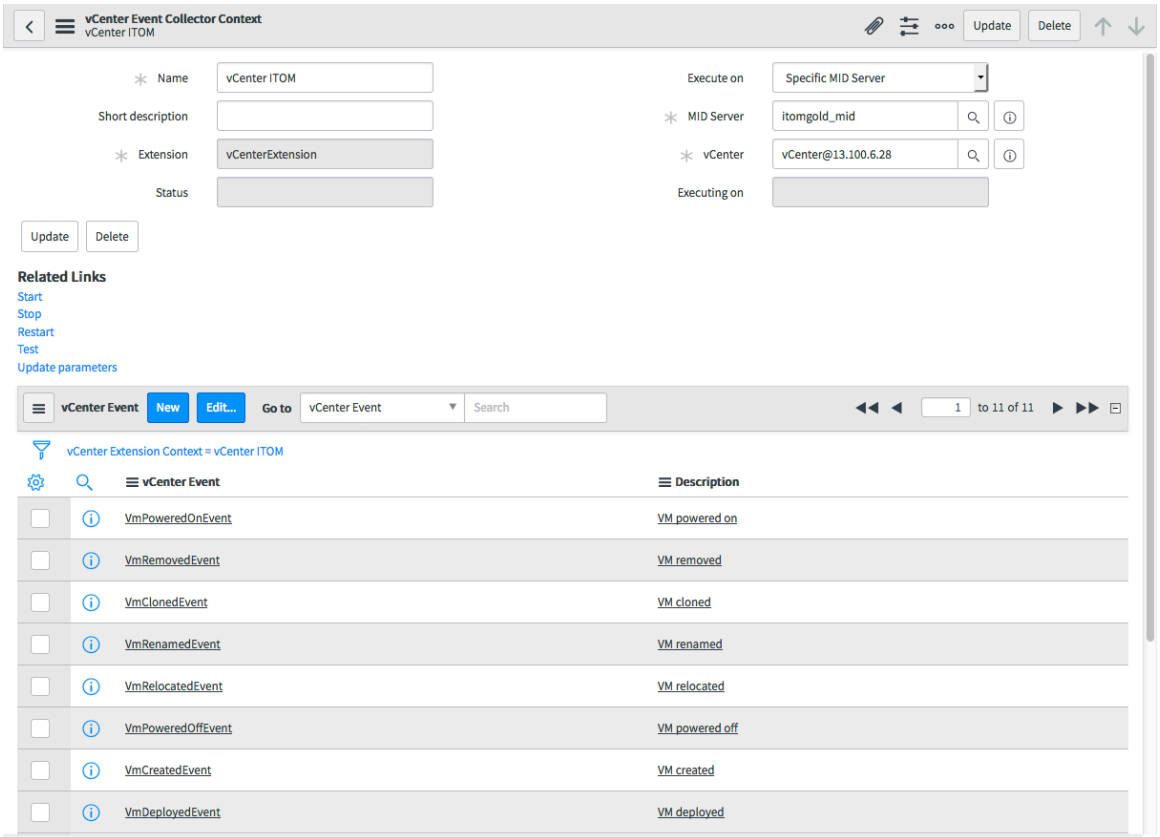

Field	Description
Name	A unique name for this vCenter event collector extension for easy identification.
Short description	A description of this collector.
Extension	[Read-Only] The collector type is automatically set to **vCenterExtension**.
Status	This field auto-populates with the status of the collector. This field is blank until the collector is started. After issuing a command to the collector, you see one of these values: ○ **Started**: The collector is running. ○ **Stopped**: The collector is not running. ○ **Offline**: The MID Server is down. ○ **Error**: The collector failed with an error.

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Field	Description
	Note: The MID Server continues to process vCenter events, even if it is paused. The status of the event collector may show as **Started**.
Error Message	Message describing any error that causes a command, such as **Start** or **Stop**, to fail. This field only appears when the value in the **Status** field is **Error**.
Execute on	Location for running this collection. The possible options are **Specific MID Server** or **Specific MID Server Cluster**.
MID Server	The name of the designated MID Server if you selected **Specific MID Server** in the **Execute on** field. The name of the designated MID Server cluster if you selected **Specific MID Server Cluster**. If you selected the MID Server cluster option, an algorithm determines which server in the cluster runs the collector.
vCenter	The IP address or hostname of the vCenter server.
Executing on	[Read-Only] The name of the MID Server on which the collector is running. This field shows the name of the MID Server even if the MID Server is down. If the collector is stopped by the user, this field is empty.

Related topics

VMware discovery

SNMP trap collector extension

The SNMP trap collector is a MID Server extension that listens for SNMP traps from the devices on your network.

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5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Upon receiving a trap, the MID Server sends the trap to the instance for further processing by Event Management. If Event Management is not active, traps are not processed and are discarded by the instance.

For the SNMP trap collector extension to receive traps from network devices, each device must designate the MID Server that runs the SNMP trap collector extension as a recipient of the trap. See the documentation for the network device to configure your hardware to do this. Generally, the SNMP trap collector extension should run on only one MID Server per VLAN. Multiple MID Server recipients on the same VLAN causes duplicate data in the CMDB. If network devices are separated by VLANs, multiple MID Servers may have trap collectors installed.

To configure multiple SNMP trap collector extensions, configure each in a separate record, with a unique name, and a designated MID Server.

Configure the SNMP Trap Collector Extension

For the SNMP trap collector extension to receive traps from network devices, each device must designate the MID Server that runs the SNMP trap collector extension as a recipient of the trap.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **MID Server** > **Extensions.** > **MID SNMP Trap Listener**
2. Click **New** or open an existing extension.
3. Fill in the fields from the table, as appropriate.
4. Click **Submit** or **Update**.

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Field name	Description
Name	A unique name for this SNMP trap collector extension for easy identification.
Short description	A description of the MID Server extension, if more description than the **Name** is necessary.
Extension	[Read-Only] The extension type is automatically set to **TrapExtension**.
UDP port	The port number that your network hardware uses when sending a trap to the designated MID Server. Port numbers 1024 and above are recommended. Port numbers 1023 and lower may be system reserved and can result in access violations for MID Servers that are not running with administrative credentials.
Status	[Read-Only] The status of the trap collector extension. This field is blank until the extension is run. After it is run, the value may be: ○ **Started:** The extension is running. ○ **Stopped:** The extension is not running. ○ **Offline:** The MID Server is down. ○ **Error:** The extension failed with an error.
Execute on	The location for running this extension: a **Specific MID Server** or a **Specific MID Server Cluster**. The recommended setting is **Specific MID Server**. Network hardware typically has to be configured to send to a specific IP address. If the listener moved to a different MID Server in the cluster, the trap would not be received.
MID Server	The name of the designated MID Server if you selected **Specific MID Server** in the **Execute on** field. The name of the designated MID Server cluster if you selected **Specific MID Server Cluster** in the **Execute on** field. If you selected **Specific MID Server Cluster**, a ServiceNow algorithm determines which server in the cluster runs the extension.
Executing on	[Read-Only] The name of the MID Server on which the extension is running. This field shows the name of the MID Server even if the MID Server is down. If the extension is stopped by the user, this field is empty.

5. In **Related Links**, run any of the following actions against the SNMP trap collector extension:

Related Link	Description
Start	Starts the extension if it is currently not running. The extension is started on the configured MID Server and port number.
Stop	Stops the running extension on the configured MID Server. No action is taken if the extension is not running.

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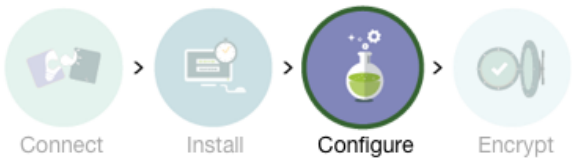
Related Link	Description
Restart	Stops, then starts the extension on the configured MID Server and port number.
Test	Verifies that the configured MID Server can run the SNMP trap collector extension on the specified port. Running a test does not affect any extensions that are currently running.
Update parameters	If you make changes to the extension configuration, use this option to update the parameters of the currently running extension. First, the parameters are tested for validity. If the parameters are valid, the extension disconnects and reconnects with the new parameters.

MID Server Resource Reservation

This feature allows resources to be reserved before a task is assigned to a thread. If the resources the task needs aren't available, then that task waits in the MID Server work queue while other tasks are assigned to the thread.



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

For Discovery, the MID Server tasks are the probes or patterns it executes. While probes are waiting to be executed on the MID Server, they provide resource requirements (CPU, memory, and so on) and if they cannot be met, the probe waits in the work queue until the resources are available.

Note:
MID Server Resource Reservation delays probe execution until resources are available. This is based on extremely flexible criteria. The MID Server Resource Reservation feature is for advanced users and should not be configured until a problem is identified. This configuration depends entirely on the problem details.

Using the MID Server Resource Reservation allows for better use of threads since the threads are not assigned a task it cannot complete.

Features:

- Resource reservations apply to a single MID Server only
- Resources can depend on system or MID Server properties
- Resources can depend on probe parameters, allowing you to limit the number of active probes and patterns against a given IP

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- Reports resource usage
- Extensible (the customer defines their own resources)
- Scriptable

Benefits:

- Keeps PowerShell probes from impacting execution of other probes
- Can be used to limit the impact Discovery has on a target system
- Can be used to limit the number of "large" probes being executed by a MID Server at the same time
- Can be used to throttle Discovery (to minimize impact on the instance)

Use MID Server Resource Reservation

A resource is just a name and a count. Define the name of the resource, which probes use it, and how many of the resources those probes should use.

Before you begin

Role required: admin

- Make sure the MID Server property **mid.probe.wait.resources** is set to true to enable MID Server Resource Reservation. Changing this property requires restarting the MID Server.
- Choose a resource name. Anything in { } in the name is replaced by the probe parameter with that name. This name is typically used for per-host resources, for example, ssh{source} means a separate resource named "ssh" is available on every host being discovered. ("source" is the name of the probe parameter that contains the IP address being probed.)
- Decide how to specify the number of the resource used by probes or patterns.
  - Every probe uses a constant number of the resource: Create a "simple value" resource.
  - The number of resources used depends on a system property: Create an "expanding" resource.
  - The number depends on multiple factors: Create a "scripted" resource.
  - Expanding: Anything in { } is replaced by the system or MID Server property with that name. Logical operators are allowed, for example, "{mid.windows.management_protocol}".toLowerCase() == "winrm" ? 1:0
  - Scripted: the script is evaluated. The return value is expanded.

Procedure

1. Create a new resource.
   a. Navigate to **Discovery Definition** > **Limited Resources**> **Simple Value** and click **New**.
   b. Enter a resource name.
   c. Enter the number of resources used and click **Save**.
2. Define which probes use the resource.
3. Navigate to the desired tab and select from the list.

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- **Used by Topic** tab: Includes all probes with that topic. Click **Invert Topic** to include all probes without that topic. For example: SSHCommand with Invert Topic, means all probes except for SSH. Heartbeat and queue messages are always excluded.
- **Used by probes** tab: Includes a list of probes. Click **Invert Probes List** to include all probes without that probe. Horizontal Discovery probe means apply to all patterns.
- **Used by patterns** tab: Includes a list of patterns. You can also click Invert Pattern list.

4. Define availability on the MID Server.
5. Navigate to **Discovery Definition** > **Limited Resources** > **MID Resources**.
   - Resource: This is the reference to the resource.
   - Available: Number available. Anything inside brackets, is replaced by the system or MID Server property.
   - MID Server: MID Server to apply this to. (Empty) means all.
6. Set the resource order.
   a. Click in the **Order** field of each resource.
   b. Type in the number.
   c. Click the check mark to Save.

Note:
Less valuable resources should have a lower order – these resources are reserved and held until higher order resources can be obtained. For example, both the total PowerShell sessions (resource is "PowerShell") and the number of simultaneous sessions to any host (resource is "PowerShell{host}") are limited. Therefore, PowerShell{host} resource should have a lower order. Obtaining PowerShell first would impact all other PowerShell probes. Obtaining "PowerShell{host}" first only impacts other PowerShell probes to that host.

7. Review the Resource State that you have set up.
   a. Run a Discovery.
   b. Observe Resource State.
   c. Click **Get resource state** from the MID Server page or view in an ECC input payload.

   Result of Get resource state:

   - PowerShell{source} has additional entries for every {source} with a current allocation.
   - "Reserved by" may show multiple resources if the probe requires more than one resource.

   Result of ECC input payload:

   - The resource_wait attribute only exists if the probe had to wait for a resource.
   - The time displayed is in milliseconds.
   - The probe may have waited on multiple resources, with different wait time for each.

How MID Server Resource Reservation works

In addition to the work queue, the MID Server contains a waiting queue. When picking a task for execution, the waiting queue is always checked first. If no task in the waiting queue can execute, then the work queue is tried. Probes and patterns in the waiting queue reserve all necessary resources until they're able to execute.

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The first probe or pattern in the queue is offered available resources. It takes any of the lowest order resource that is available. After getting the required number of lowest order resources, the probe or pattern goes to the next lowest order resources, and so on. The order allows the user to configure which resources are more or less important. Lowest order resources are gathered first because holding these resources has less impact on execution of other probes and patterns.

Tables

mid_limited_resource

- Defines the resources used by a probe or pattern.
- Extended by mid_limited_resource_value, mid_limited_resource_expanded, and mid_limited_resource_script each containing a single additional field.
  - mid_limited_resource_value adds a single field named “value” to the base table.
  - mid_limited_resource_expanding adds a field named “expanding.”
  - mid_limited_resource_script adds a field named “script”.

mid_resource

- Sets the resources available on a MID Server.
- Values from this table are copied to ecc_agent_property.
- A business rule on this table creates the corresponding MID Server properties.
- It has a reference to a resource and the number available. If the number available is inside { } then it’s the name of a system property, MID Server config, or MID Server property (all three places are checked). So {mid.powershell_api.session_pool.max_size} is the value of that MID Server config that sets the size of the PowerShell session pool.

Base: mid_limited_resource table

Label	Column	Type	Size	Information
Resource Name	name	String	100	Unexpanded name of the resource
Active	active	Boolean		Allows temporary disable
Invert Topic	invert_topic	Boolean		
Invert Probe List	invert_probe_list	Boolean		
Invert Pattern List	invert_pattern_list	Boolean		

Note:
There are m2m tables that associate a mid_limited_resource record with topics, probes, and patterns. The “invert_” fields change the list from inclusion to exclusion.

Extensions: mid_limited_resource_value, mid_limited_resource_expanding, and mid_limited_resource_script tables

Label	Column	Type	Size	Information
Value	value	Integer		

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Extensions: mid_limited_resource_value, mid_limited_resource_expanding, and mid_limited_resource_script tables (continued)

Label	Column	Type	Size	Information
Expanding	expanding	String	1000	A slightly extended version of the availability number because it accepts logical and ternary operations, for example, "{mid.windows.management_proto == "WinRM" ? 1 : 0. If the management protocol is WinRM this evaluates to 1, otherwise it's 0.
Script	script	String	4000	The script is evaluated. If the result is a string, then it's expanded

mid_resource table

Label	Column	Type	Size	Information
Active	active	Boolean		Allows temporary disable
Available	available	String	255	Number of this resource available on MID Server
MID Server	ecc_egent	Reference		Reference to MID Server or empty for all
Order	order	Integer		Order in which resources are allocated
Resource	resource	Reference		Reference to the resource

Containerized MID Server

Containerized MID Server uses a Docker image of the MID Server that allows you to quickly deploy MID Servers at scale. MID Servers are deployed using orchestration tools like OpenShift or Kubernetes. Orchestration tools can automate their deployment and maintenance and add new containers on demand or replace failed containers automatically.

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1. Ensure that the MID Server can connect to elements inside and outside your network
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8. Configure MID Server security

To use Containerized MID Servers, you can download Docker recipes for Linux from the MID Server download page. Use the recipes to build the Docker images for the current release. The recipes are zipped and signed. Some features have been deprecated for the Washington DC family release. See [KB1559617] Deprecated Containerized MID Server Features in Washington DC for more information.

Containerized MID Server system requirements:

- AlmaLinux is supported.
- The recipes cannot be used to build images for previous MID Server versions.
- Discovery of NMAP and CyberArk are not supported.
- Other applications such as Orchestration and Integration Hub are not certified.

Once the Docker images are available, you can create new MID Server containers and configure them with configuration parameters passed through environment variables or secret files. Docker, Openshift, and Kubernetes secrets are supported. The MID Server application inside the container is run as a process by a non-admin user.

When a containerized MID Server record is first created on the instance, a random UUID is created and set to the **container_id** column. During the start-up sequence, this value is replaced by the actual container ID. The container ID can be used to differentiate between containerized and regular MID Servers. Non-containerized MID Servers' container ID have a null or empty value.

In order to automatically clean up the down MID Servers on Instance, a scheduled job called Purge Orphaned Containerized MID Servers is scheduled to run daily. This job removes orphaned containerized MID Servers if they are down longer than the value set by the **max_retention_days** property. The job also creates a warning MID Server issue each day before the removal day, if there are equal to or less than the value of **warn_days** remaining. The default values for **max_retention_days** and **warn_days** are 30 and 7, respectively.

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Auto-upgrade

Auto-upgrade works the same way for containerized MID Servers as it does for regular MID Servers. However, it is recommended to disable the auto-upgrade for containerized MID Servers. Whenever a new image is needed, build a new image and deploy it by updating the deployment YAML file then re-apply it.

Containerized MID Server auto-upgrade is controlled by the **mid.container.autoupgrade.enabled** config parameter and is set to true by default. The config parameter is read-only, therefore it can not be synced down from the instance.

Add the config parameter to a MID Server profile and use it with new deployment requests. The settings are then included in deployment YAML file when the deployment request is exported, or when it is manually added to an existing deployment YAML file and re-applied.

HealthCheck

A HEALTHCHECK rule is implemented to check MID Server health status based on heartbeat every 5 minutes. If there was no heartbeat activity in last 30 minutes, it is considered a failure. After 3 consecutive failures, it becomes unhealthy in the docker ps command output.

To see more HealthCheck details, run the following docker inspection command: `docker inspect --format='{{json .State.Health}}' <container-id>`

Basic Container Operations

Basic operations are supported on container side. For example, you can stop, start, or restart a running container using Docker commands.

docker stop <container_id>

This command shuts down the containerized MID Server.

docker start <container_id>

This command starts a containerized MID Server if it is stopped.

docker restart <container_id>

This command shuts down a MID Server and restarts it.

Build MID Server Docker Image

Build a MID Server Docker Image with the provided recipes to deploy a Containerized MID Server. Containerized MID Server uses a Docker image of the MID Server that allows you to quickly deploy MID Servers at scale.

Containerized MID Server Deployment and Auto-configuration

With the deployment and auto-configuration feature, an agent admin can enter all required MID Server #settings in a MID Server Profile on the instance and then submit a deployment request to K8s cluster. After the request is#processed, the new MID servers are automatically created and auto-configured. They are ready#to use in seconds. #If the MID Server profile is changed, the related Containerized MID Servers can also be updated on demand.

Build MID Server Docker Image for Linux

Deploy Containerized MID Servers on Linux by creating a Docker image with the provided recipes. Containerized MID Server uses a Docker image of the MID Server that allows you to quickly deploy MID Servers at scale.

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Before you begin
Role required: admin

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Prerequisites:

The host must use Docker engine and command-line interface (CLI) 20.10.4 or later.

Update the library to the newest version available, or at least the highest version with a security fix. If issues identified are part of a transitive dependency, find a version of the dependent library which includes a newer transitive version. If the transitive dependency cannot be upgraded by upgrading the dependent library, consider excluding the dependency and directly including a secure version.

Note:
Check docker availability by running the docker version command as administrator. See the the docker version command documentation for more information.

Procedure

1. Download the Linux Docker recipe ZIP file from the MID Server download page and verify its signature.
   For more information about the MID Server download page and signature verification, see Download MID Server files.
2. Unzip the ZIP file to a folder.
3. **Optional:** You can change the current directory to the new folder.
4. To build an image, run the build command: `> docker build <path-to-docker-recipe> [ --tag <docker-tag> ]`

   For more information on the command, see the Docker build command documentation. The path to the Docker file can be a relative path or the current directory if the file is in the Docker recipe directory.

   The default image tag is provided out-of-the box in the .env file with the **DOCKER_TAG** parameter. You can export this parameter before executing any docker command by running the command: `> export $(grep DOCKER_TAG .env)`. You can replace `<docker-tag>` with the **DOCKER_TAG** value in all the following commands.

   The build command takes the following build arguments:

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Property	Description
MID_INSTALLATION_URL	The link to download the MID Server installation file. By default, it is set to the download link for the Linux 64 bit Installation ZIP file provided on the MID Server download page.
MID_INSTALLATION_FILE	The name of a local MID Server installation file. The default value is empty. If this parameter is not empty, the recipe uses the local file instead of downloading from the installation server. This parameter uses the file name only, not the full path. Before the build, the local file must be copied to the `asset/` sub-folder of the recipe directory. MID Server releases prior to Rome are not supported. For example: `> docker build <path-to-dockerfile> --build-arg MID_INSTALLATION_FILE=<mid.installation.fi --tag <docker-tag>`
MID_SIGNATURE_VERIFICATION	The signature of the MID Server installation file must be verified. The default value is TRUE. If it is TRUE, the build process always verifies the digital signature of the MID Server installation file whether it is downloaded from the remote server or a local file. Otherwise, the signature verification is skipped. For example: `> docker build <path-to-dockerfile> --build-arg MID_SIGNATURE_VERIFICATION=false --tag <docker-tag>`
USER_ID and GROUP_ID	By default, when not specified, Docker creates a#MID Server user with user id = 1001 and group id = 1001. You may pass a custom user id and group id into container by using the#USER_ID#and#GROUP_ID#build arguments. Docker creates an user for the #MID Server #with the provided user id and group id. Inside the container image, all files under the MID Server installation folder are owned by this user and the root group (id=0). When the image is deployed on Kubernetes platform, this MID Server user becomes the container user who runs the MID Server. When the image is deployed on an OpenShift#platform, OpenShift may assign an arbitrary non-admin user id as the container user who runs the MID Server.

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Property	Description
	However, that user always belongs to the root group. In both cases, the container user has full access to the MID Server files. That way, the same image can be deployed on Kubernetes as well as on OpenShift.

5. **Optional:** After the image is built successfully, you can list the image built with command: > `docker image ls`

What to do next

To save disk space, if there are unused or intermediate images, run the following commands to remove those dangling images:

```
$ docker rmi $(docker images --filter "dangling=true" -q
 --no-trunc)
```

For example, before removing dangling images, the command `docker image ls` may show something similar to the following:

```
REPOSITORY                                    TAG
                        IMAGE ID       CREATED                SIZE
mid
 trackdiscocopper-10-09-2020_10-14-2021_2200   4542b6ab34af   21
 seconds ago       1.01GB
<none>                                        <none>
                           1cdae087a970   About a minute ago
 1.38GB
```

After removing the dangling images, the command `docker image ls` shows the following:

```
REPOSITORY                                    TAG
                        IMAGE ID       CREATED                SIZE
mid
 trackdiscocopper-10-09-2020_10-14-2021_2200   4542b6ab34af
 About a minute ago   1.01GB
```

Launch Containerized MID Server

Containerized MID Server uses a Docker image of the MID Server that allows you to quickly deploy MID Servers at scale. MID Servers are deployed using orchestration tools like Docker Swarm.

Before you begin

Role required: admin

Prerequisites:

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- Linux hosts must use AlmaLinux distribution 64 bit architecture, and AlmaLinux distro is recommended.

- The host must use Docker engine and command-line interface (CLI) 20.10.4 or later.

> **Note:**
> Check docker availability by running the docker version command as administrator. See the the docker version command documentation for more information.

Procedure

1. Once the image is available, launch the new MID Server using the docker run command and specify an env file or env variable options: `docker run --env-file <env_file_name_here> <docker_tag or image_id>`

> **Note:**
> Do not pass sensitive data using this command, as there may be security vulnerabilities. To pass sensitive data, use the procedures Pass sensitive data to a containerized MID Server with Docker Secrets and Pass sensitive data to a containerized MID Server with Kubernetes Secrets.

For more information, see the Docker documentation pages for the docker image ls command, the docker run command, and specifying an env file or env variable options. The env file is a simple text file using the name=value format. If a variable is specified in both env file and in the `--env` option, the variable defined in the command line takes precedence.

While deployment requests are the recommended method to launch containerized MID Servers, they can be alternatively configured with environmental variables. When the container is first started, the initialization script will take the environment variables and configure the MID Server application using the following environment variables:

MID_INSTANCE_URL

This variable sets the 'url' config parameter.

MID_INSTANCE_USERNAME

This variable sets the 'mid.instance.username' config parameter.

MID_INSTANCE_PASSWORD

This variable sets the 'mid.instance.password' config parameter.

MID_SERVER_NAME

This variable sets the 'name' config parameter.

MID_PROXY_HOST

This variable sets the 'mid.proxy.host' config parameter. This variable is not mandatory and is only necessary when a proxy is set up.

MID_PROXY_PORT

This variable sets the 'mid.proxy.port' config parameter.

MID_PROXY_USERNAME

This variable sets the 'mid.proxy.username' config parameter.

MID_PROXY_PASSWORD

This variable sets the 'mid.proxy.password' config parameter.

MID_SECRETS_FILE

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This variable specifies the full secret filename that contains sensitive data like passwords or certificate.

MID_MUTUAL_AUTH_PEM_FILE

This variable specifies the full filename of the client certificate file used for auto validation setup.

2. **Optional:** To see a list of containers, run the docker container ls command: `docker container ls [-a]`

Pass sensitive data to a containerized MID Server with Docker Secrets

You can configure containerized MID Servers with configuration parameters passed through environment variables or secret files.

Before you begin

Role required: Docker Swarm admin

About this task

You can pass sensitive data, such passwords or certificates, into a containerized MID Server using Docker Secret. Setup and start Docker Swarm before using this procedure.

When creating deployments, ensure that the replicas are kept to 1.

Procedure

1. Place the sensitive data in `mid-secrets.properties`
2. Create a docker secret using the docker secret create command: `docker secret create mid-secrets mid-secrets.properties`

   The first `mid-secrets` represents the secret in docker swarm, while the second `mid-secrets.properties` parameter represents the file path to read the secret on the host machine's filesystem. You can list all created secrets by running the command `docker secret ls`.

   For more information on the docker secret command, see the docker secret documentation.
3. Update the **MID_SECRETS_FILE** environment variable with the path to the secret file inside the container.
   The default path for Docker Swarm secrets on Linux is `/run/secrets/mid-secrets.properties`.
4. Deploy the MID Server Image Container to Swarm using the docker service create command: `docker service create --name mid-service --secret mid-secrets.properties --env-file mid.env <docker-tag or image-id>`

   Make sure that the `--secret flag` is provided for the container service to associate with the specified secrets.

Pass sensitive data to a mutual authenticated containerized MID Server with Docker Secrets

You can configure containerized MID Servers with configuration parameters passed through environment variables or secret files.

Before you begin

Role required: admin

Role required: Docker Swarm admin

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About this task

If certificate based authentication is enabled on the instance, the MID Server can be configured to auto-validate using a mutual authentication client certificate (PEM file). This can be done via setting the full path to the PEM certificate file inside container with the *MID_MUTUAL_AUTH_PEM_FILE* environment variable. For example, you can update variable to *MID_MUTUAL_AUTH_PEM_FILE= /run/secrets/certificate.pem* in the `mid.env` file.

You can pass the PEM certificate file into a container using Docker or Kubernetes secret. The following is an example command to pass the PEM certificate file into a container: `docker service create --name mid-service --secret mid-secrets.properties --secret <certificate-secret-name> --env-file mid.env <docker-tag or image-id>`

The mutual PEM certificate is installed on the MID Server during initialization. MID Server then connects to the instance and auto-validates. When the MID Server connects to the instance with mutual authentication successfully enabled, you might observe some of the following entries in the MID agent log:

- Installed custom certificate into the MID keystore
- Configured MID to use mutual authentication

Procedure

1. Prepare the mutual authentication PEM bundle.
2. Create a docker secret using the docker secret create command: `docker secret create mutual-auth-secret <mutual-auth-pem-file-on-local-filesystem> .`

   You can list all created secrets by running the command `docker secret ls`.
3. Update the **MID_MUTUAL_AUTH_PEM_FILE** environment variable with the path to the secret file inside the container.

   The default path for Docker Swarm secrets on Linux is `/run/secrets/<mutual-auth-pem-file-name>`.
4. Deploy the MID Server Image Container to Swarm using the docker service create command: `docker service create --name mid-service --secret mutual-auth-secret --env-file mid.env <docker-tag or image-id>`

   Ensure the `--secret` flag is provided for the container service to associate with the specified secrets.
5. Deploy the containerized MID Server to the pod with the **deployment.yml** and run the command: `kubectl create -f deployment.yml`

Pass sensitive data to a containerized MID Server with Kubernetes Secrets

You can configure containerized MID Servers with configuration parameters passed through environment variables or secret files.

Before you begin

Role required: Kubernetest admin

Setup and start Kubernertes cluster before using this procedure. For more information on Kubernetes Secrets, see the Kubernertes secrets documentation.

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Note:
Kubernetes doesn't work directly with a local image. Upload the MID Server image to a public registry or setup a local registry. See the official Docker instruction on building a docker registry.

When creating deployments, ensure that the replicas are kept to 1.

Procedure

1. Place the sensitive data in mid-secrets.properties accordingly.
2. Create a Kubernetes secret with the command: `kubectl create secret generic mid-secret --from-file=mid-secrets.properties`
3. **Optional:** You can list all created secrets by running the command: `kubectl get secrets`
4. Update the **MID_SECRETS_FILE** environment variable with the path to the secret file inside container.
   The path is defined in data field when creating a configuration file for a Secret.
5. Create a deployment with the following sample YML content:

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: basic-example
spec:
  selector:
    matchLabels:
      app: MIDServerManagement
      provider: ServiceNow
  replicas: 1
  template:
    metadata:
      labels:
        app: MIDServerManagement
        provider: ServiceNow
    spec:
      containers:
        - name: basic-example-container
          imagePullPolicy: IfNotPresent
          image: "mid:imageTag"
          env:
            - name: MID_INSTANCE_URL
              value: "
 https://exampleinstance.service-now.com/"
            - name: MID_INSTANCE_USERNAME
              value: "mid_server_user_name”
            - name: MID_SECRETS_FILE
              value:
 "/opt/snc_mid_server/secrets/mid-secrets.properties“
            - name: MID_SERVER_NAME
              value: "Basic-Example-MID"
          volumeMounts:
            - mountPath: "/opt/snc_mid_server/secrets"
              name: "mid-mount-secret"
              readOnly: true
      volumes:
```

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```
      - name: "mid-mount-secret"
        secret:
          secretName: "mid-secret"
```

Note:
There are many ways to create a deployment or pod. For more information, see the Kubernetes deployment instructions.

6. Deploy the containerized MID Server to the pod with the deployment.yml and run the command: `kubectl create -f deployment.yml`

Pass sensitive data to a mutual authenticated containerized MID Server with Kubernetes Secrets

You can configure containerized MID Servers with configuration parameters passed through environment variables or secret files.

Before you begin
Role required: Kubernetest admin

Prerequisites:

If certificate based authentication is enabled on the instance, the MID Server can be configured to auto-validate using a mutual authentication client certificate (PEM file). This can be done via setting the full path to the PEM certificate file inside container with the *MID_MUTUAL_AUTH_PEM_FILE* environment variable. You can pass the PEM certificate file into a container using Kubernetes secret.

The mutual PEM certificate is installed on the MID Server during initialization. MID Server then connects to the instance and auto-validates. When the MID Server connects to the instance with mutual authentication successfully enabled, you might observe some of the following entries in the MID agent log:

- Installed custom certificate into the MID keystore
- Configured MID to use mutual authentication

Procedure

1. Prepare the mutual authentication PEM bundle.
2. Create a Kubernetes secret with the command: `kubectl create secret generic mutual-auth-secret --from-file=<mutual-auth-pem-file>`
3. **Optional:** You can check all created secrets by running the command: `kubectl get secrets`
4. Update the **MID_MUTUAL_AUTH_PEM_FILE** environment variable with the path to the secret file inside container.
5. Create a deployment with the following sample YML content:

```
6. apiVersion: apps/v1
7. kind: Deployment
8. metadata:
9.   name: mutual-auth-example
10. spec:
11.   selector:
12.     matchLabels:
13.       app: MIDServerManagement
14.       provider: ServiceNow
```

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```
15.   replicas: 1
16.   template:
17.     metadata:
18.       labels:
19.         app: MIDServerManagement
20.         provider: ServiceNow
21.     spec:
22.       containers:
23.         - name: mutual-auth -container
24.           imagePullPolicy: IfNotPresent
25.           image: "mid:imageTag”
26.           env:
27.             - name: MID_INSTANCE_URL
28.               value:
 "https://exampleinstance.service-now.com/"
29.             - name: MID_INSTANCE_USERNAME
30.               value: "mid_server_user_name”
31.             - name: MID_SERVER_NAME
32.               value: "Mutual-Auth-Deployment-MID"
33.             - name: MID_MUTUAL_AUTH_PEM_FILE
34.               value:
 "/opt/snc_mid_server/mutual-auth/yourpemfile.pem"
35.           volumeMounts:
36.             - mountPath: "/opt/snc_mid_server/mutual-auth"
37.               name: "mid-mount-mutual-auth"
38.               readOnly: true
39.       volumes:
40.       - name: "mid-mount-mutual-auth"
41.         secret:
42.           secretName: "mid-mutual-auth-secret"
```

6. Deploy the containerized MID Server to the pod with the **deployment.yml** and run the command: `kubectl create -f deployment.yml`

Containerized MID Server Deployment and Auto-configuration

An agent admin can enter a MID Server Profile and create a deployment request on the instance. She/he can then export the deployment request to a YAML file and use it to deploy MID Servers to Kubernetes or OpenShift cluster.

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1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Containerized MID Servers use a Docker image of the MID Server that allows you to quickly deploy MID Servers. The documentation for Build MID Server Docker Image for Linux provides steps for manually preparation and deployment. The following Containerized MID Server auto-configuration simplifies the process and makes it scalable.

MID Server profile

A MID Server profile contains all the settings required to configure a new MID Server, excluding sensitive data such as passwords and certificates. Sensitive data should be passed through Secrets created on the K8s cluster. The user only enters secret names and locations in the deployment request. An **agent_admin** role is required to create or change profiles. MID Server profiles are stored in the following tables:

- mid_server_profile
- mid_profile_config
- mid_profile_wrapper_config
- mid_profile_property
- mid_profile_application_m2m
- mid_profile_capability_m2m
- mid_profile_ip_range_m2m
- mid_profile_cluster_m2m

During deployment, the **mid_profile_config** and **mid_profile_wrapper_config** parameters are sent to the K8s cluster. These parameters populate the `config.xml` and `wrapper-override.conf` of the new MID Server. The other parameters are used by the auto-configuration on the instance. The user can access the MID Server profile from the module **MID Server Profiles** on the instance.

The MID Server name is not required in a profile because a profile can be used to deploy multiple MID Servers. Instead, the user is asked to enter MID Server names as part of a new deployment request. For the **mid_profile_wrapper_config**, the user can enter any parameters that they want to see in `wrapper-override.conf`. For example:

Name	Value

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wrapper.java.maxmemory	2048
wrapper.java.additional.3	-Djavax.net.debug=ssl:handshake

Other profile settings can be entered the same way as on a MID Server record.

MID Server Deployment Request

After creating a MID server profile, the user can make a new deployment request to prepare the deployment process. A deployment request can be different for different container orchestrators. See MID Server Deployment Request for more information.

Export MID Deployment Request for Manual Deployment

The user can export it to a K8s deployment YAML file. The user can download the YAML file to the K8s cluster and deploy new MID Servers with the following command: `kubectl apply -f <yaml_file>`

Docker image preparation

To prepare a Docker image, first build a MID Server image on a K8s cluster as explained in Build MID Server Docker Image. Upload the built image to an image registry and pull the image to a local image with the command: `docker pull registry/mid:<tag>`. Refer to Docker Registry Setup for Containerized MID Server II: Auto Configuration [KB1001380] for information on limitations on pulling an image directly from a remote registry.

Kubernetes preparation

See also How to build and deploy Containerized MID Servers in Kubernetes using StatefulSets [KB1325173].

Kubernetes service account setup

Ensure the service account has the proper RBAC set up to create, delete, and list permission for resources. The following example YAML file uses the default service account:

```
apiVersion: rbac.authorization.k8s.io/v1
 kind: ClusterRoleBinding
 metadata:
    name: default-service-acccount-as-cluster-admin
 subjects:

  - kind: ServiceAccount
    # Reference to upper's `metadata.name`
    name: default
    # Reference to upper's `metadata.namespace`
    namespace: default
 roleRef:
    kind: ClusterRole
    name: cluster-admin
    apiGroup: rbac.authorization.k8s.io
```

You may choose a custom service account and assign a **ClusterRole** to that service account and name space. The default name space is **default**. The following example YAML file uses a custom name space, **mynamespace**.

```
apiVersion: rbac.authorization.k8s.io/v1
 kind: ClusterRoleBinding
 metadata:
```

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```
    name: custom-serviceacccount-as-cluster-admin
subjects:

  - kind: ServiceAccount
    # Reference to upper's `metadata.name`
    name: mycustomserviceaccount
    # Reference to upper's `metadata.namespace`
    namespace: mynamespace
roleRef:
    kind: ClusterRole
    name: cluster-admin
    apiGroup: rbac.authorization.k8s.io
```

Kubernetes Secret setup

Secrets are created for **mid-secrets.properties** or PEM files for mutual authentication. For more information about how to create a Secret, see the section in Containerized MID Server.

Auto-configure new Containerized MID Servers

When a MID server is connected to the instance for the first time, a MID Server record is created. The MID Server record is populated with the container ID, profile ID and deployment name. The **Auto-Configure MID from profile** business rule is triggered when the new MID Server record is updated with a profile ID in the **profile_id** field. The business rule looks up the profile settings associated with that profile ID and configures the new MID server accordingly.

Sync MID Server Profile to existing MID Servers

The MID Server profile can be out-of-sync with the settings of existing MID Servers if the user updates the profile long after the related MID Servers were auto-configured. The user can synchronize the profile settings to the existing MID Server by selecting **Sync to MID Servers** on the instance.

Note:
When applying cluster settings from MID Server profile to a MID Server, the cluster assignment will fail if the MID Server doesn't have any capability assigned. It is controlled by the "validate MID server capability" business rule on the ecc_agent_cluster_member_m2m table. If you want to assign a MID server to a cluster, please make sure it has some capabilities.

MID Server Deployment Request

After creating a MID server profile, the user can make a new deployment request to prepare the deployment process. A deployment request can be different for different container orchestrators.

Before you begin
Role required: agent_admin

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1. Ensure that the MID Server can connect to elements inside and outside your network
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3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

The user can access MID Server deployment request from the app module **MID Deployment Requests**.

Currently, only K8s deployment is supported. The K8s deployment request includes a reference to a MID Server profile, information about a MID Server docker image, K8s secrets, K8s deployment labels, and a list of MID Server names to assign to the new MID Servers.

Procedure

1. Enter information about the container image.

   In this section, you will specify which image is used with this deployment request and where it can be pulled from.

   Image Registry Path and Repository

   Enter a registry address and port, as well as a repository name where the image is stored. The syntax is `my.registry.address:port/repositoryname`.

   Image Tag

   Enter a tag that identifies the container image.

2. Specify the MID Server names.

   A deployment request can be made to create multiple MID Servers. You can choose to enter the MID Server names manually, otherwise the system automatically generates them. If you enter the names manually, each MID Server name must be unique.

3. Enter the Kubernetes cluster Information.

   K8s Namespace

   Enter a K8s namespace where the new MID servers are located. The default value is **default**.

   K8s Service Account

   Enter a K8s service account name that processes this deployment request. The default value is **default**.

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MID Secrets Name

Enter the name of a K8s secrets object that holds MID Server secrets.

MID Secrets File Path

Enter the absolute path of the MID Server secrets file inside the container.

MID Mutual Auth PEM Secrets Name

Enter the name of a K8s secrets object that holds the MID Mutual Auth PEM certificate.

MID Mutual Auth PEM File Path

Enter the absolute path of the MID Mutual Auth PEM file inside container.

K8s Deployment Label

Enter a deployment label which is a list of key/value pairs. The label is attached to K8s deployment. A valid label must be 63 characters or less and can be empty. Unless the label is empty, it must begin and end with an alphanumeric character and contain only dashes, underscores, dots, and alphanumeric characters.

What to do next

When a request is ready, the user can choose **Export to YAML file** to generate a K8s deployment YAML file and attach it to the same record. Once a request is processed, the entire record is set to read-only. There is a scheduled job that removes deployment requests older than 365 days.

Containerized MID Server Autoscaling

MID Servers can be deployed via StatefulSet with any number of replicas. They can scale automatically by leveraging Kubernetes Horizontal Pod Autoscaler (HPA). Horizontal Pod Autoscaler automatically updates a workload resource (such as a Deployment or StatefulSet) to match demand.

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8. Configure MID Server security

Kubernetes can add or remove any numbers of stateful MID Server replicas as required by the workload. HPA only supports CPU and memory metrics. MID Servers can be deployed as a stateful application by providing the following information in the StatefulSet section of the deployment request form:

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- Name
- Headless service name
- Persistent volume claim (PVC)
- Parameters, such as storage class, access modes, and storage request
- The resource request/limit

The PVC declares the desired persistent volume where the MID Server stores config.xml, meta data files, and several of its sub-folders.

During workload fluctuations, a pod with a running MID Server container can be removed and replaced by a new one. StatefulSet ensures the same persistent volume is attached to the new pod, which allows the MID Server to resume its state.

The only sub-folders that can be mounted to the persistent volume are those that are initially empty with a new MID Server installation. The **config.xml** file and other meta data files must be backed up when the pod is shut down and restored during start-up.

Deployment requests exported as YAML files can be used to create a StatefulSet workload and new MID Server pods in the Kubernetes cluster.

When you make changes to the deployment YAML file and re-apply it, the existing pods of the deployment are recreated. With StatefulSet deployment, the configuration files are restored from the backup folder. The init script must detect the deployment environment changes and apply them to the configuration files before MID server is started.

HPA Autoscaling activation

HPA Autoscaling can be activated for any existing StatefulSet workload by creating an HPA controller.

When you create a deployment request, you can choose either HPA version 1 or version 2.

When creating a deployment request on the instance with an HPA configuration, apply the exported YAML file and HPA autoscaling begins working immediately.

Configure a MID Server for IPv6

A MID Server configured for IPv6 can connect to ServiceNow and use Discovery over IPv6 for specific addresses.

Before you begin
Role required: admin

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5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

A pure IPv6 MID Server does not need to be configured for IPv6. It connects to IPv6 by default, and the **ecc_agent** record for the MID Server is automatically populated with IPv6. Contact Support to ensure your instance is IPv6 enabled.

On a dual stack host, the MID Server defaults to using IPv4. The following procedure configures a dual stack MID Server to use IPv6. The following tables are automatically updated during upgrade to Tokyo to support IPv4 and IPv6:

- **ecc_agent**
- **ecc_agent_router**
- **ecc_agent_ip_address**
- **ecc_agent_command_audit_log**

When using Discovery over IPv6, the following requirements apply:

Windows Discovery

Only WinRM is supported as of the Zurich release. The requirements for WinRM over IPv6 are the same as IPv4. WinRM must be running on both the MID Server host and target, and the target must be configured as a trusted host on that MID Server.

Unix Discovery

Only SNC SSH is supported as of the Zurich release. No additional configuration is needed to use SNC SSH over IPv6. J2SSH and Maverick are not supported but, if their protocols are used over IPv6, the command is executed without guaranteeing the correct results. In that case, the following error message is reported in the MID Server logs: `IPv6 is currently not supported for MID Server using Maverick (J2SSH), however the command will be executed.`

Procedure

1. Navigate to the Java VM configuration wrapper in `agent/conf/wrapper-override.conf`.
2. Open the file, then uncomment and change the following line of code to true:

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```
#wrapper.java.additional.109=-Djava.net.preferIPv6Addresses=fa
lse
```

Change the previous line to read as follows:

```
wrapper.java.additional.109=-Djava.net.preferIPv6Addresses=true
```

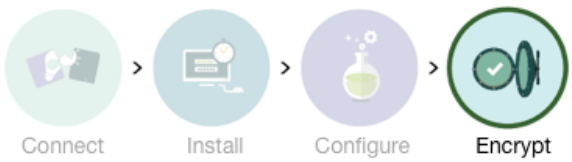
3. Restart the MID Server.
   The MID Server is now configured to connect to the instance over IPv6.

   Note:
   For dual stack MID Servers, changing the wrapper does not affect the data populated in the **ecc_agent** record, which is IPv4 by default.

4. To update the **ecc_agent** record to prefer IPv6 over IPv4, specify the following MID Server configuration parameter and set it to true: **mid.prefer_ipv6_addresses**.
5. Restart the MID Server.
   The dual stack MID Server populates the relevant fields in the **ecc_agent** record with IPv6 addresses. The tables **ecc_agent_router** and **ecc_agent_ip_address** are populated with both IPv4 and IPv6 entries on a dual stack host.

Securing and encrypting MID Server data

After configuring your MID Server, you can add security by encrypting MID Server parameter values in the `config.xml` file. Encryption protects data that the MID Server returns to the ECC Queue. Other available security options include the authorization of SOAP requests, restricting access to the MID Server configuration file, and establishing secure socket layer (SSL) connections.



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6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

How MID Server password encryption works

The *username* and *password* are initially set in the `config.xml` file on the MID Server. When the MID Server retrieves the credentials, it replaces the clear-text password with an encrypted password automatically, using an AES256 encryption algorithm. In continued efforts to improve MID Server security, the encryption algorithm has been enhanced. The MID Server also maintains an encryption key that is generated each time it starts and remains in memory

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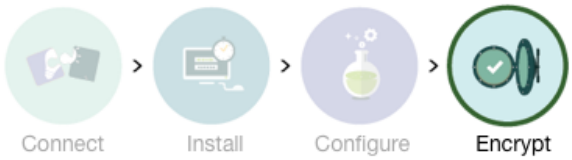
and not on the hard disk. When credentials need to be sent from the instance to the MID Server, the following process takes place:

1. The instance retrieves the encrypted *password* and the unencrypted *username* from the instance database table.
2. The instance decrypts the encrypted *password*, and then re-encrypts it using the MID Server encryption key.
3. The *username* and re-encrypted *password* are sent to the MID Server through the encrypted TLS session was already established between the MID server and the instance.
4. The MID Server receives the credentials and decrypts the *password* in memory before using the credentials for remote operations. At no point is the credential password stored on the disk in an unencrypted format.

MID Server certificate check policies

MID Server uses three kinds of security checks to secure external traffic. The security checks use TLS/SSL certificate validation, hostname validation, and OCSP validation to improve security. Control these security checks with the MID Server certificate check policies table.



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6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

TLS/SSL certificate validation

TLS/SSL encryption security uses asymmetric encryption, also called public-key encryption. This encryption uses two cryptographic keys: the public key and the private key. The public key is used for encryption of data and is publicly visible. The private key is used for decryption of data and its security is essential to verifying authenticity. For more information about preparing your network, see MID Server TLS/SSL certificate check policy Quebec upgrade information [KB0867397].

In TLS/SSL certificate validation, the MID Server attempts to connect to a web server secured with a TLS or SSL certificate. The web server sends a copy of its TLS/SSL certificate to the MID Server. The MID Server checks the authenticity of the certificate and sends a message to the webserver. The webserver responds with a digitally signed acceptance for initiating an TLS/SSL encrypted session. After which the MID Server can begin encrypted communication with the web server.

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Hostname validation

Hostname verification is a part of HTTPS that involves a server identity check to ensure that the client is talking to the correct server. This check prevents sending information to a server after being redirected by a man in the middle attack.

The check involves verifying that the `dnsName` of the certificate sent by the server matches the URL used to make the request. According to RFC 6125, hostname verification should be done against the certificate's subjectAlternativeName's dNSName field. In some legacy implementations, the check is done against the certificate's commonName field. If the names don't match, the connection is terminated.

Note:
Hostname validation derives the hostname from the validated certificate presented by the server. Therefore, TLS certificate validation is a pre-requisite for hostname validation.

Online Certificate Status Protocol (OCSP)

OCSP involves contacting the remote certificate authority server and verifying the certificate before the MID Server communicates further with the target server. Compromised certificates can be a security vulnerability, especially if those certificates have the ability to sign other certificates. If certificates have been broken or forged, then a certificate authority can inform a client which certificates are invalid and should not be used.

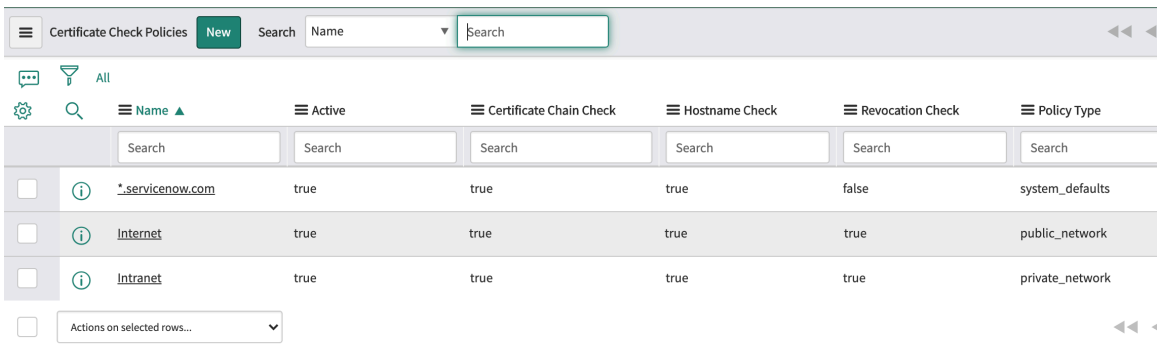
An OCSP responder (a server typically run by the certificate issuer) returns a signed response that the certificate is 'good', 'revoked', or 'unknown'. If it cannot process the request, it may return an error code.

The certificate's issuer may delegate another authority to be the OCSP responder. This creates a chain of certificates that must be verified. The responder's certificate must be issued by the issuer of the certificate in question. The responder’s certificate must include a certain extension that marks it as an OCSP signing authority.

Note:
OCSP checks are secondary HTTP calls made to an OCSP responder. The primary call may discontinue the connection based on the response from the OCSP responder.

MID Server security policy

MID Server security policies control all HTTPS traffic originating from the MID Server. This includes HTTPS connections from the MID Server to an internet endpoint, ServiceNow URLs, intranet endpoints, as well as cloud endpoints.



These connections can be further classified into 4 security policies:

ServiceNow endpoint policy

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This policy is the system default exclusively for ServiceNow URLs. On the MID Server `config.xml`, there are bootstrap properties which are only used to make first connection to the instance and will get updated with the system_default policy.

Internet policy

These policies cover all HTTPS connections initiated from MID Server to any endpoint on the internet.

Intranet policy

These policies cover the reserved IP subnets, such as self-hosted networks.

Overridden policy

You can override specific endpoints or URLs with this policy definition. Overridden policies take the highest order of precedence during operation.

Both tables are editable to include or exclude IP ranges, as well as control what kind of certificate validation checks need to be done. Enable all certificate validation checks to maximize security. The Quebec version has all policies and checks turned on by default for fresh installations.

For upgrading customers, the intranet policy has the certificate validation checks disabled by default. To improve security, configure and enable the policy for endpoints within the internal network.

Note:
Internal endpoints or URLs need to possess a valid CA signed certificate for a successful connection.

For endpoints that host a self-signed certificate, either import the certificate to the MID Server trust store or disable the policy checks which validate that host. For more information about adding certificates, see Add SSL certificates for the MID Server.

After upgrading to Quebec, go to the certificate check policies table and make changes to policy configuration if necessary. Once the MID Server starts up and connects to the instance, any subsequent HTTPS connection originating from the MID server will start applying these certificate checks at runtime. Insecure connections are broken with appropriate error messages.

Use Instance Security Policy

The MID Server configuration parameter **mid.ssl.use.instance.security.policy** controls whether the MID Server uses its bootstrap parameters rather than the security policy from the instance. By default, **mid.ssl.use.instance.security.policy** is set to false in the **config.xml** so the bootstrap policies are not overwritten by the instance's.

This default setting can prevent some problems during MID Server setup. For example if the host is unable to reach the OCSP responder, then a new MID Server installation is not disrupted by an instance's policy of requiring OCSP connection.

The configuration parameter **mid.ssl.use.instance.security.policy** can be set for each MID Server. When set to true, the MID Server syncs all policies with the instance and the bootstrap configuration parameters are overwritten by the ***.servicenow.com** policy on the instance **mid_cert_check_policy** table. The final policies update the policy map in the MID Server memory as well as the **config.xml**.

The default parameters in the **config.xml** are:

- `<parameter name="mid.ssl.bootstrap.default.check_cert_hostname" value="true"/>`
- `<parameter name="mid.ssl.bootstrap.default.check_cert_chain" value="true"/>`

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- `<parameter name="mid.ssl.bootstrap.default.check_cert_revocation" value="false"/>`
- `<parameter name="mid.ssl.use.instance.security.policy" value="false"/>`

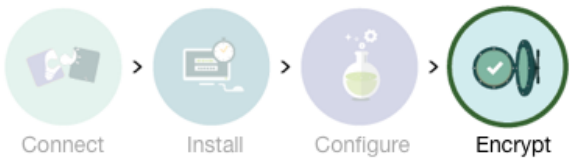
Self-hosted or on-prem instances must add the following parameter for the **config.xml**: `<parameter name="mid.ssl.bootstrap.default.target_endpoint" value="FQDN_OF_THE_INSTANCE"/>`

Encrypt or decrypt MID Server configuration file values

The value of any MID Server parameter in the `config.xml` file can be encrypted. The attributes for all encrypted values are managed from within the configuration file, including the security attribute of the login password.

Before you begin

Role required: admin



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Procedure

1. Navigate to the `agent` directory that was created when the MID Server was installed and open the `config.xml` file using a text editor such as WordPad.
2. Locate or add the parameter you want to encrypt.
   For example, you might want to protect your proxy server passwords by configuring this parameter:

   ```
   <parameter name="mid.proxy.password" value="securepassw0rd"/>
   ```

3. Add the encryption attribute **secure="true"**.

   ```
   <parameter name="mid.proxy.password" secure="true"
    value="securepassw0rd"/>
   ```

4. Restart the MID Server.
5. Open the `config.xml` file.
   The encrypted password appears as follows:

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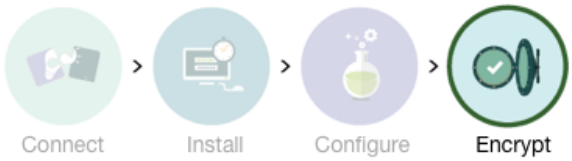
```
<parameter name="mid.proxy.password" secure="true"
 value="encrypted:rhrfUNYRzZAI8/BkTtZmNA==" />
```

.

6. To decrypt this or any other value in the `config.xml` file and display the value in clear text:
   a. Stop the MID Server.
   b. Set the **secure="true"** attribute to **false**.
   c. Replace the encrypted value with the clear text value.
   d. Restart the MID Server.

MID Server configuration file security

Sensitive MID Server configuration data can be protected using several different schemes, including internal and external data encryption and external data storage.



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6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

The MID Server allows to use one secured configuration provider at a time. You can use either the default security provider or CyberArk as the secured configuration provider. Mixed provider configurations are not supported. For example, you cannot use the default security provider together with CyberArk. The following built-in security options are available:

- **Default security provider**: Secures the data in the **config.xml** file by encryption. When the MID Server is restarted, any unencrypted data is encrypted and written to the **config.xml** file. The default security provider offers these encryption options:
  - **Default encryptor**: Default process for encrypting data in the MID Server **config.xml** file. See Encrypt or decrypt MID Server configuration file values for details.
  - **Windows Data Protection API (DPAPI)**: The operating system performs the data encryption, rather than the MID Server. DPAPI encryption is based on the logged in user's account. When this scheme is used, the data can only be decrypted by the same user account. If the account changes, the data must be re-encrypted.
  - **Custom encryption**: Implement the IMidServerEncrypter interface to create your own custom encryption scheme to manage sensitive **config.xml** data.

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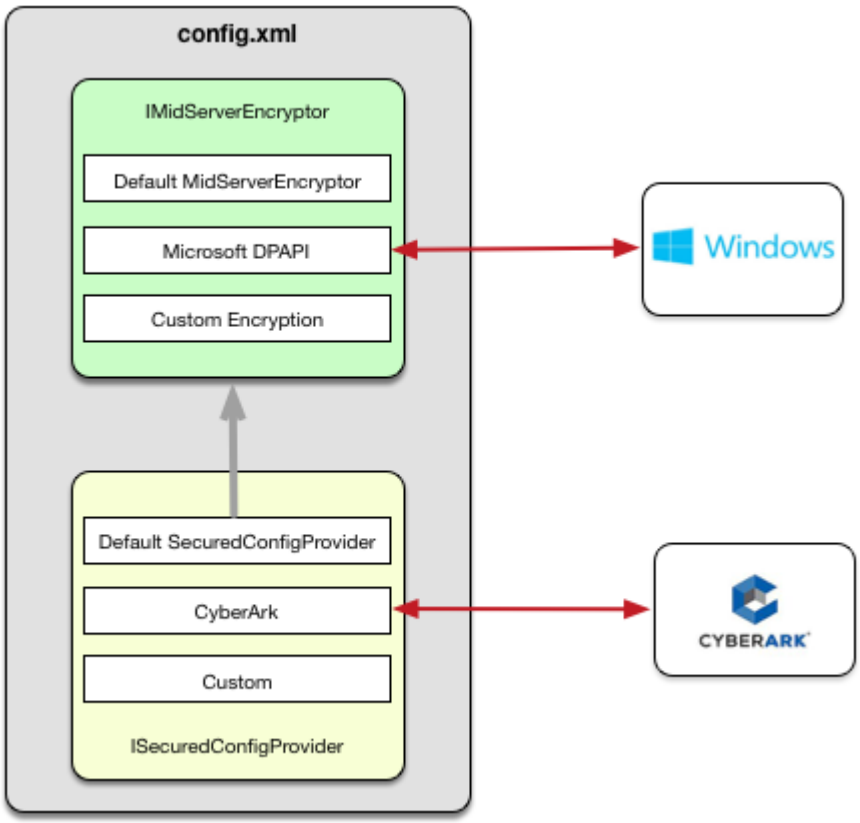
- **CyberArk**: Data security is provided by CyberArk integration configuration, which moves sensitive data from the **config.xml** file to a secure CyberArk vault. This solution does not encrypt the data.
- **Custom external storage**: Implement the ISecuredConfigProvider interface to create your own custom external storage system to manage sensitive **config.xml** data.

Secured content and encryption schemes



Encrypt MID Server configuration data with DPAPI

Windows Data Protection API (DPAPI) encrypts sensitive data from the **config.xml** file, based on the MID Server user account.

Before you begin

Role required: admin

About this task

DPAPI encryption provides another level of security for data such as credentials, IP addresses, and URLs in the MID Server **config.xml** file. The operating system performs the data encryption, rather than the MID Server. DPAPI encryption is based on the logged in user's account. When this scheme is used, the data can only be decrypted by the same user account. If the account changes, the data must be re-encrypted.

Procedure

1. Open the **config.xml** file in a text editor.
   This file is located in the **/agent** folder in your MID Server installation path.
2. Enable this parameter and value:
   ```
   <parameter name="mid.secure_encrypter"
   value="com.service_now.mid.services.config.WindowsDPAPIEncrypter"/
   >
   ```

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3. Save the configuration file.
4. Restart the MID Server.
   Any values in clear text in the **config.xml** file are encrypted by the operating system.
5. Follow this procedure if you need to change the MID Server user account that is used for encryption.

   a. Stop the MID Server service.

   b. Open the **config.xml** file in a text editor.
   This file is located in the **/agent** folder in your MID Server installation path.

   c. Re-enter all the encrypted values in clear text.

   d. Make the changes to the MID Server user account in the ServiceNow® instance.

   e. Restart the MID Server service.
   The data is re-encrypted by the operating system, based the new MID Server user account.

Use CyberArk as a secure configuration provider

You can use a CyberArk vault to secure any sensitive data from the MID Server **config.xml** file.

Before you begin

Role required: admin

Before configuring CyberArk as secured config provider, make sure that **JavaPasswordSDK.jar** is available in the `<mid_installation_folder>/agent/extlib` folder.

To configure the MID Server to connect to CyberArk using AIM, see CyberArk JAR import.

About this task

CyberArk is commonly used to secure credentials in its external vault. However, a MID Server parameter in the **config.xml** file enables you to store other types of data in CyberArk.

Procedure

1. Open the **config.xml** file in a text editor.
   This file is located in the **/agent** folder in your MID Server installation path.
2. Enable this parameter and value:
   ```
   <parameter name="mid.secure_config.provider"
   value="com.service_now.mid.services.config.CyberArkSecuredConfigProvider"/
   >
   ```
3. Configure specific data to secure in the CyberArk vault.
   Use the following example as a guide.

   a. Secure the MID Server credentials by setting this parameter to match the **ID** and **Type** for that data in your CyberArk integration configuration.

   ```
   <parameter name="mid.instance.username" secure="true"
    value="cyberark: id=<CyberArk ID>, type=<CyberArk type>"/>
   <parameter name="mid.instance.password" secure="true"
    value="cyberark: id=<CyberArk ID>, type=<CyberArk type>"/>
   ```

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b. Secure the URL of the instance by setting this parameter to match the **ID** and **Type** for that data in your CyberArk configuration.
`<parameter name="url" secure="true" value="cyberark: id=<CyberArk ID>, type=<CyberArk type>"/>`

4. Save the configuration file.
5. Restart the MID Server.

Change MID Server configuration file security schemes

The MID Server provides several schemes for securing sensitive data in the **config.xml** file and allows you to switch between these options to suit your security requirements.

Before you begin
Role required: admin

Procedure

1. Stop the MID Server service.
2. Open the **config.xml** file in a text editor.
   This file is located in the **/agent** folder in your MID Server installation path.
3. Re-enter all the encrypted values in clear text.
4. Disable the previous security scheme and configure the MID Server to use the new provider.
5. Restart the MID Server service.
   The data is re-secured or encrypted, based on the security scheme you have selected.

MID Server ISecuredConfigProvider interface

Use the methods in this interface to create custom providers that manage secured parameter values in the MID Server **config.xml** file.

Note:
These methods are contained in the **snc-automation-api.jar** file, located in the MID Server installation folder.

initialize

This method initializes the provider with additional configuration parameters and does not return a value.

Example

```
void intialize(java.util.Properties properties,
               IMidServerEncrypter encrypter)
       throws java.lang.Exception
```

Parameters

Parameters	Description
properties	Initialization properties.

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Parameters (continued)

Parameters	Description
encrypter	Encrypter to use if the provider is encryption based.

Exception

```
java.lang.Exception
```

isParameterValueSecured

This method checks to see if the parameter value has been secured or not. This method returns a **boolean** type value.

Example

```
boolean isParameterValueSecured(java.lang.String paramValue)
```

Parameters

Parameter	Description
paramValue	The parameter value.

Returns

The parameter returns **true** if the parameter value is secured.

secureParameterValue

This method secures the parameter value if it has not been secured. This method returns a **string** type value.

Example

```
java.lang.String secureParameterValue(java.lang.String
 unsecuredParameterValue)
                                throws java.lang.Exception
```

Parameters

Parameter	Description
unsecuredParameterValue	The unsecured parameter value.

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Returns

This method returns the unsecuired parameter value.

Exception

`java.lang.Exception`

unsecuredParameterValue

This method returns the unsecured value of the parameter. This method returns a **string** type value.

Example

```
java.lang.String unsecuredParameterValue(java.lang.String
 parameterName)
                                    throws java.lang.Exception
```

Parameters

Parameter	Description
parameterName	The parameter name.

Returns

This parameter returns the unsecured value.

Exception

`java.lang.Exception`

MID Server IMidServerEncrypter interface

Use the methods in this interface to create a custom external encrypter for the MID Server **config.xml** file.

Note:
These methods are contained in the **snc-automation-api.jar** file, located in the MID Server installation folder.

initialize

This method initializes the encrypter with additional configuration parameters and does not return a value.

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Example

```
void intialize(java.util.Properties properties)
        throws java.lang.Exception
```

Parameters

Parameter	Description
properties	Initialization properties.

Exception

`java.lang.Exception`

encrypt

This method encrypts the unencrypted data and returns a **byte[ ]** type value.

Example

```
byte[] encrypt(byte[] unencryptedData)
        throws java.lang.Exception
```

Parameters

Parameter	Description
unencryptedData	The data unencrypted.

Returns

Encrypted data

Exception

`java.lang.Exception`

decrypt

This method decrypts encrypted data and returns a **byte[ ]** type value.

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Example

```
byte[] decrypt(byte[] encryptedData)
        throws java.lang.Exception
```

Parameters

Parameters	Description
encryptedData	The data decrypted.

Returns

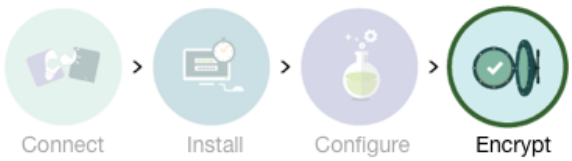
Decrypted data.

Exception

`java.lang.Exception`

MID Server authentication credentials and SOAP requests

Set basic authentication credentials to update the web service invocation data. For added security, you can enforce basic authentication on each incoming SOAP request to the MID Server.



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Basic authentication credentials and SOAP requests

You can enforce basic authentication on each request. The MID Server is not able to communicate through a proxy server if the proxy server supports only NTLM authentication. You can use basic authentication with a proxy server or create an exception for the MID server host.

Supplying basic authentication information, regardless of whether it is required, has an added advantage. The web service invocation creates or updates data using the supplied credentials.

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For example, when you create an incident record, the journal fields have the user id of the basic authenticated user instead of the default Guest user. This behavior allows you to identify data added by a specific MID Server.

You can set basic authentication credentials for SOAP requests. Each SOAP request contains an Authorization header as specified in the Basic Authentication protocol.

The setting for enforcing strict security controls how the instance uses the credentials you provide for the MID Server. When the setting is enabled, you must provide a user ID with access to the tables the MID Server is trying to access. When the setting is disabled, any valid user ID allows the MID Server to access to all tables.

Require basic authorization for incoming SOAP requests

Enforce basic authentication on each incoming SOAP request to the MID Server.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Properties** > **Web Services**.
2. Select the check box for **Require basic authorization for incoming SOAP requests**.
3. Click **Save**.
4. To provide basic authentication credentials for a MID Server, navigate to C:\Program Files \ServiceNow\<MID Server name>\agent and edit the `config.xml` file, as follows:

   a. Find the element *`<parameter name="mid.instance.username" value=""/>`* and enter the instance administrator user name as the value.

   Example
   For example, you might enter *`<parameter name="mid.instance.username" value="admin"/>`*.

   b. Find the element *`<parameter name="mid.instance.password" value=""/>`* and enter the configured password for this instance as the value.

   Example
   For example, you might enter *`<parameter name="mid.instance.password" value="abc123"/>`*.

MID Server unified key store

The MID Server unified key store allows all products on the MID Server to use common certificates and key pairs. This feature allows applications to use the same secure communication channel to the MID Server that the MID Server uses to connect to the instance.

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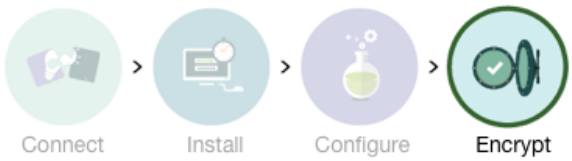

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When the MID Server starts, the common name (CN) of the certificate is inspected to identify if a custom certificate has been installed. If a custom certificate is detected, the creation of the certificate/keypair will be skipped and an attribute is set on the ecc_agent record to indicate the usage of a custom certificate.

When a custom certificate is used, the **Re-key** UI-action is disabled on the instance for the MID Server. A new UI action called **Remove custom keypair** is available to switch back to using a self-signed certificate. Using this action will cause the MID Server to remove the custom certificate and generate a new self-signed certificate, similar to the re-key option.

When a MID is upgraded, any custom certificates that were installed will be retained.

PEM bundle support

MID Server unified key store supports PEM bundle certificate and key pairs.

Sample PEM bundle

```
-----BEGIN PRIVATE KEY-----

MIIEvQIBADANBgkqhkiG9w0BAQEFAASCBKcwggSjAgEAAoIBAQC0pj5O8QKFpHy9

...

oPdU+h0grs9SJp6rFx0PzDY=

-----END PRIVATE KEY-----

Bag Attributes

    friendlyName: <myCustomCert>

    localKeyID: 54 69 6D 65 20 31 35 39 35 33 35 34 32 30 38 30
 35 31

subject=/C=US/ST=CA/L=Santa Clara/CN=epic1016883

issuer=/C=US/ST=CA/L=Santa Clara/CN=epic1016883
```

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```
-----BEGIN CERTIFICATE-----
MIIDKzCCAhOgAwIBAgIEPqMQqDANBgkqhkiG9w0BAQsFADBGMQswCQYDVQQGEwJV
...
4g53RN+LqtJVeeQkZvIbZOfuSqypdVfudkS8dqxQALb8IuHUV7JOcBvOT79mSTs=
-----END CERTIFICATE-----
```

Install custom certificates in the MID Server unified key store

Install custom certificates to unify the security channels for various applications.

Before you begin

Role required: admin

When installing the certificate on a MID Server hosted in Linux, `install-certificate.sh` can be unresponsive if the Linux entropy pool count is less than a few hundred. Check the entropy count of the Linux pseudo random number generator (PRNG) with the following command:

```
cat /proc/sys/kernel/random/entropy_avail
```

If the entropy count is too low, you can install an entropy generator such as RNGD or Haveged. For more information about installing Haveged for CentOS and Ubuntu, see How to Setup Additional Entropy for Cloud Servers Using Haveged.

Procedure

1. If the MID Server is running, stop the MID Server.

   Note:

   If the entry for alias **DefaultSecurityKeyPairHandle** is being modified, you must invalidate the MID Server before stopping it.

2. Create a PEM bundle certificate and keypair by running one of the following commands in the MID Server install folder.
   - Generate self-signed certificates for non-MTLS use cases with the command:

     ```
     openssl req -newkey rsa:2048 -nodes -keyout key.pem -x509
      -days 365 -out certificate.pem
     ```

   - Export the key store to a PEM bundle using the command:

     ```
     openssl pkcs12 -in <myCustomCert>.p12 -nodes -out
      <myCustomCert>.pem
     ```

   - Get only certificates in the PEM format with the command:

     ```
     openssl pkcs12 -in <myCustomCert>.p12 -out <myCustomCert>.pem
      -clcerts -nokeys
     ```

   - Get only keys in the PKCS#8 format with the command:

     ```
     openssl pkcs12 -in <myCustomKey>.p12 -out <myPrivateKey>.key
      -nocerts -nodes
     ```

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- Install the certificate, or certificate chain, and private key for Windows hosts using the command:

```
bin/scripts/manage-certificates.bat -a <alias> <file path to
 PEM bundle>
```

- Install the certificate, or certificate chain, and private key for Linux hosts using the command:

```
bin/scripts/manage-certificates.sh -a <alias> <file path to
 PEM bundle>
```

Note:

The header and footer of the PEM syntax must be the following:

```
-----BEGIN CERTIFICATE-----
```

```
-----END CERTIFICATE-----
```

The header and footer of the PKCS#8 syntax must be the following:

```
-----BEGIN PRIVATE KEY-----
```

```
-----END PRIVATE KEY-----
```

3. Start the MID Server.
4. Validate the MID Server with the instance.
5. **Optional:** To revert the MID Server to use a self-generated certificate, select the MID Server in the instance and use the UI action **Remove custom certificate**.

Note:
The MID Server can also be reverted using the **Invalidate** UI action. Invalidating a MID Server removes any custom certificates that are installed and creates a new self-signed certificate for the MID Server.

What to do next

The *manage-certificates* has the following functions and the scripts must be run from the agent folder.

Enable mutual authentication

For Windows, use the command: `bin\scripts\manage-certificates.bat -m`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -m`

Remove mutual authentication and restore back basic authentication

For Windows, use the command: `bin\scripts\manage-certificates.bat -b <myUserName myPassword>`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -b <myUserName myPassword>`

Add new certificates and certificate chains with a specified alias

For Windows, use the command: `bin\scripts\manage-certificates.bat -a <alias> <fileName>`

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For Linux, use the command: `./bin/scripts/manage-certificates.sh -a <alias> <fileName>`

The `alias` is a unique name given to the certificate being imported. The MID Server requires a custom certificate for mutual authentication, with the default alias name `defaultsecuritykeypairhandle`. To configure MTLS communication between the MID Server and instance, the certificate entry must be added to the key store using the alias name `defaultsecuritykeypairhandle`.

The `fileName` is a file path that can contain a PEM certificate, or certificate chain, and a PCKS#8 private key. The file path to the PEM bundle can contain multiple certificates and a single private key. The header and footer of each PEM certificate must be the following:

```
-----BEGIN CERTIFICATE-----
```

```
-----END CERTIFICATE-----
```

The header and footer of the PKCS#8 syntax must be the following:

```
-----BEGIN PRIVATE KEY-----
```

```
-----END PRIVATE KEY-----
```

An exception is thrown if the certificate chain fails validation. If the file contains multiple certificates, they must be ordered: leaf certificate, intermediate certificates, then root certificates.

Display certificate details for the specified alias

For Windows, use the command: `bin\scripts\manage-certificates.bat -g <alias>`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -g <alias>`

This command displays information such as subject distinguished name, issuer name, and expiry date from the certificate.

List all existing aliases

For Windows, use the command: `bin\scripts\manage-certificates.bat -l`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -l`

This command lists all the alias names available in the *agent_keystore*.

Delete certificates using an alias

For Windows, use the command: `bin\scripts\manage-certificates.bat -d <alias>`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -d <alias>`

This command deletes the alias and record from the keystore. The entry for alias *DefaultSecurityKeyPairHandle* can be deleted using this command.

Remove all entries from the keystore

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For Windows, use the command: `bin\scripts\manage-certificates.bat -r`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -r`

This command deletes the existing entries from the keystore, except alias *`DefaultSecurityKeyPairHandle`*.

Related topics

Enable MID Server mutual authentication

Restore the MID Server key store with a backup

If the key store becomes corrupted or is accidentally deleted you can restore a backup of the MID Server key store. This is especially useful for key stores with custom key-pairs, because otherwise recreating custom key-pair data can be difficult and time consuming.

Before you begin

Role required: Agent admin

About this task

Starting with the Tokyo release, the MID Server automatically makes a backup of the **agent_keystore** file when it is changed. Backups are stored in **security_backup** under the agent folder. They are stored outside the security folder to protect against accidental deletions or corruptions of the security folder.

In the backup folder, there is a dedicated backup log file: **keystore_backup_audit_trail.log**. This log keeps track of backup files and backup activities. Each backup log entry has backup file name with a time stamp, a matching **keypairs.mid_id**, and a list of aliases of key-pairs in the backup.

Note:
For security purposes, the backup key store should have the same attributes as the original key store, such as owner, group, and permissions. Those attributes ensure the MID Server has the same protection at file system level.

The key store backups can be modified with the MID Server properties **mid.keystore.max_backups**, **mid.keystore.max_live_backups**, and **mid.keystore.backup_overwrite_timespan**. See MID Server properties for more information.

Procedure

1. Stop MID Server.
2. Navigate to the **security_backup** and view the **keystore_backup_audit_trail.log** to choose which backup to restore.
3. Copy that backup to the **agent_keystore** file in the security folder.
   Check the file permissions to make sure that it has the same owner and permissions as the original one. If **agent_keystore** already exists in that location, overwrite it with the backup.
4. Check **config.xml** to make sure that the **keypairs.mid_id** matches the one in the audit log file.
5. **Optional:** If the **keypairs.mid_id** do not match, update **config.xml** to match them.
6. Navigate to the instance and invalidate the MID server.
   This will create a **delete_mid_keypair** system command in the **ecc_queue**.
7. Find all **delete_mid_keypair** output messages for the MID Server and mark them as processed.

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The goal is to mark the MID Server as invalidated without triggering the key-pair deletion. Unless the system commands are marked as processed, MID Server deletes the **defaultsecuritykeypairhandle** key-pair regardless of whether it is custom or auto-generated.

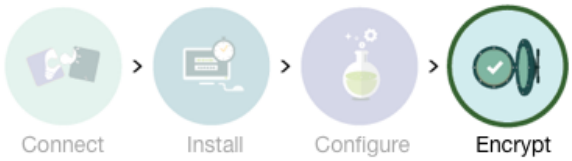
8. Restart MID Server.
9. Navigate to the instance and validate the MID Server.

Enable MID Server mutual authentication

Configure the MID Server to use a client certificate for authenticating to the instance. This avoids the need to create a basic authentication credentials in the Key Store for the MID Server's configuration.

Before you begin

Role required: admin



1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
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About this task

MID Server mutual authentication removes the MID Server user name and password and provides a client certificate for authentication. Whenever a server requests authentication, this certificate is sent instead. To use mutual authentication, certificate based authentication must be enabled. See Set up Certificate-based authentication for the procedure.

If a new MID Server is created with mutual authentication, it does not add capabilities automatically. An administrator must add capabilities to its record on the instance. However, existing MID Servers using basic authentication with capabilities are preserved when switching to mutual authentication.

A MID Server using mutual authentication cannot be re-keyed or validated as a UI action on the instance.

Self-signed certificates are not supported with mutual authentication. Internally signed certificates are only supported when signed by a private certificate authority. Commercially signed certificates are supported when signed by a commonly trusted certificate authority, such as those trusted by browsers and operating systems.

In the Quebec release, a MID Server using the Health Log Analytic application cannot be configured with mutual authentication.

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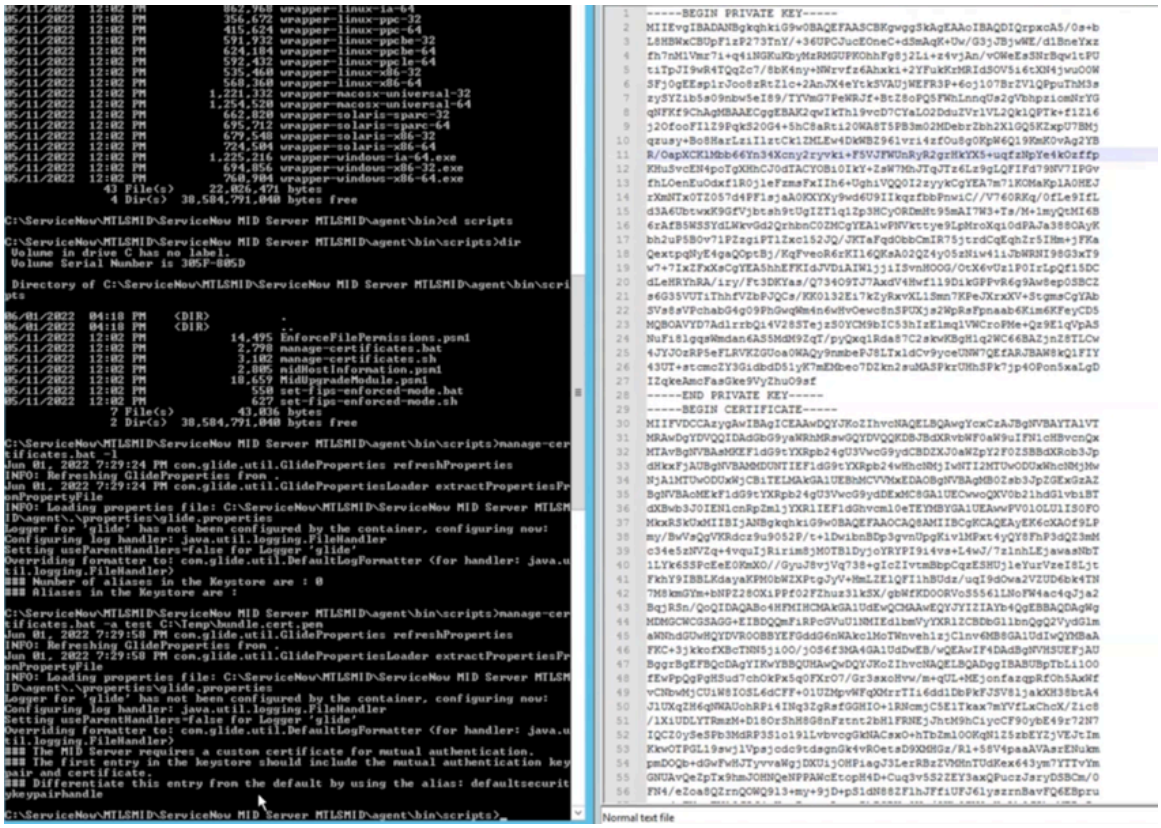
Procedure

1. Contact ServiceNow support to request mutual authentication on the MID Server.
2. Obtain a certificate and private key from a respected certificate authority.

   MID Server mutual authentication only supports the PEM bundle format and private key in PCKS#8 format. The bundle must have both the private key and certificate. Open the certificate using a text editor and see if it is in text format. The header and footer of the PEM syntax is the following:

   ```
   -----BEGIN CERTIFICATE-----
   ```

   ```
   -----END CERTIFICATE-----
   ```



   You can read the contents of a PEM certificate using the `openssl` command on Linux or Windows as follows: `openssl x509 -in cert.crt -text` . The private key must be in the PKCS#8 format. The header and footer of the PKCS#8 syntax is the following:

   ```
   -----BEGIN PRIVATE KEY-----
   ```

   ```
   -----END PRIVATE KEY-----
   ```

   #You can check the contents of a private key using the `openssl` command on Linux or Windows as follows: `openssl rsa -in private.key -check`

   Note:
   If your certificate is not in PKCS#8 format, you get an error: `- main SEVERE *** ERROR *** Could not find valid private key`

3. Split up the PEM certificate into 3 different PEM files.

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a. Private key and leaf certificate

b. Leaf certificate

c. Intermediate certificates and root certificate

4. On the instance, upload file containing the intermediate and root certificates to the CA Certificate Chain table: **sys_ca_certificate.list**.

> **Note:**
> If uploading individually instead of a bundle, start with the root certificate, and then the intermediate certificate(s). It is preferrable to uploade this file as a PEM bundle, whose type is set to CA Cert, instead of splitting it into multiple files.

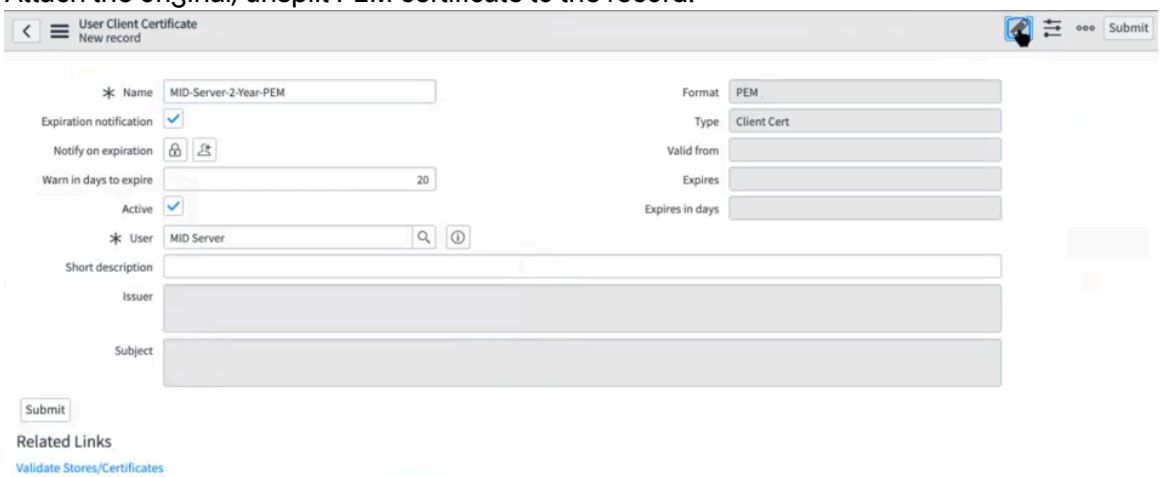
5. Check the uploaded CA Cert record on the instance and wait for the **Publish Status** to change to **Exists**.

> **Note:**
> Do not proceed until the publish status is updated to **Exists**.

6. On the instance, navigate to **sys_user_certificate.list**.
7. Attach only the leaf certificate to **sys_user_certificate.list** without including the private key.
8. If the MID Server is validated, invalidate the MID Server before continuing.
9. Create a new record.

> **Note:**
> The record must have the MID Server's name and the **User Role** must be **MID Server**.

10. Attach the original, unsplit PEM certificate to the record.



> **Note:**
> Ensure that the attached file contains only the certificate.

11. If the MID Server is running, stop the MID Server.
12. On the MID Server host machine, run the following commands to install and manage the certificate and private key.

    Run the script from the root of the agent directory because it requires the jar files in the class path. The security directory is then created in the agent root folder and is used by MID Server. For example: `bin/scripts/manage-certificates.bat -m`

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The *manage-certificates* has the following functions and the scripts must be run from the agent folder.

Enable mutual authentication

For Windows, use the command: `bin\scripts\manage-certificates.bat -m`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -m`

Remove mutual authentication and restore back basic authentication

For Windows, use the command: `bin\scripts\manage-certificates.bat -b <myUserName myPassword>`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -b <myUserName myPassword>`

Add new certificates and certificate chains with a specified alias

For Windows, use the command: `bin\scripts\manage-certificates.bat -a <alias> <fileName>`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -a <alias> <fileName>`

The `alias` is a unique name given to the certificate being imported. The MID Server requires a custom certificate for mutual authentication, with the default alias name `defaultsecuritykeypairhandle`. To configure MTLS communication between the MID Server and instance, the certificate entry must be added to the key store using the alias name `defaultsecuritykeypairhandle`.

The `fileName` is a file path that can contain a PEM certificate, or certificate chain, and a PCKS#8 private key. The file path to the PEM bundle can contain multiple certificates and a single private key. The header and footer of each PEM certificate must be the following:

```
-----BEGIN CERTIFICATE-----
```

```
-----END CERTIFICATE-----
```

The header and footer of the PKCS#8 syntax must be the following:

```
-----BEGIN PRIVATE KEY-----
```

```
-----END PRIVATE KEY-----
```

An exception is thrown if the certificate chain fails validation. If the file contains multiple certificates, they must be ordered: leaf certificate, intermediate certificates, then root certificates.

Display certificate details for the specified alias

For Windows, use the command: `bin\scripts\manage-certificates.bat -g <alias>`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -g <alias>`

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This command displays information such as subject distinguished name, issuer name, and expiry date from the certificate.

List all existing aliases

For Windows, use the command: `bin\scripts\manage-certificates.bat -l`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -l`

This command lists all the alias names available in the *agent_keystore*.

Delete certificates using an alias

For Windows, use the command: `bin\scripts\manage-certificates.bat -d <alias>`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -d <alias>`

This command deletes the alias and record from the keystore. The entry for alias *DefaultSecurityKeyPairHandle* can be deleted using this command.

Remove all entries from the keystore

For Windows, use the command: `bin\scripts\manage-certificates.bat -r`

For Linux, use the command: `./bin/scripts/manage-certificates.sh -r`

This command deletes the existing entries from the keystore, except alias *DefaultSecurityKeyPairHandle*.

13. Start the MID Server.

Related topics

Install custom certificates in the MID Server unified key store

MID Server unified key store

MID Server Azure Key Vault integration

The MID Server integration with the Azure Key vault enables Orchestration, Discovery, and Service Mapping to run without storing any credentials on the instance.

Before you begin

To install the required application on the instance, navigate to **Plugin Manager** > **External Credential Storage and Management**.

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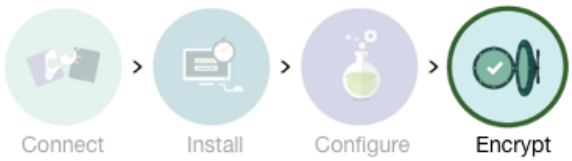

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Role required: External Credential Storage and Management application Scope ID is required: com.sn_mid_extcredstrg

About this task

When setting up access to the Azure Key Vault, the MID Server is either within the Azure environment or it is on an external virtual machine. This procedure covers setting up the Azure Key Vault for a MID Server within the Azure environment.

For more information about specific Azure and Azure Key Vault procedures, see the Azure Key Vault documentation.

Procedure

1. Within the Azure cloud environment, create a virtual machine.
2. Navigate to the Identity section of that virtual machine.
3. Enable system assigned identity.
   Once it is enabled, you have the option to assign a role for that identity.
4. Navigate to the **Add role assignment** menu.
5. Set the scope to your Subscription.
6. Add the Key Vault administrator role.
7. Set the resource to the key vault that you want to integrate with the MID Server.

Azure Key Vault Integration for External Virtual Machine MID Servers

The MID Server integration with the Azure Key vault enables Orchestration, Discovery, and Service Mapping to run without storing any credentials on the instance.

Before you begin

Role required: External Credential Storage and Management application (Scope ID:**com.sn_mid_extcredstrg**) is required.

About this task

When setting up access to the Azure Key Vault, the MID Server is either within the Azure environment or it is on an external virtual machine. This procedure covers setting up the Azure Key Vault for a MID Server that is on an external virtual machine.

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For more information about specific Azure and Azure Key Vault procedures, see the Azure Key Vault documentation.

MID servers can use the Vault Credential Resolver to consume secrets directly from Vault for the purpose of performing discovery. The External Credential Storage and Management Application offers out-of-the-box integration to external credential providers. MID Servers support certificate-based authentication when connecting to Azure Key Vault. This provides a more secure and flexible way to authenticate, especially for enterprise environments that prefer certificate credentials over client secrets. For more information on managing certificates, see MID Server unified key store.

Procedure

1. In the Azure portal, navigate to App registrations.
2. Create a new application for the MID Server.
3. Take a note of the **tenant id** and **client id** because these are used later.
4. Provide API Permission for Azure Key Vault to the application.
5. Navigate to **Certificates and Secrets** for the new application.
6. Generate a new client secret and take a note of that client secret.
   At this point, you should have the **client_id**, **tenant_id**, and **secret_key** for the application registration.
7. Add the following parameters to the MID Server **config.xml** using the recorded values.

```
<parameter name="ext.cred.azure.vault_name" secure="false"
 value="<azure_key_vault_name>"/> (optional)
<parameter name="ext.cred.azure.tenant_id" secure="true"
 value="<tenant_id_value>"/>
<parameter name="ext.cred.azure.client_id" secure="true"
 value="<client_id_value>"/>
<parameter name="ext.cred.azure.secret_key" secure="true"
 value="<secret_key_value>"/>
```

Supported Credentials for Azure Key Vault Integration

The MID Server supports specified credentials for integration with the Azure Key vault.

List of Credentials

SNMPV3 Credentials

```
 {
   "type": "snmpv3",
   "user": "<user_value>",
   "authentication_key": "<authentication_key_value>",
   "privacy_protocol": "<privacy_protocol_value>",
   "privacy_key": "<privacy_key_value>",
   "authentication_protocol":
"<authentication_protocol_value>",
   "snmp_context": "<snmp_context_value>"
 }
```

VMWare Credentials

```
 {
   "type": "vmware",
   "password": "<password_value>",
```

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```
  "user": "<user_value>"
}
```

SSH Credentials

```
{
  "type": "ssh",
  "password": "<password_value>",
  "user": "<user_value>"
}
```

Windows Credentials

```
{
  "type": "windows",
  "password": "<password_value>",
  "user": "<user_value>",
  "domain": "<domain_value>" // If it is null or
empty, user name will become `.\user`
}
```

Azure Service Principal Credentials

```
{
  "type": "azure",
  "client_id": "<client_id_value>",
  "tenant_id": "<tenant_id_value>",
  "secret_key": "<secret_key_value>"
}
```

SSH Private Key Credentials

```
{
  "type": "ssh_private_key",
  "password": "<password_value>", // optional
  "user": "<user_value>",
  "ssh_certificate": "<ssh_certificate_value>",
  "ssh_private_key": "<ssh_private_key_value>",
  "ssh_passphrase": "<ssh_passphrase_value>" //
optional
}
```

AWS Credentials

```
{
  "type": "aws",
  "access_key": "<access_key_value>",
  "secret_key": "<secret_key_value>"
}
```

API Key Credentials

```
{
  "type": "api_key",
  "api_key": "<api_key_value>"
}
```

Applicative Credentials

```
{
  "type": "<applcation_type>", // generated by JSON
builder: TODO
  "password": "<password_value>",
```

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```
  "user": "<user_value>"
}
```

Azure Enterprise Agreement Credentials

```
{
  "type": "ea_azure",
  "access_key": "<access_key_value>",
  "enrollment_number": "<enrollment_number>"
}
```

Azure SAS Credentials

```
{
  "type": "azure_sas",
  "sas_key": "<sas_key_value>",
  "sas_key_name": "<sas_key_name_value>"
}
```

Basic Auth Credentials

```
{
  "type": "basic_auth",
  "password": "<password_value>",
  "user": "<user_value>"
}
```

CIM Credentials

```
{
  "type": "cim",
  "password": "<password_value>",
  "user": "<user_value>"
}
```

Cloud Foundry Credentials

```
{
  "type": "sn_itom_pattern_pcf",
  "password": "<password_value>",
  "user": "<user_value>",
  "ssh_private_key": "<ssh_private_key_value>",
  "ssh_passphrase": "<ssh_passphrase_value>"
}
```

Google API Credentials

```
{
  "type": "gcp",
  "email": "<email_value>",
  "secret_key": "<secret_key_value>"
}
```

SSL Keystore Credentials

```
{
  "type": "keystore",
  "keystore_password": "<keystore_password_value>",
  "keystore_path": "<keystore_path_value>",
  "key_password": "<key_password_value>"
}
```

JMS Credentials

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```
{
  "type": "jms",
  "password": "<password_value>",
  "user": "<user_value>"
}
```

SNMP Community Credentials

```
{
  "type": "snmp",
  "password": "<password_value>"
}
```

SSL Credentials

```
{
  "type": "keystore",
  "user": "<user_value>",
  "password": "<password_value>",
  "additional_properties":
"<additional_properties_value>",
  "key_password": "<key_password_value>",
  "keystore": "<keystore_value>",
  "keystore_password": "<keystore_password_value>",
  "keystore_type": "<keystore_type_value>",
  "ssl_provider_name": "<ssl_provider_name_value>",
  "security_protocol": "<security_protocol_value>",
  "truststore": "<truststore_value>",
  "truststore_password":
"<truststore_password_value>",
  "truststore_type": "<truststore_type_value>"
}
```

IBM Credentials

```
{
  "type": "ibm",
  "user": "<user_value>",
  "password": "<password_value>",
  "softlayer_user": "<softlayer_user_value>",
  "softlayer_key": "<softlayer_key_value>",
  "bluemix_key": "<bluemix_key_value>"
}
```

Gov Cloud Support for Azure Key Vault Integration

You may need to override authentication and the vault URL when operating in government cloud environments. The following examples are for US government clouds.

Auth endpoint:

For US government clouds: https://login.microsoftonline.us/%s/oauth2/v2.0/token

For US government cloud support: `<paramter name="ext.cred.azure.vault_auth_endpoint" value="https://login.microsoftonline.us/%s/oauth2/v2.0/token"/>`

Scope:

For US government clouds: https://vault.usgovcloudapi.net/.default

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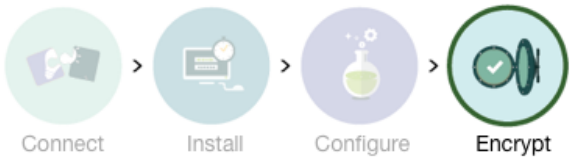
```
<paramter name="ext.cred.azure.endpoint_scope"
value="https://vault.usgovcloudapi.net/.default"/>
```

For Germany government clouds: https://vault.microsoftazure.de/.default

For Chinese government clouds: https://vault.azure.cn/.default

MID Server command audit log

The command audit log records the commands run by the MID Server for the Discovery application. Review the commands to check for anomalies or errors.



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The MID Server command audit log is a record of the commands the MID Server runs during discovery. For example, executing one pattern may run many separate commands. The MID Server command audit log supports Powershell commands for WMI and WinRM. For SSH commands, the audit log supports SSNC but not J2SSH. In Quebec, the command audit log only supports recording the commands run during discovery.

Enable the command audit log

The MID Server audit log is enabled with the MID Server property *mid.log.command_audit.enable*, which is set to false by default. Add the property in the **MID Server Properties** table [ecc_agent_property_list.do]. Once enabled, the MID Server command audit logs are accessed in the instance by navigating to **MID Server** > **Command Audit Logs** [ecc_agent_command_audit_log_list.do]. To see or change this table, the user must have the role **agent_security_admin**.

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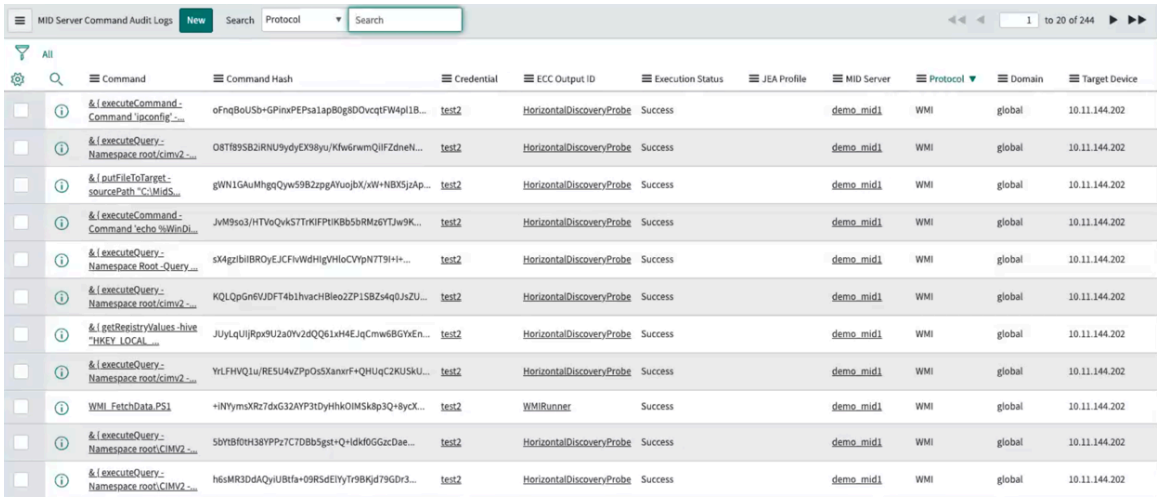

Data recorded in the command audit logs

The MID Server command audit log records the name of the command and the command hash. If, for example, during discovery a probe does not run a command but instead runs a script then the script name is recorded. The command hash is calculated based on the content of the script, regardless of the name. Therefore, changing the name does not affect the command hash.

When a probe, such as a WMIRunner, runs a command with multiple WMI fields then WMI creates one script to query those fields. The script is created temporarily on the MID Server host in the temp folder. After the script is run, it is removed from the temp folder. The script is given a name based on the fields and a random number. However, the hash key is always the same given the same contents.

The command audit log reports the execution status as either a success or failure. The record entry is a success if the command was run, or a failure if it was unable to run. The command audit log does not consider the result of the command being run. For example, a command which runs but fails gather data is still listed in the execution status as a success.

Discovery supports JEA profiles for WinRM. The MID Server command audit log records the JEA profile of the discovery command, if it is available. See Microsoft Just Enough Administration (JEA) for Discovery for more information on JEA profiles.

By default, the table is rotated every seven days. For more information, see Table Rotation.

Rekey a MID Server

Rekey a MID Server to generate a new private key. Private keys are used to decrypt automation credentials, so that MID Servers can transmit information securely. Key pairs are initially generated when a MID Server is validated, and MID Servers should be rekeyed periodically to meet security requirements.

Before you begin
Role required: admin

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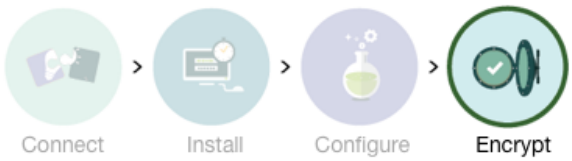

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3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

When the MID Server comes back online, the system automatically validates the new key, and the MID Server resumes processing automation tasks.
Automation credentials are secured by encrypting them in the instance with the MID Server's trusted public key prior to transmission. When the MID Server is created, it generates a keypair, consisting of a public and private key. After the MID Server is validated, it can use the private key to decrypt automation credentials. You should occasionally rekey the MID Server to meet your organizations security requirements.

Procedure

1. Navigate to **All** > **MID Server** > **Servers**.
2. Open the MID Server whose keypairs you want to rotate.
3. Under **Related Links**, click **Rekey**.

Related topics

Validate the MID Server

Add SSL certificates for the MID Server

Configure the MID Server to connect to a source over SSL.

Before you begin

Role required: admin

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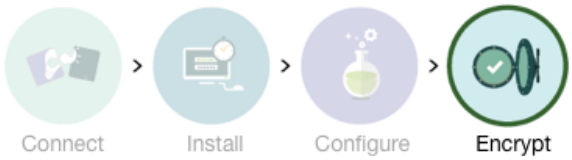

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About this task

You can add certificates to the MID Server to communicate over SSL/TLS in one of two ways:

- Add certificates directly to the bundled JRE TrustStore file, using the following procedure.
- Specify a different TrustStore file for the MID Server to use. For more information, see Specify an external TrustStore for the MID Server.

Review both methods to evaluate which best meets your needs.

During MID upgrade the bundled TrustStore is overwritten. The MID Server attempts to migrate certificates from the existing TrustStore to the incoming one. To be migrated, certificates must meet the following criteria:

Quebec (backported to Orlando Patch 10 and Paris Patch 4)

- X.509 v3 certificates
- Basic Constraints Extension evaluates to false (or is not present)

Rome (backported to Paris Patch 7 and Quebec Patch 2)

- X.509 certificates
- Any certificate present in the source, but not the destination TrustStore

Certificates that do not meet the criteria are overwritten. Alternatively, you can specify an external TrustStore file which is unaffected by MID Server upgrades. For more information, see Specify an external TrustStore for the MID Server

In Rome and later families, the migration strategy utilized during upgrade is configurable via the MID Server configuration parameter *`mid.truststore.migration.strategy`*. It can take the following values:

- **migrate_delta**: the default strategy (outlined above for Rome)
- **migrate_non_ca**: a strategy matching the one outlined above for the Quebec family
- **do_not_migrate**: disables the TrustStore migration during upgrade, though a backup of the original TrustStore is made in the event of overwrite

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During this migration process, a backup of the original and upgrade TrustStores are made and stored in the agent's work directory: ...`\agent\work\truststore_migration\<time epoch seconds>\`. The original TrustStore is renamed to `cacerts_before` and the upgrade TrustStore is renamed to `cacerts_from_upgrade`.

Procedure

1. Open a command prompt and navigate to the folder containing the JRE keytool.
   This is the location of the JRE bundled with the MID Server. An example path might be: `C:\Mid Server\agent\jre\bin`
2. Import a certificate into the MID Server's cacerts keystore, using this command:
   `keytool -import -alias <certificate alias> -file "<path to certificate>" -keystore "<path to the MID Server bundled JRE>\lib\security\cacerts"`

   For example, you might enter: `keytool -import -alias MyCA -file "C:\myca.cer" -keystore "C:\Mid Server\agent\jre\lib\security\cacerts"`

   Note:
   The keytool prompts you for a certificate password. If the certificate is for a CA, the keytool also asks whether to trust the certificate authority. To add a certificate to an instance, see Upload a certificate to an instance.

3. **Optional:** Display a list of the current certificates by running the command: `keytool.exe -list -keystore "C:\Mid Server\agent\jre\lib\security\cacerts"`

Specify an external TrustStore for the MID Server

The MID Server JVM can utilize a TrustStore external to the MID installation directory so any certificates added to the TrustStore are not overwritten during an upgrade. It is important that this TrustStore file reside outside of the MID installation directory, and the Truststore location can be specified by adding additional parameters to the MID Server's `wrapper-override.conf` file.

Before you begin

Role required: admin

Procedure

1. In the MID Server host, navigate to the `wrapper-override.conf` file.
2. Specify an external TrustStore by appending a custom parameter to the end of your MID's `wrapper-override.conf` file.
   For example, on a Windows MID with an external TrustStore found at `C:\external_truststore\cacerts`, the end of the file would appear similar to:

```
# Add additional custom parameters below

wrapper.java.additional.3=-Djavax.net.ssl.trustStore=C:\external_truststore\cacerts

wrapper.java.additional.4=-Djavax.net.ssl.trustStorePassword=<truststore's password>
```

   Note:
   If you have specified other additional parameters in this file then the numerical identifier, in this case 3 and 4, may differ.

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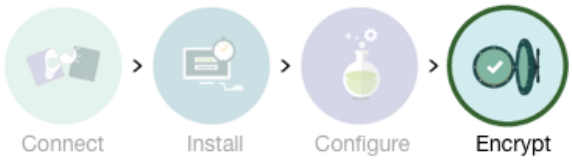
MID Server SSH cryptographic algorithms

The MID Server utilizes SSH clients to perform many discovery actions. During the SSH handshake, both the client and server first determine which algorithms both parties support, then client picks the highest priority algorithm. For the Host Key Algorithm, the client picks highest priority algorithm which both parties support that matches the key type.



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Default supported SSH algorithms by priority

Key Exchange Algorithm

1. ecdh-sha2-nistp256
2. ecdh-sha2-nistp384
3. ecdh-sha2-nistp521
4. diffie-hellman-group-exchange-sha256
5. diffie-hellman-group14-sha256
6. diffie-hellman-group16-sha512
7. diffie-hellman-group14-sha1
8. diffie-hellman-group1-sha1
9. diffie-hellman-group-exchange-sha1

Host Key Algorithm (used for public key signature during authentication)

1. ssh-ed25519-cert-v01@openssh.com
2. rsa-sha2-512-cert-v01@openssh.com
3. rsa-sha2-256-cert-v01@openssh.com
4. ssh-ed25519
5. ecdsa-sha2-nistp256
6. ecdsa-sha2-nistp384
7. ecdsa-sha2-nistp521
8. rsa-sha2-512
9. rsa-sha2-256

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10. ssh-rsa-cert-v01@openssh.com
11. ssh-rsa
12. ssh-dss

Cipher Algorithm

1. aes128-ctr
2. aes192-ctr
3. aes256-ctr
4. aes128-cbc
5. aes192-cbc
6. aes256-cbc

MAC Algorithm

1. hmac-sha2-256
2. hmac-sha1
3. hmac-sha2-512
4. hmac-sha1-96
5. hmac-md5-96
6. hmac-md5

Customize the SSH algorithms priority list

The MID Server SSH algorithm priorities can be customized based on security needs. Each algorithm is controlled by one of the following MID Server properties.

Note:
Glide Import on the instance uses the default algorithm list. The four MID Server properties do not affect Glide Import because it is not run on the MID server. SNCSSH is used for Glide Import on instance for SFTP and SCP.

- Key Exchange algorithms: **mid.ssh.algorithms.kex**
- Host Key algorithms: **mid.ssh.algorithms.host_key**
- Cipher algorithms: **mid.ssh.algorithms.cipher**
- MAC algorithms: **mid.ssh.algorithms.mac**

The properties accept comma separated lists with operators. The first name in the list is highest priority, last name in list is lowest priority. Adding a comma separated list without any operators replaces the default algorithm list. The following operators are based on the OpenSSH standard syntax and modify the algorithm priority list.

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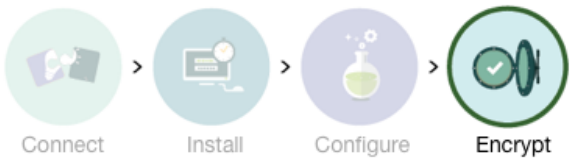
- The **+** operator appends the comma separated list of algorithms to the default algorithm list.
- The **-** operator removes the comma separated list of algorithms from the default algorithm list.
- The **^** operator places the comma separated list of algorithms at the front of the default algorithm list.

mid.ssh.algorithms.cipher	-aes128-ctr
mid.ssh.algorithms.host_key	+ssh-rsa
mid.ssh.algorithms.kex	diffie-hellman-group1-sha1, diffie-hellm...
mid.ssh.algorithms.mac	^hmac-md5

Attach a script file to a file synchronized MID Server

You can attach a script file to synchronize to a connected MID Server.

Before you begin
Role required: **admin**



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About this task
Use file synchronization to make script files available on a connected MID Server. The files on the instance and the MID Server stay synchronized, so there is no need for the MID Server to download the whole file. File synchronization also helps prevent updates you make in those script files from being overwritten during an instance upgrade.
You can attach multiple files, but the last attached file gets synchronized to the MID Server. If you delete the attachment, the script file becomes inactive, and the synchronized file is deleted from the MID Server.

Procedure

1. Navigate to **All** > **MID Server** > **Script Files**.
2. Open the file to which you would like to attach the script file, or click **New** to create a new file.
3. Select **Use attachment**, and then click the paperclip icon to add the attachment.
   When **Use attachment** is checked, an attached script file overrides the script contained in the **Script** field. If this check box is cleared, the script in the **Script** field is used instead of the attachment.

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The script file attachment name must match the MID Server script file name, since the record can contain other attachments.

4. Click **Update** to initiate the synchronization process.
   Ensure that the file name matches the script name. If you receive the error message: `File type not permitted or mime type does not match the file content`, request that your administrator turn off mime type validation on attachments. The system property **glide.security.file.mime_type.validation** controls this setting.

How script file synchronization works on the MID Server

Script files attached to a record stay synchronized with a connected MID Server.

Script files synchronized with the MID Server are stored on the instance in the MID Server Script File `[ecc_agent_script_file]` table, which you can access in the **MID Server** > **Script Files** module.

When the MID Server first connects to the instance, the instance creates a directory called `\scripts` in the MID Server root. The instance then creates a parent directory in the path `\scripts\<parent name>` using definitions from the ecc_agent_script_file table. Finally, the instance creates the script files themselves inside the parent directory using the records from the ecc_agent_script_file table.

The instance creates each script file in the parent directory on the MID Server using the record *Name* from the ecc_agent_script_file table as the file name and the *Script* field payload as the file contents. The synchronization of the script file continues to work as if the script was manually added to the form.

See Attach a script file to a file synchronized MID Server for instructions on how to attach a script file.

Note:
The MID Server Script File [ecc_agent_script_file] table is domain separated. You can create versions of these policies that only a MID Server from the same domain can use. For instructions, see Set up domain separation for MID servers.

MID Server FIPS Enforced Mode

The MID Server supports the National Security Cloud (NSC) IL-5 environment, which requires all utilized cryptography to be FIPS validated. The MID server can be run in FIPS Enforced Mode, where only cryptographic algorithms which are FIPS validated are utilized.

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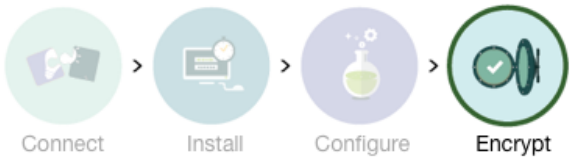

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The Federal Information Processing Standards are a group of standards compiled by the National Institute of Standards and Technology for use in computer systems. There are many FIPS publications, but for the sake of this discussion we are specifically referring to FIPS 140-2: Security Requirements for Cryptographic Modules. Cryptographic algorithms can proceed through a validation process specified by the NIST. For the purposes of our new secure cloud environment, the MID server will be utilizing algorithms that have been validated by such process.

Only MID Servers of the Rome release family or later with a JRE version of 11.0.9+11 or later can be set to run in FIPS Enforced Mode.

FIPS Enforced Mode

The following algorithms are not available for use in these SSH functions by the MID Server in FIPS Enforced Mode.

Key Exchange:

diffie-hellman-group1-sha1

Mac:

- hmac-md5
- hmac-md5-96

The following restrictions are now in place for SNMP for use by the MID Server in FIPS Enforced Mode.

- SNMP v1 and v2 are completely disabled.
- For SNMP v3, the following protocol uses are not permitted by the MID Server in FIPS Enforced Mode:
  - auth protocol: none or MD5
  - privacy protocol: none or DES

Other functionality that utilizes the MID Server may be impacted when run in FIPS Enforced Mode. Please refer to that functionality's specific documentation for details.

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Enable MID Server FIPS Enforced Mode

The MID server can be run in FIPS Enforced Mode, where only cryptographic algorithms which are FIPS validated are utilized.

Before you begin

Role required: admin

Procedure

1. Deploy a new MID Server or upgrade existing MID Servers to the Rome family release or later.
2. Shut down the MID Server.
3. Execute the following bundled script provided to convert the MID to run in FIPS Enforced Mode:
   - For Windows hosts: `> <MID install directory>\agent\bin\scripts\set-fips-enforced-mode.bat on`
   - For Linux hosts: `$ <MID install directory>/agent/bin/scripts/set-fips-enforced-mode.sh on`

   Success will be logged to the console including the location of modified files and any backups generated during the conversion process. If invoked programmatically, success will be indicated by a 0 return code.
4. Start the MID Server.

What to do next

The mode the MID is running in can be confirmed via two methods:

1. Check the agent logs after start-up and look for the following log line: `Running in FIPS Enforced mode`
2. Check the ecc_agent table on the instance and look for the value of the **FIPS Enforced** boolean column.

Manually convert the MID Server to FIPS Enforced Mode

The MID server can be run in FIPS Enforced Mode, where only cryptographic algorithms that are FIPS-validated are utilized.

Before you begin

Role required: admin

About this task

To manually convert the MID Server to FIPS Enforced Mode while using an external JRE, you must perform the following steps while the MID Server is shut down:

- Convert the JRE's TrustStore to BCFKS type.
- Set the JRE's default KeyStore type to be BCFKS.
- Set the FIPS Enforced Mode flag in the MID Server's configuration file.

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Procedure

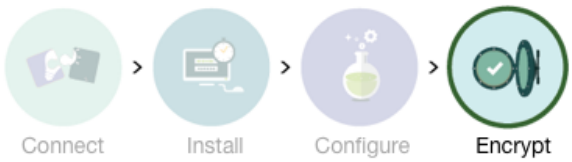
1. Convert the JRE's cacerts file type to BCFKS by using the Java Keytool with a command similar to:
   `$ keytool -importkeystore -srckeystore` **<source keystore path>** `-srcstoretype` **<source keystore type>** `-srcstorepass changeit -destkeystore` **<destination keystore path>** `-deststoretype BCFKS -deststorepass changeit -provider org.bouncycastle.jcajce.provider.BouncyCastleFipsProvider -providerpath` **<BouncyCastle FIPS jar path>**

   Note:
   Rome and later MID installations contain a BouncyCastle jar suitable for this purpose. It can be found at: .../`agent/lib/bc-fips.jar`

2. The JRE's default KeyStore type can be set in the `<JRE installation directory>\conf\security\java.security` file.
3. In that file, find the `keystore.type` line and set its value as follows:
   `keystore.type=bcfks`
4. In the MID Server's .../`agent/conf/wrapper-override.conf` file, uncomment the FIPS line and set its value to true.
   The line should read: `wrapper.java.additional.106=-Dorg.bouncycastle.fips.approved_only=true`

MID Server Governance

Improve MID Server security by setting an automatic timeout to invalidate and shut down inactive MID Servers. You can enable this feature and set the inactivity timeout period globally and for each MID Server.



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Overview of MID Server Governance

MID Server Governance prevents forgotten MID Servers connected to ServiceNow instances from being utilized if the instance is compromised. MID Server Governance keeps a record of the last status change of the MID Server validation/invalidation process.

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This feature is not enabled by default, and is available out-of-the-box as part of the MID Server plugin. Once enabled, MID Server authentication is expired after a predetermined period of inactivity unless explicitly configured to never expire.

Enable and Configure MID Server Governance

MID Server Governance is enabled for all MID Servers by setting the following true/false system property: **mid.inactivity.timeout.enabled**. This property is not defined by default. The global inactivity timeout is specified by setting the following integer system property: **mid.inactivity.timeout.days**. The property takes an integer which specifies the timeout in days. The default timeout is 30 days if unspecified.

You can override the timeout for a particular MID Server by specifying **mid.inactivity.timeout.days** as a configuration parameter on that MID Server. A timeout value of 0 disables MID Server Governance on that MID Server. Therefore, you can set a global timeout and also change or disable timeouts for certain MID Servers.

You do not need to restart the MID Server after changing the Governance configuration. Governance works with either basic or mutual authentication.

Activity Tracking

The MID Server analyzes activity by tracking incoming and outgoing ECC queue messages . Once per hour, the MID Server reports the last activity to instance, which is stored in the ecc_agent record, and checks if the inactivity timeout has been reached. If the inactivity timeout has been reached and the MID Server is up, the MID Server is invalidated and shuts down. If the timeout is reached when the MID Server is down, a job on the instance determines if the MID Server is idle and invalidates it on the instance.

When MID server is approaching auto-invalidation timeout due to inactivity, the MID Server page will display a message indicating:

- An info message when 3-7 days remain before inactivity timeout.
- An error message when less than 3 days remain before inactivity timeout.
- After a MID has been auto-invalidated, an error message is displayed indicating the date the MID was auto-invalidated.

Clearing the auto-invalidated state

After a MID Server has been auto-invalidated, the auto-invalidated status must be manually cleared in order to bring the MID back up successfully. The MID Server shuts down immediately if it is restarted without clearing this state. In addition, a MID issue will be logged indicating this occurrence.

The auto-invalidated state of a MID Server can be cleared by selecting the **Clear auto invalidated** UI action from the MID Server instance page. After invoking this UI action, the user should start their MID Server and continue with the usual validation process.

Purpose field

The purpose is a text field that the customer can update at any point to indicate the intended usage for the MID Server. This field is purely descriptive and has no further interactions.

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MID Server reference

MID Server reference information includes system requirements and other information you need to configure a MID Server for your specific needs.

MID Server system requirements

Use these minimum system requirements to allocate resources for computers hosting MID Servers.

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MID Server supported systems

Windows server

To discover Windows-based servers, run Service Mapping patterns, or execute Orchestration commands on Windows devices, the MID Server must be installed on a Windows server. The MID Server supports these Windows operating systems, including virtual machines and 64-bit systems:

- Windows Server 2012
- Windows Server 2016
- Windows Server 2019
- Windows Server 2022
- Windows Server 2025

On Windows, MID Server requires Microsoft .NET Framework 4.5 or later.

Linux

The MID Server is supported on these Linux versions for virtual machines and 64-bit systems:

- Linux Red Hat 6 and above
- Ubuntu 1404 (Ubuntu 14) and above
- CentOS 7 and above

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Note:
ServiceNow no longer supports new installations of 32-bit MID Servers or upgrades to version Rome. New MID Server installation are blocked through RPM and MSI installer on the following operating systems:

- CentOS 7
- Windows server 2008
- Windows server 2008 R2
- Windows 8
- Windows 10

MID Servers can be manually installed to any operating system with the ZIP file, however Windows 10 is unsupported. Unsupported MID Servers auto-upgrading to Rome create an issue record in MID Server Issues (ecc_agent_issue). For more information, see Supported platform changes for MID Server [KB0863694].

Security requirements

To meet high security standards, the MID Server performs x.509 certificate validation on HTTPS traffic when connecting to ServiceNow®. If a network appliance or proxy exists between the MID Server and the instance, that appliance needs to present a digital certificate signed by a trusted CA. If you are using a self-signed certificate or a certificate signed by an internal CA, import the certificate to the MID Server trust store. For more information on adding SSL certificates, see Add SSL certificates for the MID Server.

OCSP connectivity requirements

The Online Certificate Status Protocol (OCSP) is the protocol used to determine the revocation status of SSL/TLS certificates. When certificates are exchanged and validated, the MID Server needs to determine if the certificate has been revoked and shouldn't be trusted.

OCSP works by using a client, such as a MID Server, to receive a certificate from an HTTP website. The client sends a request to an OCSP responder: a server operated by the certificate authority (CA) that issued the certificate. The OCSP responder's response to the client indicates whether the certificate is valid or has been revoked.

In order to connect, the MID Server requires access to:

- *.service-now.com or <instance_name>.service-now.com
- install.service-now.com
- http://ocsp.entrust.net
- http://ocsp.digicert.com (or other CA OCSP Responder)

While SSL/TLS certificates are always issued with an expiration date, there are certain circumstances in which a certificate must be revoked before it expires (for example, if its associated private key may have been compromised). Therefore, the current validity of a website's certificate must always be checked by clients regardless of its expiry date.

Clients fail a connection when they can't check the revocation status of a certificate. Firewalls and proxy configurations may block calls to the OCSP Entrust and DigiCert servers, which prevents the MID Server from working. You may need to change your firewall permissions so that the OCSP traffic goes through. For more information and resolutions, see the HI Knowledge Base article [KB1216223].

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PowerShell requirements

The MID Server requires the minimum PowerShell version 3.0 and supports versions up to PowerShell 5.1. See Microsoft's documentation for more information about PowerShell requirements. To find your current PowerShell version using the instance, go to **ecc_agent_list.do**. Using the **Update Personalize List** gear icon, add **Host PowerShell Version** to the Selected column. Then sort the list of MID Servers by their PowerShell version to find outdated MID Servers. Alternatively, you can find the PowerShell version on the host machine by using the command **$Host.Version** in the host's PowerShell console. The PowerShell version is listed as PSVersion.

Java version support

Java 17.0.12 is bundled with the MID Server installer package and is installed on the host for all new MID Servers. The installer automatically configures Java 17.0.12 to run in your environment. No additional configuration is required. This version supports both 64-bit Windows MID Servers and 64-bit Linux MID Servers. The MID Server requires a minimum JRE version 17.0.10, and recommended version 17.0.12. If you are using a lower version than 17.0.10, you may see encryption related issues.

Testing showed that the MID Server works as expected with Oracle Java 11 version 17.0.10. If you need to upgrade the JRE to a different version, then coordinate with the appropriate account representative for support.

Upgraded MID Servers might use different Java versions depending on their operating system versions.

- MID Servers upgraded from earlier versions use the OpenJDK provided with the MID Server installer. This version of the OpenJDK was tested and certified for use with these MID Servers.
- MID Servers upgraded on any other operating system versions also automatically upgrade the JRE to the version provided with the installation package.

Note:
Linux MID Servers require glibC version 2.17. The library must be updated for JRE 11. On 64-bit Linux systems, you must install the 32-bit GNU C library (glibc). The installation command for CentOS is: `yum install glibc.i686`

MID Server JRE downgrade support

If the ServiceNow® instance is downgraded from Quebec, then the MID Server is also downgraded. However, the JRE may not be downgraded unless the instance is downgraded to one of the following patches.

- New York Patch 12
- Orlando Patch 9
- Paris Patch 3

If the MID Server is downgraded from Quebec to a different patch than specified, follow the instructions in Install Java 11 on MID Servers [KB0752451].

Java Service Wrapper

The MID Server installer includes the Tanuki Software Java Service Wrapper, version 3.5.40.

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Setting the JVM Memory size

The MID Server installs with 1 GB of JVM memory. If the suggested memory size for your product is greater than 1 GB, see Set the MID Server JVM memory size for the procedure to override the default setting.

Deployment types

System requirements for your instance are determined by the needs of the individual products you use that require a MID Server. Some applications, such as Health Log Analytics, have additional system requirements listed in their documentation.

Standard deployments

The following products are considered "standard" because their MID Servers share the same minimum disk space and memory requirements:

- Discovery
- Event Management
- Integrations
- Orchestration
- Service Mapping

The minimum standard requirements pertain to both a single product and a combined product deployment. You can deploy a single MID Server for multiple standard products without significantly increasing the disk or memory requirements.

High resource deployments

Cloud Management Platform (CMP) and Operational Intelligence are processing intensive and require more resources for each MID Server than the standard products. Install MID Servers for these products on dedicated hosts that do not support MID Servers for other products.

Recommended MID Server minimum requirements

MID Server performance and system requirement are driven my multiple factors including but not limited to:

- The size of the customer infrastructure and specific function (Capability) MID Server is configured to perform.
- The number of MID Servers installed on the host.
- The number of threads per MID Server.
- The number and nature of other applications running on MID Server host.
- Architectural and design enhancements over ServiceNow releases. For example, using PowerShell for Windows Discovery in Orlando or changing default Java Garbage Collection policy in Quebec.

As a result, there is no one size requirement that fits for all MID Server deployments. The following documented sizing guidelines can be a starting point for deployments. However, customers need to monitor MID Server performance and resource utilization continuously, then tune and scale up their MID Servers as needed.

MID Server minimum system requirements

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The minimum CPU configuration required for a MID Server is a quad core processor with a speed of 2+ GHz for a Windows Server 2012 R2 host with a single MID Server deployed and with standard configuration of 25 concurrent threads.

MID Server CPU utilization

Most of the MID Server applications, such as Discovery, are designed for maximizing their performance which results in maximizing the resource utilization for the MID Server. As a result, some customers might observe very high CPU utilization segments in the range of 90-100% while the MID Server is running Discovery schedules or similar applications.

The very high CPU utilization segments should not be a cause for concern because it aligns with architectural design of maximizing the throughput and does not have any negative impact on the Discovery performance. The MID Server host's resource utilization automatically returns to normal after the Discovery execution successfully stops.

Customers who notice frequent and long very high CPU utilization segments should avoid:

- Running more than one MID Server on same host when these MID Servers are expected to process active workloads at the same time, such as overlapping Discovery schedules.
- Sharing the MID Server host with other applications.
- Configuring performance alerts, which are purely based on CPU utilization, on MID Server host. If required, these alerts need to be used in conjunction with other performance monitors.

Configuring additional performance monitoring on MID Server host

While CPU utilization on MID Server is a good indicator of load on the host, it gives only limited visibility. Additional monitoring with System Processor Queue Length on Windows Operating Systems and Load Averages on UNIX Operating Systems is crucial.

- **Processor Queue Length (Windows OS):** the number of threads that are ready but currently unable to run on the processor due to another active thread. A bottleneck on the processor may occur where the number of threads in the queue is more than twice the number of processor cores over a continuous period.
- **Load Averages (Unix OS):** the average system load on a Linux server for a defined period. It is the CPU demand on a server that includes sum of the running and the waiting threads. Typically, the top or the uptime command provides the load average of the server with output.

MID Server CPU Performance Case Studies

The impact of modifying number of MAX threads on MID Server CPU utilization

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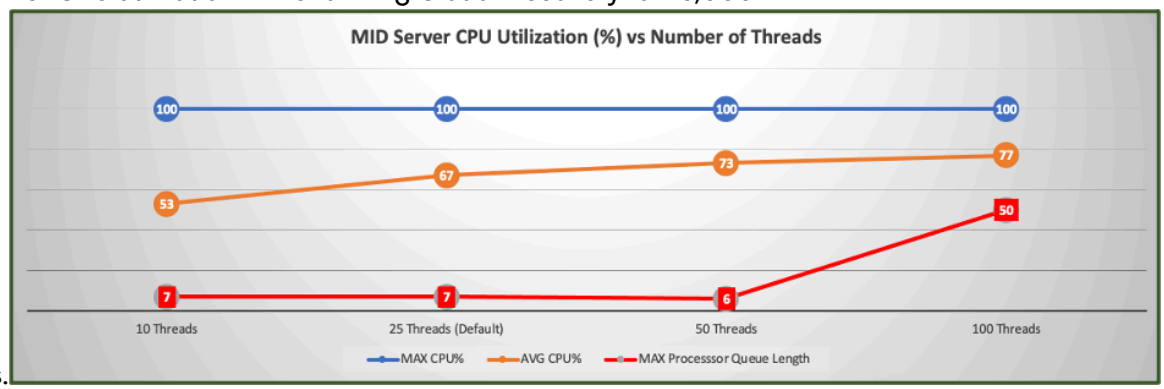
Based on internal benchmarking, the following is sample data for MID Server CPU utilization while running Cloud Discovery for 10,000 servers.

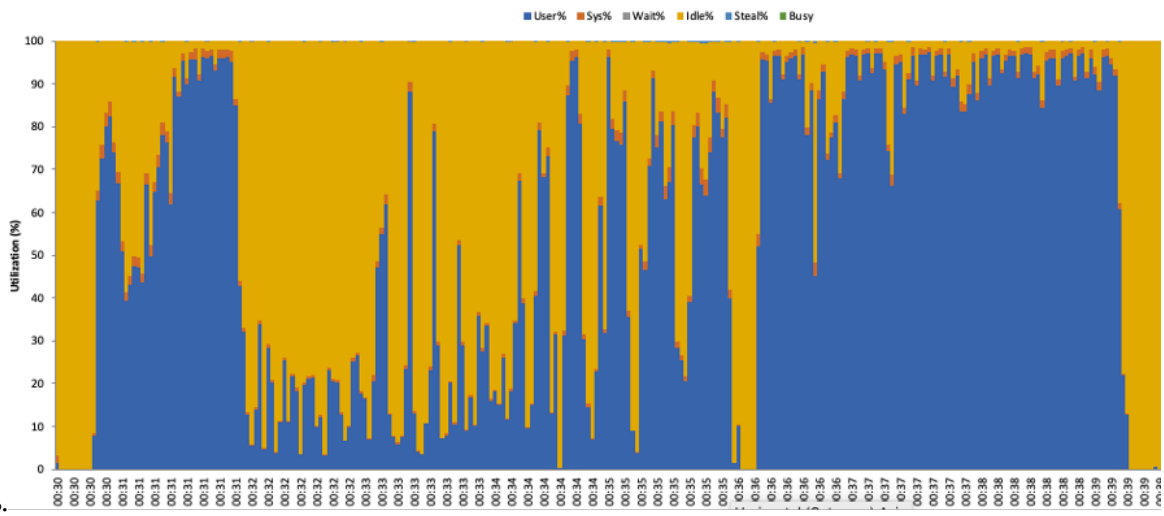


In these tests, the maximum CPU utilization was observed to be 100% independent of number of threads and OS. The average CPU utilization was observed to be proportional to number of threads. Increasing number of threads did not necessarily result in immediate CPU pressure. Increasing the number of threads from the default 25 to 50 did not create additional CPU pressure, as shown by the max processor queue length. However, increasing the max threads value to 100 caused a significant increase in processor queue length, indicating CPU pressure.

The impact of sharing MID Server with other applications or MID Servers on CPU utilization

Running Discovery is a CPU intensive operation for MID Server. Deploying other applications or MID Servers on same host creates additional CPU pressure on the host. This pressure results in a performance impact for running applications, including the MID Server. The following examples are sample CPU utilization data points for MID Server with different load patterns:

Dedicated host for a single MID Server: the average CPU usage is 48%.



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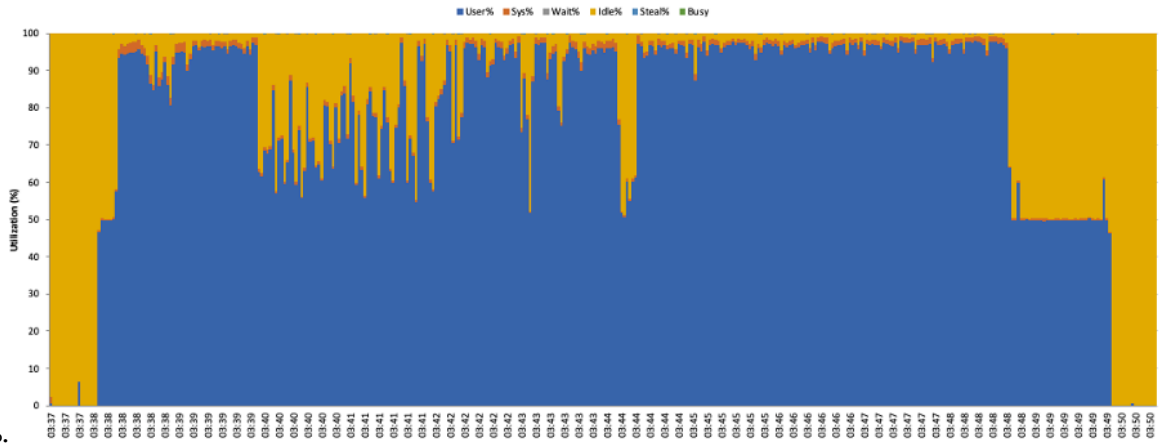
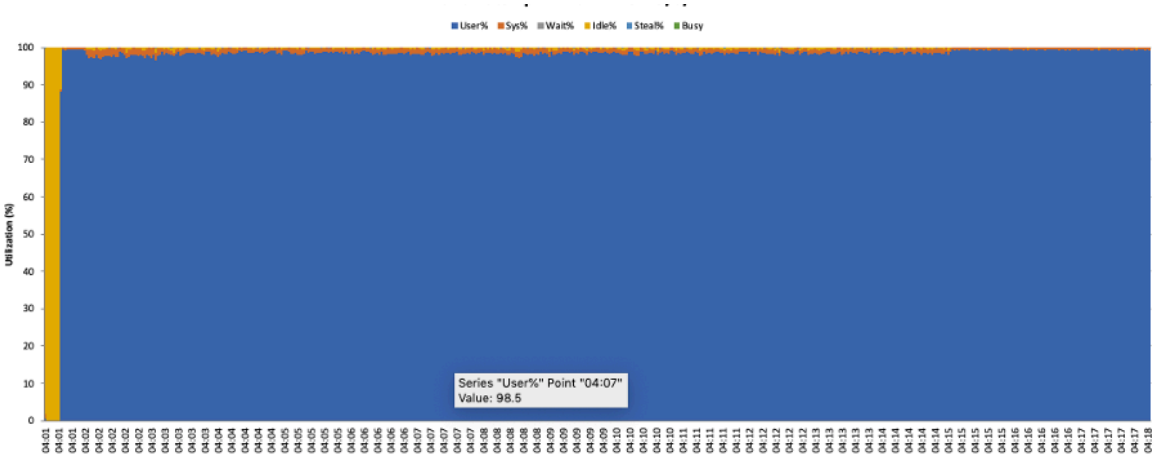
Host shared between a MID Server and another application with moderate load: the average CPU usage is 77%.



Host shared between a MID Server and another application with heavy load: the average CPU usage is 97%.



Scaling up MID Server and its impact on MID Server CPU resource utilization

When the MID Server is heavily constrained on CPU resources, scaling up the MID Server host, by adding more CPUs, helps ease resource pressure. However, this may not necessarily eliminate the very high CPU usage segments. MID Server applications like Discovery, which are designed for maximizing the performance, will continue to use additional available CPU resources. The following examples are sample CPU utilization data points for a 4 CPU MID Server host and an 8 CPU MID Server host running same Discovery schedules:

Parameter	4 CPU	8 CPU
Average CPU%	48%	28%
Max CPU %	98%	98%

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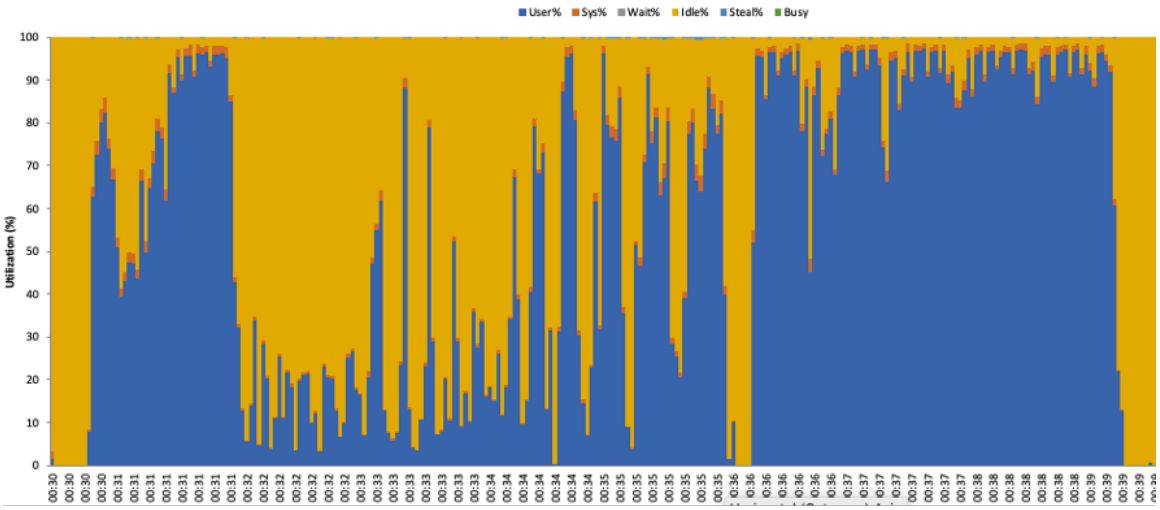
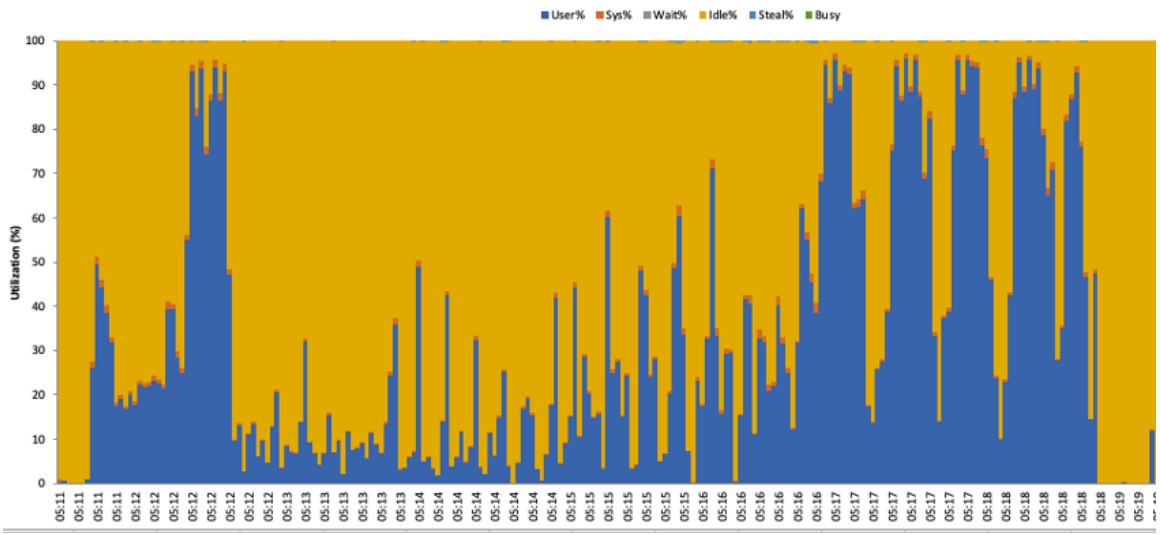
MID Server CPU utilization when deployed on a 4 CPU host:



MID Server CPU utilization when deployed on an 8 CPU host:



Monitoring performance

To ensure that the MID Server resource allocations are sufficient for your environment, monitor performance during peak periods of product execution from the MID Server dashboard.

MID Server upgrades

Upgrade MID Servers manually, or automatically through the instance. MID Server automatic upgrade is triggered when the instance upgrades and the MID Server no longer has the same version. The new MID Server package is downloaded from install.service-now.com, replaces the old one, and the MID Server starts with the new version.

Warning:
The MID Server can't auto-upgrade on a Windows host if the Windows Application Experience service is turned off. For information on the error that is displayed and instructions for re-enabling this service, see KB0597552.

MID Server upgrade requirements

Access to the MID Server download site

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The MID Server host computer must have access to the ServiceNow download site at `install.service-now.com` to upgrade automatically. If you have a self-hosted ServiceNow environment that blocks access to the download site, you must import the MID Server installer package into your MID Server hosts manually. For instructions, see KB0760123 in the Self-Hosted knowledge base.

MID Server access to OCSP blocked

Firewalls and proxy configurations may block calls to the OCSP Entrust and DigiCert servers, which prevents the MID Server from working. You may need to change your firewall permissions so that the OCSP traffic goes through. For more information and resolutions, see the HI Knowledge Base article [KB1216223].

MID Server operating system compatibility

Upgrading Windows or Linux MID Servers with 32-bit operating systems isn't supported. For more information, see [KB0863694].

The MID Server can't upgrade on a Windows host if the Windows Application Experience service is turned off. For information on the error that is displayed and instructions for re-enabling this service, see KB0597552.

The MID Server upgrade is blocked by some antiviruses running on Windows hosts. For information on the errors and list of these antiviruses, see KB0870329.

Any Linux MID Server upgrade that's service is installed under system in Madrid or lower needs to re-install the service after upgrade. If you didn't manually reinstall the service in previous upgrades and your MID Server service is still installed on Madrid or lower versions, during upgrade the MID Server automatically re-installs the service. To re-install the service MID Server needs to run as an admin user. If your MID Server upgrade needs to re-install the service, make sure that the MID Server user is admin, or you can manually re-install the service before upgrade. For information about manually re-install the service, see KB0821436.

When does the MID Server need to upgrade

Any MID Server with a version different from the instance version needs to upgrade. The following two system properties control the version of all MID Servers:

- **mid.buildstamp**: Identifies the MID Server version with an identifier based on the date of the build. This property uses the format of **mm-dd-yyyy-hhmm**. The MID Server checks for version information hourly. If no override version is configured, the MID Server looks at the **mid.buildstamp** property for the version to use. This property resets itself to the default version (the version that matches your instance version) when the instance is restarted or upgraded, so any user changes are lost at that time. The system appends the release name and patch information to the date and time format.

  Warning:
  This property is not visible by default and should not be configured.

- **mid.version.override**: Sets an override condition for the current version for all MID Servers in your environment. This action pins the MID Servers to a single version and disables the automatic upgrade feature. This property is not visible in the base system and must be added to the System Property [sys_properties] table when it is set. For details, see Add a system property.

When the MID Servers check the version each hour, they look at the **mid.version.override** property first. If this property is empty, the MID Servers get their version information from the **mid.buildstamp** property. If an override version is configured, the MID Servers use this value and ignore the version information in the **mid.buildstamp** property. This override value remains when

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the instance is restarted and is passed to the MID Servers. The value in the **mid.version.override** property is cleared during an upgrade, which forces the MID Server to reset itself to the version in the **mid.buildstamp** property.

In addition to **mid.version.override**, the MID Server version can also be controlled with the configuration parameter **mid.pinned.version** which pins the MID Server to a specific version.To pin a MID Servers, set the **mid.pinned.version** parameter with the name of that version in the **config.xml** file of each MID Server. Use the format **<version>-mm-dd-yyyy**. This setting overrides the property setting for the pinned MID Server version. For instructions, see Add a MID Server parameter. The value set in this parameter is not affected by an upgrade.

Warning:
Using **mid.version.override** and **mid.pinned.version** is not recommended. The different versions on the MID Server and instance can cause outage issues on the MID Server.

Upgrade methods

Automatic

Automatic upgrade can be triggered by the instance or the MID Server itself. This functionality is available by default. Automatic upgrade occurs:

- When the instance is upgraded and the MID Server for that version is different than the version currently on the MID Server. The instance sends **autoUpgrade**system command to the connected MID servers.
- Every hour, the MID Server checks with the instance to see if there is a different version available for upgrade. You cannot modify this time period.

Manual

Manually start the upgrade by clicking a related link on the MID Server record. Use this method when you do not want to wait until the next hourly automatic update or if your upgrade failed and you want to force an upgrade. See Upgrade the MID Server manually for instructions.

Upgrade process

1. **Pre-upgrade Check:**Before starting the actual MID Server upgrade process, the MID Server runs a set of tests to make sure that the host machine meets the minimum requirements. Any errors encountered during this automatic test prevent the upgrade from occurring until the issues are resolved. The pre-upgrade test is enabled by default but can be disabled by adding and setting a system property. See MID Server pre-upgrade check for more information.
2. **Download the packages:**The MID Server downloads upgrade packages from install.service-now.com. These packages are in zip format and are downloaded to the agent folder in the **package/incoming** folder.
3. **Digital Signature Verification**

   After downloading every package, MID Server verifies the digital signature of the package. It throws an exception if the verification fails. The error will be recorded in the agent log and the MID Server issue table.

   If the packages are downloaded and replaced manually you can verify the signature manually. To manually verify the signature of an installation or upgrade package, use the jarsigner tool which is available for free with JDK. The following is the jarsigner command to initiate the verification: `Jarsigner -verify -verbose -certs -strict <zip-file>`

   The output should be similar to the following example:

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```
- Signed by "CN=ServiceNow Inc., O=ServiceNow Inc., L=Santa
 Clara, ST=California, C=US"
Digest algorithm: SHA-256
Signature algorithm: SHA256withRSA, 2048-bit key
Timestamped by "CN=Symantec SHA256 TimeStamping Signer - G3,
 OU=Symantec Trust Network, O=Symantec Corporation, C=US" on
 Tue Nov 05 19:55:37 UTC 2019
Timestamp digest algorithm: SHA-256
Timestamp signature algorithm: SHA256withRSA, 2048-bit key

jar verified.

The signer certificate will expire on 2021-08-09.
The timestamp will expire on 2029-03-22.
```

4. **Extracting Zip Files:**After downloading all required packages, the MID Server extracts the zip files.
   - **Before Rome**: The zip files are extracted in a folder under the operating system defined temporary folder. The folder name is a randomly generated number. The operating system temporary folder is specified by system property **java.io.tmpdir**. On a UNIX host, the value for this property is typically is `/tmp` or `/var/tmp`.
   - **From Rome onward**: The MID Server avoids using operating system defined temporary folders during MID Server upgrade. The zip files are extracted in a folder in the **work/upgrade_temp** folder under the agent folder. The folder name format is a randomly generated number. If you want to switch to the previous behavior and use an operating system defined temporary folder you can add **mid.upgrade.use_os_temp_folder**to MID Server's **config.xml** file and set it to true. To switch the behavior for all MID Servers, you can add it to the MID Server property [ecc_agent_property] with MID Server field blank.

   Note:
   If you are using KB0747569 to change the**java.io.tmpdir**and you want to keep it for future upgrades from Rome, set **mid.upgrade.use_os_temp_folder**to true after upgrading to Rome. If **mid.upgrade.use_os_temp_folder** is not set to true then **java.io.tmpdir** isn't applied during the MID Server upgrade and the folder under `agent\work\upgrade_temp` will be used.

5. **Replace old packages with the upgraded packages:**After downloading and extracting the upgrade packages, the MID Server replaces old files with the new files and starts with the new version. To replace the packages, the MID Server starts a process named "ServiceNow AI Platform" Distribution Upgrade and shuts down. ServiceNow AI Platform Distribution Upgrade waits for the MID Server to shut down properly, then replaces the required files as follows:
   - **Before Rome:**The process deletes all files and folders in the bin, lib and jre folders and copies the new files into those folders.
   - **From Rome onward:** The process replaces the files in the bin, lib and jre only if the new version of the file is different from the old version. **ServiceNow Platform Distribution Upgrade** does not clean the upgrade files and the unchanged files are kept.

   If the reinstalling service was required as a part of MID Server upgrade, ServiceNow Platform Distribution Upgrade reinstalls the service before starting the MID Server. For more information refer to KB0821436.

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Note:

If the MID Server upgrade fails in this step the MID Server stays Down. Some anti-viruses block the file replacement in this step. For more information refer to KB0870329.

6. **Start the MID Server:** After replacing all required files with the new version, the ServiceNow AI Platform Distribution Upgrade starts the MID Server. When the MID Server comes Up with the new version, it cleans up all temporary folders used to extract the upgrade files.

Upgrade log messages

The MID Server log messages are available in the following log files:

- Pre-upgrade check log messages are available in agent.log file under agent/logs folder. The message **Performing pre-upgrade validation tests.** indicates that the pre-upgrade check has started. If all mandatory tests are passed, the message **Pre-upgrade validation tests successful. Continuing with upgrade process.** indicates the end of the pre-upgrade check.

- Log messages for downloading missing files are also available in agent.log. Every package download starts with **Downloading package to PACKAGENAME.ZIP from https://install.service-now.com/ PACKAGEINFO** message. The download progress and the size of downloaded file is monitored in the log. After downloading every package, **Package was successfully downloaded from https://install.service-now.com/ PACKAGEINFO** indicates the successful download.

- Extracting the zip files is the last step available in the **agent.log**. The message **Upgrading MID server** indicates the start of this step, and the message **Extracting package PACKAGE.ZIP to EXTRACT_TMP_FOLDER** is shown for every package extraction. When all required zip files are successfully extracted, the MID Server starts the ServiceNow AI Platform Distribution Upgrade process and the message **Stopping MID server. Bootstrapping upgrade** shows the end of this step before MID Server goes Down.

ServiceNow AI Platform Distribution Upgrade logs include log messages for the process start up and for replacing files during the MID Server upgrade. The upgrade log messages are placed between the messages ************UPGRADE MAIN LOGIN START************ and ************UPGRADE MAIN LOGIN END************. ServiceNow AI Platform Distribution Upgrade log messages can be found in the following log files:

- In the **glide-dist-upgrade.log** file under temp extract folder. This file is available in upgrade-wrapper/logs folder under temp extract folder. This log file includes process log messages and upgrade log messages.
- In the **dist-upgrade.log** file in `agent\logs` folder. This file only includes the upgrade portion of log messages. If there was some issue with the process startup you need to look at **glide-dist-upgrade.log.**
- In **wrapper.log**under `agent\logs` folder. After replacing files, ServiceNow AI Platform Distribution Upgrade appends **glide-dist-upgrade.log** to the wrapper.log file.

Update the wrapper configuration with upgrade-wrapper-override.conf

The wrapper configuration for `glide-dist-upgrade` can be updated using a `upgrade-wrapper-override.conf` file. Create a file named `upgrade-wrapper-override.conf` in the `agent/conf` folder. Any configurations in the `upgrade-wrapper-override.conf` are used during the upgrade process.

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By modifying the configuration with `upgrade-wrapper-override.conf`, debug logs can be enabled at the `dist-upgrade` wrapper level and changes can be tested.

For example, the default timeout may not be long enough for certain JVM level commands. The timeout can be increased with `upgrade-wrapper-override.conf` for the `dist-upgrade` wrapper configuration.

MID Server states

Upgrading

The MID Server status is changed to Upgrading while the upgrade is running. The Upgrading state is similar to the **Paused** state. This is avoids potential miscommunication between the new version of the instance and the previous version of the MID Server during upgrade. While in the Upgrading state, you cannot resume or restart the MID Server. However, you can perform the same actions that you can when the MID Server is in the Paused state.

Note:
If you are using an Istanbul instance but you are upgrading a pre-Istanbul MID Server to Istanbul, these upgrade states are not available. They are only available for MID Servers that are already on Istanbul.

Upgrade Failed

If the upgrade failed in pre-upgrade check step or download/extract packages step, failed upgrades are handled differently based on the version you are upgrading.

- Upgrade to another major release (such as Istanbul to the next full release): the status changes to **Upgrade Failed**.
- Upgrade from a minor version within a release (such as Jakarta patch 1 to patch 2): the MID Server continues using the version it is currently running. It does not perform the upgrade and the status eventually changes to **Up**, assuming the MID Server was already functioning properly.
- If the upgrade failed in last step, replacing old version of packages with the new version of packages, the MID Server stays **Down**.

MID Server upgrade history

Use the MID Server Upgrade History module for troubleshooting problems with MID Server upgrades. The module contains a record of each instance upgrade. Those records provide step-by-step status details for each MID Server's upgrade process. If an error occurs, it is noted in the step and a message is dynamically generated with further details. The table cleanup job automatically deletes issues that haven't been detected for 30 days, regardless of their state. For further information, see MID Server Upgrade History.

JRE TrustStore certificate migration during JRE updates

For JRE updates after upgrading to Quebec, the MID Server migrates existing self-signed certificates in the JRE TrustStore to the new JRE version's TrustStore. When these certificates are migrated, their aliases are prepended with the string "snc_".

In order for a certificate to be migrated it must be:

- an X509 certificate
- certificate standard v3
- have the basic constraint extension set to false (i.e. it is not CA issued)

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The MID Server identifies when a JRE upgrade is about to take place and begins the migration process. Before the migration, the MID Server creates a backup of the original TrustStore as a fall-back in the event of failure. If there is a failure, the backup TrustStore can be manually restored.

MID Server pre-upgrade check

Prior to an upgrade, the MID Server runs tests to identify issues that could cause the upgrade process to fail or result in a MID Server outage.

Each MID Server contains an AutoUpgrade monitor that compares the MID Server version with that of the instance to determine if the MID Server needs to upgrade. If the AutoUpgrade monitor discovers that the MID Server version is out of date, the monitor runs pre-upgrade validation tests for that MID Server. If an issue is detected, a message is logged to the MID Server Issue [ecc_agent_issue] table, and the upgrade is blocked. The AutoUpgrade monitor continues to run every hour, until all the tests pass. If there are no blocking issues, the MID Server downloads the appropriate upgrade package and begins the upgrade process. The MID Server pre-upgrade check also runs for the upgrades triggered by the instance when the instance was upgraded, as well as for manual upgrades.

Pre-upgrade tests

The pre-upgrade runs two sets of tests: **Mandatory tests**and **Alert tests**. Every mandatory test is required to pass to start MID Server upgrade. If a mandatory test was not passed, the test is recorded in the agent log and a MID Server active issue is created in the MID Server issue [ecc_agent_issue] table. These errors are published before the actual MID Server upgrade occurs and must be resolved before the upgrade can continue. MID Server stops the Upgrade process and changes the status based on MID Server states. If any alert test was not passed, a message is added in the agent log and MID Server issue table, but the pre-upgrade check continues and MID Upgrade doesn't stop.

Pre-upgrade validation tests check the following mandatory tests:

- At least 2 GB of free disk space
- Access to the download site at install.service-now.com
- Verify the digital signature of a sample downloaded file
- Permission to execute, which involves the following:
  - Extract a Zip archiver to the upgrade temp folder: agent/work/upgrade_temp
  - Copy files from the upgrade temp folder to the agent folder
  - Read a text file and validate the content
  - Delete the pre-upgrade check contents
- MID Server host machine is not a 32 bit system
- On Linux MID Servers, the glibC version is at least 2.17

On Windows MID Servers, the pre-upgrade validation runs the following alert tests:

- Any MID Server Upgrade blocker services is running on the host machine
- Status of Application Experience on the host machine
- For security best practice, run the MID Server as a non-administrator user. If the current **Log On As** user account for the MID Server is **LocalSystem** or is a user that is part of the Administrators group, the upgrade does not fail, but this configuration is not recommended.

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Errors that block the upgrade

These messages describe failing a mandatory test and are published to the MID Server Issue [ecc_agent_issue] table. Failure of any of these tests blocks the upgrade.

Not enough free disk space. The system reports <n> bytes free

This message is displayed when less than 2 GB of free disk space is detected on the MID Server host. This error is also written to the MID Server agent log.

Unable to download updates from the install server

This message indicates that either the MID Server host does not have permission to download the installation package from install.service-now.com, or network problems prevent connection. This error is also written to the MID Server agent log.

Signature verification failed:<message>

This message indicates that a Verification Exception has occurred when pre-upgrade check tries to verify the digital signature of the downloaded check file.

Unable to verify digital signature:<message>

This message indicates that the verification signature process was interrupted by an exception.

Unable to extract contents of pre upgrade check zip

This message indicates that the service account on the MID Server host does not have permission to extract the pre-upgrade ZIP archive to the temporary folder.

Unable to create folder <upgrade check file path>

This message indicates that the MID Server service account does not have permission to create the upgradeCheck folder for the pre-upgrade checking files in the agent/package path.

Unable to verify file permissions: <message>

This message indicates an exception has occurred when checking file permissions, such as a file that does not exist or access failure.

MID Server Windows Service is not running as LocalSystem or a local Administrator

This message warns that the Windows service is not running with the desired permissions.

Upgrade Failure: The host machine does not meet the minimum system requirements to upgrade the MID server.

MID upgrade is not supported on 32-bit host. Please refer to KB0863694 for more information.

Upgrade Failure: Host does not meet the minimum system requirements to upgrade the MID server. Please refer to MID Server product documentation on GlibC library for more information

This error can only occur for Linux MID Servers. Refer to Java version support for more information.

Non-blocking warnings

These warnings are displayed in the MID Server Issue [ecc_agent_issue] table and do not prevent a Windows MID Server from upgrading:

Unable to parse $logOnAsUser

This message warns that the Log On As User value for the Windows service is not in either of these expected formats:

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- user@domain.company.com
- domain\user

Unable to look up Log On As user's groups

When the instance attempts to look up the logged on user's group memberships, it executes the **net user <username>** command. The instance expects a certain output structure by the Windows service from this command and issues this warning if the expected output does not match the actual output.

These PowerShell warnings are written only to the MID Server agent log. Because PowerShell is not required to use a MID Server, these configuration issues do not prevent a Windows MID Server from upgrading. However, these warnings might indicate issues in your environment that require attention.

Skipping PowerShell upgrade checks since PowerShell is not usable

PowerShell 3.0 (at a minimum) is not installed or powershell.exe is not available to the MID Server service user.

Skipping Powershell test: Target folder has not been initialized

Skipping Powershell test: Unable to detect the service name

Service CiscoAMP running on the MID Server host machine is identified as a MID Server upgrade blocker

For more information, refer to KB0870329.

The Application Experience is disabled on the MID Server host, which can cause the auto-upgrade process to fail and the MID Server to go down. Enable the service on the host to ensure successful auto-upgrade

For more information, refer to KB0597552.

Continuing with upgrade, but the following issue was encountered during upgradeCheck: <exception message>

This message indicates that there was an issue running the PowerShell portion of the pre-upgrade tests.

Disabling the pre-upgrade check

A MID Server configuration parameter called **mid.upgrade.run_precheck** is set to **true** by default, which allows the automatic pre-upgrade test to run. To disable these tests for a single MID Server, add this parameter to that MID Server's config.xml file and set it to **false**. To disable these tests for all MID Servers, add a new record to the MID Server Property [ecc_agent_property] table called **mid.upgrade.run_precheck**. Set the value of this property to **false** and leave the **MID Server** field blank.

Pinning a MID Server to a specific version

You can pin all the MID Servers in your environment to a specific version by setting a system property, or you can configure specific versions for individual MID Servers.

Note:
Under most circumstances, do not pin the MID Server to a specific version. Pinning the MID server can make it out of sync with the instance, and lead to broken functionality. Instead, let the instance determine which MID Server version to use.

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Version control properties

These system properties control the version for all MID Servers:

- **mid.buildstamp**: Identifies the MID Server version with an identifier based on the date of the build. This property uses the format of **mm-dd-yyyy-hhmm**. The MID Server checks for version information hourly. If no override version is configured, the MID Server looks at the *mid.buildstamp* property for the version to use. This property resets itself to the default version (the version that matches your instance version) when the instance is restarted or upgraded, so any user changes are lost at that time. The system appends the release name and patch information to the date and time format.

  Warning:
  This property is not visible by default and should not be configured.

- **mid.version.override**: Sets an override condition for the current version for all MID Servers in your environment. This action pins the MID Servers to a single version and disables the automatic upgrade feature. This property is not visible in the base system and must be added to the System Property [sys_properties] table when it is set. For details, see Add a system property.

  When the MID Servers check the version each hour, they look at the *mid.version.override* property first. If this property is empty, the MID Servers get their version information from the *mid.buildstamp* property. If an override version is configured, the MID Servers use this value and ignore the version information in the *mid.buildstamp* property. This override value remains when the instance is restarted and is passed to the MID Servers.

  Important:
  The value in the **mid.version.override** property is cleared during an upgrade, which forces the MID Server to reset itself to the version in the *mid.buildstamp* property.

Version control configuration parameter

To pin specific MID Servers on a desired version, set the **mid.pinned.version** parameter with the name of that version in the **config.xml** file of each MID Server. Use the format **<version>-mm-dd-yyyy**. This setting overrides the property setting for the pinned MID Server version. The MID Server version is checked every 20 minutes or whenever the MID Server restarts, at which point the pinned version is applied. For instructions, see Add a MID Server parameter.

Note:
The value set in this parameter is not affected by an upgrade.

Upgrade the MID Server manually

You can manually upgrade MID Servers at any time if you do not want to wait for the automatic upgrade.

Before you begin

Role required: mid_server or admin

For the upgrade to run, MID servers must be in the **Up** state and must be validated. The MID Server automatically runs the pre-upgrade test before upgrading. Any errors encountered during this test must be resolved for the upgrade to proceed.

About this task

The MID Server is upgraded to the version specified by build stamp on the instance, or by the upgrade property that you specify.

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Procedure

1. Navigate to **All** > **Discovery** > **MID Servers** or **Orchestration** > **MID Server Configuration** > **MID Servers**.
2. Open the record of the MID Server that you want to upgrade.
3. Click **Upgrade MID** under **Related Links**.
4. Confirm that you want to perform the upgrade.

Resolving MID Server issues

Troubleshoot problems with the MID Server to find solutions. Monitor the MID Server to receive alerts about issues as they occur. Troubleshooting procedures exist to resolve specific problems with the MID Server. The Knowledge Base on Hi contains several articles to help you troubleshoot MID Server issues.

Monitor the MID Server

Monitoring a MID Server involves verifying entries in log files, confirming network connectivity, and checking MID server status.

- If the MID Server is on a Windows host, navigate to the Windows Services console, locate the service name that matches the name that appears from the `wrapper-override.conf` file. If the MID Server process is the only Java process running on the host, monitor the memory used by java.exe and alert on less than the maximum configured memory defined in the `~\agent\conf\wrapper-override.conf` folder.
- Ensure that the `agent0.log.0.lck` file appears in the `~\agent\logs` folder to confirm that the MID Server running and logging system activity in the `agent0.log.0` file.
- Review the following logs for warning, critical, and severe errors: `~\agent\logs\agent0.log.0` `~\agent\logs\wrapper.txt` See Manage ECC Queue content for a MID Server to see how to open log entries from the instance.
- Test MID Server connectivity to confirm that the MID Server host is able to communicate with the instance. Resolve any issues with the network connectivity such as conflicts with firewalls, access control lists, and routing errors.
- From the MID Server instance, navigate to the **MID Servers** page, and review the status of the MID Server. For additional information, click a **Name**.
- Set up email, SMS, and push notifications to alert you when issues occur with MID servers. The **MID Server Down** notification is enabled by default. See Notifications for details.

Java Flight Recorder

Java Flight Recorder (JFR) uses an articulate data model to analyze Java Virtual Machine (JVM) internal and application specific memory usage and thread related details. On hosts with Java 14 or later, Event Streaming enables analysis of specific JVM or application events.

The JFR file actions **Start JFR Recording**, **Stop JFR Recording**, or **Write JFR File**, are accessed on the instance in the MID Server's Related Links. By starting and stopping the JFR recording,

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you can dump JFR data to the disk on demand. While JFR recording is on, you can write to the JFR file from the MID Server instance page.

The JFR file is deleted by a scheduler to clean the data after 24 hours. This default behavior can be overridden by adding the following configuration parameter in the **config.xml**: `<parameter name="mid.jfr.data.clean.interval" value="<time in milisec>"/>`

Custom JFR events can be written to JFR file. To disable event writing, add the following configuration parameter to the **config.xml**: `<parameter name="mid.jfr.record.aprobe" value="false”/>`

Troubleshooting procedures

The following procedures provide information on resolving specific problems with the MID Server. Knowledge Base articles also cover a wide range of issues. If you are encountering problems which are not covered in these procedures, search the Knowledge Base for related articles. For instance, if you are experiencing symptoms such as the MID Server going down or not responding, or CIs being duplicated during discovery, see KB0597571 for information and recommended solutions.

MID Server active issues

The ServiceNow® instance has a dedicated table that publishes active issues with MID Servers and alerts administrators when a MID Server is in danger of exceeding its resources.

Active MID Server post-cloning credential issues

The system provides automatic processes to detect and notify you of possible MID Server credential issues after instance cloning.

MID Server resource threshold alerts

The instance displays warnings when a MID Server breaches its resource thresholds for CPU and JVM memory usage, enabling users to create email notifications or custom scripts when a breach occurs.

MID Server user connectivity issues

The instance writes issues involving MID Server user logins and network connectivity to the MID Server Issue [ecc_agent_issue] table and creates events you can use in custom scripts or to send email notifications.

Interpreting MID Server user debugging output

Debugging output from the system log is available in either a summary or detailed view for MID Server user issues, but must be enabled manually.

MID Server Upgrade History

Use this module to troubleshoot errors that occur during the MID Server upgrade process. The MID Server Upgrade Histories table contains a record of each instance upgrade. The MID Server Upgrade Stages table shows the status of each MID Server and its upgrade progress, including any errors encountered.

MID Server active issues

The ServiceNow® instance has a dedicated table that publishes active issues with MID Servers and alerts administrators when a MID Server is in danger of exceeding its resources.

The MID Server Issue [ecc_agent_issue] table displays a number of common issues that a MID Server can experience, as they occur. Error checking processes attempt to pinpoint the most likely cause of the issue. Informative error messages name the affected MID Server and explain the possible cause of the issue. The ecc_agent_issue table retains its records for 30 days.

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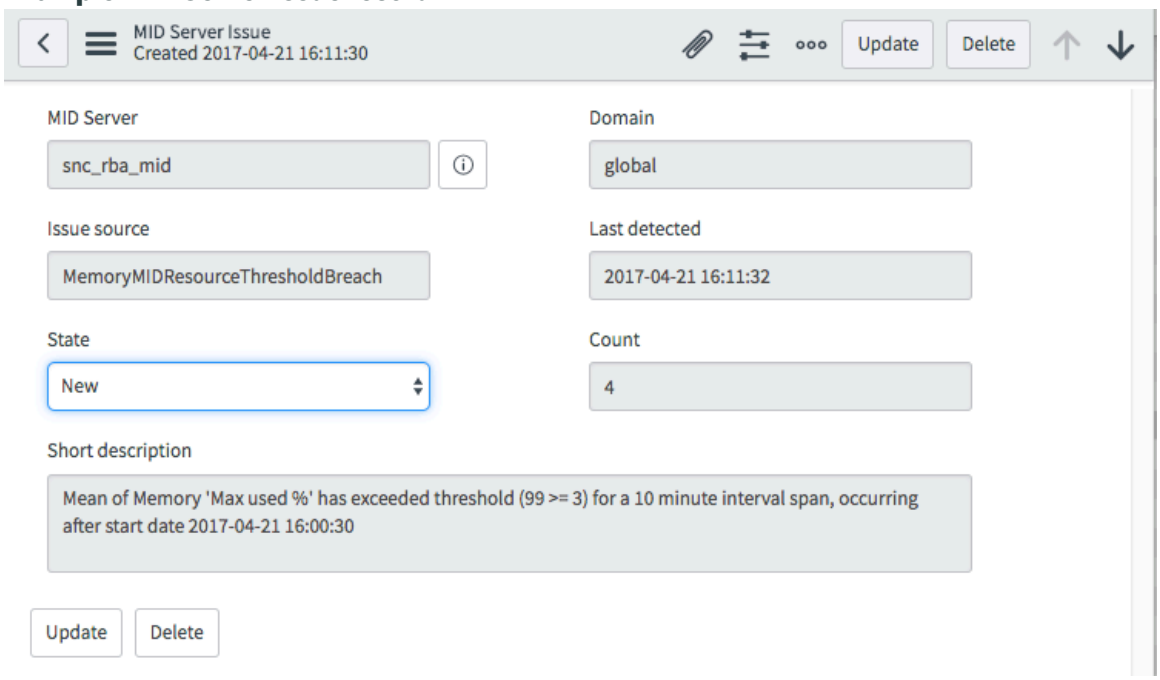
To access records in this table, navigate to **MID Server** > **Server Issues**.

Supported MID Server active issues:

- Bad user credentials after instance cloning.
- Unsupported Java Runtime Environment (JRE) on the MID Server host.
- Approaching resource thresholds for CPU usage and JVM memory.
- Errors detected during pre-upgrade testing.
- User authentication and authorization failures.
- Network connectivity interruptions and role configuration errors.

Example MID Server Issue record



MID Server fails to start

When a newly installed MID Server fails to start or shuts down prematurely, improper configuration could be to blame.

Duplicate MID Server names

When the MID Server service starts, it verifies that it is the only active (not down) MID Server with that name. If the MID Server discovers another active MID Server with the same name, the starting MID Server waits 5 minutes and sends another query. The MID Server repeats this query 12 times and logs each attempt in the agent log. If the IP address or home directory of an existing MID Server is changed, then that MID Server is invalidated. If the MID Server still detects a duplicate after this cycle, it creates a record in the MID Server Issue [ecc_agent_issue] table and shuts down.

Note:
The record in the MID Server Issue [ecc_agent_issue] table cannot be resolved automatically by the instance. Close this record manually for accounting purposes. Either mark the issue **Resolved** or delete it.

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Upgraded MID Servers running multiple services

Beginning with the New York release, a batch file in the MID Server installer package ensures that only one Windows MID Server service is configured for an executable path (MID Server installation folder). Previous versions have not checked for this configuration. Upgraded MID Servers that run multiple services with the same executable path are prevented from starting. If you experience this issue, follow this procedure to reconfigure the MID Server to use only one service:

1. Delete the unwanted Windows service by running **sc.exe delete <service name>** from the command line.
2. Open the `wrapper-override.conf` file in the MID Server installation folder.
3. Change the **wrapper.name** and **wrapper.displayname** parameters to the service name that you want to keep.
4. Restart the MID Server.

Active MID Server post-cloning credential issues

The system provides automatic processes to detect and notify you of possible MID Server credential issues after instance cloning.

During an instance clone, the MID Server [ecc_agent] table is not copied from the source instance, but the User [sys_user] table is copied. As a result, the source MID Server user credentials copied into the target instance might not match those used by the existing set of MID Servers used by the target. Bad credentials can cause those MID Servers to be down for the target instance. Processes on the instance notify you if a MID Server is down from suspected bad credentials following an instance clone.

Table for post-cloning credential issues

The MID Server Issue [ecc_agent_issue] table stores active MID Server issues after an instance clone. Records in this table show a MID Server's current state, evaluation times, and the **Issue source**. For cases in which a MID Server for a cloned instance is down because of possible bad credentials, the **Issue source** is **InstanceClone**. Data from the MID Server Issue [ecc_agent_issue] table are displayed in a related list on a MID Server record. Records in this table are removed if they have not been detected for 30 days. Ongoing issues reappear as they occur.

Post-cloning cleanup script and scheduled jobs

A cleanup script called *`Bad MID Server credentials after clone`* runs on the target instance after cloning and calls a script include called *`BadMIDCredentialAfterClone`*. This script include schedules the execution of the following jobs on the Schedule Item [sys_trigger] table:

- *`BadMIDCredentialAfterClone-1`*: Runs 15 minutes after clone execution.
- *`BadMIDCredentialAfterClone-2`*: Runs 75 minutes after clone execution.

These jobs log to the MID Server Issue [ecc_agent_issue] table any MID Servers that existed on the target instance prior to the clone that are in the **Down** state. These MID Servers are not ready for normal processing and might be down due to invalid credentials resulting from the cloning process. The state of MID Servers added to the target instance after the clone is not evaluated.

Note:
The MID Server log shows that the MID Server user associated with the target instance could not be authenticated or was missing the proper role.

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Business rule that checks for bad credentials

The **Check for bad MID credential after clone** business rule monitors the MID Server [ecc_agent] table for MID Servers that are transitioning from **Down** to **Up**. If the business rule finds a MID Server making that transition, the rule attempts to find a matching MID Server in the MID Server Issue [ecc_agent_issue] table that has an issue source of **InstanceClone** and a state other than **Resolved**. If a match is found, the business rule updates the state of the MID Server in the [ecc_agent_issue] table to **Resolved**.

Resolving MID Server issues

The error message in the MID Server Issue [ecc_agent_issue] table names the affected MID Server user. This message appears each time the business rule runs and finds a MID Server that is down from suspected bad credentials:`MID Server not operational (status: Down), possibly due to recent clone. Verify credentials for logged in User 'local-midserver'.`

Attempt to resolve the issue first by comparing the user's credentials with the credentials that the affected MID Server is expecting. If the credentials are incorrect, fix the problem and check the MID Server status again. If the credentials are correct, but the MID Server remains down, check the Knowledge Base for other possible causes.

MID Server resource threshold alerts

The instance displays warnings when a MID Server breaches its resource thresholds for CPU and JVM memory usage, enabling users to create email notifications or custom scripts when a breach occurs.

The MID Server Issue [ecc_agent_issue] table warns users when a MID Server exceeds configured thresholds of its allocated CPU and memory resources. These warnings are published before the MID Server experiences performance degradation or an out-of-memory error, enabling the administrator to increase resources and avoid downtime. Administrators can use a registered event to send email notification to selected recipients, advising them of any threshold breaches, or to create a custom script to do some other type of work. The instance continues to update the MID Server Issue [ecc_agent_issue] table to keep unresolved issues current.

By default, CPU and memory threshold alerts are disabled and no alerts are published to the MID Server Issue [ecc_agent_issue] table. To enable both types of alerting, add these properties to the System Property [sys_properties] table, and then set their values to **true**:

- **mid.threshold.resource.breach.enable.cpu.alerts**
- **mid.threshold.resource.breach.enable.memory.alerts**

For details on adding system properties to the platform, see Add a property using sys_properties.list.

Evaluation process

This processing occurs whether or not alerting is enabled:

1. Every 10 minutes, each MID Server transmits its CPU and memory consumption metrics to the instance. The instance inserts CPU metrics into the **Mean CPU used %** field of the ECC Agent Scalar Metrics [ecc_agent_scalar_metric] table and memory metrics into the **Max memory used %** field of the ECC Agent Memory Metrics [ecc_agent_memory_metric] table.
2. After a successful insert, the following business rules run on each table, invoking a script include that calls an appropriate function. Each function takes an average of the metric sets inserted into the tables, based on the configured sampling intervals.

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- **Update cpu mean on MID Server Status**: Calls the *MIDResourceThresholdBreach.checkCpuUsage()* script include.
- **Update max memory on MID Server Status**: Calls the *MIDResourceThresholdBreach.checkMemoryUsage* script include.

Each function takes an average of the metric sets inserted into the tables, based on the configured thresholds and sampling intervals. The instance first looks at each MID Server for configuration parameters that set custom threshold values or sampling intervals for that MID Server. If no configuration parameters for these attributes are found, the instance looks in the System Properties [sys_properties] table for custom values to use. If no properties are found, the instance uses the default threshold and interval values from the code.

Note:
Both the threshold percentages and the sampling intervals are configurable. See Configuring thresholds and sampling intervals for details.

Alerting process

When alerting for CPU or memory thresholds is enabled, this processing occurs:

1. If the aggregated average metric value equals or exceeds the configured percent threshold, the instance triggers the *mid.threshold.resource.breach* event. Administrators can use this event to create email notifications for threshold breach alerts or to create a custom script.
2. The instance inserts a record of the breach into the MID Server Issue [ecc_agent_issue] table with a **State** value of **New** and a **Count** of 1, and then publishes a message containing all the pertinent details of the breach. An example of this message is `Mean CPU used % has exceeded threshold (96>=91) for a 40 minute interval span, occurring after start date 2017-01-11 14:25:19`. This message appears in the **Short description** field of the MID Server Issue form and in the event. You can copy any part of the message into your email notifications.

MID Server issue states

When the administrator first examines an issue in the MID Server Issue [ecc_agent_issue] table, the administrator can change the **State** of the issue to **Acknowledged** to indicate that the issue is being addressed. Each time the instance detects a breach, it attempts to match the breach with an existing issue. If a MID Server already has an issue record for that breach in a **State** of **New** or **Acknowledged**, the instance updates the **Last Detected** field with the current date/time and increments the **Count** field in the existing record. This prevents the creation of duplicate records in the MID Server Issue [ecc_agent_issue] table and records the number of times after the initial incident that the breach reoccurred. The administrator can increase MID Server resources gradually and watch the effect on the **Count** field. When the counter stops incrementing, the administrator knows that the MID Server has adequate resources. When the MID Server resource have been adjusted appropriately, the administrator sets the **State** to **Resolved**. If a new threshold breach is logged that matches a MID Server issue with a **State** of **Resolved**, the instance creates a new issue record.

Note:
Any record in the MID Server Issue [ecc_agent_issue] table that has not been updated in 30 days is deleted, regardless of its state.

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Recommendations for resolving resource issues

Administrators have the opportunity to resolve any resource issues with a MID Server when they receive notification of the event. Follow these recommendations for reducing the strain on MID Server resources:

- **JVM memory**:
  - Allocate more max memory to the MID Server. For more information, see Set the MID Server JVM memory size.
  - Add additional MID Servers to share the workload. For more information, see MID Server clusters.
  - Reduce the amount of concurrent processing for the MID Server. This includes segmenting IP Address ranges into smaller segments for a Discovery schedule or loading smaller segments of data within an import job.
- **CPU**: Reduce the activity on the host or migrate the MID Server to a new host with more available resources.

> **Note:**
> MID Server can create a resource usage spike during Discovery, especially discovering against a large number of targets or executing multiple Power Shell sessions concurrently. The MID Server host's resource utilization automatically returns to normal after the Discovery execution successfully stops. To decrease CPU utilization, host the MID Server on a dedicated machine. If you encounter resource usage issues, make sure only one MID Server is run on each dedicated host machine. If the MID Server is hosted on a public cloud, add more CPU resources and avoid the noisy neighbor issue. For more information, see High CPU Usage on Host with MID Server(s) [KB0597639].

Tables used for resource threshold evaluation

Table	Description
MID Server Issue [ecc_agent_issue]	Stores data on various types of MID Server issues, including breaches of configured CPU and memory thresholds. Fields used for resource threshold breaches are: • **count**: Number of times a previously reported threshold breach occurs, if the event is not marked **Resolved**. • **last_detected**: Current date and time a threshold breach is detected. This field is updated each time a previously detected breach is found, if it is not marked **Resolved**. • **message**: Descriptive message summarizing the conditions that triggered the threshold breach event. This message includes the actual percentage of CPU and memory calculated and the configured thresholds that were breached. • **mid_server**: Name of the MID Server experiencing the resource threshold breach. • **source**: The issue source for the breach. These are the possible sources:

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Table	Description
	○ **CpuMIDResourceThresholdBreach**: CPU threshold issue sources. ○ **MemoryMIDResourceThresholdBreach**: Memory threshold issue sources.
MID Server Status [ecc_agent_status]	Stores the percentages used for the CPU and memory resources, averaged over configurable intervals for each resource. The fields used are: • Mean CPU used % • Max Memory used %
ECC Agent Scalar Metric [ecc_agent_scalar_metric]	Stores the CPU usage data inserted by each MID Server every 10 minutes. The table field used by resource threshold alerting is **mean**.
ECC Agent Memory Metric [ecc_agent_memory_metric]	Stores the memory usage data inserted by each MID Server every 10 minutes. The table field used by resource threshold alerting is **max_used_pct**.

Business rules that check for threshold breaches

Business rule	Description
Update cpu mean on MID Server Status	Runs after the MID Server inserts a record into the ECC Agent Scalar Metric [ecc_agent_scalar_metric] table. This business rule triggers the *`MIDResourceThresholdBreach`* script include function that evaluates threshold settings to determine if the MID Server has breached its configured CPU resource thresholds.
Update max memory on MID Server Status	Runs after the MID Server inserts a record into the ECC Agent Memory Metric [ecc_agent_memory_metric] table. This business rule triggers the *`MIDResourceThresholdBreach`* script include function that evaluates threshold settings to determine if the MID Server has breached its configured memory resource thresholds.

Configuring thresholds and sampling intervals

You can use the default threshold percentages and sampling intervals or configure custom values using either of these methods:

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- Add system properties to the instance and change the default values for all MID Servers.
- Add configuration parameters to change the default resource values for individual MID Servers.

The system properties and the configuration parameters use the same names.

Property/configuration parameter	Description
mid.threshold.mean_cpu.aggregate_interval_span	Number of 10 minute units in the interval for sampling CPU usage data. The default interval is 30 minutes (3 x 10 min.) **Default**: 3
mid.threshold.mean_cpu.percent	Usage percentage of the total CPU resources that initiates a threshold breach alert. **Default**: 95
mid.threshold.mean_max_memory.aggregate_interval_span	Number of 10 minute units in the interval for sampling memory usage data. The default interval is 30 minutes (3 x 10 min.) **Default**: 3
mid.threshold.mean_max_memory.percent	Usage percentage of the total memory resources that initiates a threshold breach alert. **Default**: 95

MID Server resource reporting

The MID Server dashboard contains two reports that give you views into the consumption of CPU and JVM memory resources. These reports show usage over the previous 30 days.

- **Avg Percentage of CPU Used**: Trending the daily average on CPU usage helps illustrate the amount of CPU processing that the MID Server host consumes. MID Servers deployed on the same host will report the same CPU usage.
- **Avg Percentage of Max Memory Used**: The maximum used percentage (*max_used_pct*) is a useful metric for determining if the MID Server has enough memory resources. This metric is a percentage of the max used memory over the total available memory. Trending this over time provides a visualization of how much memory is needed by the MID Server.

MID Server user connectivity issues

The instance writes issues involving MID Server user logins and network connectivity to the MID Server Issue [ecc_agent_issue] table and creates events you can use in custom scripts or to send email notifications.

Records in the MID Server Issue [ecc_agent_issue] table can provide insight into why your MID Server user cannot log in or why a MID Server cannot connect to the instance. The system displays records for connectivity problems in this table that include informative error messages suggesting possible causes. By default, a scheduled job called MIDUserConnectivity runs every four hours and launches the MIDUserConnectivity script include to evaluate MID Server

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connection activity. Records in the MID Server Issue [ecc_agent_issue] table reflect the status of MID Server login attempts and connectivity at the time the scheduled job runs.

From the perspective of the instance, the MID Server is **Down** when:

- User authentication fails
- User authorization fails.
- Network issues prevent MID Server from establishing a TCP/IP connection.

Note:
To associate a user with a MID Server, navigate to the `servicenow/<mid server name>/agent/config.xml` file and enter the user credentials in the **mid.instance.username** and **mid.instance.password** parameters. Make sure to restart the MID Server to activate your changes.

How issues are logged

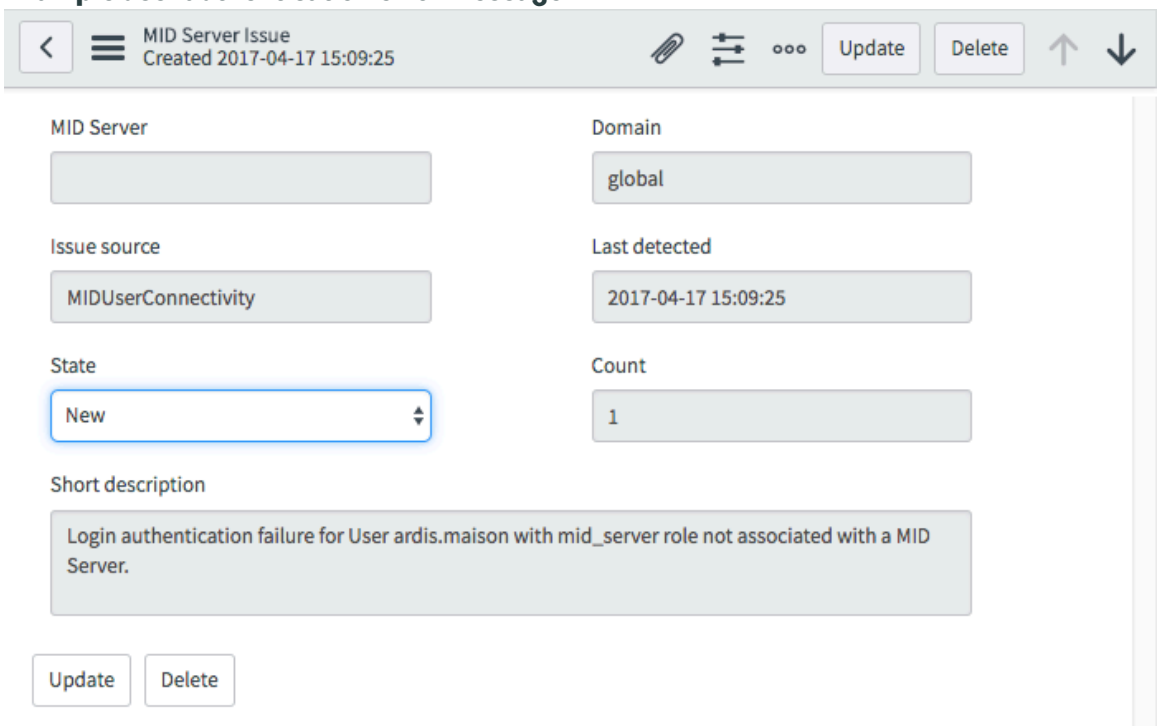
User authentication failures and authorization issues are logged automatically to the MID Server agent log file. The message for both is the same: **User cannot be authenticated or is missing the proper roles.** If the issue is related to authorization, the `agent.log` file shows the list of missing roles.

When debugging is enabled, MID Server issues are logged to the system log (syslog) and are available for display in either a summary or a detailed format. You can also change the sampling interval from the default 4 hours to something shorter for tracking your remediation efforts. For instructions on enabling and configuring debugging for MID Server user issues, see Test remediation efforts for MID Server user connectivity issues.

Data provided

When the instance encounters user connectivity issues, it opens a record in the MID Server Issue [ecc_agent_issue] table.

Example user authentication error message



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The MID Server Issue table contains these fields:

MID Server issue fields

Field	Description
Last detected	Date and time the issue was last detected.
Short description	Contents of the generated message that specifies a possible issue with the named user or the MID Server.
MID Server	Empty in the Jakarta release.
Issue source	The process that identified the issue. For all issues with MID Server user connectivity, the source is `MIDUserConnectivity`.
State	The current state of the issue. Possible states are: • **New**: Starting state when the instance creates the issue. • **Acknowledged**: State set when the administrator first examines the issue. • **Resolved**: Ending state, set by the instance, indicating that the issue has been resolved. If the scheduled job does not encounter the issue when it runs again, the instance automatically sets this value.
Domain	Domain associated with the MID Server user account.
Count	Number of times an issue has been detected. Each time the scheduled job runs and encounters the same issue, it increments this field.

User authentication failure

The credentials that the instance uses to authenticate a MID Server user are configured in the MID Server Configuration Parameters [ecc_agent_config] table. If the MID Server user attempts to log into the instance with invalid credentials, the instance rejects the connection, and writes the **login.failed** event to the Events [sysevents] table for the user. Administrators can use this event in a custom script or in email notifications for authentication failure.

Note:
If user authentication fails, user authorization is not attempted.

User accounts associated with a MID Server

Either of the following messages in the MID Server Issue [ecc_agent_issue] table indicate authentication failure for user accounts that are associated with a MID Server:

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- **Login authentication failure for User <user name> associated with 1 down MID Server. Check password on MID server.**
- **Login authentication failure for User <user name> associated with <n> down MID Servers. Check password on MID servers.**

The necessary conditions for these messages to appear are:

- The **Status** field in the MID Servers [ecc_agent] table that is associated with the MID Server indicates that the MID Server is **Down**.
- The user identified in the MID Server Configuration Parameters [ecc_agent_config] table is the user that one or more MID Servers is configured to use for authentication and authorization when connecting to the instance. The record in the [ecc_agent_config] table must have these values:
  - Parameter name [param_name] field set to **mid.instance.username**.
  - Value [value] field set to the user's name, corresponding to the User ID [user_name] field in Users [sys_user] table.
- The Events [sysevent] table contains posts showing that the last login attempt associated with the user failed during the scheduled time period. The record created in the [sysevent] table contains these field values:
  - Event Name [name] field is set to **login.failed**.
  - Parm1 [parm1] field is set to the user's name.

Note:
The MID Server [mid_server] field in the MID Server Issues [ecc_agent_issue] table is empty (=NULL).

User accounts with the mid-server role not associated with a MID Server

The following message appears when a user with the mid_server role who is not associated with a MID Server fails to authenticate: **Login authentication failure for User <user name> with mid_server role not associated with a MID Server.**

The necessary conditions for this message to appear are:

- The User Roles [sys_user_has_role] table contains a record linking the sys_id associated with the user record stored in the [sys_user] table, with the sys_id associated with the mid_server role record stored in the [sys_user_role] table.
- The user is not identified in the MID Server Configuration Parameters [ecc_agent_config] table as the user whom one or more MID Servers are configured to use for authentication and authorization when connecting to the instance.
- The Events [sysevent] table contains posts showing that the last login attempt associated with the user failed during the scheduled time period.
  - The [sysevent] table contains a record with the Event Name [name] field set to **login.failed**.
  - The Parm1 [parm1] field is set to the user's name, corresponding to the User ID [user_name] field in Users [sys_user] table.

Note:
The MID Server [mid_server] field in the MID Server Issues [ecc_agent_issue] table is empty (=NULL).

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User authorization failure

The user authorization check occurs after the MID Server has successfully authenticated on the instance. In this step, the system ensures that the user account associated with a MID Server is granted the minimum roles required. A SOAP web service called *MIDServerCheck* performs the role checking on the instance. If the MID Server user has the proper roles, the connection is allowed and a *login* event is written to the Events [sysevents] table. If the user does not have the proper roles, the instance writes a **login.authorization.failed** event to the Events [sysevents] table. This event provides a comma separated list of the user's missing roles. Administrators can use this event in custom scripts or in email notifications for authorization failure.

Authorization can fail if a user is missing the mid_server role or any of the important SOAP roles, as in these cases:

- If the user has the soap_script role, the *MIDServerCheck* SOAP web service runs to check for the appropriate MID Server roles. If the user lacks the mid_server role or any of the other SOAP roles, authorization fails, and the **login.authorization.failed** event is created.
- If the user is missing the soap_script role, that user is not authorized to launch the *MIDServerCheck* SOAP web service, which checks for all required MID Server roles. Authorization fails, but the **login.authorization.failed** event is not created. When this occurs, the instance displays this message: **Connectivity of MID Server user <user name> cannot be detected by the instance**.

Users associated with one or more down MID Servers

Either of the following messages in the MID Server Issue [ecc_agent_issue] table indicate authorization failure for user accounts that are associated with a MID Server that is **Down**:

- **Login authorization failure for User <user name> associated with 1 down MID Server. Re-assign mid_server role to grant all required roles.**
- **Login authorization failure for User <user name> associated with <n> down MID Servers. Re-assign mid_server role to grant all required roles.**

The **MIDUserConnectivity** script include identifies active users associated with one or more down MID Servers whose last login attempt within the reporting period failed user authorization. This message is generated when user authorization failures are detected and reported by the MIDServerCheck scripted web service. However, user authorization failures are not reported for users who are not assigned the soap_script role. Should this occur, problems with the user are reported by the network connectivity message.

This message appears in the MID Server Issue [ecc_agent_issue] table when:

- The user may or may not have the mid_server role.
- The user is identified in the MID Server Configuration Parameters [ecc_agent_config] table as the user whom one or more MID Servers are configured to use for authentication and authorization when connecting to the instance.
- The Events [sysevent] table contains posts showing that the last login attempt associated with the user failed during the scheduled time period. The [sysevent] table contains a record with these settings:
  - Event Name [name] field set to **login.authorization.failed**.
  - Parm1 [parm1] field set to the user's name, corresponding to the User ID [user_name] field in Users [sys_user] table.

Note:
The MID Server [mid_server] field in the MID Server Issues [ecc_agent_issue] table is empty (=NULL).

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Users with the proper role not associated with a MID Server

The following message appears when a user with the mid_server role who is not associated with a MID Server fails authorization: **Login authorization failure for User <user name> with mid_server role not associated with a MID Server.**

This message is generated when user authorization failures are detected in which the user account, with the mid_server role, is not identified as a configured MID Server user in the [ecc_agent_config] table. It is possible that the user account was associated with a MID Server at the time of the failure.

This message appears in the MID Server Issue [ecc_agent_issue] table when:

- The user has the mid_server role. The User Roles [sys_user_has_role] table has a record linking the sys_id associated with the user record stored in the [sys_user] table, with the sys_id associated with the mid_server role record stored in the [sys_user_role] table.
- The user is not identified in the MID Server Configuration Parameters [ecc_agent_config] table as the user whom one or more MID Servers are configured to use for authentication and authorization when connecting to the instance.
- The Events [sysevent] table contains posts showing that the last login attempt associated with the user failed during the scheduled time period. The [sysevent] table contains a record with these settings:
  - Event Name [name] field set to **login.authorization.failed**.
  - Parm1 [parm1] field set to the user's name, corresponding to the User ID [user_name] field in Users [sys_user] table.

Note:
The MID Server [mid_server] field in the MID Server Issues [ecc_agent_issue] table is empty (=NULL).

Network issues

A network issue can prevent the MID Server from connecting to the instance's TCP/IP server to begin a session. In this case, the instance marks the MID Server as **Down**, because the instance failed to receive the MID Server heartbeat within the prescribed 5 minute interval.

Users associated with down MID Servers who have not attempted to log in

Either of the following messages in the MID Server Issue [ecc_agent_issue] table name users associated with MID Servers who have not attempted to log in during the reporting period:

- **User <user name> is associated with 1 down MID Server. No login attempts within reporting period.**
- **User <user name> is associated with <n> down MID Servers. No login attempts within reporting period.**

The MIDUserConnectivity script include reports active users associated with down MID Servers where network connectivity cannot be detected by the instance.

This message appears in the MID Server Issue [ecc_agent_issue] table when:

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- The user may or may not have the mid_server role.
- The user is identified in the MID Server Configuration Parameters [ecc_agent_config] table as the user which one or more MID Servers are configured to use for authentication and authorization when connecting to the instance.
- There are no login attempts, either failed or successful, recorded in the Events [sysevent] table for the user during the scheduled reporting period.

Note:
The MID Server [mid_server] field in the MID Server Issues [ecc_agent_issue] table is empty (=NULL).

Users not associated with MID Servers who have not attempted to log in

The following message appears when a user with the mid_server role who is not associated with a MID Server has not attempted to login during the configured reporting interval: **User <user name> with mid_server role is not associated with a MID Server. No login attempts within reporting period.**

The MIDUserConnectivity script include reports active users with the mid_server role not associated with a MID Server, where connectivity cannot be detected by the instance.

This message appears in the MID Server Issue [ecc_agent_issue] table when:

- The user has the mid_server role. The User Roles [sys_user_has_role] table has a record linking the sys_id associated with the user record stored in the [sys_user] table, with the sys_id associated with the mid_server role record stored in the [sys_user_role] table.
- The user is not identified in the MID Server Configuration Parameters [ecc_agent_config] table as the user whom one or more MID Servers are configured to use for authentication and authorization when connecting to the instance.
- There are no login attempts, either failed or successful, recorded in the Events [sysevent] table for the user during the scheduled reporting period.

Note:
The MID Server [mid_server] field in the MID Server Issues [ecc_agent_issue] table is empty (=NULL).

Configuration issues

Any of the following messages, discussed above, can indicate a configuration issue:

- **Login authentication failure for User <user name> with mid_server role not associated with a MID Server.**
- **Login authorization failure for User <user name> with mid_server role not associated with a MID Server.**
- **User <user name> with mid_server role is not associated with a MID Server. No login attempts within reporting period.**

These are some common configuration errors:

- An administrator neglected to associate the user record with the MID Server record as shown in the MID Server Configuration Parameters [ecc_agent_config] table. This table is read-only and cannot be updated directly. To associate a user with a MID Server, configure the user name and password in the MID Server's `config.xml` file and restart the MID Server.

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- During the process of reconfiguring a MID Server to use a different account for TCP/IP connection, the administrator has not yet removed the mid_server role from the account or deleted the account.
- A multipurpose user account was created and granted a large number of roles, including the mid_server role, although this account was never intended to be used as a MID Server account.

User who successfully authenticates and authorizes but might not need mid_server role

The following message appears when a user with the mid_server role who is not associated with a MID Server successfully logs in: **User <user name> with mid_server role successfully connected but not associated with a MID Server. The mid_server role should be reserved for MID Server use only.**

The MIDUserConnectivity script include reports active users with the mid_server role who are not identified as a configured MID Server user, and whose last login attempt was successful during the scheduled time period. This message suggests that the user's credentials are being used by a system administrator or a process that is not running on a MID Server. The assumption here is that the mid_server role should only be used for applications deployed to a MID Server. The presence of this message reminds the system administrator to remove extraneous mid_server roles from user accounts that do not require them.

This message appears in the MID Server Issue [ecc_agent_issue] table when:

- The user has the mid_server role.
- The user is not identified in the MID Server Configuration Parameters [ecc_agent_config] table as the user whom one or more MID Servers are configured to use for authentication and authorization when connecting to the instance.
- The Events [sysevent] table contains posts showing that the last login attempt associated with the user succeeded during the scheduled time period. The [sysevent] table contains a record with these settings:
  - Event Name [name] field set to **login**.
  - Parm1 [parm1] field set to the user's name, corresponding to the User ID [user_name] field in Users [sys_user] table.

Note:
The MID Server [mid_server] field in the MID Server Issues [ecc_agent_issue] table is empty (=NULL).

Test remediation efforts for MID Server user connectivity issues

After attempting to resolve a user connectivity issue that appears in the MID Server Issue [ecc_agent_issue] table, you can test your remediation efforts without having to wait until the next scheduled reporting period by shortening the sampling interval.

Before you begin
Role required: admin

About this task
Reconfigure the sampling interval using this procedure and then examine the results in the MID Server Issue [ecc_agent_issue] table. You can set any time span for the sample, but you should define a window of not less than 5 minutes, since this is the default interval of the MID Server heartbeat that reports its status. The recommended method for configuring a shorter sampling interval is to copy and modify the code from the MIDUserConnectivity scheduled job, and then run it manually in the background script utility.

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Warning:
Avoid editing the script in the MIDUserConnectivity schedule record. If you make any change to this record, it will not be updated when you upgrade the instance.

Procedure

1. Navigate to **All** > **System Definition** > **Scheduled Jobs**.
2. Open the MIDUserConnectivity scheduled job.
3. Copy this line from the **Run this script** field:
   `MIDUserConnectivity(0).checkConnectivity(4 * (60 * 60 * 1000));`

   This code sets the 4 hour sampling interval in milliseconds and turns debugging off with the **MIDUserConnectivity(0)** value.
4. Navigate to **System Definition** > **Scripts - Background**.
5. Paste the code from the scheduled job into the **Run script** field.
6. Set the sampling interval to 5 minutes by changing the time calculation to **(5 * 60 *1000)**.
   The modified command looks like this:
   `MIDUserConnectivity(0).checkConnectivity (5 * 60 *1000);`
7. Click **Run script**.
8. Open the record of the MID Server that had the issue and select the **MID Server Issues** related list.
   The issue is updated as follows:
   - If the issue persists, the **Count** column is incremented, and the **Last detected** column shows the current date and time.
   - If the issue no longer exists, the system changes the **State** to **Resolved**.
9. **Optional:** You can enable debugging by selecting a level, and then run the script again to see the breakdown for each condition evaluated.
   Use these settings to select a debugging level:
   - For a summary view, enter **MIDUserConnectivity(1)**.
   - For a detailed view, enter **MIDUserConnectivity(2)**.

   For details about the type of debugging information provided, see Interpreting MID Server user debugging output.

Interpreting MID Server user debugging output

Debugging output from the system log is available in either a summary or detailed view for MID Server user issues, but must be enabled manually.

To enable debugging and display all connectivity issues in either of the available formats, you must run a method manually on your instance. For instructions on enabling debugging, see Test remediation efforts for MID Server user connectivity issues. For information about each error condition and how records are created in the MID Server Issue [ecc_agent_issue] table, see MID Server user connectivity issues.

Available formats

You can configure the instance to generate a simple summary of the issue or a detailed output that identifies users and MID Servers. Summaries provide a quick look at the issue conditions, by count, while the detailed view allows you to examine roles, MID Server associations, and login activity by named users.

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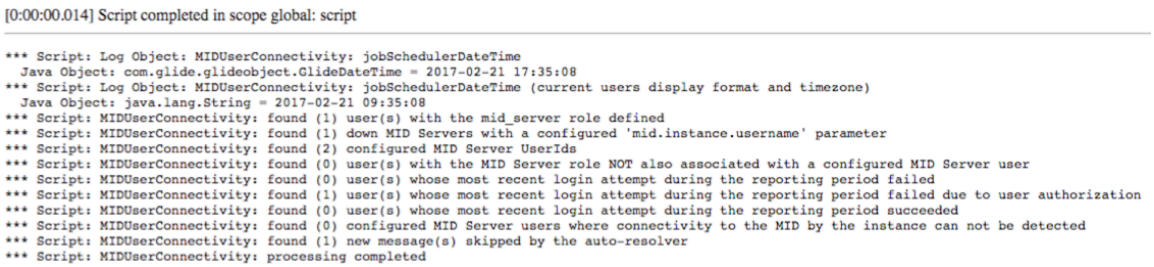
In this summary example of an authorization issue, the instance evaluates each condition and indicates how many users met that condition. You can see that a MID Server is down and that one of two users configured for a MID Server failed authorization. Because this is a summary, neither the MID Server nor the users are named.

Sample summary debug output



```
[0:00:00.014] Script completed in scope global: script

*** Script: Log Object: MIDUserConnectivity: jobSchedulerDateTime
  Java Object: com.glide.glideobject.GlideDateTime = 2017-02-21 17:35:08
*** Script: Log Object: MIDUserConnectivity: jobSchedulerDateTime (current users display format and timezone)
  Java Object: java.lang.String = 2017-02-21 09:35:08
*** Script: MIDUserConnectivity: found (1) user(s) with the mid_server role defined
*** Script: MIDUserConnectivity: found (1) down MID Servers with a configured 'mid.instance.username' parameter
*** Script: MIDUserConnectivity: found (2) configured MID Server UserIds
*** Script: MIDUserConnectivity: found (0) user(s) with the MID Server role NOT also associated with a configured MID Server user
*** Script: MIDUserConnectivity: found (0) user(s) whose most recent login attempt during the reporting period failed
*** Script: MIDUserConnectivity: found (1) user(s) whose most recent login attempt during the reporting period failed due to user authorization
*** Script: MIDUserConnectivity: found (0) user(s) whose most recent login attempt during the reporting period succeeded
*** Script: MIDUserConnectivity: found (0) configured MID Server users where connectivity to the MID by the instance can not be detected
*** Script: MIDUserConnectivity: found (1) new message(s) skipped by the auto-resolver
*** Script: MIDUserConnectivity: processing completed
```

Authentication failure

When a MID Server user cannot authenticate on the instance, the system displays these error messages in the detailed output:

- **Login authentication failure for User <user name> associated with 1 down MID Server. Check password on MID server.**
- **Login authentication failure for User <user name> associated with <n> down MID Servers. Check password on MID servers.**
- **Login authentication failure for User <user name> with mid_server role not associated with a MID Server.**

In this example, three users with the mid_server role, **midserver2**, **local-midserver**, and **ardis.maison**, failed to authenticate. Two of these users were configured for MID Servers that were **Down**, and the other user was not configured for any MID Servers. Each of these users has an authentication failure and is named in the appropriate error message.

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Detailed debugging log for authentication failure

```
*** Script: Log Object: MIDUserConnectivity: activeUserIDsWithMIDServerRole
  Array of 3 elements
    [0]: string = ardis.maison
    [1]: string = midserver2
    [2]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: downMIDServerConfiguredUserIDs
  Array of 2 elements
    [0]: string = midserver2
    [1]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: userIDMIDServerMap
  Object
    ardis.maison: Object
      sys_domain: string = global
      mid_server: Array of 0 elements
    midserver2: Object
      sys_domain: string = global
      mid_server: Array of 1 elements
        [0]: string = 7faf7154fb023200fb70cd3b217069e9
    local-midserver: Object
      sys_domain: string = global
      mid_server: Array of 2 elements
        [0]: string = f0a86914fb423200fb70cd3b21706998
        [1]: string = 1aa2cf83c7213200fb709c569b976390
    1aa2cf83c7213200fb709c569b976390: string = snc_rba_mid
    7faf7154fb023200fb70cd3b217069e9: string = MIDServerWinVM-10.11.145.205-2-Local
    f0a86914fb423200fb70cd3b21706998: string = xsnc_rba_mid
*** Script: Log Object: configuredMIDServerUserIDs
  Array of 2 elements
    [0]: string = midserver2
    [1]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: activeUserIDsWithMIDServerRoleNotAssociatedWithConfiguredMIDServer
  Array of 1 elements
    [0]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsWithIssues
  Array of 3 elements
    [0]: string = midserver2
    [1]: string = local-midserver
    [2]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptFailed
  Array of 3 elements
    [0]: string = midserver2
    [1]: string = local-midserver
    [2]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptAuthorizationFailed
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptSuccessful
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: userIDsWhereConnectivityToMidCanNotBeDetectedByInstance
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: doNotAutoResolveMessages
  Array of 3 elements
    [0]: string = Login authentication failure for User midserver2 associated with 1 down MID Server.  Check password on MID server.
    [1]: string = Login authentication failure for User local-midserver associated with 2 down MID Servers.  Check password on MID servers.
    [2]: string = Login authentication failure for User ardis.maison with mid_server role not associated with a MID Server.
*** Script: MIDUserConnectivity: processing completed
```


MID Server ID map

The debugging output lists all MID Servers that are marked as **Down** and maps them to their user accounts by the MID Server **sys_id**. This map includes all user accounts that have the mid_server role, whether or not they are associated with a MID Server. If there are no **Down** MID Servers, the map is not displayed in the debugging output.

The map is presented in three sections:

- User accounts not associated with any MID Servers.
- User accounts associated with **Down** MID Servers, identified by their **sys_id**.
- The **sys_id** of each **Down** MID Server, identified by name.

MID Server ID map

```
*** Script: Log Object: MIDUserConnectivity: userIDMIDServerMap
  Object
    ardis.maison: Object
      sys_domain: string = global
      mid_server: Array of 0 elements
    midserver2: Object
      sys_domain: string = global
      mid_server: Array of 1 elements
        [0]: string = 7faf7154fb023200fb70cd3b217069e9
    local-midserver: Object
      sys_domain: string = global
      mid_server: Array of 2 elements
        [0]: string = f0a86914fb423200fb70cd3b21706998
        [1]: string = 1aa2cf83c7213200fb709c569b976390
    1aa2cf83c7213200fb709c569b976390: string = snc_rba_mid
    7faf7154fb023200fb70cd3b217069e9: string = MIDServerWinVM-10.11.145.205-2-Local
    f0a86914fb423200fb70cd3b21706998: string = xsnc_rba_mid
```


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Authorization failure

If a user is missing any of the required roles, the instance generates these authorization failure messages:

- **Login authorization failure for User <user name> associated with 1 down MID Server. Re-assign mid_server role to grant all required roles.**
- **Login authorization failure for User <user name> associated with <n> down MID Servers. Re-assign mid_server role to grant all required roles.**
- **Login authorization failure for User <user name> with mid_server role not associated with a MID Server.**

In this example, three users with the mid_server role, **midserver2**, **local-midserver**, and **ardis.maison** have failed authorization. One user is not associated with any MID Server, but the other two users are. The system has logged an authorization failure, indicating that the user is missing at least one critical role. To see what roles are missing, look at the comma separated list in the **Parm2** field in the **login.authorization.failed** event record. This record is the most recent login attempt in the Event [sysevent] table for the user account within the reporting period.

Detailed debugging log for authorization failure

```
*** Script: Log Object: MIDUserConnectivity: activeUserIDsWithMIDServerRole
  Array of 3 elements
    [0]: string = ardis.maison
    [1]: string = midserver2
    [2]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: downMIDServerConfiguredUserIDs
  Array of 2 elements
    [0]: string = midserver2
    [1]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: userIDMIDServerMap
  Object
    ardis.maison: Object
      sys_domain: string = global
      mid_server: Array of 0 elements
    midserver2: Object
      sys_domain: string = global
      mid_server: Array of 1 elements
        [0]: string = 7faf7154fb023200fb70cd3b217069e9
    local-midserver: Object
      sys_domain: string = global
      mid_server: Array of 2 elements
        [0]: string = f0a86914fb423200fb70cd3b21706998
        [1]: string = 1aa2cf83c7213200fb709c569b976390
    1aa2cf83c7213200fb709c569b976390: string = snc_rba_mid
    7faf7154fb023200fb70cd3b217069e9: string = MIDServerWinVM-10.11.145.205-2-Local
    f0a86914fb423200fb70cd3b21706998: string = xsnc_rba_mid
*** Script: Log Object: configuredMIDServerUserIDs
  Array of 2 elements
    [0]: string = midserver2
    [1]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: activeUserIDsWithMIDServerRoleNotAssociatedWithConfiguredMIDServer
  Array of 1 elements
    [0]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsWithIssues
  Array of 3 elements
    [0]: string = midserver2
    [1]: string = local-midserver
    [2]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptFailed
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptAuthorizationFailed
  Array of 3 elements
    [0]: string = midserver2
    [1]: string = local-midserver
    [2]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptSuccessful
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: userIDsWhereConnectivityToMidCanNotBeDetectedByInstance
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: doNotAutoResolveMessages
  Array of 3 elements
    [0]: string = Login authorization failure for User midserver2 associated with 1 down MID Server.  Re-assign mid_server role to grant all required roles.
    [1]: string = Login authorization failure for User local-midserver associated with 2 down MID Servers.  Re-assign mid_server role to grant all required roles.
    [2]: string = Login authorization failure for User ardis.maison with mid_server role not associated with a MID Server.
*** Script: MIDUserConnectivity: processing completed
```


Network issues

Network issues may exist for these users who are associated with MID Servers, but who have not attempted to log in during the reporting period:

- **User <user name> is associated with 1 down MID Server. No login attempts within reporting period.**
- **User <user name> is associated with <n> down MID Servers. No login attempts within reporting period.**

Network issues may also exist for these users who are NOT associated with MID Servers, and who have not attempted to log in during the reporting period: **User <user name> with mid_server role is not associated with a MID Server. No login attempts within reporting period.**

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In this example, no login attempts have been detected for **midserver2**, **local-midserver**, and **ardis.maison**, all of whom have the mid_server role. Two of those users are associated with MID Servers that are marked **Down**. The other user is not associated with any MID Server. None of these users has attempted to log in to the system within the configured reporting interval. The system assumes that these users would make an attempt to log in unless network issues prevented them from doing so.

Note:
By default, the sampling period is 4 hours. However, during debugging or remediation, the sampling period can be reset to a value that matches the MID Server heartbeat interval of 5 minutes, or greater.

Detailed debugging log for network connection issues

```
*** Script: Log Object: MIDUserConnectivity: activeUserIDsWithMIDServerRole
  Array of 3 elements
    [0]: string = ardis.maison
    [1]: string = midserver2
    [2]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: downMIDServerConfiguredUserIDs
  Array of 2 elements
    [0]: string = midserver2
    [1]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: userIDMIDServerMap
  Object
    ardis.maison: Object
      sys_domain: string = global
      mid_server: Array of 0 elements
    midserver2: Object
      sys_domain: string = global
      mid_server: Array of 1 elements
        [0]: string = 7faf7154fb023200fb70cd3b217069e9
    local-midserver: Object
      sys_domain: string = global
      mid_server: Array of 2 elements
        [0]: string = f0a86914fb423200fb70cd3b21706998
        [1]: string = laa2cf83c7213200fb709c569b976390
    laa2cf83c7213200fb709c569b976390: string = snc_rba_mid
    7faf7154fb023200fb70cd3b217069e9: string = MIDServerWinVM-10.11.145.205-2-Local
    f0a86914fb423200fb70cd3b21706998: string = xsnc_rba_mid
*** Script: Log Object: configuredMIDServerUserIDs
  Array of 2 elements
    [0]: string = midserver2
    [1]: string = local-midserver
*** Script: Log Object: MIDUserConnectivity: activeUserIDsWithMIDServerRoleNotAssociatedWithConfiguredMIDServer
  Array of 1 elements
    [0]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsWithIssues
  Array of 3 elements
    [0]: string = midserver2
    [1]: string = local-midserver
    [2]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptFailed
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptAuthorizationFailed
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: userIDsMostRecentLoginAttemptSuccessful
  Array of 0 elements
*** Script: Log Object: MIDUserConnectivity: userIDsWhereConnectivityToMidCanNotBeDetectedByInstance
  Array of 3 elements
    [0]: string = midserver2
    [1]: string = local-midserver
    [2]: string = ardis.maison
*** Script: Log Object: MIDUserConnectivity: doNotAutoResolveMessages
  Array of 3 elements
    [0]: string = User midserver2 associated with 1 down MID Server.  No login attempts within reporting period.
    [1]: string = User local-midserver associated with 2 down MID Servers.  No login attempts within reporting period.
    [2]: string = User ardis.maison with mid_server role not associated with a MID Server.  No login attempts within reporting period.
*** Script: MIDUserConnectivity: processing completed
```


Configuration issues

Any of the following messages can indicate a user configuration issue:

- **Login authentication failure for User <user name> with mid_server role not associated with a MID Server.**
- **Login authorization failure for User <user name> with mid_server role not associated with a MID Server.**
- **User <user name> with mid_server role successfully connected but not associated with a MID Server. The mid-server role should be reserved for MID Server use only.**
- **User <user name> with mid_server role is not associated with a MID Server. No login attempts within reporting period.**

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In this example, a user with the mid_server role has logged in successfully within the configured sampling interval. However, this user is not configured for a MID Server and might have the role in error.

Detailed debugging log for MID Server user account login

MID Server Upgrade History

Use this module to troubleshoot errors that occur during the MID Server upgrade process. The MID Server Upgrade Histories table contains a record of each instance upgrade. The MID Server Upgrade Stages table shows the status of each MID Server and its upgrade progress, including any errors encountered.

MID Server Upgrade Histories

Users with admin or agent-admin roles can find detailed information for any MID Server upgrade in the Upgrade History module for MID Server. Whenever an instance is upgraded, all MID Servers in the Up state are upgraded automatically. The Upgrade History module uses the MID Server Upgrade Histories table [ecc_agent_upgrade_history]. This table shows the following information:

- The old instance version.
- The new version.
- The number of successfully upgraded MID Servers.
- The number of MID Servers with pending upgrades. MID Servers have pending upgrades if the upgrade has failed or is in progress.

MID Server Upgrade Stages

Select an instance record to see more details about the MID Servers upgraded with that instance. The Pending Upgrades and Complete Upgrade Details related lists use the MID Server Upgrade Stages table [ecc_agent_upgrade_history_stage]. MID Servers pinned to a specific version generate an entry with a blank MID Upgrade History on the MID Server Upgrade Stages table [ecc_agent_upgrade_history_stage].

MID Upgrade History	Refers to a corresponding record in the [ecc_agent_upgrade_history] table.
Stage	Shows the progress of the MID Server through each stage of the upgrade process.
State	Shows the status of each stage.
Message	Displays dynamically generated messages about the upgrade stages, such as the file path to download directories or extract folders.

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	It also displays information about any errors encountered, even if those errors do not block the upgrade.

MID Server ECC Queue

The External Communication Channel (ECC) Queue is a connection point between an instance and the MID Server. Jobs that the MID Server needs to perform are saved in this queue until the MID Server is ready to handle them.

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Asynchronous Message Bus

The MID Server subscribes to messages published by the Asynchronous Message Bus (AMB), which notifies the MID Server that it has pending task records in the ECC Queue. If a task exists in the ECC Queue for that MID Server, the MID Server sets the status to "Processing". When finished working on a requested job, the MID Server reports back to the ECC queue with the results.

The MID Server opens a persistent connection to the instance through the AMB Client and listens on the `/mid/server/<mid_sys_id>` AMB channel. When an output record is inserted into the Queue [ecc_queue] table, an AMB message is sent to the MID Server's channel. The MID Server receives this message and immediately polls the ecc_queue table for work, unless the MID Server is busy and the message priority level is not Interactive.

The MID Server polls the ECC queue at the maximum regular interval defined in the **mid.poll.time** configuration parameter (40 seconds by default), regardless of AMB message activity. If the MID is busy and receeives an AMB message witrh a priority level other than Interactive, the queue poll time changes to **mid.poll.time.standard** (5 seconds by default). This polling of the ECC queue at a regular interval is done in case the AMB connection is dropped.

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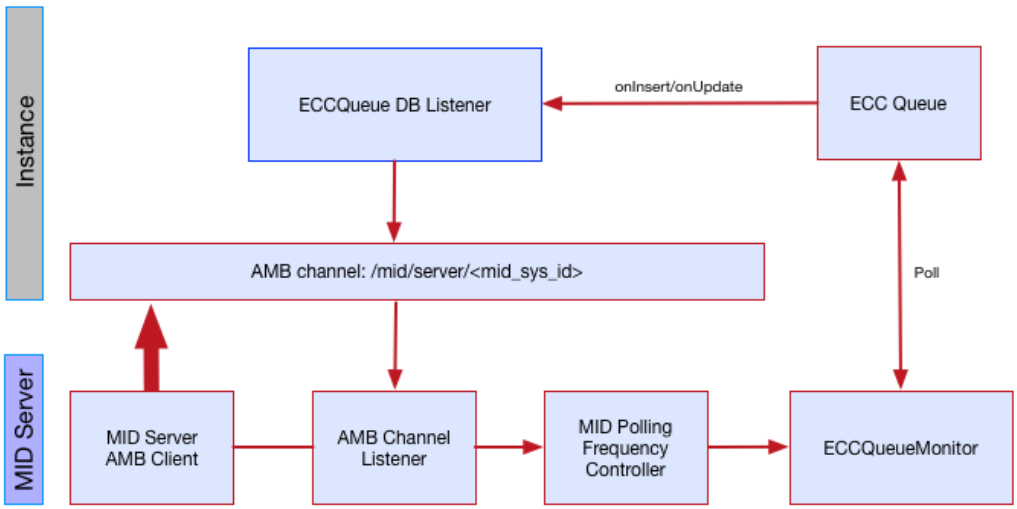
MID Server ECC queue polling process



Note:
The AMB client on the MID Server does not work in all environments and might need to be disabled to avoid performance issues. To disable AMB in your environment, set the **mid.disable_amb** parameter to **true**. When you disable AMB, the MID Server no longer receives notifications for each new ECC queue output record. See **mid.poll.time** in#MID Server parameters for more information.

ECC Queue information

You can access the ECC Queue by navigating any of these paths:

- **Discovery** > **Output and Artifacts** > **ECC Queue**
- **Discovery** > **Discovery Schedules** > **{schedule name}** > **{Discovery status record}**
- **ECC** > **Queue**
- **{Discovery Status record}** > **ECC Queue**

An ECC Queue provides the following information:

Field	Input value
Agent	The name of the external system that this messages is either from or to. If the message is from or to a MID Server, the agent name is in the form `mid.server.xxx`, where xxx is the name of a particular MID Server.
Topic	The name of the probe the MID server ran. If you are using a pattern for discovery, the Horizontal Pattern probe Horizontal Pattern probe appears.

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Field	Input value
Name	The actual command the probe ran. For example, if **Topic** is SSHCommand, then the **Name** field contains the actual shell command to run. If you are using a pattern for discovery, the following appears: **Pattern Launcher:** followed by the name of the pattern and the multipage number.
Source	The IP address that the discovery is to run against. A few probes run against multiple IP addresses; in those cases, this field contains a human-readable description.
Response to	This optional field contains a reference (sys_id) to the ECC Queue message that this message is in response to. Discovery makes extensive use of this field to track the hierarchy of messages that result from a given scheduled Discovery. Click the record icon for the value in this field to open the ECC Queue record for the activity that spawned the current probe or sensor record.
Queue	An indicator of whether this message was is an input message or an output message.
State	The state of the current ECC queue record. States update automatically.
Processed	The time when this message was processed.
Created	The time when this message was created.
Sequence	The unique sequence number for this message. This value is automatically generated when an ECC Queue record is inserted. Its use is deprecated.
Error string	An error message, if an error occurred during processing. This field is hidden on the standard form unless there was an error.
Payload	The body of the message in XML format. The returned XML has a root tag of `<results>` containing one or more `<result>` tags and a single `<parameters>` tag. The parameters are simply an echo of those sent to the MID server in the probe; they vary from probe to probe, but in general they tell the probe the details of what it is to do and how it should behave. The result tags are the most interesting ones: they contain the actual data generated by the probe.

ECC queue controls

The ECC Queue form contains these related links:

Related link	Description
Run again	Runs the probe again. You can re-run probes when you encounter a failed discovery or other unexpected results.
Go to CMDB item	Open the CI record for the CI that was updated during the discovery.
Go to Sensor	Open the record for the associated sensor.

ECC Queue retry policy

The ECC Queue Retry Policy plugin (com.glideapp.ecc_retry_policy) needs to be activated to be able to view the ECC Queue Retry Policy and Queue Retry Activity modules.

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Manage ECC Queue content for a MID Server

The ECC Queue allows you to create ECC Queue messages, access MID Server log entries, and retrieve statistics from an individual MID Server record.

Before you begin

Role required: admin, mid_server

Procedure

1. Send remote commands through a MID Server to a hosting device directly from the ECC Queue without running Discovery.

   a. Navigate to the ECC Queue and click **New**.

   b. Create a message with these settings:

   - **Agent**: The name of the MID Server that executes the command.
   - **Topic**: Command
   - **Name**: The actual command that you want to process. For Windows, this is expressed in a DOS command line structure. For Linux, the structure could be a bash command line entry.
   - **Queue**: Output
   - **Payload**: With proper XML tags, you can specify the command here instead of in the **Name** field. The advantage to this is that the command is not restricted by the **Name** field length of 120 characters. Use the following XML format for the command:

   ```
   <parameters>
      <parameter name="name" value="ACTUAL_COMMAND_LINE"/>
   </parameters>
   ```

2. Access entries in the ECC Queue that show **agent0.log.0** logs and **wrapper.log** logs for an individual MID Server.

   a. Open a MID Server record.

   b. Under **Related Links**, click **Grab MID logs, files and thread dump**.
   ECC queue records appear in the list using the following filter:

   - [Topic] [is] [SystemCommand]
   - [Source] [is] [grabLog]
   - [Agent] [is] [your MID Server]

   Only **agent0.log.0** and **wrapper.log** entries appear. These logs are also accessible in the ~\agent\logs\ file path.

   c. To open a log entry, click the link under the **Created** column.

3. Access the **queue.stats** topic for useful information about individual MID Servers, such as memory and CPU usage data.

   a. Open a MID Server record.

   b. Under **Related Links**, click **MID Statistics**.
   ECC queue records appear in the list using the following filter:

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- [Topic] [is] [queue.stats]
- [Agent] [is] [your MID Server]

MID Server dashboard

The MID Server dashboard is a central place for MID Server users to monitor ongoing operations. The dashboard consists of reports and gauges that display information from the MID Server Status table.

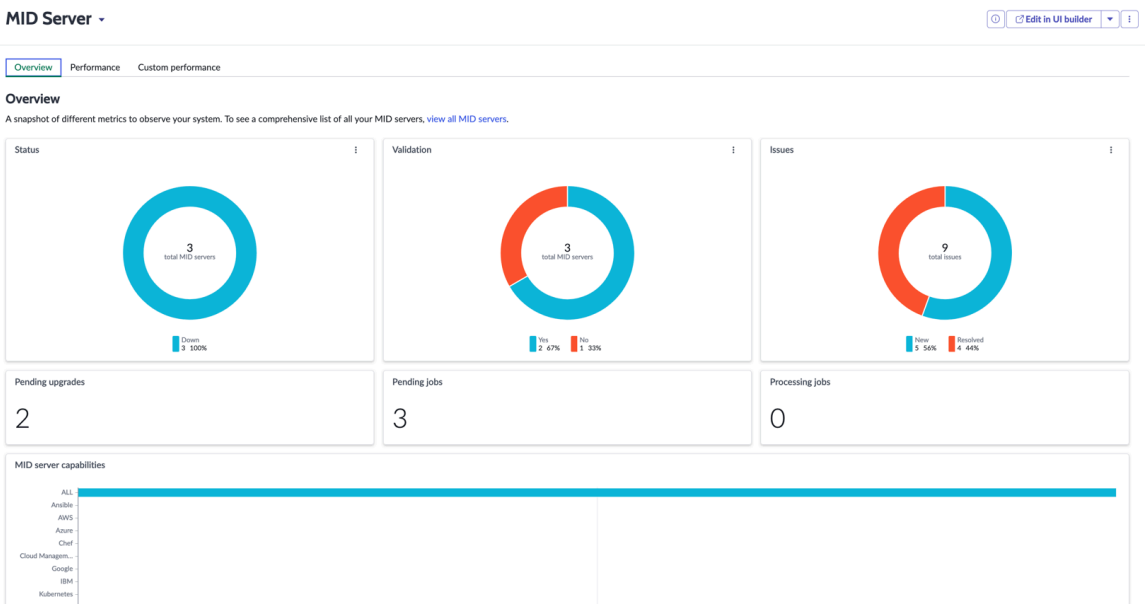
1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

The MID Server Dashboard is available from the **MID Server** > **Dashboard** module.

After upgrading to Discovery Admin Workspace version 1.3.1 (August 2024 Store), you can navigate to **Workspaces** > **Discovery Admin Workspace** > **Insights** and use the enhanced dashboard.

MID Server Overview tab

The Overview tab provides graphs showing the status of MID Servers, including any validation issues or pending upgrades and jobs. The tab also displays which MID Servers by capability.



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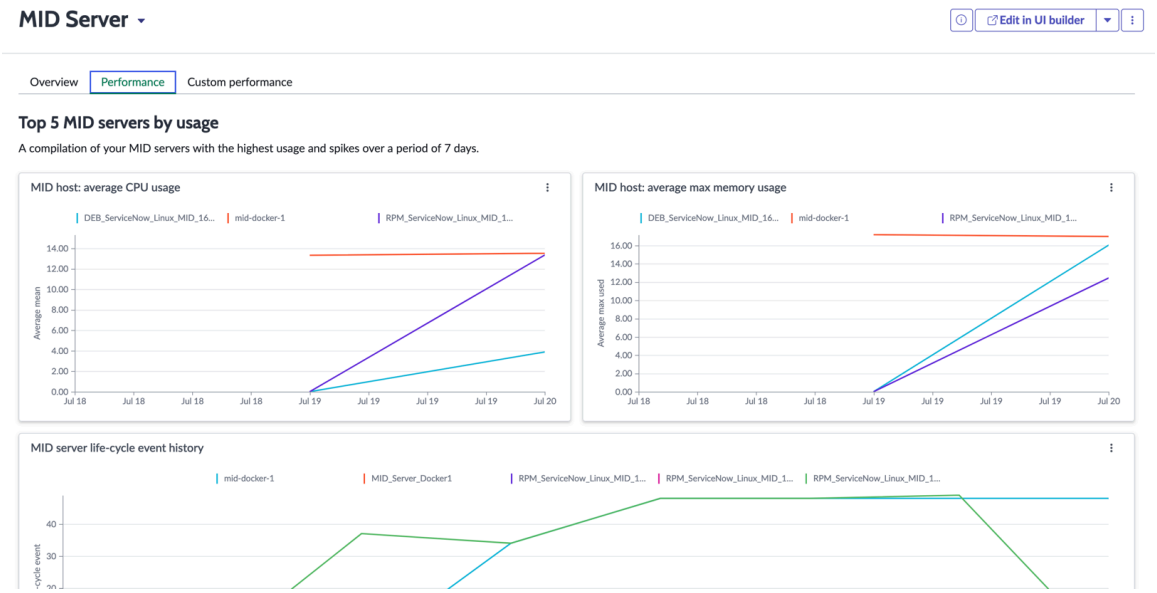
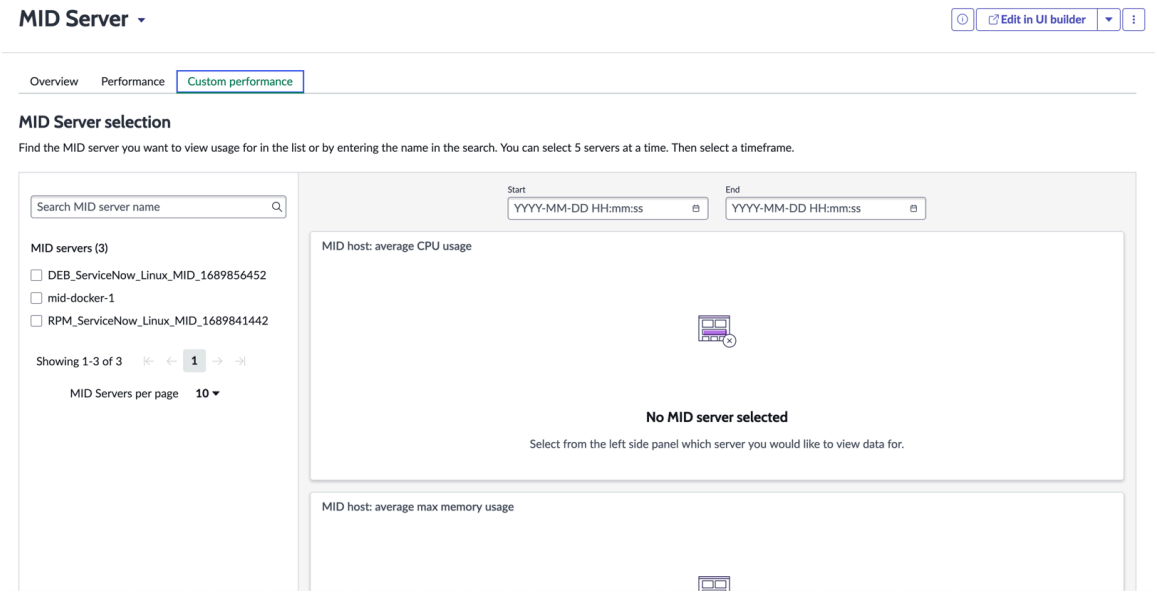
MID Server Performance tab

The Performance tab displays information relating to the MID Server CPU and memory usage, including the life-cycle event history.



MID Server Custom performance tab

The Custom performance tab enables users to set custom MID Server selection criteria to show particular MID Servers in a select time frame.



MID Server status gauge

The MID Server Status gauge on the dashboard displays basic information about each MID Server. This information comes from the MID Server Status [ecc_agent_status] table.

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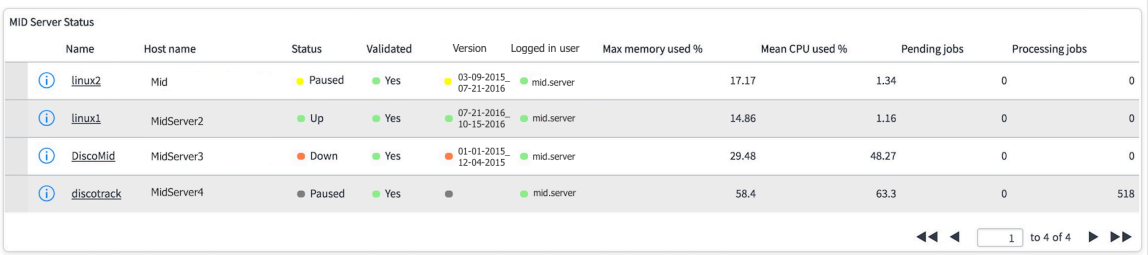
MID Server Dashboard gauge



If the version is not compatible, the MID Server status is not changed to **Down** in the MID Server dashboard. So it might still appear to be processing commands when it actually is not doing so. You must check the MID Server **Version** on the dashboard.

See KB0535181 for additional MID Server troubleshooting information.

The icons in the **Version** column indicates the following:

- **Red**: Incompatible. The MID Server and instance do not belong to the same release. You must upgrade the MID Server and verify that it is not pinned to an older version with the mid.version.override property. The MID Server will not be upgraded until the parameter is cleared.
- **Yellow**: Compatible, but an upgrade is recommended. This indicates that the MID Server version belongs to the same family as the instance, but not the same version.
- **Green**: Compatible. No upgrade necessary.
- **Gray**: Incompatible. The instance cannot detect the version.

Column	Description
Name	The name of the MID Server.
Host name	The name of the system that hosts the MID Server.
Status	The status of the MID Server.
Validated	Whether or not the MID Server was validated.
Max memory used %	The highest percent usage of memory on the system that hosts the MID Server, in the configured sampling interval. The default interval is 30 minutes, but this value is user configurable. See MID Server resource threshold alerts for details.
Mean CPU used %	The average percent usage of CPU on the system that hosts the MID Server, in the configured sampling interval. The default interval is 30 minutes, but this value is user configurable. See MID Server resource threshold alerts for details.
Pending jobs	Number of pending ECC queue jobs for that MID Server.
Processing jobs	Number of processing ECC queue jobs for that MID Server.
Version	The version of the MID Server. An icon indicates the validity of the MID Server: • **Red**: Incompatible. The MID Server and instance do not belong to the same release. You must upgrade the MID Server and verify that it is not pinned to an older version with the mid.version.override property. The MID Server will not be upgraded until the parameter is cleared.

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Column	Description
	• **Yellow**: Compatible, but an upgrade is recommended. This indicates that the MID Server version belongs to the same family as the instance, but not the same version. • **Green**: Compatible. No upgrade necessary. • **Gray**: Incompatible. The instance cannot detect the version.
User	The login name of the user. An icon indicates the validity of the user: • **Red**: Incompatible. The user does not have themid_server role or the user does not match the value in the mid.instance.username parameter (in the `config.xml` configuration file). Reconfigure the MID Server user and verify that it works. • **Green**: Compatible. The user has the mid_server role and matches the user in the configuration file. **Note:** The user can also have any of the SOAP roles that the mid_server role inherits.

MID Server properties

Properties control the behavior of all MID Servers or a particular MID Server.

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

The MID Server properties are in the MID Server Property [ecc_agent_property] table and can be accessed by navigating to **MID Server** > **Properties**. To set these properties, you must add them, if they are not already present.

MID Server properties

com.glide.closure_max_rows_per_table

Sets the maximum number of rows allowed in a table. This property is not visible by default and must be added.

- Type: integer
- Default value: 200000

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concurrent.dist.download

Sets the number of concurrent MID Server auto-upgrades permitted by the instance. The default value of this property is 2, which allows the MID Server to use 2 of the 4 semaphores available on the instance for upgrading. If your instance has more than 4 INT semaphores, you can increase the value in this property to allow more concurrent upgrades.

- Type: integer
- Default value: 2

glide.stored_proc.data_type.validation

Stops validation of data types in stored procedure parameters. Use this property if you use Orchestration to run a stored procedure on MySQL, Oracle DB, and MS-SQL databases and you want to avoid performing data type validation. Restart the MID Server service after you change the value of this property.

- Type: true | false
- Default value: false

glide.http.proxy_host

Set the proxy server hostname or IP address.

- Type: string
- Default value: none

glide.http.proxy_port

Set the port number for the proxy server.

- Type: integer
- Default value: none

glide.http.proxy_username

Set the proxy server username. If the proxy server is authenticating using user name and password, enter a value for this property.

- Type: string
- Default value: none

glide.http.proxy_password

Set the proxy server password. If the proxy server is authenticating using user name and password, enter a value for this property.

- Type: string
- Default value: none

mid.discovery.max_ci_count_per_page

Defines the maximum CI count per page.

- Type: integer (bytes)
- Default value: 500

mid.discovery.max_related_count_per_page

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- Type: integer
- Default: 100

mid.discovery.max_relation_count_per_page

Splits the payload based on the number of relations in it.

- Type: integer
- Default: 10000

mid.discovery.max_total_items_size_per_page

Splits the payload based on the size of the items.

- Type: integer
- Default:

mid.aws.sts.assume_role.disable_credential_caching

Set this property to **true** to prevent the caching of temporary credentials for Cloud Discovery. For more information, see Access setup for AWS service accounts Access setup for AWS service accounts.

- Type: true | false
- Default: false

mid.aws.sts.assume_role.credential_ttl_minutes

Set the number of minutes you want to cache temporary credentials for Cloud Discovery. For more information, see Access setup for AWS service accounts Access setup for AWS service accounts.

- Type: integer
- Default: 60

mid.ca.certificate.api.request.retry.count

Indicates how many times the Certificate Import query will retry after the rate limit has occurred.

- Type: integer
- Default: 3

mid.ca.certificate.api.request.retry.interval

Used to delay Certificate import from CAs when the rate limit has occurred.

- Type: integer
- Default: 30000

mid.cloud.discovery.bypass.proxy

This configuration parameter accepts a comma separated list of DNS/IP addresses of proxy servers. The listed proxy servers are bypassed during Cloud Discovery. To bypass proxies on multiple cloud service providers (such as AWS or Azure), a separate MID Server must be set up for each provider. Otherwise, the MID Server proxy configuration is followed normally.

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- Type: string
- Default value: none

mid.discovery.file_transfer_protocol

Used to determine the file transfer method used for probes or patterns.

- Type: Choice (SCP or SFTP)
- Default: SCP

mid.discovery.max_pattern_payload_size

Defines the maximum overall payload size for the payload of results that come from patterns.

- Type: integer (bytes)
- Default value: 50000000

mid.discovery.max_payload_size

Specifies the maximum string length of Discovery results that the MID Server sends to the instance. If the Discovery probe results exceed the limit, the MID Server discards them and returns a warning message.

For probes, this applies only to those probes where the *Used by Discovery* field is *true*. For patterns, this applies to the Horizontal Pattern probe.

Set the value to any negative number to disable the payload limit and allow payloads of any size to be sent to the instance. For example, -1.

- Type: integer (bytes)
- Default value: 5000000

mid.discovery.multiprobe.skip_others_on_error

Prevents probes in a multi-probe from iterating through available credentials when another member probe has already failed or timed out. If this property is set to **false**, each probe in the multi-probe attempts to connect to the target with the same invalid credentials. This condition results in longer probe execution times on the MID Server.

This property is not visible by default and must be added to the sys_properties table to change the value.

- Type: true | false
- Default value: true

mid.discovery.aws_ssm.kms_key_name

Using a dedicated key enhances security by verifying that applicative credentials are encrypted and securely retrieved at runtime, without being exposed in plain text. This step is optional and only necessary if you plan to use applicative credentials during discovery. To configure the MID Server to support secure credential handling during SSM Agent discovery, set the **mid.discovery.aws_ssm.kms_key_name** property to the name of the AWS KMS key.

- Type: string
- Default value: none

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mid.discovery.aws_ssm.kms_key_region

Using a dedicated key enhances security by verifying that applicative credentials are encrypted and securely retrieved at runtime, without being exposed in plain text. This step is optional and only necessary if you plan to use applicative credentials during discovery. To configure the MID Server to support secure credential handling during SSM Agent discovery, set the **mid.discovery.aws_ssm.kms_key_region** property to the region where the key is located.

- Type: string
- Default value: none

mid.discovery.aws_ssm.s3_bucket_name

Because the SSM Run Command console has a 24,000-character limit, results that exceed this limit must be stored in and retrieved from an S3 bucket. For Put File commands, the S3 bucket also serves as a transfer point between the MID Server and the AWS environment, enabling file delivery to target devices via SSM. To configure the MID Server to support these S3-based operations, set the **mid.discovery.aws_ssm.s3_bucket_name** property to the name of the S3 bucket used for SSM Agent discovery.

- Type: string
- Default value: none

mid.discovery.aws_ssm.s3_bucket_region

Because the SSM Run Command console has a 24,000-character limit, results that exceed this limit must be stored in and retrieved from an S3 bucket. For Put File commands, the S3 bucket also serves as a transfer point between the MID Server and the AWS environment, enabling file delivery to target devices via SSM. To configure the MID Server to support these S3-based operations, set the bucket's region in the **mid.discovery.aws_ssm.s3_bucket_region** property.

- Type: string
- Default value: none

mid.discovery.aws_ssm.linux.fallback_root_user

When the **glide.discovery.enable_ssm** property is enabled, AWS SSM Discovery on Linux defaults to using the root user for command execution. If you prefer not to configure alternate user credentials on your EC2 instances, you must enable the **mid.discovery.aws_ssm.linux.fallback_root_user** property to allow fallback to root execution. When enabled, it automatically creates a record in the AWS SSM Instance Users [aws_ssm_instance_user_credentials] table with the user name root. However, if you leave this property set to false, you must configure non-root credentials to run Discovery commands.

- Type: true | false
- Default value: false

mid.eccq.max_payload_size

Specifies the maximum string length of a payload that the MID Server sends to the instance. The MID Server verifies the size of the payload before sending it to

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the instance. If the payload size exceeds the limit, the MID Server discards it and returns an error message in the payload.

- Type: integer (bytes)
- Default value: 20000000

mid.http_classy.allow_credentials_over_http

Enables the HTTP Classify probe to send credentials over the HTTP protocol during discovery.

- Type: true | false
- Default value: false

> **Warning:**
> Enabling this setting can expose credentials to security risks, such as man-in-the-middle (MitM) attacks. Therefore, it's strongly recommended to keep this property set to **false** and use HTTPS whenever possible.

mid.install_server.base_uri

Modifying this system property requires maint privileges. The MID Server uses the value provided as the base URL when making requests for update files.

- Type: string
- Default value: https://install.service-now.com

mid.jdbc.datastream.max.record.size

Specifies the maximum record size in KB.

- Type: integer
- Default value: 64
- Maximum value: 128

mid.jdbc.datastream.fail.when.attachement.limit.exceeded

Specifies if the data up to 4GB (four attachments, each of size 1GB) can be retrieved from the RDBMS. By default, a flow or action fails with an error, when there is data of more than 4GB to be retrieved. Set value to `false` to retrieve data of size 4GB without an error.

- Type: string
- Default: true

mid.keystore.max_backups

Specifies the maximum number of backups from manual key store operations through the **manage_certificate** script. If it is 0 or negative, no backup will be made.

- Type: Integer
- Default value: 3

mid.keystore.max_live_backups

Specifies the maximum number of live backups from running MID server. If it is 0 or negative, no backup will be made.

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- Type: Integer
- Default value: 2

mid.keystore.backup_overwrite_timespan

Specifies the number of seconds from the current backup time to determine if a the most recent backup in that time span should be replaced by the new one instead of creating a new backup and so removing the oldest backup, should the number of backups exceed the maximum limit.

- Type: Integer
- Default value: 60

mid.log.command_audit.enable

Enables the MID Server command audit log.

- Type: string
- Default value: false

mid.powershell.target_base_dir

Specifies the location of the target base folder used for Discovery using WMI. If another network share is mounted on each Window's target, the folder may be changed by updating this property.

- Type: string
- Default value: admin$\temp

mid.probe.collect_debug_info

An optional property to collect debug information. If this property is set to true, the probe collects credential debug information when it runs and puts that information in the payload of ECC input message. It doesn't affect how Discovery works.

- Type: true | false
- Default value: false

mid.probe.use_legacy_forward_dns

Enables the legacy DNSNameResolver probe and disables the default DNSNameResolver probe. See Probes used by Orchestration for more information.

- Type: true | false
- Default value: false

mid.probe.use_legacy_reverse_dns

Enables the legacy DNS probe and disables the default DNS probe. If you experience problems with the features of the default DNS probe, use this property to disable those features. The default DNS probe's features include being lightweight and faster due to executing in parallel, while the legacy probe is throttled by the MID Server because it executes in serial. The default probe utilizes DNS lookup by the MID Server host OS to make use of the OS maintained DNS cache, while the legacy probe does not. Consequently, after a DNS lookup by the default probe fails in Windows systems, the OS also tries looking up by NETBIOS name.

- Type: true | false
- Default value: false

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mid.process_flow.log_listener.max_size

Sets the maximum size in bytes of memory available to save log messages for Workflow Studio actions running on a MID Server. The MID Server stores up to the limit in memory and discards additional log messages, then sends the messages back to the instance along with the execution plan.

- Type: integer (bytes)
- Default value: 10485760

mid.property.jdbc_operations

Tells the JDBCOrchestrationProbe what JDBC operations it is allowed to execute. Edit this property value to allow JDBC Orchestration activities to perform more operations. All operations are comma separated. Select a MID Server in the **MID server** field to define specific operations for that MID Server, or leave the field empty to apply the list of operations to all MID Servers. This property requires the Orchestration plugin.

- Type: string
- Default value: select,update,insert,delete,show,create,describe,begin,if,end,not,exists

mid.property.jms.command.allowed_factory_names

Comma delimited list of Java Messaging Service (JMS) connection factories that the MID Server requires for a custom JMS activity or action. This property requires the Orchestration plugin.

- Type: string
- Default value: connectionFactory, queueConnectionFactory, topicConnectionFactory

mid.property.ssh.use_snc

Enables the use of the SNCSSH client for Discovery and Orchestration. Change this property to **false** to use J2SSH. This property applies to all MID Servers connected to the instance.

- Type: true | false
- Default value: true

mid.property.powershell.use_base64_password

If the Credential is set to be specific to certain MID Servers, then the property can also be set to those same MID Servers. Leaving the MID Servers field empty will apply to all MID Servers.

- Type: true | false
- Default value: false

mid.sa.prefer_powershell

Enables MID Server to use PowerShell Remoting.

Note:
It is not recommended to change this property as it is being deprecated.

- Type: True | False
- Default value: true

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mid.sa.ssh.use_sncssh

Toggles SSH between non-interactive and interactive modes. True corresponds to non-interactive mode and allows probes to open sessions with the device without waiting for a prompt. False corresponds to interactive mode, which requires interactive sessions with the device for network devices and servers.

- Type: True | False
- Default value: true

mid.sa.windows.allowable_failures

Specifies the number of allowable failures before the MID Server stops executing the pattern. Once the limit is reached, the next failure will terminate the pattern. A failure occurs when a PowerShell command can't complete successfully due to issues such as authentication failure, command timeout, or command execution exceptions.

- Type: integer
- Default value: 2
- Values:
  - 0: The first failure will terminate the pattern immediately.
  - 1: The first failure is tolerated; the second failure will terminate the pattern.
  - 2: Two failures are tolerated; the third failure will terminate the pattern.
  - -1: No maximum limit on failures; the pattern continues regardless of the number of failures.

mid.servicewatch.max_concurrent_connections

Defines the maximum number of concurrent tasks sent to an individual host by a single MID Server.

- Type: integer
- Default value: 7

mid.shazzam.regulator.interval_ms

Sets the interval, in milliseconds, in which Shazzam can launch packets.

- Type: integer
- Default value: 1

mid.shazzam.regulator.packets_per_interval

Sets the number of packets that Shazzam can launch in the time interval specified by the mid.shazzam.regulator.interval_ms property.

- Type: integer
- Default value: 1

mid.shazzam.threads

Specifies the number of concurrent threads that Shazzam uses. Setting this or the mid.shazzam.max_scanners_per_thread parameter to 0 disables Shazzam multi-thread optimization.

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- Type: Integer
- Default value: 5

mid.shazzam.max_scanners_per_thread

Specifies the number of concurrent scanners processed by each Shazzam thread. Setting this or the mid.shazzam.threads parameter to 0 disables Shazzam optimization.

- Type: Integer
- Default value: 100

mid.sm.discolog.max_log_size

Limits the length of the log statements in the Horizontal Discovery Log. If the results are truncated, the **Command results** reports, "Result is larger than [value] characters and was truncated by the logger."

- Type: integer (characters)
- Default value: 1000

mid.sm.discolog.max_object_size

Limits the length of the object in the Horizontal Discovery Log. Objects in the log statement are truncated to the number of characters set by this property's value. This property only affects the object character size in the Horizontal Discovery Log. The following message appears if an object is limited by this property "The max object size reached the maximum limit of [value]. To adjust this use the mid property mid.sm.discolog.max_object_size."

- Type: integer (characters)
- Default value: 5000

mid.snmp.use_getbulk

Specifies whether to use GETBULK to receive a large amount of data in batches. This can be used to globally configure all MID servers.

- Type: true | false
- Default value: true

GETBULK can also be set at the probe level or for an individual MID Server. Settings are listed in the order of precedence:

- SNMP probe parameter
- MID Server configuration parameter
- MID Server properties

mid.ssh.algorithms.kex

Modifies the Key Exchange SSH algorithm priority list. The property accepts a comma separated lists with operators. The first name in the list is highest priority, last name in list is lowest priority. Adding a comma separated list without any operators replaces the default algorithm list. For more information, see MID Server SSH cryptographic algorithms.

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- Type: string
- Default value: ecdh-sha2-nistp256,ecdh-sha2-nistp384,ecdh-sha2-nistp521,diffie-hellman-group-exchange-sha256,diffie-hellman-group14-sha256,diffie-hellman-group16-sha512,diffie-hellman-group14-sha1,diffie-hellman-group1-sha1,diffie-hellman-group-exchange-sha1

mid.ssh.algorithms.host_key

Modifies the Host Key SSH algorithm priority list. The properties accept comma separated lists with operators. The first name in the list is highest priority, last name in list is lowest priority. Adding a comma separated list without any operators replaces the default algorithm list. For more information, see MID Server SSH cryptographic algorithms.

- Type: string
- Default value: ecdsa-sha2-nistp256,ecdsa-sha2-nistp384,ecdsa-sha2-nistp521,rsa-sha2-256,rsa-sha2-512,ssh-rsa,ssh-dss

mid.ssh.algorithms.cipher

Modifies the Cipher SSH algorithm priority list. The properties accept comma separated lists with operators. The first name in the list is highest priority, last name in list is lowest priority. Adding a comma separated list without any operators replaces the default algorithm list. For more information, see MID Server SSH cryptographic algorithms.

- Type: string
- Default value: aes128-ctr,aes192-ctr,aes256-ctr,3des-ctr,aes128-cbc,aes192-cbc,aes256-cbc,3des-cbc

mid.ssh.algorithms.mac

Modifies the MAC SSH algorithm priority list. The properties accept comma separated lists with operators. The first name in the list is highest priority, last name in list is lowest priority. Adding a comma separated list without any operators replaces the default algorithm list. For more information, see MID Server SSH cryptographic algorithms.

- Type: string
- Default value: hmac-sha2-256,hmac-sha1,hmac-sha2-512,hmac-sha1-96,mac-md5-96,hmac-md5

shazzam.chunk_size

Maximum number of IP addresses Shazzam can scan in parallel. This property primarily controls outbound port consumption.

- Type: integer
- Default value: 100

mid.use_net_tools

Enables or disables the use of net-tools commands during discovery of devices running on the Linux operating system. Starting from Quebec, ITOM Visibility supports the iproute2 commands for discovery. By default, ITOM Visibility and discovery patterns first use net-tools commands, and only then, as a fallback, may use iproute2 commands. If all Linux-based devices and applications in your IT network use iproute2 commands, disable net-tools commands to make the discovery process more efficient.

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- Type: true | false
- Default value: true

mid.servicewatch.use_full_linux_netstat_path

Controls if the *netstat* command is executed with its full installation path. This command lists open ports on Linux servers during the process detection phase of the top-down discovery.

- Type: true | false
- Default value: true

mid.servicewatch.num_paths_linux_netstat_to_check

Define the maximum number of installation paths to use during discovery of Linux servers. This property is relevant when you run the top-down discovery on Linux servers with several netstat installation paths, and the *mid.servicewatch.use_full_linux_netstat_path* property is set to true.

The top-down discovery attempts to execute the *netstat* command using each of these installation paths. The result of the first successful execution is used to determine the list of open ports.

- Type: true | integer
- Default value: 5

mid.servicewatch.use_full_linux_ss_path

Controls if the *ss* command is executed with its full installation path. This command lists open ports on Linux servers during the process detection phase of the top-down discovery.

- Type: true | false
- Default value: false

mid.servicewatch.num_paths_linux_ss_to_check

Define the maximum number of installation paths to use during discovery of Linux servers. This property is relevant when you run the top-down discovery on Linux servers with several ss installation paths, and the *mid.servicewatch.use_full_linux_netstat_path* property is set to true.

The top-down discovery attempts to execute the *ss* command using each of these installation paths. The result of the first successful execution is used to determine the list of open ports.

- Type: true | integer
- Default value: 5

Create a MID Server property

Use a MID Server property to control either the behavior of all MID Servers or a particular MID Server.

Before you begin

Role required: admin

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About this task

You set MID Server properties to override MID Server parameters. Configure MID Server properties in the MID Server plugin. Do not configure MID Server properties in the **glide.properties** file that is located in the properties folder of the agent. The **glide.properties** file gets overwritten during the upgrade process.

Procedure

1. Navigate to **All** > **MID Server** > **Properties**.
2. Click **New**.
3. Fill in the fields, as appropriate (see table).

MID Server properties fields

Field	Description
Name	Enter the property name.
Value	You can enter the value you want the property to have. **Note:** If you are amending JDBC operations through the mid.property.jdbc_operations properties, you can enter verbs like BEGIN, END, IF, or common PL/SQL block statements. This will assist in being able to run CREATE or ALTER statements. You might have to restart the MID server before running some of the statements.
MID Server	Leave this field blank to set a MID Server property that affects all MID Servers. To set a MID Server property for a particular MID Server , select the MID Server.

4. After setting any MID Server properties, restart the MID Server to ensure the properties sync with the instance.

MID Server parameters

Parameters control the behavior of a particular MID Server and have lower precedence than MID Server properties.

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

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To add a parameter to a MID Server, see Add a MID Server parameter.

Important:
Changes to parameters only take effect when the MID Server is started (or restarted).

Note:
The value of any MID Server parameter in the config.xml file can be encrypted. See Encrypt or decrypt MID Server configuration file values for more information.

Required parameters

Note:
Using special characters in an XML configuration file requires you to encode them.

url

Specifies the URL to the associated instance. Normally the URL is similar to https://instance.service-now.com, where you replace instance with the instance name. If you host your own instance, use the URL set by your organization.

- Type: string
- Default value: none

mid_sys_id

Records the MID Server record's unique identifier. This parameter should be empty when you initially configure a MID Server. Do not change the value.

- Type: string
- Default value: automatically set (GUID)

name

Use this parameter to supply a name that is meaningful for you. If you do not supply this parameter, the MID Server uses the default value. A set of business rules synchronizes the name in the configuration file with the name in the MID Server record. The business rules ensure that changing the name in one location also changes the name in the other location.

- Type: string
- Default value: YOUR_MIDSERVER_NAME_GOES_HERE

mid.instance.username or glide.glidesoap.username

If the ServiceNow instance has authentication enabled, as it is by default, set this parameter to define the user name the MID Server should use to log in to the instance. This user should have the mid_server role on the ServiceNow instance in order to access necessary tables and fields. You can use this parameter to define user names with special characters.

- Type: string
- Default value: none

mid.instance.password or glide.glidesoap.password

If your ServiceNow instance has authentication enabled, as it is by default, set this parameter to define the password the MID Server should use to log in to the instance. You can use this parameter to define passwords with special characters.

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- Type: string
- Default value: none

CIM parameters

mid.cim.batch.size

Specifies the maximum number of messages sent at once to a CIM server.

- Type: integer
- Default value: 1

mid.cim.request.interval

Specifies the number of milliseconds to wait between requests to the same Common Information Model Object Manager (CIMOM).

- Type: integer
- Default value: 0

mid.cim.host.connection.limit

Specifies the maximum number of simultaneous connections to each CIMOM. A value of zero disables simultaneous connections.

- Type: integer
- Default value: 0

Connection parameters

glide.mid.fast.responses

Instructs the MID Server to try sending messages to the instance as soon as they are ready. Normally the MID Servers end messages to the ServiceNow instance serially (that is, one message at a time). Since many probes can be run in parallel, there can be multiple messages transmitted simultaneously to the instance. Setting this parameter to **true** may decrease the time between a probe's completion and its response arriving at the instance. However, the multiple simultaneous messages consume resources, decreasing the overall instance responsiveness. If there are communications problems, this parameter's value can also cause a logjam on the MID Server, as threads normally used for running probes may become consumed for sending messages. Generally, leave this parameter out of your configuration. Setting it to **true** is meaningful only under very special circumstances.

- Type: true | false
- Default value: false

glide.mid.max.sender.queue.size

Places an upper limit on how large the queue is allowed to get. The MID Server starts deleting queued messages if this limit is exceeded. When the MID Server generates messages to the ServiceNow instance faster than it can send them, it queues them temporarily on the file system of the MID Server's host. This queue is normally quite small, and is completely emptied as soon as the MID Server processing slows for a short period. However, this queue can grow in size when there are communication problems between the MID Server and the instance, and especially if there is an integration running on the MID Server.

The parameter is of the form {number}{multiplier}, where {number} is any positive decimal number including non-integers, and the optional multiplier is any spelling

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of bytes, kilobytes, megabytes, gigabytes, or terabytes (only the first character is tested, and the test is case-insensitive). The default multiplier is bytes. White space is liberally tolerated. The following strings all represent valid parameters: "1000000000", "0.5m", "5 GB", "7.67gigas", "145.69392 meg", and "1.1 terra".

- Type: string
- Default value: 0.5 GB

instance.date.format

Specifies the format the instance uses for dates and times. The primary impact of setting this parameter is to allow the MID Server to correctly refresh its start and stop times on the MID Server record in ServiceNow. The format of this date/time string is identical to that used by the Java SimpleDateFormat class.

- Type: string (Date format)
- Default value: yyyy-MM-dd HH:mm:ss

mid.disable_amb

Disables the Asynchronous Message Bus (AMB) notifications for new ECC queue output messages. For more information, see the Asynchronous Message Bus section inAsynchronous Message Bus. When AMB is enabled the MID Server uses a different default polling interval than when AMB is disabled. See the **mid.poll.time** parameter for more details. If you set a polling interval with the **mid.poll.time** parameter, the MID Server uses that value whether or not the AMB client is enabled.

- Type: true | false
- Default value: false

mid.https.truststore.password

Sets the trustStore password that is required for HTTPS connections with the Asynchronous Message Bus (AMB) Client.

- Type: string
- Default value: none

mid.https.truststore.path

Path to the trustStore to be used by the MID Server for TLS transactions (Asynchronous Message Bus (AMB) Client). Add this parameter only if you want to change the default path.

- Type: string
- Default: Path to the JRE trustStore bundled with the MID Server

mid.instance.skip_basic_auth

Allows the MID Server to connect to an instance using cookies instead of basic authentication credentials. When set to **true**, it uses cookies first. However, if the connection fails, the MID Server will try to connect again using basic authentication credentials.

- Type: true | false
- Default value: true

mid.jmx.enabled

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Enables a JMX server on the MID Server, which exposes some management information to JMX consoles. Implementing JMX requires additional configuration of the Java runtime environment. Setting this parameter to **true** is only recommended for those with detailed knowledge of the Java security architecture and a specific need for JMX.

- Type: true | false
- Default value: false

mid.poll.time

Sets the default MID Server polling interval (in seconds). The polling interval is the amount of time the MID Server waits before checking the ECC queue for work when the MID Server is not busy. For more information, see the Asynchronous Message Bus section in.

When **mid.disable.amb** is set to false (the default setting), see the Asynchronous Message Bus section in Asynchronous Message Bus for more information about how **mid.poll.time** is used.

When **mid.disable.amb** is set to true, polling occurs on a fixed **mid.poll.time** interval, but polling switches to using **mid.poll.time.standard** (5 seconds by default) when the MID Server is busy.

- Type: integer (seconds)
- Default value: 40 when **mid.disable.amb** is false, or 5 when **mid.disable.amb** is true.

mid.probe.wait.resources

Indicates whether probe execution is delayed until resources are available. Used to enable MID Server Resource Reservation.

Note:
Requires MID Server restart.

- Type: true | false
- Default value: true

mid.property.long_runner

Identifies the name of a script include that manages long running commands.

Note:
This property is applicable till the Rome version only. If your instance is of a later version, you must configure the system property, *`glide.eccprobe.longrunner.class`*.

- Type: string
- Default value: LongRunner

threads.interactive.max

Sets the maximum number of interactive worker threads that can run simultaneously in the interactive thread pool. See Set MID Server Thread Use.

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- Type: integer
- Default value: 10

threads.expedited.max

Sets the maximum number of expedited worker threads that can run simultaneously in the expedited thread pool. See Set MID Server Thread Use.

- Type: integer
- Default value: 20

threads.max

Sets the maximum number of standard worker threads that can run simultaneously in the standard thread pool. This parameter provides direct control over what CPU resources the MID Server consumes on the computer that hosts it. See Set MID Server Thread Use.

- Type: integer
- Default value: 25

> **Important:**
> You can set threads.max as high as 200, however, this setting may need to be changed depending on the OS. For example, Windows-based MID Servers running Discovery uses Powershell which is resource intensive. In this case, you may exhaust the CPU power of the host machine with just 50 threads count.

Credentials parameters

mid.aws.instance_profile_name

Name of the AWS IAM role configured on the EC2 instance. When configured, the MID Server uses the temporary credentials granted to this role by the AWS instance profile to Discover cloud resources.

- Type: string
- Default value: None (User must provide a non-blank value)

mid.credentials.provider

Specifies the Java class name of the credentials provider.

- Type: string
- Default value: com.service_now.mid.creds.standard.StandardCredentialsProvider

mid.secure_credentials.key_pairs.provider

Class that the MID Server uses to generate secure key pairs.

- Type: string
- Default value: com.service_now.mid.keypairs.provider.standard.StandardKeyPairsProvider

Debug parameters

debug.logging

[Deprecated] Specifies whether to enable logging of MID Server events and messages (both sent and received). Normally this parameter is only used by

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developers, but it is occasionally useful when troubleshooting a problem. Be aware that setting this parameter to **true** causes intensive logging on the MID Server, potentially using considerable disk space.

- Type: true | false
- Default value: false

This parameter has been replaced by the *mid.log.level* parameter.

debug

[Deprecated] Specifies whether to enable debug logging on the MID Server. Normally this parameter is only used by developers, but it is occasionally useful when troubleshooting a problem. Be aware that setting this parameter to **true** causes intensive logging on the MID Server, potentially using considerable disk space.

- Type: true | false
- Default value: false

This parameter has been replaced by the *mid.log.level* parameter.

file.probe.template.debug

Specifies whether to debug file probe templates.

- Type: true | false
- Default: false

mid.cim.debug

Specifies whether to enable debug logging for CIM, WBEM, SLP, or SMI-S.

- Type: true | false
- Default value: false

mid.ssh.debug

Enables SSH debug information in the log file. The parameter usage depends on whether the ServiceNow SSH client is enabled.

When the ServiceNow SSH client is enabled, the parameter functions as follows:

- Type: string
- Default value: false

  The following string values are valid for the ServiceNow SSH client:

  - true: Enables SSH debug information in the log file.
  - false: Disables SSH debug information in the log file.
  - <IP Addresses>: Specify which IP ranges to enable SSH debug information in the log file. You can enter IP addresses in the following formats:

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        - An IP range defined by a slash and the number of bits in the subnetwork. For example, the string 10.10.10.0/24 scans 24 bits of IP addresses from 10.10.10.0 to 10.10.10.254.
        - An IP range defined by a dash. For example, the string 10.10.11.0-10.10.11.165 scans the IP addresses from 10.10.11.0 to 10.10.11.165.
        - A comma-separated list of specific IP addresses. For example the string 10.10.11.200,10.10.11.235 scans the IP addresses 10.10.11.200 and 10.10.11.235.
    - deferred: Logs SSH debug information in memory unless an error or warning occurs. If an error or warning occurs, the platform publishes the debug information to the log file. This ensures that only the part of the log file pertaining to the error or warning is recorded. If no error or warning is detected, the platform deletes the unused log data from memory when the session closes. Each session stores up to 1000 log messages. If the session exceeds 1000 log messages, the deferred log discards the oldest log message to make room for the newest log message.

  When the ServiceNow SSH client is disabled, the parameter enables or disables SSH debug information in the log file:

  - Type: true | false
  - Default value: false

  Note:
  The MID Server parameter **mid.ssh.debug** only affects SNCSSH and J2SSH. To enable Maverick client debug logging, set the MID Server configuration parameter **mid.log.level** to `debug, com.maverick=debug`.

mid.log.level

Specifies the logging level for the MID Server. Possible values are:

- debug
- info
- warn
- error

Note:
Values are case insensitive.

- Type: string
- Default value: info

mid.http.idle_connection_monitor.debug

Enables debug logging for the Idle Connection Monitor.

- Type: true | false
- Default value: false

DNS parameters

mid.dns_scan.regulator.interval_ms

Specifies the interval between DNS scans in milliseconds.

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- Type: integer
- Default value: 10

mid.dns_scan.regulator.packets_per_interval

Specifies the number of regulator packets per DNS scan.

- Type: integer
- Default value: 1

mid.dns_scan.default_name_servers

Specifies the host names or IP addresses of the default name servers.

- Type: string
- Default value: none

mid.dns_scan.default_name_servers

Specifies the host names or IP addresses of the default name servers.

- Type: string
- Default value: none

mid.dns_scan.additional_name_servers

Specifies the host names or IP addresses of any additional name servers.

- Type: string
- Default value: none

mid.dns_scan.load_balancing_enable

Specifies whether to enable load balancing of name servers.

- Type: true | false
- Default value: false

mid.probe.use_legacy_forward_dns

Enables the legacy DNSNameResolver probe and disables the default DNSNameResolver probe. See Probes used by Orchestration for more information.

- Type: true | false
- Default value: false

mid.probe.use_legacy_reverse_dns

Enables the legacy DNS probe and disables the default DNS probe. If you experience problems with the features of the default DNS probe, use this parameter to disable those features. The default DNS probe's features include being lightweight and faster due to executing in parallel, while the legacy probe is throttled by the MID Server because it executes in serial. The default probe utilizes DNS lookup by the MID Server host OS to make use of the OS maintained DNS cache, while the legacy probe does not. Consequently, after a DNS lookup by the default probe fails in Windows systems, the OS also tries looking up by NETBIOS name.

- Type: true | false
- Default value: false

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Event Management parameters

mid.probe.event.bulk_size

Specifies the maximum size of an event payload, in MB.

- Type: integer
- Default value: 120

mid.probe.event.wait_time

Waiting period on an empty queue for sending events.

- Type: integer
- Default value: 1000

mid.probe.event.send.enabled

Enables or disables the sending of events.

- Type: true | false
- Default value: true

mid.probe.event.queue.max_size

Specifies the maximum size permitted for the event queue before incoming events are rejected.

- Type: integer
- Default value: 100,000

mid.probe.event.max.retry_time

The maximum number of seconds MID retries sending events.

- Type: integer
- Default: 1800

mid.probe.event.queue.use_bulk

Specifies whether events are sent to the server singly or in bulk. If this parameter evaluates to **true** then events are sent to the server in bulk.

- Type: true | false
- Default value: true

mid.probe.event.suppress.whitespaces

Allows line breaks in description fields for multi-line events. Apply this parameter to each MID Server used with event connector instances. Choices are:

all

This setting removes all whitespaces.

leave_as_is

This setting keeps all whitespaces.

keep_newline

This setting keeps only new_line and removes all other whitespaces.

- Type: string
- Default: all

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mid.em.metric.metric_to_ci_map_limit

Specifies the maximum number of active metrics allowed per CI map.

- Type: integer
- Default value: 200,000

mid.em.metric_binding_timeout_seconds

Specifies the number of seconds to wait before resending unhandled events

- Type: integer
- Default value: 300

mid.em.metric_binding_timeout_max_seconds

Specifies the maximum number of seconds to wait before resending unhandled events.

- Type: integer
- Default value: 10800

mid.em.metric_max_elapsed_time_before_refresh

Specifies the maximum number of seconds before the metric source type cache is refreshed in memory.

- Type: integer
- Default value: 60

mid.em.matric_max_sql_string_length_for_types

Specifies the maximum length of the string (composed of types) used for an SQL command

- Type: integer
- Default value: 30000

mid.em.statistics_report_perioon_sec

Specifies the period, in seconds, between statistics reports to the instance. Use **0** to disable reporting. This parameter requires a restart.

- Type: integer
- Default value: 60

mid.em.metric_connector_max_run_time_seconds

Specifies the maximum number of seconds to collect metrics in every cycle.

- Type: integer
- Default value: 300

mid.em.metric_connector_history_min

Specifies the number of minutes to go back in history to retrieve metrics.

- Type: integer
- Default value: 180

mid.em.metric_event_logging

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Specifies the level of metric and event logging. Choices are:

- none
- all
- events
- metrics
- metrics:<filter>
- events:<filter>

- Type: string
- Default value: none

mid.em.metric_connector_late_arrivals_delay

Specifies the number of seconds to delay when collecting metrics.

- Type: integer
- Default value: 30

FTP connection parameters

mid.ftp.max_pool_size

Specifies the maximum size of the FTP Connection Pool, in megabytes.

- Type: integer
- Default value: 25

mid.ftp.max_per_target

Specifies the maximum number of the FTP connections per target.

- Type: integer
- Default value: 5

mid.ftp.max_conn_idle_time

Specifies the maximum amount of time, in milliseconds, that an FTP connection can sit idle in the pool.

- Type: integer
- Default value: 300000

mid.filesystem.max.ls

Specifies the maximum number of files that can be returned in the filesystem list directory command.

- Type: integer
- Default value: 10000

Logging parameters

disable_monitors

Specifies whether to disable the MID Server from actively checking for monitors on the instance.

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- Type: true | false
- Default value: true

mid.show.queries

Instructs the MID Server whether to log details about every query it makes to the ServiceNow instance. Typically this parameter is only used by developers, but it is occasionally useful when troubleshooting a problem. Be aware that setting this parameter to **true** causes intensive logging on the MID Server, potentially using considerable disk space.

- Type: true | false
- Default value: false

disable.remote.logging

Prevents the MID Server from logging any information to the MID Server log on the instance. Relatively little information is logged on the instance in any case, but setting this parameter to **true** eliminates all logging to the instance.

- Type: true | false
- Default value: false

disable.status

Prevents the MID Server from sending a status report to the instance every 10 minutes.

- Type: true | false
- Default value: false

mid.file_cleaner.disabled

Files and empty folders within the following folders may be deleted by this MID File Cleaner. Files last accessed more than 30 days ago are deleted. It runs on start-up, and then every 24 hours after that. You can force the File Cleaner to run by restarting the MID Server service.

Folders/files cleaned:

- `\agent\import`
- `\agent\export`- Used by the Export Set feature.
- `\agent\work\monitors\ECCSender\output_error` - Used for ECC input payloads that cannot be inserted for any reason
- `\agent\work\monitors\ECCSender\output_oversize` - Used for saving copies of payloads that are not sent to the instance because they are larger than the limit set by **mid.eccq.max_payload_size**, which defaults to 20000000 bytes
- `\agent\logs`- Specifically JFR Dumps

- Type: true | false
- Default value: false

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mTLS protocol parameters

Add these parameters to the `config.xml` file in the `/agent` directory, in the MID Server installation directory.

mid.httpclient.protocol.myprotocol.path

Specifies the path to the keystore. The path can be absolute or relative. In the parameter name, make sure you replace **myprotocol** with the name of your protocol.

Type: String.

mid.httpclient.protocol.myprotocol.port

Specifies the port number for the protocol. In the parameter name, make sure you replace **myprotocol** with the name of your protocol.

Type: String.

mid.httpclient.protocol.myprotocol.password

Specifies the mTLS credential password. In the parameter name, make sure you replace **myprotocol** with the name of your protocol. Add the encryption attribute *`secure="true"`* to encrypt the password using standard MID Server encryption.

Type: String.

Pattern parameters

mid.parsing.max_field_size

Sets the maximum character length of strings stored as temporary variables while patterns are run. Strings longer than this parameter's value are truncated to equal the value. Use the parameter to increase the limit when parsing longer strings.

> ⚠ **Warning:**
> Exceeding the max field size limits of the SQL database implementation cause errors.

- Type: integer
- Default value: 1024

mid.sa.discovery.pattern_string_attributes.deduplicate

Reduces memory consumption for pattern execution context attributes by eliminating duplicate strings.

- Type: true | false
- Default: true

Proxy server parameters

mid.instance.use_proxy or mid.proxy.use_proxy

If your MID Server must go through a web proxy to access the ServiceNow instance, set this parameter to **true** to instruct the MID Server to use the proxy. You must also set the proxy server's host and port, and perhaps the user name and password as well.

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- Type: true | false
- Default value: false

mid.proxy.host

If your MID Server must go through a web proxy to access the ServiceNow instance, set this parameter to define the proxy's host.

- Type: string
- Default value: none

mid.proxy.password

If your MID Server must go through a web proxy to access the ServiceNow instance, and your proxy requires a password, set this parameter to define that password.

- Type: string
- Default value: none

mid.proxy.port

If your MID Server must go through a web proxy to access the ServiceNow instance, set this parameter to define the proxy's port.

- Type: integer (0-65535)
- Default value: 80

mid.proxy.username

If the MID Server must go through a web proxy to access the ServiceNow instance, and the proxy requires a user name, set this parameter to define that user name.

- Type: string
- Default value: none

Request timeout override parameters

mid.sa.cloud.request_timeout

Sets the timeout in milliseconds for cloud requests. This parameter overrides the **glide.http.timeout** system property, which specifies the maximum number of milliseconds to wait before an outbound REST transaction times out.

- Type: integer
- Default value: 30000

mid.http_classy.request_timeout

Sets the timeout in milliseconds for HTTP classification requests with the HTTP - Classify probe. This parameter overrides the **glide.http.timeout** system property, which specifies the maximum number of milliseconds to wait before an outbound transaction times out.

- Type: integer
- Default value: 30000

Security parameters

mid.windows_host.file_permissions.allow_list

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Sets an inclusion list for Windows file permissions enforcement to improve security. The parameter takes a string of comma separated group names, user names, and SIDs. Group and user names must follow SAM account naming requirements. Domain accounts can be specified by using the SID.

- Type: string (comma separated group and user names)
- Default value: None

mid.windows_host.file_permissions.enforce

Enables the MID Server to use Windows file permissions enforcement to improve security. Setting this parameter to **false** will prevent the MID Server from updating the file permissions inclusion list, but will not revert the file permissions.

- Type: true | false
- Default value: true

mid.httpclient.tls.verify_revoked_certificate.verify_issuer

Controls whether the issuer must be present during certificate revocation (OCSP) checks. By default, when certificate revocation checking is enabled, the issuer for each certificate must be present. If the parameter is set to **false**, the MID Server walks the returned certificate chain and checks each certificate for revocation; however, the request will not fail if a issuer is missing from the chain.

Note:

- This property affects only OCSP revocation checks. It does not affect TLS certificate chain validation.
- If *Certificate Chain Check* is enabled in MID Certificate Check Policies, a complete and valid certificate chain, from the returned certificates to those present in the local cacerts, is enforced regardless of the *mid.httpclient.tls.verify_revoked_certificate.verify_issuer* parameter setting.

- Data type: boolean
- Default value: true

Shazzam parameters

mid.shazzam.regulator.interval_ms

Sets the interval, in milliseconds, in which Shazzam can launch packets. This parameter works with the *mid.shazzam.regulator.packets_per_interval* parameter to set the number of packets allowed in this interval. By default, Shazzam launches one packet each millisecond.

- Type: integer
- Default value: 1

mid.shazzam.regulator.packets_per_interval

Sets the number of packets that Shazzam can launch in the configured time interval. This parameter works with the *mid.shazzam.regulator.interval_ms* parameter, which sets that interval. By default, Shazzam launches one packet each millisecond.

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- Type: integer
- Default value: 1

mid.shazzam.chunk_size

Specifies the maximum number of IP addresses that Shazzam scans in parallel. This parameter primarily controls outbound port consumption.

- Type: integer
- Default value: 100

mid.shazzam.threads

Specifies the number of concurrent threads that Shazzam uses. Setting this or the mid.shazzam.max_scanners_per_thread parameter to 0 disables Shazzam multi-thread optimization.

- Type: integer
- Default value: 5

mid.shazzam.max_scanners_per_thread

Specifies the number of concurrent scanners processed by each Shazzam thread. Setting this or the mid.shazzam.threads parameter to 0 disables Shazzam multi-thread optimization.

- Type: integer
- Default value: 500

SNMP configuration parameters

mid.snmp.enable_auto_public

Specifies whether to use the SNMP public community string automatically if no other SNMP credentials were successful.

- Type: true | false
- Default value: true

mid.snmp.request.timeout

Specifies the timeout value for the first OID request, in milliseconds. For subsequent requests (for example, table OIDs), the *mid.snmp.session.timeout configuration* parameter (see below) takes effect.

Note:
You can override this parameter with the *timeout* SNMP probe parameter.

- Type: integer
- Default value: 1500

mid.snmp.session.timeout

Specifies the timeout value for subsequent OID request, in milliseconds. SNMP communication is stateless and does not have a session or connection in the normal sense. The system regards a positive response from the first OID request as a sign that it should expect prompt responses to subsequent requests. While the default is short, it may be useful to increase this parameter value to the same value as that used for *mid.snmp.request.timeout*.

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Note:
You can override this parameter with the *establish_session_timeout* SNMP probe parameter.

- Type: integer
- Default value: 500

mid.snmp.use_getbulk

Specifies whether to use GETBULK to receive a large amount of data in batches. This can be used to configure an individual MID Server.

- Type: true | false
- Default value: True

GETBULK can also be set at the probe level or globally for all MID servers. Settings are listed in the order of precedence:

- SNMP probe parameter
- MID Server configuration parameter
- MID Server properties

mid.snmp.use_snmp4j

Use the Snmp4j library for SNMP communication. This is a strict requirement for SNMPv3. This parameter should only be set to **false** based on advice from Customer Service and Support.

- Type: true | false
- Default value: true

mid.snmp.use_snmp_v1_v2c

Attempt communication using the SNMPv1 and SNMPv2c protocol versions. It may require configuration of SNMP community credentials. This parameter is an alternative and **not a strict requirement for SNMPv3.**

- Type: true | false
- Default value: true

mid.snmp.use_snmp_v3

Attempt communication using the SNMPv3 protocol version. Requires configuration of SNMPv3 credentials.

- Type: true | false
- Default value: true

SSH Discovery parameters

By default, the MID Server is configured to search for SSH commands in the following paths and the logged-on user's default paths:

- /usr/sbin
- /usr/bin

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- /bin
- /sbin

mid.connection_cache

Specifies whether to cache connections. Set to **false** to disable connection caching. This parameter applies to SSH connections only.

- Type: true | false
- Default value: true

mid.ssh.disable_history

Controls whether the shell session history is saved on the target host and if the `HISTFILE=/dev/null` command is executed. Set this property to **false** to retain history on the target host, ensuring the `HISTFILE=/dev/null` command is not sent to the target device.

- Type: true | false
- Default value: true

mid.ssh.set_path

Specifies whether to set the PATH environment variable for SSH commands.

- Type: true | false
- Default value: true

mid.ssh.local

Specifies whether to execute commands for the MID Server host machine (localhost) via SSH rather than from a console. This allows long-running commands to execute properly. This parameter applies to the legacy SSH client only.

- Type: true | false
- Default value: false

mid.ssh_connections_per_host

Controls the number of concurrent probes the MID Server can run against a given host. Lowering the number of concurrent connections can slow Discovery.

- Type: integer
- Default value:

  7 for the ServiceNow client

  3 for the legacy SSH client.

mid.ssh.sudo_preserve_environment

Specifies whether to use sudo to preserve the environment for SSH.

- Type: true | false
- Default value: false

mid.ssh.terminal.width

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Controls the maximum characters per line when handling sudo -l in the terminal. If the value is too low, the output can be broken into multiple lines and affect the parser. Set the value to a sufficient size to handle outputs as needed.

- Type: int
- Default value: 255

mid.ssh.path_override

Overrides the default paths set before executing a command. Enter one or more override paths delimited by a colon (:). The default path is /usr/sbin: /usr/bin: /bin: /sbin.

- Type: string (a colon-separated list of directories)
- Default value: None

The ServiceNow SSH client accepts the following prefixes in front of the path_overide value.

- *append*: Appends the override path to the end of the host's path. This is the default behavior.
- *replace*: Replaces the host path with the path_overide value.
- *prepend*: Appends the override path to the front of the host path.

mid.ssh.use_snc

Enables the ServiceNow SSH client (SNCSSH) on individual MID Servers. SNCSSH is a ServiceNow implementation of an SSH client and is active by default for all MID Servers on new instances, via a MID Server property. Enabling the ServiceNow SSH client disables the legacy J2SSH client.

Important:
Mixing SSH client types for MID Servers connected to the same instance is not a good practice.

- Type: true | false
- Default value: false

mid.ssh.max_retries

Specifies the maximum amount of times to retry an SSH operation after a time-out. The system sleeps two seconds between each connection attempt. By default, the MID Server retries once only. Set the parameter to *0* to disable retries.

- Type: integer
- Default value: 1

mid.ssh.alt_rm

Sets a different SSH remove file command.

- Type: string
- Default value: none

mid.ssh.initial_delay_ms

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Delays sending any SSH probe commands to a server after connecting to the target for the time specified, in milliseconds. This parameter applies to the legacy SSH client only.

- Type: integer (milliseconds)
- Default value: 0

mid.ssh.suppress_history

Suppresses the generation of the SSH history file. This parameter applies to the legacy SSH client only.

- Type: true | false
- Default value: false

mid.ssh.socket_timeout

Specifies the timeout value for the SSH socket to prevent issues created by a socket timeout. Some devices, such as systems with embedded controllers like UPSs and PDUs, that have SSH enabled require more time to respond to an authentication request. The default value of 2 minutes ensures such requests do not timeout prematurely.

- Type: integer (milliseconds)
- Default value: 120000 (2 minutes)

mid.ssh.channel_timeout

Specifies the amount of time that the MID Server waits for activity on the SSH socket before closing the connection. If there has been no activity on the SSH socket for the specified timeout value, the MID Server closes the connection. Some devices, such as systems with embedded controllers like UPSs and PDUs, that have SSH enabled may require more time to respond to an authentication request.

- Type: integer (milliseconds)
- Default value: 120000 (2 minutes)

mid.ssh.session_timeout

Specifies the amount of time that a cached session remains in memory after last use. Excessively small values tend to decrease performance. This parameter applies to the ServiceNow SSH client only.

- Type: integer (milliseconds)
- Default value: 300000 (5 minutes)

mid.ssh.command_timeout_ms

The timeout duration, in milliseconds, for the execution of an SSH command.

- Type: integer (milliseconds)
- Default value: 300000 (5 minutes)

mid.ssh.use_keyboard_interactive

Uses the keyboard interactive authentication mode in SSH daemons on which it is activated.

- Type: true | false
- Default value: false

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> **Warning:**
> An issue exists in Mac OS X Sierra and later with the authentication order of the **password** and **keyboard-interactive**modes that can cause Discovery to fail. For details about this issue and the configuration required for proper SSH authentication, see KB0623600.

mid.ssh.dh_group_length_min

Specifies the minimum group length in bits used for generating a "shared secret" key in Diffie-Hillman key exchange. The larger the key the more secure the SSH connection is but at the cost of performance.

- Type: integer (bits)
- Default value: 1024

mid.ssh.dh_group_length_max

Specifies the maximum group length in bits used for generating a "shared secret" key in Diffie-Hillman key exchange. The larger the key the more secure the SSH connection is but at the cost of performance.

- Type: integer (bits)
- Default value: 8192

mid.ssh.shells_supported

Defines the bourne-compatible shells supported by the MID Server. This value is a comma-separated list of supported shells, such as **ksh**, **dsh**, **bash** and **sh**.

- Type: string
- Default value: ksh,bash,sh

mid.ssh.discard_lrc_error

Discard long running command error output, emulating legacy behavior.

- Type: string
- Default value: j2ssh - true, sncssh - false

mid.ssh.pool_thread_ratio

Ratio of the SSH session pool capacity to the configured MID Server thread number (threads.max), expressed as a percentage. The number of permitted pool capacity sessions is set in this parameter. Regardless of the value set in this parameter, the system never permits the pool capacity to fall below 25 sessions.

- Type: integer
- Default value: 150

mid.ssh.disable_privilege_check

This parameter has no effect if the target is using a privileged command other than sudo. For more information, see MID Server privileged commands.

The remainder of this section only applies to targets which run sudo. When this parameter is set to **true**, the MID Server assumes that the user configured in the credential has the privilege to run the given command using sudo. The MID Server assumes the target user can run any command string following sudo on the target. When this parameter is set to **false**, the MID Server runs "sudo -l" on the target to verify the command which follows sudo has permission to run on the target.

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Regardless of this parameter's value, the MID Server always validates that sudo by itself can be run on the target.

Some releases do not show this parameter in the MID Configuration Parameters pull down list. In this case, you may optionally add this parameter in MID Properties.

- Type: true | false
- Default value: false

Upgrade parameters

mid.pinned.version

Name of the version to which this MID Server is pinned.

- Type: string
- Default value: MID buildstamp

> **Note:**
> To see the MID buildstamp for your instance, type **stats.do** in the navigation filter. An example of the buildstamp format is **london-06-27-2018__patch3-10-24-2018_11-11-2018_0542**.

mid.upgrade.use_proxy

If your MID Server must go through a web proxy to access the upgrade URL, set this parameter to **true** to instruct the MID Server to use the proxy. You must also set the proxy server's host and port. If the instance proxy user name and password are set, they are used for the upgrade proxy as well.

> **Note:**
> This parameter is not intended to control proxy details configured with **glide.mid.autoupgrade.proxy*** parameters.

- Type: true | false
- Default value: true

glide.mid.autoupgrade.proxy_host or glide.glidesoap.proxy_host

If your MID Server must go through a web proxy to access the upgrade URL, define the proxy's host here.

- Type: string (URL)
- Default value: none

glide.mid.autoupgrade.proxy_port or glide.glidesoap.proxy_port

If your MID Server must go through a web proxy to access the upgrade URL, define the proxy's port here.

- Type: integer (0-65535)
- Default value: 80

glide.mid.autoupgrade.proxy_user

If your MID Server must go through a web proxy to access the upgrade URL, define the proxy's user name here.

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- Type: string (URL)
- Default value: none

glide.mid.autoupgrade.proxy_password

If your MID Server must go through a web proxy to access the upgrade URL, define the proxy's password here.

- Type: string
- Default value: none

Windows Discovery parameters

mid.powershell_api.session_pool.max_size

Specifies the maximum number of sessions allowed in the session pool.

> **Note:**
> Setting or changing this parameter requires restarting the MID Server.

- Type: integer
- Default value: 25

mid.powershell_api.session_pool.target.max_size

Specifies the maximum number of sessions allowed in the pool per target host.

> **Note:**
> Setting or changing this parameter requires restarting the MID Server.

- Type: integer
- Default value: 2

mid.sa.prefer_powershell

Enables MID Server to use PowerShell Remoting.

- Type: true | false
- Default value: false

mid.powershell_api.winrm.use_ssl

Requires the use of SSL certificates for HTTPS connections using WinRM.

- Type: true | false
- Default value: false

mid.powershell_api.winrm.additional_pssesion_options

Controls advanced options for a PSSession. For more information about advanced PSSession options, see https://docs.microsoft.com/en-us/powershell/module/microsoft.powershell.core/new-pssessionoption?view=powershell-6.

mid.powershell_api.winrm.remote_https_port

Configures the port for connecting to Windows servers using PowerShell over HTTPS.

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- Type: integer
- Default value: 5986

mid.powershell_api.winrm.remote_port

Configures the port for connecting to Windows servers using PowerShell over HTTP.

- Type: integer
- Default value: 5985

mid.powershell_api.winrm.skip_ssl_cert_check

Skips the SSL certificate check when using WinRM for HTTPS connections.

- Type: true | false
- Default value: false

mid.powershell_api.winrm.skip_ssl_cert_check_options

Skips specific SSL certificate checks when using WinRM for HTTPS connections. Configure the MID Server to skip checks for certificates from a Certification Authority (CA), from the Common Name (CN) that identifies the host associated with the certificate, and for revoked certificates.

- Type: string
- Default value: -SkipCACheck -SkipCNCheck -SkipRevocationCheck

mid.powershell.use_credentials

Determines the credentials to use for Discovery with PowerShell. A setting of **true** directs the MID Server to run probes with the Windows credentials from the credentials table. To run probes with the credentials of the user for the MID Server service, set this parameter to **false**.

- Type: true | false
- Default value: true

mid.powershell.path

Enables an administrator to point to a specific PowerShell on a MID Server in cases where more than one PowerShell is installed. Supply the path to the folder containing the PowerShell executable, for example, `C:\mypowershell` or `C:\mypowershell\`. ServiceNow automatically appends the string powershell.exe to the path. Configure this parameter when both a 32-bit and 64-bit PowerShells are active on the same MID Server, and it becomes necessary to launch the correct PowerShell for the context. 64-bit Windows employs file system redirection and the MID Server runs as a 32-bit application. If trying to specify a path in %WinDir%\System32, Windows automatically redirects to %WinDir%\SysWOW64. To avoid redirection, specify the path as %WinDir%\Sysnative. For example, instead of C:\WINDOWS\system32\WindowsPowerShell\v1.0\, specify C:\WINDOWS\sysnative\WindowsPowerShell\v1.0\.

Note:
On a 64-bit version of Windows XP, a Microsoft hotfix may be required to enable this.

To discover applications running on a 64-bit Windows machine, the MID Server must be running on a 64-bit Windows host machine.

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- Type: string (path)
- Default value: none

mid.powershell.enforce_utf8

Enable this parameter to force commands on a target Windows system to return UTF-8 encoded output. Disabling it allows the target system to use its default encoding. This parameter is only valid when PowerShell is enabled.

Setting this value to **false** may result in incorrect values in the CMDB when non-ASCII characters are returned by a probe.

- Type: true | false
- Default value: true

mid.powershell.local_mid_service_credential_fallback

Enables automatically falling back to MID Server service credentials if all other credentials fail.

- Type: true | false
- Default value: true

mid.powershell_api.idle_session_timeout

Specifies the timeout value of idle PowerShell sessions in seconds.

Note:
Setting or changing this parameter requires restarting the MID Server.

- Type: integer
- Default value: 60

mid.powershell.command.parameter_passing

Enable this parameter to allow passing PowerShell parameters from the command line.

- Type: true | false
- Default value: false

mid.powershell.command.script.parameter_passing

Enable this parameter to allow passing PowerShell scripts from the command line.

- Type: true | false
- Default value: true

mid.windows.management_protocol

Enables administrators to select the Windows management protocol used for device and process classification. Options include: WMI and WinRM.

- Type: string
- Default value: WMI

mid.windows.probe_timeout

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Sets the timeout interval for all Windows probes on a specific MID Server. This value is overridden by the values configured for individual probes with the wmi_timeout probe parameter.

- Type: integer
- Default value: 300

mid.powershell.jea.append_username

Specifies whether user name of the current user will be appended to the JEA endpoint.

- Type: true | false
- Default value: False

mid.powershell.jea.endpoint

JEA configuration name (endpoint) on remote servers that the MID Server will connect to. Set to JEA_DISCO_BASIC.

- Type: string
- Default value: ""

Add a MID Server parameter

Use a MID Server parameter to control the behavior of a particular MID Server.

Before you begin

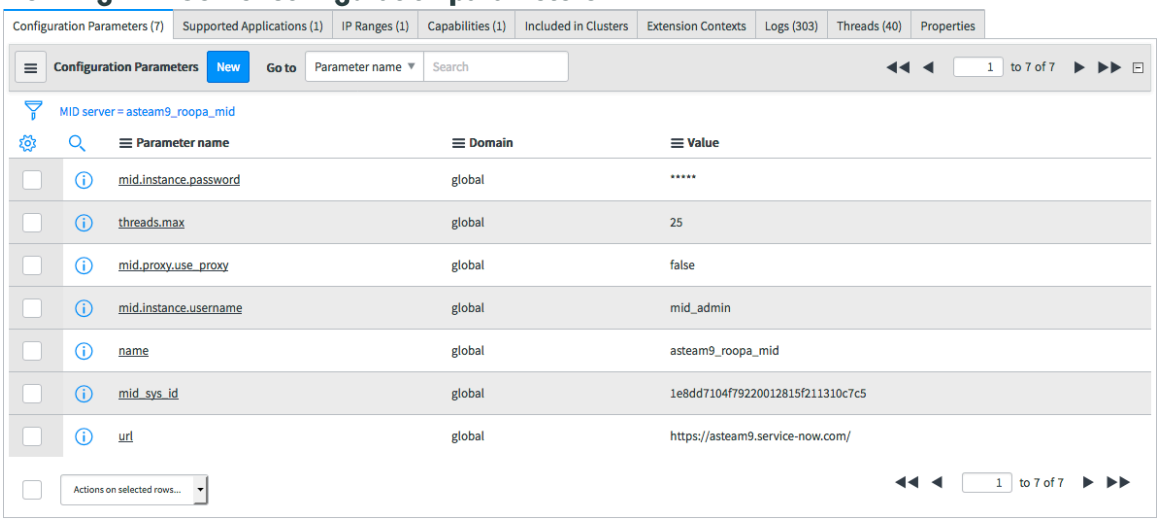
Role required: admin

Procedure

1. Navigate to **All** > **MID Server** > **Servers**.
2. From the list of MID Servers, select a MID Server to configure.
3. Select the **Configuration Parameters** related list.

   This shows all the parameters currently in the MID Server's configuration file. If there are any passwords, they are displayed in asterisks for security reasons. See MID Server parameters for a list of available parameters.

Defining MID Server configuration parameters



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4. To add parameters, click **New**, and then complete the form.
   After the form is submitted, the configuration file for that MID Server is modified to include the new parameter. Changes to existing parameters are reflected in the MID Server configuration file as well. Changes made to the MID Server configuration file do not take place immediately, but rather the next time the MID Server is restarted. The MID Server form has a related link for restarting the MID Server.

   Note:
   ServiceNow prevents you from saving changes, such as modifying or deleting parameters, that would cause the MID Server to lose communications with the instance. For example, you cannot change the url parameter. Any changes to these protected parameters must be made directly in the `config.xml` file for that MID Server.

5. **Optional:** Set parameters in the `config.xml` file.
   MID Server configuration is controlled by an XML file called `config.xml`. This file is located in the `/agent` directory, in the MID Server isntallation directory. You can edit this file directly to make any configuration changes to protected parameters. Many configuration changes, such as those that do not disrupt communication between the MID Server and the ServiceNow instance, may also be made from the instance.

   The structure of the `config.xml` file is simply an outer parameters tag and a series of inner parameter tags. Each parameter tag has name and `value` attributes.

   - To change the value of a parameter, edit the value attribute.
   - To add a parameter, add another parameter tag with its name and value.
   - To delete a parameter, delete the entire parameter tag.

   The order of the parameters within the file is not important. Notice the green comment sections in the sample. Use these elements to add useful comments to the configuration file.

   Note:
   When configuring the MID Server for use with a proxy server, be sure to remove the comment tags around the proxy sections that you configure.

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MID Server config.xml file

```
- <parameters>
    <!-- MID Server Configuration -->
    <parameter name="url" value="https://example.service-now.com"/>
    <parameter name="refresh_rate" value="65"/>
    <parameter name="name" value="Super Duper MID Server #1"/>
    <parameter name="mid_sys_id" value=""/>
    <!-- MID Server Threads -->
    <parameter name="threads.max" value="25"/>
    <!-- MID Server proxy configuration -->
    <parameter name="mid.proxy.host" value=""/>
    <parameter name="mid.proxy.port" value=""/>
    <parameter name="mid.proxy.username" value=""/>
    <parameter name="mid.proxy.password" value=""/>
  - <!--

            MID Server to instance configuration options

              mid.instance.use_proxy
                  - when talking to instance, should we use the proxy config?

              mid.instance.username
              mid.instance.password
                  - supply username and password if instance has basic authentication enabled

    -->
    <parameter name="mid.instance.use_proxy" value="true"/>
    <parameter name="mid.instance.username" value=""/>
    <parameter name="mid.instance.password" value=""/>
  - <!--

            MID Server upgrade options

              mid.upgrade.use_proxy
                 - when talking to upgrade server, should we use the proxy config?

              mid.upgrade.branch
                 - define a branch our MID Server is pinned to

    -->
    <parameter name="mid.upgrade.use_proxy" value="true"/>
    <parameter name="mid.upgrade.branch" value=""/>
</parameters>
```

Note:
The sample file here is from a Firefox browser. Conventional text editors, such as Notepad, WordPad, or TextEdit, do not display colors and variable fonts.

MID Server Configuration Parameter settings and priority

The MID Server's settings reside in multiple tables and the MID Server prioritizes them in a set order. MIDConfigParameter must be defined with the correct type-style builders.

MID Server settings priority

MID Server settings can reside in both the Configuration Parameter table and Properties tables. MID Servers prioritize the settings in the following order:

1. MID Configuration Parameter
2. MID Property (specific MID)
3. MID Property (global)

Invalid Record Prevention

Avoid creating duplicate records in the MID Property table because they can invalid records. Duplicate properties have the same name and are assigned to the same MID Server.

Similarly, avoid creating global configuration parameters because they are unsupported. Global configuration parameters are configuration parameters with no assigned MID Server. If a setting should be applied to all MID Servers, then use a global MID Property.

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MID Server File Cleaner

A monitor thread runs in the MID Server to clean up old files, to keep the size and quantity of files within the install folder manageable, and to prevent performance issues with the MID Servers.

Files and empty folders within the following folders may be deleted by this MID File Cleaner. Files last accessed more than 30 days ago are deleted.

It runs on startup, and then every 24 hours after that. You can force the File Cleaner to run by restarting the MID Server service.

Folders/files cleaned:

- \agent\import
- \agent\export - Used by the Export Set feature.
- \agent\work\monitors\ECCSender\output_error - Used since San Diego for ECC input payloads that cannot be inserted for any reason (see PRB1521761/KB0995569).
- \agent\work\monitors\ECCSender\output_oversize - Used since Eureka/Fuji for saving copies of payloads that are not sent to the instance because they are larger than the limit set by mid.eccq.max_payload_size, which defaults to 20000000 bytes (see PRB598334)
- \agent\logs - Specifically JFR Dumps (Utah release)

Logging

The MID Server agent log shows this monitor starting and shutting down with the MID Server.

```
2022-10-21T13:08:58.330+0200 INFO (MIDServer) [Main:265]
 Initializing MID Server
2022-10-21T13:10:36.527+0200 INFO (StartupSequencer)
 [Monitors:307] Enabling monitor: FileCleanerMonitor
...
2022-10-24T09:29:35.193+0200 INFO (MIDServer)
 [MIDServerState:160] MID Server stopping
2022-10-24T09:29:38.591+0200 INFO (MIDServer) [Instance:928]
 interrupting thread FileCleanerMonitor.21600
```

To see exactly when it runs, enable debug with parameter `mid.log.level=debug`.

```
2022-11-17T02:49:13.201-0800 DEBUG (FileCleanerMonitor.21600)
 [AFileCleaner:103] Scanning directory to delete files:
 C:\...\agent\import
2022-11-17T02:49:13.201-0800 DEBUG (FileCleanerMonitor.21600)
 [AFileCleaner:103] Scanning directory to delete files:
 C:\...\agent\export
2022-11-17T02:49:13.201-0800 DEBUG (FileCleanerMonitor.21600)
 [AFileCleaner:103] Scanning directory to delete files:
 C:\...\agent\work\monitors\ECCSender\output_error
2022-11-17T02:49:13.201-0800 DEBUG (FileCleanerMonitor.21600)
 [AFileCleaner:103] Scanning directory to delete files:
 C:\...\agent\work\monitors\ECCSender\output_oversize
2022-11-17T02:49:13.201-0800 DEBUG (FileCleanerMonitor.21600)
 [AFileCleaner:103] Scanning directory to delete files:
 C:\...\agent\logs
```

There is no logging for individual file/folder deletes.

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Disabling the MID File Cleaner

Export Sets write files to the MID Server agent\export folders. The idea is then that a custom implementation on the customer side takes those files and moves them elsewhere, so that these files only need to remain in the MID Server application's install directory for a short time.

The MID File Cleaner can be disabled completely for all folders, by adding the MID Server Configuration Parameter **mid.file_cleaner.disabled=true**. When the parameter is not present, which is the out-of-box state, it defaults to false, and the file cleaner runs.

On the MID Server form, click New on the "Configuration Parameters" related list, select mid.file_cleaner.disabled, and enter the value "true".

This can also be manually added to the config.xml file: `<parameter name="mid.file_cleaner.disabled" value="true"/>`. See MID Server parameters for more information.

MID Server protected records and reserved characters

Some MID Server records cannot be altered. Certain special characters are pre-defined in XML and cannot be used in passwords.

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

MID Server Records that cannot be altered

These records cannot be modified or deleted.

Table	Record
Public Page [sys_public]	InstanceInfo
Scripted Web Service [sys_web_service]	• InstanceInfo • GetMIDInfo • MIDAssignedPackages • MIDFieldForFileProvider • MIDFileSyncSnapshot

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Table	Record
	• MIDServerCheck • MIDServerFileProvider

Using special characters in an XML file

The XML specification defines five predefined entities that represent special characters, and requires that all XML processors honor them. If these characters are used in a password, you will experience unexpected results.

The following characters represent the five pre-defined entities:

- "
- &
- '
- <
- >

If you use the pre-defined entity characters in an XML file, such as the MID Server configuration file, you need to encode them. To encode pre-defined entities into an XML document:

- replace **"** with **"**
- replace **&** with **&**
- replace **'** with **'**
- replace **<** with **<**
- replace **>** with **>**

For example, to specify the password as `test&` in the MID Server config.xml file:

```
<parameter encrypt="true" name="mid.instance.password"
 value="test&amp;"/>
```

MID Server privileged commands

To discover certain information on a host server, the MID Server must run SSH commands with higher privileges. The platform provides default privileged commands for the MID Server to use and the ability to add additional commands to the system.

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1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

An example of information that requires elevated privileges is information about storage disks on a host server, retrieved with the *fdisk -l* command. If your system cannot use sudo commands, you must configure the hosts in your network to use one of the other privileged commands. You can configure different privileged commands for different hosts. However, Discovery supports only one privileged command per host.

Important:
You can edit supported privileged commands, but do not delete them.

For a list of possible SSH commands requiring root privileges, see SSH credentials.

SSH privileged escalation command requirements

Command	Description
sudo	• Host must support the *sudo -S -p <password>* command and return the correct list of allowed SSH commands. • Credentials provided for Discovery must be able to run the command *sudo -S -p <password> <commands>*. • Discovery calls *sudo -l* to determine whether *sudo* is available on the host and which commands the current user can run with elevated privileges.
pbrun	• Host must support the *pbrun -v* command and return the correct version of PowerBroker. • Credentials provided for Discovery must be able to run *pbrun <commands>*. • Discovery does not support any other **pbrun -** options, such as a password prompt. • The instance must be able to reach the target host via SSH.

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SSH privileged escalation command requirements (continued)

Command	Description
pfexec	• Host must support the *pfexec id -a* command and return the correct ID. • Credentials provided for Discovery must be able to run *pfexec <commands>*. • Discovery does not support any other **pfexec -** options, such as a password prompt.
dzdo	• Host must support the *command -v dzdo* command and return the path to dzdo in standard output. • Credentials provided for Discovery must be able to run dzdo <commands>. • Discovery does not support any other *dzdo* – options, but Discovery supports password authentication for dzdo.

Long-running commands with sudo

Configure J2SSH and ServiceNow SSH to prevent long running commands using sudo from failing when the MID Server disconnects.

ServiceNow SSH allows probes to run sudo against individual commands or an entire, long-running script. This is also supported for the *pbrun* and *pfexec* privileged commands.

Sudo for individual commands

You can run sudo against individual commands within a probe, but only if all the following sudoer configurations are performed on the target:

- The `!requiretty` option is required.
- Allow individual commands to be run by the user in the provided credential with NOPASSWD configured.
- The target specifies an individual sudo call in the command or referenced scripts. For example, set sudo as `"sudo fdisk -I"` or `"${sudo:fdisk -I}"` rather than `"must_sudo"` for the entire script.

Note:
Running sudo against individual commands with ServiceNow SSH produces detailed and useful entries in the sudo logs on the target computer.

Running sudo on an entire script

If any of the required sudoer configuration requirements for individual commands is not in place, Discovery applies sudo to the initial and complete probes, and does not execute sudo remotely inside the command. This condition can be forced by setting **must_sudo** on the probe and eliminating any sudo commands within the probe.

This approach prevents long running commands from failing when the probe disconnects, but cannot specify individual commands in the sudoers configuration.

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Logging

The logs from ServiceNow SSH sudo activity run against an entire script show cryptic entries, such as `/tmp/.run.aef13123fe124123`, which prevent administrators from controlling permissible commands and knowing the exact command that was run. Sudo run against individual commands produces more detailed log entries, such as `/sbin/fdisk -l`.

Add a new privileged command for use by the MID Server

Add a new privileged command to the Privileged Command [privileged_command] table that is available to your MID Servers.

Before you begin
Role required: admin

About this task

Important:
Do not delete any of the supported commands.

Procedure

1. Navigate to **All** > **MID Server** > **Privileged Command** and click **New**.
2. Complete these fields:
   - **Command**: The name of the privileged command.
   - **Password Prompt**: The password prompt displayed to the user for this privileged command, or a regular expression that matches this password prompt. If this field is empty, no password is required for this privileged command, and no prompt is displayed. SUDO commands do not require a password prompt.
3. Click **Submit**.

Configure the MID Server to use specific privileged commands

You can configure the MID Server to use specific commands in a defined order.

Before you begin
Role required: admin

Procedure

1. Navigate to the list of MID Servers using one of the following paths:
   - **MID Server** > **Servers**
   - **Discovery** > **MID Servers**
   - **Orchestration** > **MID Servers**
2. Select the MID Server you want to configure.
3. Click the menu icon in the header bar and select **View** > **Advanced** from the context menu.

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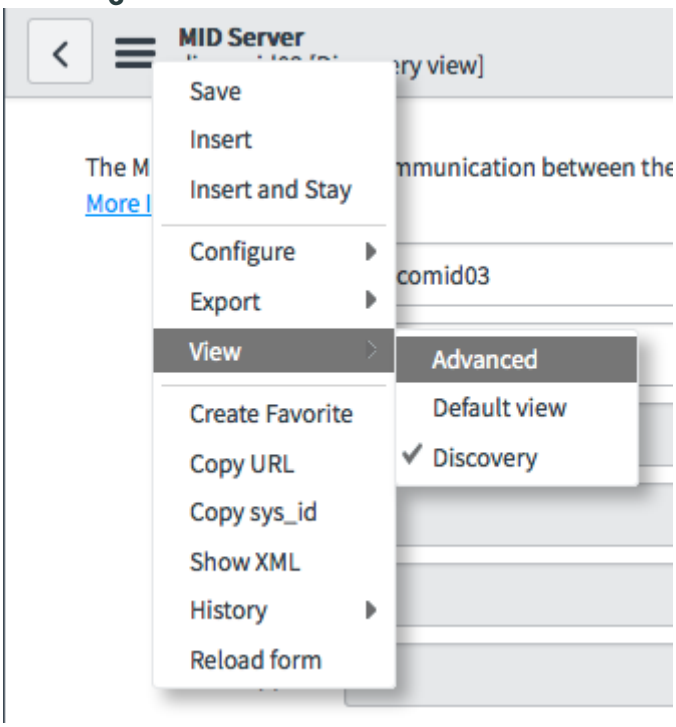
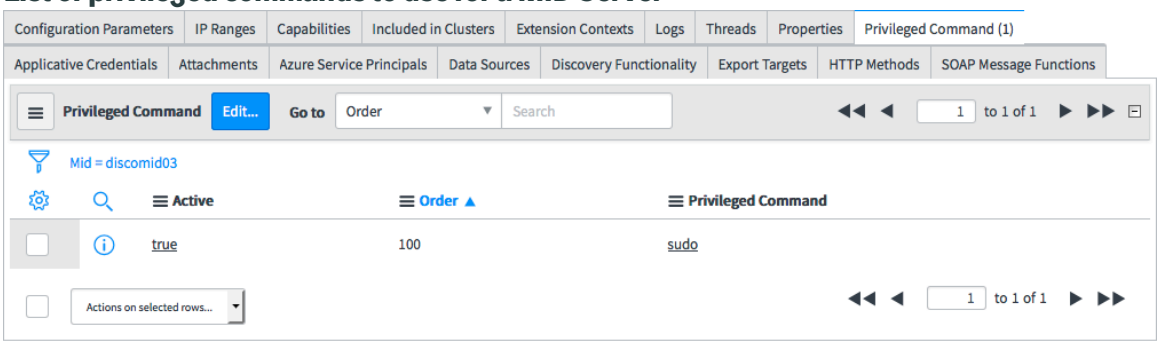
Selecting the Advanced view



4. In the **Privileged Command** related list, click **Edit**.
5. Select the command you want this MID Server to use and click **Save**.
   The default order of privileged commands is 100, but you can change the order as necessary. The privileged command with the smallest order number is tried first.

List of privileged commands to use for a MID Server



Create a pbrun profile privileged command

You can create a special configuration for the *pbrun* privileged command that allows it to run as a profile.

Before you begin

Role required: discovery_admin, admin

About this task

Of all the privileged commands, only the *pbrun* command can be configured to run as a profile, and only one of these special *pbrun* configurations can function on a MID Server.

Important:
Edit the existing *pbrun* record for this purpose. The system ignores any additional commands you create for *pbrun*.

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Procedure

1. Navigate to **All** > **MID Server** > **Privileged Command**.
2. Select **pbrun** from the list.
3. In the Privileged Command record, edit the value in the **Command** field to use the format *pbrun -u <profile>*.
   For example, you can set *pbrun -u admin* as a command to run with an admin profile.
4. Click **Update**.

What to do next

Return to Configuring MID Servers.

MIDSystem methods

MIDSystem variables (referred to by the variable name ms.) provide a variety of methods to get information about the MID Server.

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Method summary	Description
log(String message)	Logs the given message with a standard prefix to indicate that the message was generated by JavaScript.
getConfigParameter(String parameter name)	Returns the value of the named configuration parameter.
include(String script include)	Include the MID Server script include with the given name into the current context.
getName()	Returns the name of the MID Server.
getSysID()	Returns the sys_id of the MID Server.
toJavaScript(Object)	Converts the given Java object into the equivalent JavaScript object.

This example writes a message to the log:

```
ms.log('Attempting to log in with user: ' +
this.getParameter('user'));
```

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Manually start, stop, and restart a MID Server

If you did not start the MID Server at the end of the installation procedure, you can manually start the MID Server.

Before you begin

Role required: MID Server Service account user or a Windows Admin account

This procedure is only for users who install the MID Server using the ZIP file. The Windows MID Server installer completes the installation automatically.

Procedure

1. Open the agent directory in the directory you created for the MID Server installation files. For example, the path might be C : `\ServiceNow\MID Server1\agent`.
2. Start the MID Server by executing the `start.bat` file.
3. To stop the MID Server, execute the `stop.bat` file.
4. To restart a stopped MID Server, either:
   - If the MID Server is stopped, execute the `start.bat` file.
   - If the MID Server is running, execute the `restart.bat` file.

MID Server heartbeat

The instance checks the MID Server for a response every 5 minutes, using a synthetic transaction monitoring system.

---

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

Checking for a heartbeat

ServiceNow instances send a synthetic transaction via the Heartbeat probe to every MID Server every 5 minutes. The Heartbeat probe functions exactly as a normal probe does and is sent by writing an output record to the ECC queue. A MID Server retrieves the record when it queries the ECC queue for work. The MID Server processes the probe just as it would any other probe and responds back to the instance. If the instance does not detect a response from a MID Server, the instance marks that MID Server as **Down**. If the MID Server responds, the instance considers the MID Server to be functioning and communicating properly with the instance.

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Note:
Make sure that your MID Server can communicate on **port 443**. See Configure MID Server network connectivity and MID Server system requirements for more information.

System events

When a MID Server transitions from one state to another, one of these events is triggered:

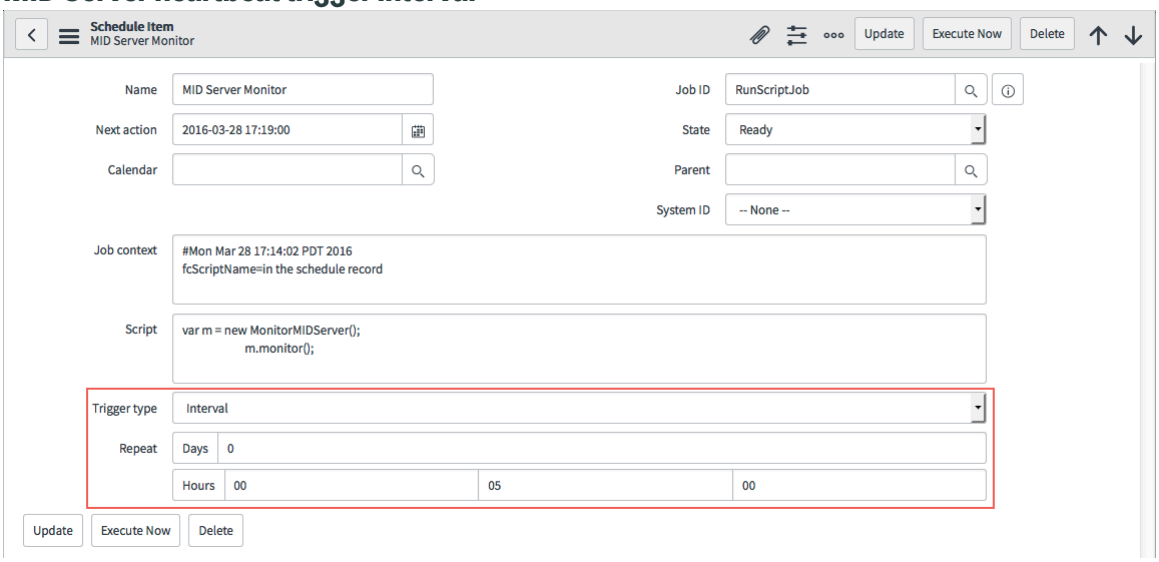
- *mid_server.up*: The MID Server goes from a status of **Down**, **Paused**, or **Upgrading** to a status of *Up*.
- *mid_server.down*: The MID Server goes from a status of *Up* to a status of *Down*.
- *mid_server.paused*: The MID Server is paused.
- *mid_server.upgrading*: The MID Server is being automatically upgraded because the instance is being upgraded.

You can use these events to send notifications or trigger actions that you specify in scripts.

Scheduled job

To change the trigger interval for the Heartbeat probe, navigate to **System Scheduler** > **Scheduled Jobs** > **Scheduled Jobs**. Open the **MID Server Monitor** record and edit the interval.

MID Server heartbeat trigger interval



Set the MID Server JVM memory size

The MID Server starts with a default JVM memory allocation, but you can modify this setting in the configuration file.

Before you begin
Role required: admin

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1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task

In the base ServiceNow system, the MID Server JVM memory is set to 1024 MB, which is configured in the `\agent\conf\wrapper-override.conf` file in the MID Server installation directory. This setting might not be appropriate for the way your organization uses the MID Server. If you want the MID Server to work harder, allocate more resources to it. If the MID Server is located in a small branch office and runs in an environment where memory allocation is shared between a print server, mail server, or web proxy server, the allocation might have to be reduced.

Note:
For a complete list of minimum MID Server requirements, see MID Server system requirements.

Procedure

1. Open the `\ServiceNow\<MID Server name>\agent\conf\wrapper-override.conf` file in a text editor.
   For more information about this file, see Installing Multiple MID Servers on a Single System.
2. Locate the following lines in the file:

```
# OPTIONAL: Maximum Java Heap Size (in MB)
#wrapper.java.maxmemory=1024
```

3. Edit the memory allocation.
4. Remove the comment tag (#) from the memory allocation parameter, `#wrapper.java.maxmemory=1024`.
   The resulting code is as follows:

```
# OPTIONAL: Maximum Java Heap Size (in MB)
wrapper.java.maxmemory=1024
```

5. Save the file.
6. Restart the MID Server service.

Pause the MID Server

Pause the MID Server to temporarily prevent it from polling the ECC Queue for work or sending Discovery results back to the instance.

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Before you begin
Role required: agent_admin

1. Ensure that the MID Server can connect to elements inside and outside your network
2. Download and install the MID Server on a Linux or Windows host
3. Configure your MID Server
4. Configure MID Server security
5. Ensure that the MID Server can connect to elements inside and outside your network
6. Download and install the MID Server on a Linux or Windows host
7. Configure your MID Server
8. Configure MID Server security

About this task
You can only pause validated MID Servers. You might want to pause the MID Server when your network infrastructure is undergoing changes. This prevents applications like Discovery from throwing errors during a particular maintenance window.

A paused MID Server continues processing commands that it had already retrieved before it was paused. When you resume the MID Server, the MID Server starts retrieving new commands to process.

Note:
Discovery continues to assign jobs to MID Servers that are **Paused**. MID Servers that are **Down** are not assigned jobs.

Procedure
1. Open the MID Server record.
2. Select a running MID Server that has been validated.
3. On the MID Server form, select **Pause MID** under **Related Links**.
   The state of the MID Server changes to **Paused**.

A paused MID Server

Name	Version	Host name	Status	Validated
MidServer1	Version	MidServer1hostname.com	Paused	Yes

4. To resume MID Server processing, select **Resume MID** under **Related Links**.

MID Server pause

The MID server can be put into a **Paused** state to temporarily prevent it from polling the ECC Queue for work or sending Discovery results back to the instance.

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Unlike stopping the MID Server from the Windows or Linux server command line on the MID Server machine, pausing the MID server is something that you can do from the instance. The MID Server pause feature is available starting with the Istanbul release.

Note:
You can only pause validated MID Servers.

You can still perform these actions when the MID Server is paused:

- Access the MID Server logs and delete log entries.
- View MID server statistics. While the MID Server is in the **Paused** state it stops generating statistics. But you can still view the statistics generated before you paused the MID Server.
- Retrieve the MID Server thread dump.
- Make and save configuration changes and property changes to the server. The changes take effect after the MID Server is resumed.
- Clear the ECC queue.

The MID server heartbeat continues to function while the MID Server is in the **Paused** state. If the MID Server is upgraded while it is in the **Paused** state, the MID Server state automatically changes to **Up** after successful upgrade. It does not return to the **Paused** state.

During MID Server selection, paused MID Servers can still be selected but are prioritized below MID Servers that are not paused.

Events that occur during MID Server pause

The **vCenter** and **SNMP** event collectors, continue to run and process events when you pause the MID Server. These events are not part of the normal synchronous communication that the MID Server has with the instance that you see in the ECC queue. Events are still relayed to the instance and can even trigger actions on records in the instance, such as a CI update. For example, if vCenter detects that a virtual machine goes down or is deleted, a vCenter event makes a change to the status of the corresponding CI record for that virtual machine.

To prevent these events from being processed, stop the extensions from running. For more information, see:

- Configure and run the vCenter event collector extension
- Configure the SNMP Trap Collector Extension

Now Assist for MID Server

Use agentic AI workflows for improved functionality with MID Server.

Explore	Use
Learn about MID Server deployment and uses.	Get information about MID Server upgrades, issues, system requirements, and properties.

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- There might be AI agents installed with the Now Assist application that are not used in agentic workflows. To learn how to see all agents that are available on your instance, see Find AI agents.
- To find agents that might not be installed on your instance, visit the AI Agent Marketplace on the ServiceNow Store.

Explore Now Assist agentic workflows for MID Server

The Now Assist for MID Server application uses generative AI to analyze errors and provide remediation procedures. The procedures collate technical information from multiple web sources to help you investigate the issues more effectively.

Analysis tools such as MID Guardian completely transforms the issue triage process and can help achieve faster, seamless problem management. Powered by generative AI, it uses a large language model (LLM) to generate human-readable alert titles and detailed descriptions based on enriched and actionable alert data. The AI-generated alert information facilitates quick alert triage and effective analysis for your team, which can lead to a substantial reduction in resolution time.

Use Now Assist agentic workflows for MID Server

Use Now Assist for MID Server applications to view alert or incident analyses that Now Assist creates using generative AI.

MID Server Guardian

The MID Guardian is an agentic AI feature within the MID Server ecosystem and ITOM Infra Services Workspace. It is designed to proactively assist users in diagnosing and resolving issues related to configuration, connectivity, upgrades, and operations.

The MID Guardian analyzes logs, signals, and runtime behaviors to offers guided troubleshooting steps, automated fixes, and predictive insights. The agent significantly reduces Mean Time to Repair (MTTR) and enhances the reliability and operational efficiency of the MID Server. Features of the MID Guardian include:

- Root cause analysis (RCA) with Agentic AI
- Correlation of symptoms from various telemetry sources (logs, errors)
- Automated execution of corrective actions (validating or restarting services)
- Playbook-driven or Agentic AI-led remediation strategies
- Action recommendations for unresolved or partially resolved issues, utilizing web searches
- Self-learning from previous resolutions and human interventions

Access MID Guardian

To begin using MID Guardian, open the agentic AI chat and type or select MID Guardian. The MID Guardian provides the options:

Troubleshooting existing MID Server

You can provide the name or sys_id of the MID Server you want to troubleshoot. The MID Guardian checks the MID Server for issues and creates a plan for corrective actions.

Setting up a new MID Server

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The MID Guardian generates a procedure to set up a MID Server using existing documentation. The MID Guardian takes into account issues like Network connectivity problems and adjusts the procedure accordingly.

Something else

You can provide an error message and the MID Guardian searches web resources, such as Knowledge Base articles, to create a troubleshooting procedure.

When you are finished, type `end chat` to stop the agent.

MID Guardian in ITOM Infra Services Workspace

Using MID Guardian from the ITOM Infra Services Workspace dashboard enables the agent to use the information on the page to inform its suggestions and actions.

If you open a specific MID Server record, opening the Agentic AI chat and selecting MID Guardian automatically assesses the record. If you go to the MID Server Issues section of a record and open the MID Guardian, the MID Guardian focuses on the errors present. The MID Guardian offers diagnosis for issues, such as the MID Server upgrade failed. The MID Guardian can create a procedure to resolve the issue, including suggesting diagnostic scripts for you to run to gather necessary information.

For certain issues, MID Guardian can automatically implement corrective actions. If it detects that current issue can be solved through remediation such as re-keying MID Servers or restarting services, the MID Guardian offers to initiate the action automatically.

Check MID Server logs

If the MID Guardian checks a MID Server and detects no issues, it provides options to investigate potential issues. You can select **Fetch MID Server Errors and Warnings** to make the MID Guardian call the MID Server, scan its logs, and get the ECC queue record.

The MID Guardian collates a list of most frequent errors. You can choose an error, and the MID Guardian draws from corroborating web data, existing documentation, and Knowledge Base articles to create a troubleshooting procedure.

Remote tables

Connect the ServiceNow AI Platform to third-party sources, or to another instance, so that you can retrieve external data and optionally cache it in memory.

You can view external data in lists or forms and process it with standard Glide scripts. You can also group, sort, aggregate, and filter the data just like you would for standard internal tables. If editing is enabled for a remote table, you can insert, update, and delete data in the external source from the remote table on the instance.

Remote table components

Use the following components to build an external data framework:

Remote tables

You create remote tables to describe the schema for the data that you want to retrieve from an external source.

The table definition is in the ServiceNow AI Platform, but its rows, or external records, live in memory. You create a remote table the same way that you would create a standard internal table. You define columns and controls and designate application access for it just like you would do for an internal table. Unlike an internal

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table, a remote table doesn't get its records from the ServiceNow AI Platform database. It gets its records from running an associated query script against an external data source.

To learn more about creating remote tables, see Create a remote table.

Script definitions

You create and associate script definitions with a remote table. The external data that you retrieved using the query script can be cached in memory. You can also designate how this data is cached and how long the data is cached in memory. Every time that you refresh a list that contains the external data from a remote table, the associated query script runs again. For editable remote tables, you can create insert, update, and delete script definitions in addition to the query script definition.

To learn more about script definitions and how to associate them with a remote table, see Create script definitions for a remote table.

How remote tables work

By using a remote table, you can retrieve the data from external sources or from another instance with REST or SOAP services. The external data lives in memory in read-only mode, which makes the data temporary, or transient, within the ServiceNow AI Platform. You can then view and update the external data without importing or storing it.

You view the external data in lists or forms in the same way that you view internally stored data. You can manipulate this data by using standard Glide records, business rules, remote APIs, scripting, table reference fields, services, and development tools in the ServiceNow AI Platform. If editing is enabled for a remote table, you can insert, update, and delete data in the external source from the remote table on the instance.

Important:
If the data size that is retrieved from the external source is small, use the 1000 rows default limit in a remote table to minimize query times. If the retrieved data size is large and could be less performative, in the script definition, you can select the advanced **Enhanced Capacity** field to support a large number of rows.

External data life cycle within the ServiceNow AI Platform

The data that you retrieve from an external source has a finite duration, or life cycle, within the ServiceNow AI Platform.

- When you run a script that is associated with a remote table, the retrieved data lives in memory for as long as the list or form appears. After you close the list or form, that external data is purged from memory. The next time that you use or view the external data in this remote table, memory is repopulated from the external system.
- However, if you have defined caching parameters for the script, the external data remains cached in memory for the specified caching duration.

  For example, if you designate that the external data should be cached for 300 seconds, it remains cached in memory for 5 minutes. After that time expires, the cached data is purged from memory. The next time that you use or view the external data in this remote table, the cache is refreshed from the external system.

Practical applications for remote tables

Set up and use remote tables in your enterprise when:

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- You want to fetch external data for temporary use without storing it in the ServiceNow AI Platform. For example, you can create a remote table that fetches weather-related data that appears on a home page when a user logs in. You would then create an associated query script definition that retrieves this data from a third-party weather source that is based on the user's location.
- You want to retrieve customer details that are stored in an external Customer Relationship Management (CRM) application for viewing in Customer Service Management functions such as Agent Workspace.

Note:
To learn more about data retrieval for Customer Service Management, see Third-party data integration for CSM.

- You want to retrieve and view personnel data from Human Capital Management (HCM) applications such as Workday or SAP SuccessFactors for use in HR Service Delivery functions.

Post-filtering and sorting

When you run a remote table script, it applies post-filtering and sorting query conditions after it adds rows to a table. These applied conditions support any other required queries that the script doesn't handle. When you apply post-filtering and sorting, the remote table queries work like standard internal table queries.

When you create remote table scripts, you generally handle the most frequent and expansive queries in the script. Post-filtering queries and sorting can take a long time and might adversely affect how your instance performs. Use a small data set instead so that it doesn't take much time to do post-filtering and sorting.

Based on your use cases, determine if you should try a narrower query in the external call or a more expansive query. Because the internal filtering and sorting can be expensive to run on large result sets, use a narrower query when the data doesn't require extra filtering. Use a more expansive query when a more general query would return a small result set and would require extra filtering and sorting.

Differences between remote tables and the Integration Hub

Choose whether to use a remote table or Integration Hub to process external data.

- When you want to cache external data temporarily, use remote tables.
- If you want more advanced importing and transformation options, including Workflow Studio, or if you want to develop custom integrations, use the Integration Hub.

Note:
If you create a remote table that uses the data from an external source that is outside of the ServiceNow AI Platform, you must have an Integration Hub subscription entitlement. To learn more about the Integration Hub, see Integration Hub.

Activate the remote tables plugin

If you have the admin role, you can activate the Remote Tables plugin (com.glide.script.vtable). This plugin includes demo data and activates related plugins if they aren't already active.

Before you begin
Role required: admin

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About this task
Remote Tables activates these related plugins if they are not already active.

Plugins for Remote Tables

Plugin	Description
Remote Tables [com.glide.script.vtable]	Supports remote tables and associated script definitions that can be used to retrieve and optionally cache data from external sources.
Transformation Service [com.glide.transform]	Supports use of Transform APIs that are associated with the remote tables.

Procedure
1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Related topics
List of plugins (Zurich)

Create a remote table
Create a remote table using data retrieved from an external source.

Before you begin
Role required: delegated_developer or admin

About this task
When you designate a table as a remote table, keep the following points in mind:

- Before you create a remote table, you must have a good understanding of external data sources. For example, if you want to retrieve CRM data for use in Customer Service Management, you must understand how the data is structured in the external CRM source.
- A remote table needs an external primary key to relate its temporary data to the data that is stored in the external source. When you designate a table as remote, only a sys_id field is auto-generated and appears in the Columns section, which it uses as its primary key for use in Glide records. All external table primary key values are converted to string values.
- Unlike standard internal tables, you can't extend a remote table from another table.

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Procedure

1. Navigate to **System Definition** > **Remote Tables** > **Tables**.

   Tip:
   You can also create a remote table using the standard form for tables from **System Definition** > **Tables**.

2. Select **New**.
3. On the form, fill in the fields.

   Note:
   You create a remote table in the same manner as a normal table, but designate it as a remote table. The following controls differ in how they operate and what you enter into them when you create a remote table:

Control	Description
Name	Table name, which is automatically populated based on the table label and a prefix as follows: ○ For a remote table in a scoped application, the name is prefixed with a namespace identifier and the string `st_` to indicate that it's remote and part of an application. ○ For a remote table in the global application, the name is prefixed with the string `u_st_`. You can't modify the prefix; however, you can modify the rest of the table name. The name can contain only lowercase, alphanumeric ASCII characters and underscores (_).
Extends Table	Option that is not available if you select the **Remote Table** option to designate that this table is remote. It no longer appears because you can't extend remote tables from other tables.
Remote Table	Option to designate this table as a remote table. A remote table is a table to which you can associate a script definition for retrieval of data from an external data source. Unlike a standard internal table, the data doesn't come from records in the current instance. To learn more about remote tables, see Remote tables.

4. In the Columns section, use the **Table Columns** embedded list to add columns to the remote table like you do when you create columns for a standard internal table.
5. In the Controls section, define additional remote table options like you do when you define additional table options for a normal table.
6. In the Application Access section, define the scope protection for the remote table like you do when you define additional table options for a normal table.
   For more information, see Application access settings.
7. Select **Submit**.

Related topics

Create a table

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Create script definitions for a remote table

Define scripts for a remote table to retrieve data from an external data source or edit data in the external source.

Before you begin

Role required: delegated_developer with Allow scripting permissions or admin

About this task

The ServiceNow AI Platform retrieves and caches the data for the remote table by running the query script against an external data source so you can view or modify it. You can also designate how this external data is cached and how long the data is cached in memory until the script must run again.

Procedure

1. Navigate to **All** > **System Definition** > **Remote Tables** > **Definition**.
2. Select **New**.
3. On the form, fill in the fields.

Control	Description
Name	Name of the script that you're creating to associate with the selected remote table.
Table	Name of the remote table that you want to associate the script that you're creating. ○ For a remote table in a scoped application, the name is prefixed with a namespace identifier and the string `st_` to indicate that it's remote and part of an application. ○ For a remote table in the global application, the name is prefixed with the string `u_st_`.
Application	Application that is associated with this remote table. If you're working on an application or are creating a remote table from an application record, the field defaults to that application. Otherwise, the field defaults to **Global**. Any records that are created from the table record, such as modules and security rules, are assigned to this application by default.
Active	Option for activating the script that you're associating with the remote table. You can have multiple inactive script definitions for a remote table, but can only have one active script definition. When you activate a script definition, you associate it with the remote table so that you can retrieve and cache the external data.
Advanced	Option to access advanced caching and editing settings. Caching settings designate how the memory caching should operate in the ServiceNow AI Platform for this remote table. **Note:** Only advanced users should set caching parameters for a remote table.

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4. **Optional:** If you selected the **Advanced** option, from the Advanced section, fill in the fields.

   Note:
   By default, the external data is cached in the memory by the user.

Field	Description
Cache TTL	Cache time to live, expressed in seconds, that external data is cached in memory for this remote table script definition. For example, enter `300` to cache the data in the memory for 5 minutes. The default value is 0, meaning data isn't cached and is retrieved every time. The maximum value is 60 minutes (3600 seconds).
Cache Isolation Level	Cache query results for each user or across all users. ○ Cache per user: The cached query results should be specific to the logged-in user. This is the default value. ○ System Shared Cache: The cached query results should be the same for all users.
Enhanced Capacity	Option to select the enhanced capacity to support more than 1000 rows in a remote table. **Note:** If the data size that is retrieved from the external source is small, use the 1000 rows default limit in a remote table to minimize query times. You can select the **Enhanced Capacity** field if the retrieved data size is large and can be less performative. This field isn't supported if **Editable** is selected.
Editable	Option to support editing the remote table and its external data source from the instance. Use the `v_record` API to customize script definitions for inserting, updating, and deleting data in the table.

5. Customize the following script definitions using the `v_table`, `v_query`, and `v_record` APIs.

   For more information about these APIs, see v_table – Scoped, Global, v_query – Scoped, Global, and v_record - Scoped, Global.

Script definition	Description
Query	The query script definition retrieves data from the external source to include in the remote table. From the Query section, customize the script using the `v_table` and `v_query` APIs. Every time a list that contains external data from a remote table is refreshed, the associated query scripts runs.

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Script definition	Description

	(function executeQuery(v_table, v_query) {
	// Parameters:
	// v_table - object to record response:
	// v_table.addRow({ ... }) - adds a row to the result set.
	// keys are the column names of the table definition.
	// sys_id must be non-empty and uniquely identify each row.
	// the above rule will be strictly enforced for editable tables, and generate warnings for read-only tables.
	// sys_id will be supplied to the Update, and Delete scripts to specify the row's identity.
	
	// v_query - the query definition:
	// v_query.getEncodedQuery() - encoded querystring
	// v_query.getCondition(field) - encoded querystring for the given field (includes field name, operator, and value)
	// v_query.getParameter(field) - parameter for the given field (only includes value for equality conditions)
	// v_query.isGet() - whether the query is a single get by sys_id
	// v_query.getSysId() - parameter for sys_id field
	// v_query.isTextSearch() - whether the query contains a text query parameter
	// v_query.getTextSearch() - text search query parameter (internal field name 123TEXTQUERY321)
	// v_query.getFirstRowWanted() - the first row to include, don't use with caching
	// v_query.getLastRowWanted() - the last row to include, don't use with caching
	// v_query.setLastErrorMessage(message) - the message is visible from GlideRecord.getLastErrorMessage()
	
	// Sample code:
	// try {
	// retrieve-rows-from-external-system; // if (there-was-an-error) {
	// var message = ...; // v_query.setLastErrorMessage(message);
	// return;
	// }
	//
	// for (var row in rows) {
	// v_table.addRow(row);
	// }
	// } catch (ex) {
	// var message = ex.getMessage();

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Script definition	Description

	`//  v_query.setLastErrorMessage(message);`
	`// }`
	
	`})(v_table, v_query);`

Insert	The insert script definition adds a record to the external source. This script definition is available only if you selected the advanced **Editable** option. From the Insert section, customize the script using the *v_record* API.
	
	Every time a record is added to a remote table, the associated insert scripts runs.
	
	`function executeInsert(v_record) {`
	`// Parameters:`
	`//  v_record is a map of field names and values containing the sys_id of the`
	`//  record and the fields that need to be inserted in the record on the`
	`//  remote system (source of data)`
	
	`//  v_record.<field_name>  - fields in the remote table GlideRecord`
	`//  v_record.setLastErrorMessage(message)  - signal an error`
	
	`// Sample code:`
	`// try {`
	`//  update-external-system;`
	`//  if (there-was-an-error) {`
	`//  var message = ...;`
	`//  v_record.setLastErrorMessage(message);`
	`//  }`
	`// } catch (ex) {`
	`//  var message = ex.getMessage();`
	`//  v_record.setLastErrorMessage(message);`
	`// }`
	`})(v_record);`

Update	The update script definition modifies a record in the external source. This script definition is available only if you selected the advanced **Editable** option. From the Update section, customize the script using the *v_record* API. Every time a record is updated in a remote table, the associated update scripts runs. **Note:** If multiple users update the same record at the same time, the value on the remote system is from the last update call executed. `(function executeUpdate(v_record, v_changed_fields) {`

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Script definition	Description

	// Parameters:
	// v_record - a map of field names and values containing the sys_id of the record
	// v_record.<field_name> - fields in the remote table GlideRecord
	// v_record.setLastErrorMessage(message) - signal an error
	// v_changed_fields - a map of field names and values containing the sys_id of the record
	// v_changed_fields.<field_name> - changed fields in the remote table GlideRecord
	
	// Sample code:
	// try {
	// update-external-system;
	// if (there-was-an-error) {
	// var message = ...;
	// v_record.setLastErrorMessage(message);
	// }
	// } catch (ex) {
	// var message = ex.getMessage();
	// v_record.setLastErrorMessage(message);
	// }
	})(v_record, v_changed_fields);

Delete	The delete script definition removes a record from the external source. This script definition is available only if you selected the advanced **Editable** option. From the Delete section, customize the script using the *v_record* API.
	
	Every time a record is deleted from a remote table, the associated delete scripts runs.
	
	(function executeDelete(v_record) {
	// Parameters:
	// v_record - a map of field names and values containing (among others) the
	// sys_id of the record that needs to be deleted on the remote system
	// v_record.<field_name> - fields in the remote table GlideRecord
	// v_record.setLastErrorMessage(message) - signal an error
	
	// Sample code:
	// try {
	// update-external-system;
	// if (there-was-an-error) {
	// var message = ...;
	// v_record.setLastErrorMessage(message);
	// }
	// } catch (ex) {
	// var message = ex.getMessage();
	// v_record.setLastErrorMessage(message);

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Script definition	Description
	`// }` `})(v_record);`

6. Select **Submit**.

Example 1: Retrieving all incident records from an external source

These are examples of script definitions you might create for retrieval and caching of data from sources external to your current instance. In this first example, we create a script to load all incident records from an external source.

For Remote Table API information, refer to:

- v_query – Scoped, Global
- v_record - Scoped, Global
- v_table – Scoped, Global

```
/**
 * Using `v_query`, add the rows to `v_table`
 */
(function executeQuery(v_table, v_query) {
 fetchAllIncidents(v_table, v_query);
 /**
 * fetch all incidents records from the remote instance
 */
 function fetchAllIncidents(v_table, v_query) {
  // Uses RestMessage with name 'Remote Instance Incidents' and function 'All Incidents'
  // Create a RestMessage first which calls an external REST service
  try {
   var restMessage = new sn_ws.RESTMessageV2('Remote Instance
Incidents', 'All Incidents');
   var response = restMessage.execute();
   var responseBody = response.getBody();

   // if REST call ends up in an error, set the last error message which shows up
   // at the bottom of the list view
   if (response.haveError()) {
    v_query.setLastErrorMessage(response.getErrorMessage());
    // can use gs.error() or gs.addErrorMessage() while debugging
    // gs.debug() messages visible in session debugger
    // gs.debug(response.getErrorMessage());
    return;
   }
  } catch (ex) {
   v_query.setLastErrorMessage(ex.message);
   // gs.debug(ex.message);
   return;
  }
  var transformerDefinition = getTransformerDefinition();
  var transformer = new
 sn_tfrm.Transformer(transformerDefinition, responseBody);
  // transformer parses the responseBody and extracts rows
  while (transformer.transform()) {
   // row is field-value map e.g. { active:"true", number: "INC0000001"}
```

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```
    var row = transformer.getRow();
    // you may do any additional transformations to the row like GlideDuration, GlideDataTime
etc. For example,
    // row.duration = new GlideDuration(row.duration);
    // finally add the row to the remote table
    v_table.addRow(row);
   }
  }
  /**
  * returns a sn_tfrm.TransformerDefinition, which defines the mapping of the table fields and
elements in the response body
  */
  function getTransformerDefinition() {
   // create a rule list to map a field to its element path
   var ruleList = new sn_tfrm.TransformerRuleList()
    .fromJSON()  // the response body is a JSON
    // 'active' field maps to path '$.active'
    .addRule("active", "$.active")
    .addRule("caller_id", "$.caller_id.value")
    .addRule("number", "$.number")
    .addRule("short_description", "$.short_description")
    .addRule("sys_id", "$.sys_id")
    .addRule("updates", "$.sys_mod_count");
   var recordPath = "$.result";
   return new sn_tfrm.TransformerDefinition(ruleList, recordPath);
  }

})(v_table, v_query);
```

These code snippets are of note in this script:

```
function fetchAllIncidents(v_table, v_query) {
  // Uses RestMessage with name 'Remote Instance Incidents' and
 function 'All Incidents'
  // Create a RestMessage first which calls an external REST
 service
  try {
   var restMessage = new sn_ws.RESTMessageV2('Remote Instance
 Incidents', 'All Incidents');
   var response = restMessage.execute();
   var responseBody = response.getBody();

   // if REST call ends up in an error, set the last error
 message which shows up
   // at the bottom of the list view
   if (response.haveError()) {
    v_query.setLastErrorMessage(response.getErrorMessage());
    // can use gs.error() or gs.addErrorMessage() while
 debugging
    // gs.debug() messages visible in session debugger
    // gs.debug(response.getErrorMessage());
    return;
   }
  } catch (ex) {
   v_query.setLastErrorMessage(ex.message);
   // gs.debug(ex.message);
```

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```
    return;
  }
```

You can create a RestMessage and directly use it in the script. In this example, it uses a RESTMessageV2 API with the name of `Remote Instance Incidents`, and the function `All Incidents`, which gets all incident data. Once a response is returned from the server, an error message appears if problems are encountered in the data retrieval.

Note:
To learn more about use of RESTMessageV2 and how to define a direct message, see RESTMessageV2 - Scoped, Global and Direct RESTMessageV2 example.

If no problems are encountered in the data retrieval, it gets the data body for the records.

```
  var transformerDefinition = getTransformerDefinition();
  var transformer = new
sn_tfrm.Transformer(transformerDefinition, responseBody);
  // transformer parses the responseBody and extracts rows
  while (transformer.transform()) {
    // row is field-value map e.g. { active:"true", number:
"INC0000001"}
    var row = transformer.getRow();
    // you may do any additional transformations to the row like
GlideDuration, GlideDataTime etc. For example,
    // row.duration = new GlideDuration(row.duration);
    // finally add the row to the remote table
    v_table.addRow(row);
```

It then uses the Transformer API to perform any required data transformations, extracts rows, and then adds a row for each record to the remote table.

```
/**
  * returns a sn_tfrm.TransformerDefinition, which defines the
 mapping of the table fields and elements in the response body
  */
 function getTransformerDefinition() {
  // create a rule list to map a field to its element path
  var ruleList = new sn_tfrm.TransformerRuleList()
    .fromJSON() // the response body is a JSON
    // 'active' field maps to path '$.active'
    .addRule("active", "$.active")
    .addRule("caller_id", "$.caller_id.value")
    .addRule("number", "$.number")
    .addRule("short_description", "$.short_description")
    .addRule("sys_id", "$.sys_id")
    .addRule("updates", "$.sys_mod_count");
  var recordPath = "$.result";
  return new sn_tfrm.TransformerDefinition(ruleList,
 recordPath);
 }

})(v_table, v_query);
```

`getTransformerDefinition` defines the schema of the record in the external API response body. It maps each of the fields in the table script to an element in the external record. Any external data elements outside of this mapping are not supported or retrieved.

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Note:
You must map a sys_id in the transformer definition to an element in the external data. In this case, the sys_id is mapped to the external incident sys_id. The maximum length of the sys_id is 32 characters. You do this sys_id mapping so forms that use the external data can operate properly.

Related topics

Debugging remote table script definitions

TransformerDefinition API - Scoped, Global

TransformerRuleList API - Scoped, Global

TransformerScripted API - Scoped, Global

Example 2: Retrieving specific records from a third-party source

In this example, we create a script to retrieve specific types of incident records from a third-party source.

For Remote Table API information, refer to:

- v_query – Scoped, Global
- v_record - Scoped, Global
- v_table – Scoped, Global

```
/**
 * Using `v_query`, add the rows to `v_table`
 */
(function executeQuery(v_table, v_query) {
 if (v_query.isGet()) {
  bySysId(v_table, v_query, v_query.getSysId());
 }
 else if (v_query.getParameter("caller_id")) {
  byCallerId(v_table, v_query, v_query.getParameter("caller_id"));
 }
 else {
  fetchAllIncidents(v_table, v_query);
 }
 /**
 * fetch all incidents records from the remote instance
 */
 function fetchAllIncidents(v_table, v_query) {
  // Uses RestMessage with name 'Remote Instance Incidents' and function 'All Incidents'
  // Create a RestMessage first which calls an external REST service
  var restMessage = new sn_ws.RESTMessageV2('Remote Instance
Incidents', 'All Incidents');
  loadData(v_table, v_query, restMessage);
 }
 /**
 * fetches a specific record from the remote instance with Sys Id being `sys_id`
 */
 function bySysId(v_table, v_query, sys_id) {
  // Uses RestMessage with name 'Remote Instance Incidents' and function 'By SysId'
  var restMessage = new sn_ws.RESTMessageV2('Remote Instance
Incidents', 'By SysId');
  // sets variable 'sys_id'
  restMessage.setStringParameterNoEscape("sys_id", sys_id);
```

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```
  loadData(v_table, v_query, restMessage);
 }
 /**
 * fetches records from the remote instance with Caller (caller_id) being `caller_id`
 */
 function byCallerId(v_table, v_query, caller_id) {
  var restMessage = new sn_ws.RESTMessageV2('Remote Instance
Incidents', 'By CallerId');
  restMessage.setStringParameterNoEscape("caller_id", caller_id);
  loadData(v_table, v_query, restMessage);
 }
 /**
 * Adds rows to `v_table` using `restMessage`
 */
 function loadData(v_table, v_query, restMessage) {
  try {
   var response = restMessage.execute();
   var responseBody = response.getBody();

   // if REST call ends up in an error, set the last error message which shows up
   // at the bottom of the list view
   if (response.haveError()) {
    v_query.setLastErrorMessage(response.getErrorMessage());
    // can use gs.error() or gs.addErrorMessage() while debugging
    // gs.debug() messages visible in session debugger
    // gs.debug(response.getErrorMessage());
    return;
   }
  } catch (ex) {
   v_query.setLastErrorMessage(ex.message);
   // gs.debug(ex.message);
   return;
  }
  var transformerDefinition = getTransformerDefinition();
  var transformer = new
 sn_tfrm.Transformer(transformerDefinition, responseBody);
  // transformer parses the responseBody and extracts rows
  while (transformer.transform()) {
   // row is field-value map e.g. { active:"true", number: "INC0000001"}
   var row = transformer.getRow();
   // you may do any additional transformations to the row like GlideDuration, GlideDataTime
etc. For example,
   // row.duration = new GlideDuration(row.duration);
   // finally add the row to the remote table
   v_table.addRow(row);
  }
 }
 /**
 * returns a sn_tfrm.TransformerDefinition, which defines the mapping of the table fields and
elements in the response body
 */
 function getTransformerDefinition() {
  // create a rule list to map a field to its element path
  var ruleList = new sn_tfrm.TransformerRuleList()
   .fromJSON()  // the response body is a JSON
   // 'active' field maps to path '$.active'
   .addRule("active", "$.active")
```

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```
    .addRule("caller_id", "$.caller_id.value")
    .addRule("number", "$.number")
    .addRule("short_description", "$.short_description")
    .addRule("sys_id", "$.sys_id")
    .addRule("updates", "$.sys_mod_count");
  var recordPath = "$.result";
  return new sn_tfrm.TransformerDefinition(ruleList, recordPath);
 }
})(v_table, v_query);
```

These code snippets are of note in this script:

```
function fetchAllIncidents(v_table, v_query) {
  // Uses RestMessage with name 'Remote Instance Incidents' and
 function 'All Incidents'
  // Create a RestMessage first which calls an external REST
 service
  var restMessage = new sn_ws.RESTMessageV2('Remote Instance
 Incidents', 'All Incidents');
  loadData(v_table, v_query, restMessage);
 }
```

You can create a RestMessage and directly use it in the script. In this example, it uses a RESTMessageV2 API with the name of `Remote Instance Incidents`, and the function `All Incidents`, which gets all incident data. Once a response is returned from the server, an error message appears if problems are encountered in the data retrieval.

```
 function bySysId(v_table, v_query, sys_id) {
  // Uses RestMessage with name 'Remote Instance Incidents' and
 function 'By SysId'
  var restMessage = new sn_ws.RESTMessageV2('Remote Instance
 Incidents', 'By SysId');
  // sets variable 'sys_id'
  restMessage.setStringParameterNoEscape("sys_id", sys_id);
  loadData(v_table, v_query, restMessage);
 }
```

When you query a specific record using `GlideRecord.get("<sys_id>")`, then `v_query.isGet()` is `true`. It fetches the specific record from the external service.

```
function byCallerId(v_table, v_query, caller_id) {
  var restMessage = new sn_ws.RESTMessageV2('Remote Instance
 Incidents', 'By CallerId');
  restMessage.setStringParameterNoEscape("caller_id",
 caller_id);
  loadData(v_table, v_query, restMessage);
 }
```

You can also handle any other specific query conditions in the script, such as using `caller_id` in the preceding code snippet. The remainder of this script operates in a manner similar to Example 1.

```
 function getTransformerDefinition() {
  // create a rule list to map a field to its element path
  var ruleList = new sn_tfrm.TransformerRuleList()
    .fromJSON() // the response body is a JSON
    // 'active' field maps to path '$.active'
    .addRule("active", "$.active")
```

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```
    .addRule("caller_id", "$.caller_id.value")
    .addRule("number", "$.number")
    .addRule("short_description", "$.short_description")
    .addRule("sys_id", "$.sys_id")
    .addRule("updates", "$.sys_mod_count");
  var recordPath = "$.result";
  return new sn_tfrm.TransformerDefinition(ruleList,
 recordPath);
 }
})(v_table, v_query);
```

If no problems are encountered in the data retrieval, it gets the data body for the records. It then uses the Transformer API to perform any required data transformations, extracts rows, and then adds a row for each record to the remote table.

`getTransformerDefinition` defines the schema of the record in the external API response body. It maps each of the fields in the table script to an element in the external record. Any external data elements outside of this mapping are not available in the remote table.

Example 3: Insert a record in an external source

In this example, we create a script to insert an incident record into the external source.

For Remote Table API information, refer to:

- v_query – Scoped, Global
- v_record - Scoped, Global
- v_table – Scoped, Global

```
(function executeInsert(v_record) {
 var gr = new GlideRecord("incident");
 gr.setNewGuidValue(v_record.sys_id);

 delete v_record["sys_id"];
 gr.number = v_record.u_number;
 gr.short_description = v_record.u_short_description;
 if (!gr.insert()) {
  v_record.setLastErrorMessage("Error on insert: " +
 gr.getLastErrorMessage());
 }
})(v_record);
```

Example 4: Update a record in an external source

In this example, we create a script to update an incident record in the external source.

Note:
If multiple users update the same record at the same time, the value on the remote system is from the last update call executed.

For Remote Table API information, refer to:

- v_query – Scoped, Global
- v_record - Scoped, Global
- v_table – Scoped, Global

`v_changed_fields` is a map of changed field names and values.

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```
(function executeUpdate(v_record, v_changed_fields) {

 var gr = new GlideRecord('incident');
 if (gr.get(v_changed_fields.sys_id)) {
  Object.keys(v_changed_fields).map(function(k) {
    switch (k){
    case "u_number" :
     gr.number = v_changed_fields.u_number;
     break;
    case "u_short_description" :
     gr.short_description =
 v_changed_fields.u_short_description;
     break;
   }
  });
 gr.update();
} else {
 v_record.setLastErrorMessage("Missing record to update, " +
 v_changed_fields.sys_id);
}

})(v_record, v_changed_fields);
```

Example 5: Delete a record in an external source

In this example, we create a script to delete an incident record from the external source.

For Remote Table API information, refer to:

- v_query – Scoped, Global
- v_record - Scoped, Global
- v_table – Scoped, Global

```
(function executeDelete(v_record) {

     var gr = new GlideRecord('incident');
     if (gr.get(v_record.sys_id)) {
         gr.deleteRecord();
     } else {
         v_record.setLastErrorMessage("Record not found");
     }
 })(v_record);
```

Create a flow definition for a remote table

Build and create a flow for a remote table so that you can retrieve data from an external source with it.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Remote Tables** > **Definition**.
   A list of all remote tables definitions shows up.
2. Click **New** to create a new flow definition.

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3. On the form, fill in the fields.

Control	Description
Name	Name of the script that you are creating to associate with the selected remote table.
Table	Name of the remote table that you want to associate the script that you are creating. ○ For a remote table in a scoped application, the name is prefixed with a namespace identifier and the string `st_` to indicate that it's remote and part of an application. ○ For a remote table in the global application, the name is prefixed with the string `u_st_`.
Flow	Option to build and define your own flow by leveraging the existing functions. Configure the mapping of the flow and tie it to thee required remote table. When the remote table is queried, the flow is triggered and the data is retrieved. See Defining the flow for more information. **Note:** The Script section doesn't show up when the **Flow** field has an entry.
Application	Application that is associated with this remote table. If you are working on an application or are creating a remote table from an application record, the field defaults to that application. Otherwise, the field defaults to **Global**. Any records that are created from the table record, such as modules and security rules, are assigned to this application by default.
Active	Option for activating the script that you are associating with the remote table. You can have multiple inactive script definitions for a remote table, but can only have one active script definition.
Advanced	Option to access the Caching section to designate how the memory caching should operate in the ServiceNow AI Platform for this remote table. **Note:** Only advanced users should set caching parameters for a remote table.

4. In the Caching section, designate how this data is cached and how long the data is cached in the memory of the ServiceNow AI Platform:

Field	Description
Cache TTL	Cache time to live, expressed in seconds, that external data is cached in memory for this remote table script definition. For example, enter 300 to cache the data in the memory for 5 minutes. The maximum value you can enter is 60 minutes (3600 seconds).
Enhanced Capacity	Option to select the enhanced capacity to support more than 1000 rows in a remote table.

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Field	Description
	Note: If the data size that is retrieved from the external source is small, use the 1000 rows default limit in a remote table to minimize query times. You can select the **Enhanced Capacity** field if the retrieved data size is large and can be less performative.

Note:
By default, the external data is cached in the memory by user.

5. Click **Submit**.

Define a flow logic

Set the triggers and actions to define a remote table flow logic.

Before you begin
Role required: admin

Procedure

1. Select the **Flow** field on the flow definitions form.
   The Flow properties dialog box shows up.
2. Set the **Trigger** and link the required remote table.
   For the set trigger, the flow pills get created in the right nav.
3. Set the action items in the Create Remote Table Record section.

   a. Set the Action as Create Remote Table Record.

   b. Drag and drop the Query ID pill from the right nav.

   Note:
   The Query ID is the id of the query that triggered the execution of the flow. It is a mandatory step to pass the Query ID to the Create Remote Table Record action to associate the Trigger to the Action.

   c. Select **Done** to save the action.

4. **Optional:** Add conditions to the flow logic if you want to create a different flow path.

   a. Fill up the Condition Label field.

   b. Set the condition by dragging and dropping the Query Parameter pill from the right nav.

   c. Select the add function icon next to the Query Parameter pill to add specifics.
   The Search Transform Functions dialog box shows up.

   d. Go to **Utilities** and select the next function depending on the Query Parameter type.

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For example, if the condition is set to search for a name, you can go to **Utilities** > **Get Item from Name/Values**. Fill up the **Key** details and select **Apply**. The **Key** field needs to specify the parameter you are looking for.

Note:
Ensure that the **Key** is the same as the Column name and not the Label name.

5. **Optional:** Add a log to the flow logic.
   a. Select Log as the **Action** and select a **Level**.
   b. Set the Message field by dragging and dropping the Query Parameter pill from the right nav.
   c. Select **Done** to create logs for the set condition.

Debugging remote table script definitions

You can enable session debugging for remote table script definitions. To enable script definition logging in a session debug log, set the *glide.script.vtable.log.debug* property to **true**.

When you create remote table script definitions, you can use the `gs.debug()` command to add debug logs that are visible in the session debugger. The session debugger also contains debug logs with [RemoteTable] tags, each with the following information:

- Query definition
- Number of rows loaded in the remote table
- Number of aggregate rows `(if GlideAggregate)`

Prolonged use of the *glide.script.vtable.log.debug* property can affect performance, so it is best to set its value to **false** when you finish a debugging session.

Note:
If you are not on the application node that processed your remote table script, you may not see the resulting log statements. In this case, contact Technical Support.

Use the *v_query.setLastErrorMessage(message)* API to set the last error message that appears at the bottom of the list view. In script, you can retrieve this message using the *glideRecord.getLastErrorMessage()* API. To learn more about these APIs, see Text-To-Display.

Related topics

Available system properties

Script Debugger and Session Logging

Domain separation and remote tables

Domain separation is unsupported in remote tables. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: No support

- The domain field may exist on data tables but there is no business logic to manage the data.
- This level is not considered domain-separated.

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

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Domain Separation Overview

Domain separation provides complete data isolation for domain-specific users.

How domain separation works with remote tables

When you create standard internal tables, you can add a sys_domain field, which results in domain separation of the data that is stored in the table. This functionality is not supported when you natively create remote tables, which results in lack of domain separation for rows that are added to a remote table.

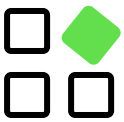
However, script definitions that you create and associate with a remote table can be domain (data) separated. When you create the script, you can include DomainSupport APIs that provide domain separation support. If the script definition is domain separated, only users that belong to the designated domain can view the data in the remote table.

Related topics

- Create script definitions for a remote table
- Domain separation

Manage content capabilities

Handle all the necessary aspects of document and knowledge base management for your enterprise with several ServiceNow products.

Document Services	Knowledge Management	Response templates
		
Create, maintain, and update your documents with this suite of products available for your instance.	Create and share knowledge articles, and provide information for user self-help and troubleshooting.	Leverage reusable text to display standard chat response messages to requesters in Agent Chat.

Document Services

Take care of all your documentation through ServiceNow® Document Services. Get storage space and tracking for large amounts of documents with Document Management. Examine files up to 50 MB without downloading, by using Document Viewer. Access to electronic documents is easily controlled through Managed Documents, with adjustable user parameters. Integrate third-party providers for document handling, including Microsoft OneDrive, Microsoft Entra ID, and more.

Knowledge Management

Keep your users up to date with knowledge bases crafted to fit with your ServiceNow instance. The Knowledge Management plugin enables sharing of articles for task resolution, self-help, troubleshooting, and any other information pertinent to your enterprise. Create and maintain

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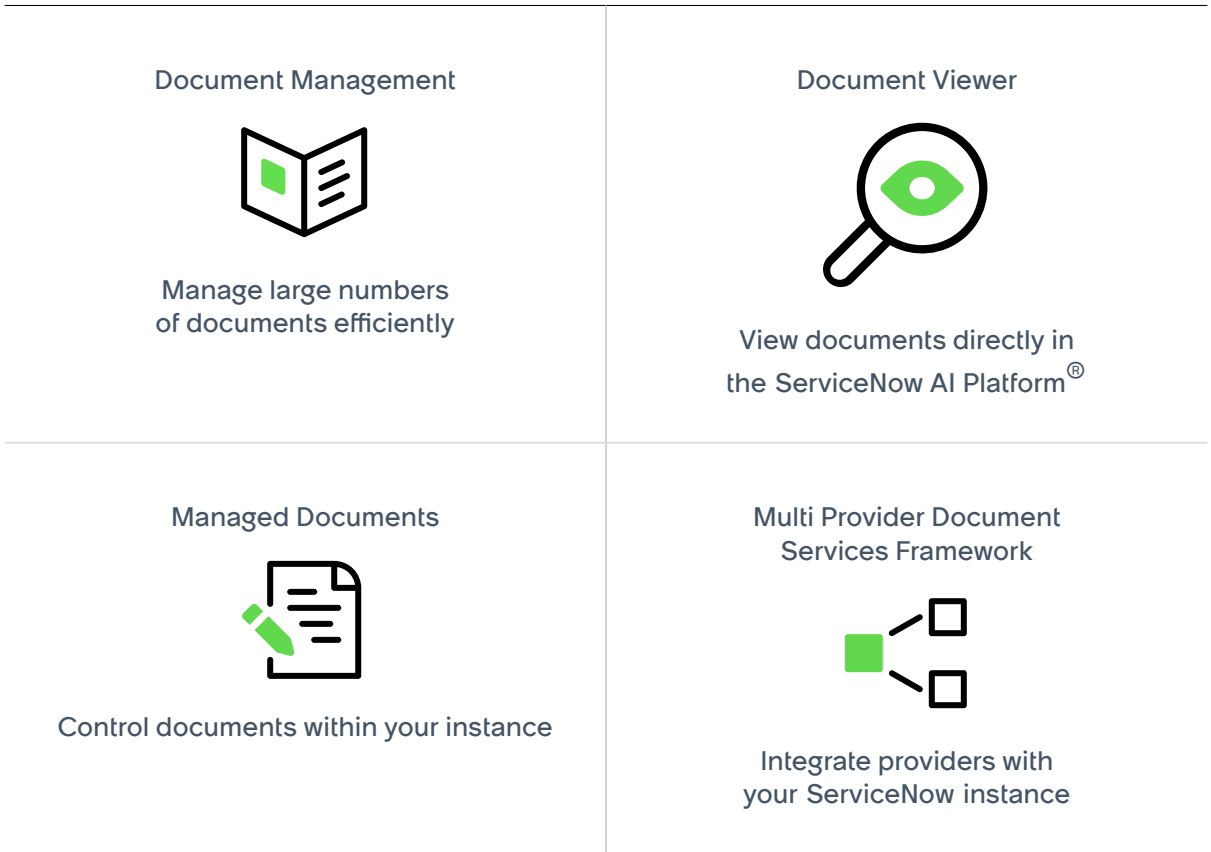
articles, control access for reading, contribution, and feedback, and delegate administrative roles as needed for multiple groups and separate workflows.

Response templates

Resolve cases or support issues faster and more efficiently with response templates, which are reusable snippets of text. Use response templates in Agent Chat sessions to provide quick and consistent messages to your users.

Document Services

Document Services provides a broad range of services related to document management, creation, maintenance, and conversion, and integrating with third parties such as Microsoft SharePoint.



Document Management

Manage large numbers of documents efficiently. Document Management provides storage space and a tracking system to easily upload, retrieve, and delete documents.

Document Viewer

View documents directly in the ServiceNow AI Platform® rather than having to download them. Document Viewer supports viewing various file types in the platform. The maximum document file size is 50 MB. Enable#Document Viewer and the tables you want to use with it at the instance level.

Managed Documents

Control electronic documents within your instance. Documents can move through the managed document cycle after the parameters have been set by the administrator and the Knowledge Document plugin installed.

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Multi Provider Document Services Framework

Integrate providers with your ServiceNow instance to store files, upload, add versions, and download information with document providers.

- Upgrade to Zurich
- Developer training
- Domain separation and Document Management

Document generation apps

- PDFGenerationAPI API
- Document API
- DocumentListService API
- DocumentService API

Troubleshoot and get help

- Ask or answer questions in the Platform community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Document Management

The Document Management applications allows management of large numbers of documents efficiently. With the Document Management application, you can create, share, upload, track, and manage documents throughout the life-cycle of the workflow.

Get started

Explore Explore Document Management	Activate Activate Document Management	Access Access Document Management
Use Use Document Management	Reference Reference Document Management	

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Troubleshoot and get help

- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring Document Management

With the ServiceNow® Document Management application, you can manage large numbers of documents efficiently. Easily upload, retrieve, share and delete documents.

Document Management overview

With the Document Management application, you can create, upload, track and manage documents throughout the lifecycle of the workflow.

Use the document repository to easily upload, retrieve, share, delete and sign documents. Documents can also be linked to other records in the system.

https://player.vimeo.com/video/1083888930?h=085b783dc8&badge=0&autopause=0&player_id=0&app_id=58479

Document Management benefits

Benefit	Feature
Classify documents for organization. Share documents to collaborate with internal and external users.	Document repository
Secure your documents by limiting who can access them. Share documents with selected users and user groups who have Reader, Writer, and Owner permissions.	Document security and access
Maintain versions of documents. Versions can be a file or a URL.	Document versions
Link a document record to other records, which can be any other table or record on the platform.	Document references
Link documents to other records on the platform.	Linking documents to a parent record
Create document lists and add multiple documents to a single list.	Document Management lists
Include documents in activity streams to include and track updates on attached documents to any record.	Document attachments in an activity stream
Send documents for review and approval before publishing.	Document approval and publish process
Digitally sign PDF documents by using your Personal Identity Verification (PIV) or Common Access Card (CAC) card.	Digital signature for PDF documents using CAC or PIV smart cards
Integrate Document Management with external cloud providers for editing, sharing and collaborating on documents.	Document Management integration with external content providers
Redact sensitive data from documents.	Redact sensitive data from documents

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Document Management plugin

With the ServiceNow® Document Management plugin (**com.snc.platform_document_management**), you can create documents, manage large numbers of documents efficiently, and track each version. The plugin is independent, with no dependencies on existing plugins and has been built on the existing **sys_attachment** framework.

Overview

There are Document Management roles the system admin can assign to maintain the lifecycle of documents. The system admin installs the plugin and then assigns one or more of these roles to users.

The system admin installs the Document Management plugin (**com.snc.platform_document_management**).

The application contains four modules:

- Documents
- References
- Lists
- List Entries

Activate Document Management

Activate the Document Management plugin.

Before you begin

Role required: admin

About this task

The following items are installed with Document Management:

- Roles
- Tables

For more information, seeComponents installed with Document Management.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Document Management plugin (com.snc.platform_document_management) using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

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Document security and access

Document access permissions for users and groups provide you with security for your documents.

Owner access to documents

By default, the document owner has all privileges to the document and can do the following:

- Update the document parameters
- Upload document versions
- Create document references
- Share a document with other users
- Delete a document

Note:

If the document owner changes, the new owner obtains all rights to the document and the previous owner loses access. If the previous owner wants to keep access to the document, the document should be shared instead of transferring owner access.

Document access settings

You can access documents through three different settings.

Document access settings

Access	Description
By referenced records	When a document is referenced to a parent record, any user with access to the parent record has access to the document.
Admin access	All document users with admin access can access the document.
Shared permissions	Enables sharing a document with other users as Reader, Writer, or Owner at different permission levels such as: • User Permissions • Group Permissions • Role Permissions • User Criteria Permissions

Sharing permissions and roles

Users can give permissions to other users based on their own access to the document. The permission levels are:

- Owner
- Writer
- Reader

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To share documents with other users and groups you must have write access to the document record and roles to share at different levels.

Sharing permissions and roles

Sharing permissions	User permissions required	Role required
User Permissions	All users even if they don't have a role assigned	No role required. All users can share documents with other user
Group Permissions	Writers and Owners can assign access based on their access permissions	dm_user_group_read
Role Permissions	Writers and Owners can assign access based on their access permissions	dm_user_role_read
User Criteria Permissions	Writers and Owners can assign access based on their access permissions	dm_user_criteria_read

Share documents with users

Assign Reader, Writer or Owner permissions to users to enable them to read, download, update, or delete documents.

Before you begin
Role required: none

About this task
User permission is assigned to all users, even if they don't have a role assigned.

Procedure

1. Navigate to **Documents** > **Documents**.
2. Open the document record.
3. Select the **Sharing Permissions** check box.
4. Select the **User Permissions** tab.
5. Select **New** and select the permission level from the drop-down list.
6. Select the record for the user you want to assign permission to.
7. Click **Submit**.

Share documents with groups

As a Writer or Owner, assign access to user groups based on your access permissions.

Before you begin
Role required: dm_user_group_read

Procedure

1. Navigate to **Documents** > **Documents**.
2. Open the document record.
3. Select the **Sharing Permissions** check box.

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4. Select the **Group Permissions** tab.
5. Select **New** and select the permission level from the drop-down list.
6. Select the user group you want to assign permission to.
7. Click **Submit**.

Share documents with roles

As a Writer or Owner, assign access and permissions based on user roles.

Before you begin

Role required: dm_user_role_read

Procedure

1. Navigate to **Documents** > **Documents**.
2. Open the required document record.
3. Select the **Sharing Permissions** check box.
4. Select the **Role Permissions** tab.
5. Select **New** and select the permission level from the drop-down list.
6. Select the user role you want to assign permission to.
7. Click **Submit**.

Share documents with user criteria

As a Writer or Owner assign access to a document based on the user criteria permissions.

Before you begin

Role required: dm_user_criteria_read

Procedure

1. Navigate to **Documents** > **Documents**.
2. Open the document record.
3. Select the **Sharing Permissions** check box.
4. Select the **User Criteria Permissions** tab.
5. Select **New** and select the permission level from the drop-down list.
6. Select the user criteria you want to assign permission to.
7. Click **Submit**.

Using Document Management

Use Document Management to easily upload, retrive, share, publish, and delete documents.

Document repository

In the Document Management application, you can create, view, update, share documents in the document repository. When new documents are created, they're placed into a record with metadata such as name, description, type, and so on. The record contains all the versions of the document so you can track and update the documents.

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You can access the document by opening one of its versions. A document can contain numerous versions. The document record contains references to the documents and not contain actual document files.

When you want to add a document to a record, upload it as an attachment. Each time you update the document, you can create a new version. Alternatively, you can provide the link to a document in the URL field. You can include the review and approval workflow before publishing a document.

You can generate and share the document link with authorized users for collaboration or to include the link on any page. The default version of the shared document will have public access and can be accessed by anyone within or outside the organization.

Create a document record

Create document records and include default versions for the documents.

Before you begin

Role required: none

Procedure

1. Navigate to **All** > **Documents** > **Documents**.
2. Select **New**.
3. On the form, fill in the fields.

New document record fields

Field	Description
Name	Name of the document.
Owner	Name of the document owner.
Reviewers	Name of the reviewers if any.
Template	Option to determine whether the document is a template.
Department	Name of the department that created the document.
Type	The type of document based on the content: guideline, policy, procedure, or contract.
Classification	Classification of the document: public, restricted, or confidential.
Audience	Audience of the document, either internal or external. **Note:** The **Audience** field is hidden in the default view.
State	The state the document is in: Draft, Submit, Review, or Complete.
Description	A brief description about the document.

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Field	Description
Default Version	The document version that is used for document download. By default, the latest version is the default version.

4. Select the access setting.
5. Select **Submit**.

Document versions

In the ServiceNow® Document Management application, documents display as versions in the record. You view these versions as a related list within the document record. A document can have many versions.

The term "document" refers to the container record that holds document information such as its name, description, type and other metadata. While the document record doesn't contain the actual document file, it does contain versions in the record, which you can open, update, and track.

Use the Attachment icon (📎) to add documents to a record.

Alternatively, you can provide the link to a document in the URL field. You then access the actual documents by selecting the versions in the related list.

Document version review and approval

All approver and reviewer users have read access to the documents that they're approving.

A document can have a reviewer or multiple reviewers and no approvers and vice versa. Users with admin and platform_document_management_admin roles have the option to create approval and review rules.

Document owners have the option to:

- Initiate approval and review workflow for a document version.
- Publish the approved version.
- See the activity stream of the approval and review workflow.
- Track the document **Version State**.

For multiple document versions, the latest reviewed and approved version gets published and the previous versions are retired.

Create a document version

Create a document version for each document.

Before you begin

Role required: none

Procedure

1. Navigate to **All** > **Documents** > **Documents** and click the document record.
2. Scroll down to **Versions** tab.

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3. Select **New**.
4. Select the file type you want to upload and add any information related to the file under **Notes**.
   - To upload a file, select **Attachment**, select the file icon, and select the file.
   - To link to a document, select **URL** and provide the link.
5. Select **Submit**.
6. To submit the version for review and approval, go back and select the version and select **Submit Version**.

Compare document versions

Document version comparison enables you to view differences between two versions of a document, highlighting changes such as added, removed, or modified content.

Before you begin
Role required: admin

About this task
In the navigation filter, enter `sys_property.list` and ensure *`glide.documents.compare.enabled`* property is set to **true**.

Procedure
1. Create an experience for UI Builder, if an experience is already created, go to Step 5.
2. Create a page from a template.
3. Go to created page template and select **Use template**.
4. Go to home page, select **Workspaces**.
5. Select the workspace and the record.
6. Select the **Documents** tab, select the document from the list of documents.
7. Select the **Versions** tab.
8. Select the **Compare** button.
9. Select the **Source version** and the **Target version** you want to compare and select **Compare**.

   Note:
   Both the versions must be in the same format. Only .doc and .docx formats are supported.

10. A new **Compare** tab opens up showing the comparison summary with Total changes, Edited, Deleted, and Format changes.
11. You can review the changes and have the option to hide the redlines on the side by selecting **hide redlines**.
12. To download the document, select **Download redlined document** showing the changes.

Download a document

Download an attached document version based on the selected default version.

Before you begin
Role required: none

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About this task

Note:
To download a document, the version file type must be an attachment and not a URL.

Procedure

1. Navigate to **All** > **Documents** > **Documents**.
2. Select the record.
3. Select the **Documents** tab.
4. Select the documents you want to download.
5. In the **Actions on selected rows** drop-down menu, select **Download Document**.

Share a document link

Create and control document sharing based on classification for shared links with public access.

Before you begin

Role required: owner or writer

About this task

The **Share document** button is visible only when the document has a valid default version.

Procedure

1. Navigate to **All** > **Documents** > **Documents**.
2. Select the record that you want to share the document link for.
3. In the record, select **Share** to share the document link.

   Note:
   To restrict the creation and sharing of permalinks based on document classifications go to the system property *com.snc.documents.permalink.allowed_classification* and add the classification type under the property value.

4. For Link Validity, select **Permanent** to keep the link permanently, or select **Expire Link On**, and select the link expiry date.

   Note:
   If a classification that was previously allowed for permalink creation becomes restricted then a new permalink cannot be created for documents if the classification is changed to restricted. But existing permalinks will continue to function until they have reached their expiry date or are explicitly deleted.

5. Select the copy link icon ( ) to copy and share the document link to download the document.

   Important:
   The permalink generated can be accessed publicly irrespective of the document classification.

6. Select **Done**.

Modify a shared link access

Modify the document shared link access to make the link inactive or change the expiration date.

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Before you begin
Ensure that the Permalinks table is added in the related list.

Role required: owner or writer

Procedure
1. Navigate to **All** > **Documents** > **Documents**.
2. Scroll down to the **Documents Permalinks** tab.
3. For the document:
   - To make the link inactive, in the Active column, select **false**.
   - To add or modify the expiry date, in the Expiration column, select the date.

> **Important:**
> The permalink generated can be accessed publicly irrespective of the document classification.

Configure document permissions

Set sharing permissions on external cloud files using document configuration.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Documents** > **Administration** > **Document Configurations**.
2. Select **New**.
3. Enter the **Name**, and the **Order**.
4. Select the provider and the table.
5. Set the conditions to be met.
6. Select **Submit**.
   A new configuration is created under Document Configurations.
7. To set permission rules, select the configuration by clicking on the name.
8. Select **New**.
9. Set the conditions to be met for document access.
10. From **User fields**, select and add fields.
11. Select internal permissions from the Internal Permissions drop down.
12. Select external permissions from the External Permissions drop down.
13. Select **Submit**.

Delete a document link

Delete a shared link to remove existing user access to the document.

Before you begin
Role required: owner or writer

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Procedure

1. Navigate to **All** > **Documents** > **Documents**.
2. Select the record that you want to share the link for.
3. In the record, select **Share Document**.
4. Select the delete icon ( ) to delete the shared link.
5. In the dialog box, select **Delete** to confirm.

Delete documents

Delete documents in the document repository.

Before you begin

Role required: admin with admin access

or

Access permission: owner

or

User: owner

Procedure

1. Navigate to **All** > **Documents** > **Documents**.
2. Either delete a single document or multiple documents.
   - To delete a single document, open the document record and select **Delete**.
   - To delete multiple documents, select the document record entries, and from the Actions on selected rows drop-down menu, select **Delete**.

Document approval and publish process

A reviewer approves or rejects the document. A document can have multiple reviewers. During the approval process, the approver approves or rejects the document. A document goes through the approval process after the review process. A document is published after the review and approval process.

A document can have a reviewer or multiple reviewers and no approvers and vice versa. You must have the platform_document_management_admin or admin role to create approval and review rules.

Users who can create documents have the option to do the following:

- Add approvers and reviewers to a document.
- Initiate the approval and review workflow for a document version.
- Publish the approved version.
- See the activity stream of the approval and review workflow.

All approvers and reviewers have read access to the documents that they're approving.

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Document approval revision rule

The document approval and revision rule is created based on the conditions defined in the condition builder to determine which documents use the approval rule. After the approval rule is saved, reviewers and approvers are added if the conditions in the Condition field are met.

Note:
Document reviewer and approver directly added from the document record aren't added to the Document approval and revision rule.

Document review

If the reviewer rejects the document, the author and owner are notified and the review is canceled. The author, owner, and reviewer should discuss what changes must be made to the document. If the reviewer approves the document, the author and owner are notified that the review was successful, and the document can move to the approval stage. If multiple reviewers are assigned to a document, the first reviewer to act dictates what happens to the document. For example, there are two reviewers, A and B.

If reviewer A acts first and rejects the document, the review process stops and the revision state is set to Canceled. Reviewer B receives a notification email stating that the review was rejected and the status is changed to No Longer Required. If reviewer A acts first and approves the document, the review process stops and the document can move to the approval stage. Reviewer B's status is changed to No Longer Required.

Document approval

After the document has been reviewed, submit the document for approval. If the document doesn't have an approver, the approval process is omitted.

If the final approver approves the document, the author and the owner are notified. After the final approval is successful, the document stage changes to Ready for Publishing in the Document versions list.

If there are multiple approvers, the approval process works in sequence, and multiple approvers can be assigned to a single sequence. For example:

- Sequence 1: Approvers A and B
- Sequence 2: Approvers C and D
- Sequence 3: Approver E

The sequences take place in ascending chronological order, approvers A and B receive the approval request first (approvers C, D, and E aren't part of the process yet). Similar to the review process, the first approver to act within a sequence dictates what happens to the document. If approver A acts first and rejects the document, the approval process stops and the state is set to Canceled. Approver B's status is changed to No Longer Required. If approver A acts first and approves the document, the process stops and approver B's status is changed to No Longer Required. The document then moves to approval sequence 2. After at least one approver in each sequence approves the document, the author and the owner are notified that the document has been approved.

Publish a document

After a document has been created and edited, the revision can be submitted for draft review and final approval. After final approval, the document can be published.

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If the approval and publishing process is repeated, the published revision is retired when the new revision is published. Any workflows running against previous revisions are canceled when the document is published.

Create a document approval revision rule

Create a document approval revision rule for the document review and approval process.

Before you begin

Role required: platform_document_management_admin or admin

Procedure

1. Navigate to **All** > **Documents** > **Approval and Revision Rules**.
2. On the form, fill in the fields.

Approval revision rule form

Field	Description
Name	A unique identifier for the approval rule.
Description	A short description of the approval rule.
Document Conditions	A condition builder that determines which documents use this approval rule.
Active	Activates the rule.

3. Select **Submit**.

Add a reviewer

Add a single or multiple reviewers to the document approval and review rule for document review.

Before you begin

Role required: platform_document_management_admin or admin

About this task

The procedure described in this task applies to newly created records. For existing records, go to the document record, select the additional actions icon (☰) and select **Refresh Approvers and Reviewers** to match the rules and add reviewers.

Note:
Document reviewers can be directly added through the document record but they aren't added to the Document approval and revision rule.

Procedure

1. Navigate to **All** > **Documents** > **Approval and Revision Rules**.
2. Go to the rule that you want to add a reviewer or approvers to.
3. Select the **Reviewers** tab.
4. Select **New**.
5. In the **Reviewer** field, enter the name of the reviewer.

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6. Select **Submit**.
7. Repeat steps 3–6 to add multiple reviewers.

Add an approver

Add a single or multiple approvers to the document approval and review rule for document approval.

Before you begin
Role required: platform_document_management_admin or admin

About this task
The procedure described in this task applies to newly created records. For existing records, go to the document record, select the additional actions icon (☰) and select **Refresh Approvers and Reviewers** to match the rules and add approvers.

> **Note:**
> The document reviewer and approver can be directly added through the document record but they aren't added to the Document approval and revision rule.

Procedure
1. Navigate to **All** > **Documents** > **Approval and Revision Rules**.
2. Go to the rule that you want to add a reviewer or approvers to.
3. Select the **Approvers** tab.
4. Select **New**.
5. In the **Approvers** field, enter the name of the reviewer.
6. In the **Sequence** field, enter the sequence for the approver.

> **Note:**
> The document is sent to approvers in ascending order based on the sequence number entered. If two approvers have the same sequence number, only one approver's approval is needed to move on to the next approver in the sequence or to publish the document if there’s no approver in the sequence.

7. Select **Submit**.
8. Repeat steps 3–7 to add multiple approvers.

Send a document version for review and approval

Send a document version for review and approval before publishing the document.

Before you begin
Role required: none

Procedure
1. Navigate to **All** > **Documents** > **Documents**.
2. Select the document record.
3. Select the version and select **Submit Version**.

Approve or reject a document version

Approve or reject a document version after the review process is complete.

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Before you begin
Role required: approver_user

Procedure

1. Navigate to **All** > **Self-Service** > **My Approvals**.
2. Select the requested document for approval.
3. Select **Approve** to approve the document version or select **Reject** to reject the document version.

Approve or reject a document version through email

Approve or reject a document version request directly from your email.

Before you begin
Role required: approver_user

Procedure

1. Open the approval request email.
2. Select **Click here to approve** to approve the document version or select **Click here to reject** to reject the document version.

Publish a document

Publish a document revision that has been approved.

Before you begin
Role required: none

About this task
After a document has been created and edited, a version can be submitted for draft review and final approval. After the final approval, the document can be published. The published version becomes the default version of the document.

Procedure

1. Navigate to **All** > **Documents** > **Documents**.
2. Select the document record.
3. Scroll down to the **Versions** tab.
4. Select the document version that has been approved.
5. Select **Publish Version**.

Digital signature for PDF documents using CAC or PIV smart cards

Use digital signatures to make the document signing experience seamless and to eliminate manual intervention by using your Personal Identity Verification (PIV) or Common Access Card (CAC) smart card.

CAC or PIV cards

The Common Access Card (CAC) and Personal Identification Verification (PIV) are smart cards used for general identification and authentication of user access. CAC and PIV hold a unique digital certificate and user information such as a photograph, personal identification number (PIN), and signature to identify each user.

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Sign PDF documents

ServiceNow enables you to integrate with Adobe, as well as configure and use PIV or CAC smart cards as an authenticator for digital signing of PDF documents. This integration provides the flexibility to use PIV or CAC cards to safeguard critical and valuable assets.

The Adobe Acrobat Reader desktop application enables you to digitally sign a PDF with CAC or PIV smart cards.

Note:
You should do the following to digitally sign a PDF with CAC or PIV smart cards:

- Install Adobe Acrobat Reader on your desktop.
- Configure your Google Chrome or Mozilla Firefox browser to open downloaded PDFs in Adobe Acrobat Reader.

Document template for digital signature

Digital signing for documents is configured with a document template. You must define document templates and signing workflows for digital signature using smart cards to generate and send auto-filled documents to be signed by different participants.

To configure digital signing for CAC or PIV smart cards, the following must be done:

- Use Document Templates to create and upload a PDF document
- Set up certificates in the sys_ca_certificate table
- Set up a map certificate in the sys_user_certificate table
- Review the *com.snc.pdfsigning.validation.method* property
- Sign and review the PDF document

Install Document Template integration with digital signatures using a smart card

You can install the Document Template integration with Digital Signatures using Smart Cards application (com.sn.dt-digital-signature-smart-card-integration) if you have the admin role.

Before you begin

- Confirm that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Document Template integration with Digital Signatures using Smart Cards application (com.sn.dt-digital-signature-smart-card-integration) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   In the list next to the **Install** button, the versions that are available to you are displayed.
3. Select a version from the list and select **Install**.

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In the Review Installation Details dialog box, any dependencies installed with your application are listed.

4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. Select **Install**.

Set up a document template for signing documents using a CAC or PIV smart card

Set up a document template for PDF using a Common Access Card (CAC) or Personal Identification Verification (PIV) card. Set up certificates to automate and simplify the process of filling, reviewing, and signing a document online.

Before you begin

Adobe Acrobat Reader must be installed on your desktop.

The Document Templates application must be installed. For more information, see Configuring Document Templates.

Role required: sn_doc.admin, sn_doc.reader, or admin

Procedure

1. Create a document template.
   a. Configure a PDF document template.

      Note:
      The **Signing type** field should be **Digital Signature Smart Cards**.

   b. Map fields for the PDF document template

   c. Select **Edit Document Preview** to define the label and placement of the button to submit the signature.

   d. Create participants for the PDF document template.

   e. To map templates to participants, go to the **Template Mapping** tab, select the field name, and add the participant name, and to map fields, select the field from the **Mapping field** drop-down menu.

      Note:
      The text fields can have pre-filled values mapped, and the digital signature field types should be mapped to the participants.

   f. Select **Update**.

   g. Select **Publish**.

2. Set up Certificate-based authentication.
3. Configure your browser settings to automatically open the downloaded PDF documents in Adobe Acrobat Reader.

   For Google Chrome, see PDF download setting for Google Chrome.

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For Mozilla Firefox and Apple Safari, see Configure browser to use the Adobe PDF plug-in to open online PDF files.

4. Configure Adobe Acrobat Reader to add your download location as your Privileged Location.
   a. In Adobe Acrobat Reader, go to **Preferences** > **Security (Enhanced)**.
   b. Select **Add Folder Path** and add your download location as your Privileged Location.
   c. Select **OK**.

What to do next

Sign document templates for PDF documents using CAC or PIV smart card

Assign a custom signing domain for CAC/PIV digital signatures

Improve signing traffic management by assigning a custom domain for CAC/PIV digital signatures by setting an optional system property to override the default *glide.servlet.uri* setting.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Properties** > **All Properties**.
2. Select **New** on the form header.
3. In the **Name** field, enter `com.snc.pdfsigning.uri`.
4. In the **Value** field, enter the custom domain URL.
5. Select and hold (or right-click) the form header and select **Save**.

Property value for digital signature using CAC or PIV smart cards

Specify the method that will be used to identify and validate the user who has signed the PDF using the *com.snc.pdfsigning.validation.method* property.

The property value *com.snc.pdfsigning.validation.method* is used for identifying and validating the user who has signed the PDF. Identifying the user is necessary to validate whether the correct user has signed the PDF. The IT team of a customer can define the way to validate a PDF depending on their policies and issued certificates.

Property value and action

Value	Action
common_name	Uses the Common Name (CN) field in the Subject of the certificate to check if a certificate exists in the sys_user_certificate table that is associated with a user.
email	Uses the email IDs in the certificate to locate a user in ServiceNow with a matching email ID.
any (default value)	Utilizes both of the above validation methods to resolve a user.
ignore	No user validation is performed on the signing fields.

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Sign document templates for PDF documents using CAC or PIV smart card

Use the PDF document template to initiate digital signing, review, and generate a filled PDF document using a Common Access Card (CAC) or Personal Identification Verification (PIV) card.

Before you begin

Adobe Acrobat Reader must be installed on your desktop.

A document template must be set up for signing documents. For more information, see Set up a document template for signing documents using a CAC or PIV smart card.

Role required: none

About this task

Procedure

1. Initiate the PDF document signing process with a custom implementation using script.
   For more information, see Using Document Templates: Custom use case.

   Note:
   HR cases can skip this step as custom implementation using scripts is for cases related to non-HR applications.

2. Sign the PDF document in Service Portal.
   - To navigate through the Employee Center, navigate to **All** > **Self-Service** > **Employee Center**.
   - To navigate through My Document Tasks, navigate to**Self-Service** > **My Document Tasks**.
3. Select the document task that is assigned to you.
4. Review the PDF document and select **Sign Document** to sign the document or **Reject** to reject the document.
   The signed document opens as a PDF document in Adobe Acrobat Reader.
5. Go to the sign location to click and select the mapped certificate or Digital ID file.
6. Enter the password for the Digital ID file, select **Sign**, and save the signed copy.
7. In the PDF document, select send to send the signed PDF document.
   The signed document is uploaded to the document task for verification.
8. Go to the **My Document Tasks** and select the document, review and select **Validate Document** to validate the document or select **Reject** to reject the document.
   The signature is successfully captured and authenticated after document validation.

Review the digitally signed document

Review the digitally signed PDF document to either approve or reject it.

Before you begin

Role required: none

Procedure

1. Navigate to your Document Tasks through either the Employee Center or through My Document Tasks.
   - To navigate through the Employee Center, navigate to **All** > **Self-Service** > **Employee Center**.
   - To navigate through My Document Tasks, navigate to**Self-Service** > **My Document Tasks**.
2. Select the document template task assigned to you and review the document.

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3. To approve or reject the document, do one of the following.
   - To approve the document, select **Approve**.
   - To reject the document, select **Reject** and provide a reason for the rejection.

Document references

References are used for linking a document record to other records, which can be any other table or record on the platform.

A reference is a link or mapping between a document and a target or a parent record.

You can add references directly and view all document references in other records across the platform by navigating to **Documents** > **References**.

You can create and link document references directly from references or from the document record.

Create document references from document record

Link the document record to other records in any other table or record.

Before you begin
Role required: none

Procedure

1. Navigate to **Documents** > **Documents**.
2. Select the document.
3. In the **Document References** tab, select **New**.
   In the dialog box, the **Document** field reflects the document you selected.
4. In the **Target Record** field, select the Lookup documents using list icon .
5. In the Select the document dialog box, for the **Table name** field, select the table for the record you want to link the document to.
6. In the **Document** field, select the Lookup using list icon ( ) and select the record to which you are linking the document.
7. Select **OK**.
8. Select **Submit**.

Create document reference from References

Link document references to any record directly from the References list. You can easily see all documents linked to tables and target records.

Before you begin
Role required: admin

About this task

Procedure

1. Navigate to **Documents** > **Documents** > **References**.
2. Select **New**.
3. Select the document.

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4. In the **Target Record** field, select the Lookup documents using list icon .
5. In the Select the document dialog box, for the **Table name** field, select the table for the record you want to link the document to.
6. In the **Document** field, select the Lookup using list icon ( ) and select the record to which you are linking the document.
7. Select **OK**.
8. Select **Submit**.

Delete a document reference from document record

Remove and unlink a document reference from a document record.

Before you begin

Role required: admin with admin access

or

Access permission: owner

or

User: owner

About this task

Note:
This action unlinks the document but does not delete the document.

Procedure

1. Navigate to **Documents** > **Documents**.
2. Select the document.
3. In the **Document References** tab, select the documents you want to unlink.
4. In the **Actions on selected rows** drop-down menu, select **Remove**.

Linking documents to a parent record

Documents can be linked to records referred to as "parent records." You can create a document version and reference it through a parent record. You can also view, edit, download, or delete document references in the parent record.

Note:

The terms "other record" and "parent record" are used interchangeably and refer to any records to which documents are linked.

You can use references to link a document record to any other table or record on the platform.

Enable viewing related documents in a parent record

Add the Documents related list to the record to be able to link and view documents related to the record.

Before you begin

Role required: admin

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Procedure

1. Navigate to the record, (for example, Incident, Interaction, and so on).
2. Select the Additional Actions icon ( ) and select **Configure** > **Related Lists** .
3. Move **Documents** from the Available list to the Selected list.
4. Select **Save**.

Result

The Documents related list is added to the related lists available in the record.

Create a document record in a parent record

Add documents to a parent record so they are available for downloading, sharing, or viewing directly from the record.

Before you begin

Role required: none

Procedure

1. Navigate to the record (for example, Incident).
2. Select the **Documents** tab.
3. Select **New**.
4. On the form, fill in the fields.

New document record fields

Field	Description
Name	Name of the document.
Owner	Name of the document owner.
Reviewers	Name of the reviewers.
Template	Option to determine whether the document is a template.
Department	Name of the department.
Type	The type of document based on the content, for example, guideline, policy, procedure, or contract.
Classification	Classification of the document such as public, restricted, or confidential.
Audience	Audience of the document, either internal or external.
State	The state the document is in: Draft, Submit, Review, or Complete.
Description	A brief description about the document.
Default Version	The document version used for document download.

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Field	Description
	By default, the latest version is the default version.

5. Select the access settings.
6. Click **Submit**.

Upload a document version in a parent record

Upload a document version for each document in the parent record.

Before you begin
Role required: none

Procedure
1. Navigate to the record (for example, Incident).
2. Select the **Documents** tab.
3. Right-click the document name.
4. Select **Upload Version**.
5. Select the file type you want to upload and add any information related to the file under **Notes**.
   - To upload a file, select **Attachment**, select the file icon, and select the file.
   - To link to a document, select **URL** and provide the link.
6. Select **OK**.

Related topics
Create a document version

Download a document from its parent record

Download documents related to a parent record directly from the record.

Before you begin
Role required: none

About this task
Note:
To download a document, the version file type must be an attachment and not a URL.

Procedure
1. Navigate to the required record (for example, Incident).
2. Select the **Documents** tab.
3. Select the documents you want to download.
4. In the **Actions on selected rows** drop-down menu, select **Download Document**.

Link existing documents to a parent record

Link documents that are in your repository to a parent record.

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Before you begin
Role required: none

You must have sufficient permissions to access the document.

Procedure

1. Navigate to the required record (for example, Incident).
2. Select the **Documents** tab.
3. Select **Edit**.
4. Select the documents you want to link.
5. In the **Actions on selected rows** drop-down menu, select **Link Documents**.

Unlink documents from a parent record

Remove and unlink documents from a parent record when they are no longer relevant.

Before you begin
Role required: admin

About this task

Note:
This action unlinks the document from the parent record but doesn't delete it from the repository.

Procedure

1. Navigate to the record (for example, Incident).
2. Select the **Documents** tab.
3. Select the documents you want to unlink.
4. In the **Actions on selected rows** drop-down menu, select **Remove**.

Delete a document from a parent record

Delete documents directly from a parent record.

Before you begin
Role required: admin with admin access

or

Access permission: owner

or

User: owner

Procedure

1. Navigate to the required record (for example, Incident).
2. Select the **Documents** tab.
3. Select and open the documents you want to delete.
4. Select **Delete**.

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Document Management lists

Lists are a collection of template documents you can use to create documents that are linked to other target records. Only users with the admin role can access lists.

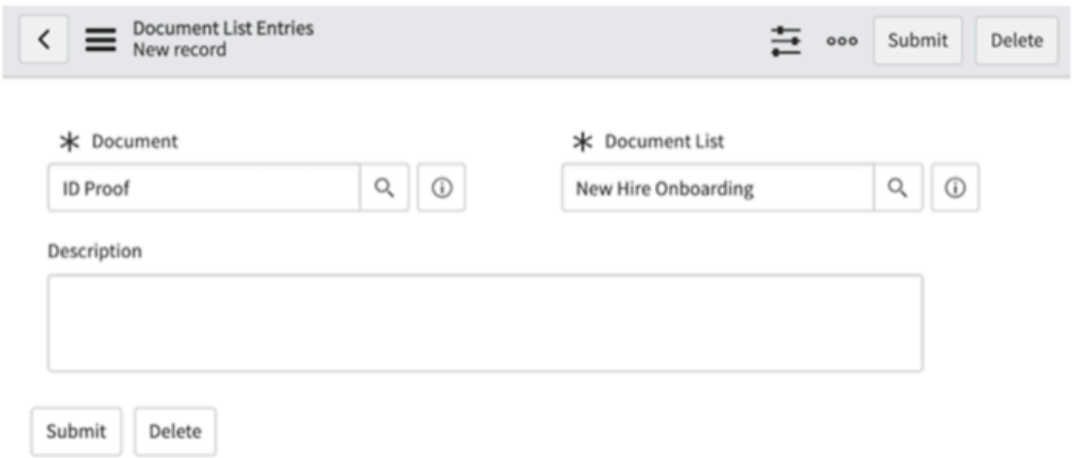
Document lists

A user with the admin role can create document lists and add multiple documents to a single list. Only users with the admin role can access lists.

Example: New hire onboarding

During new hire onboarding, employees must upload multiple documents such as ID, training certificates, and so on. Your organization can create documents as templates and group them under a list. Then when you reference this list to a target record, all the template documents under the list are created and linked to the target record.

Document List Entries

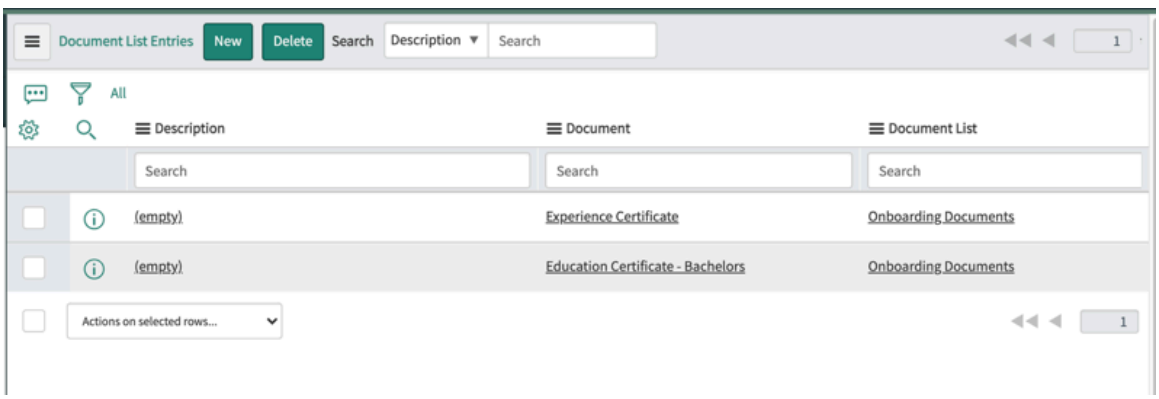


List entries

Lists entries are a mapping of a template document with a document list. Only template documents can be linked to a list, such as when documents have the **Template** option selected in the document record. The Document List Entries related list displays the list entries.

Note:
Users can link only documents that they have access to.

List entries



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Related topics

Group document templates in a list for creating and linking documents to a target record

Add a document template to a document list

Group document templates in a list for creating and linking documents to a target record

Group document templates in a list to enable all the template documents in the list to automatically be created and linked to the target record when the list is referenced.

Before you begin
Role required: platform_document_management_admin

Procedure

1. Navigate to **Documents** > **Documents** > **Lists**.
2. Select **New**.
3. Provide a name and description of the list.
4. Select **Submit**.

What to do next
Create a document template

Related topics

Add a document template to a document list

Add a document template to a document list

Add a template document to a document list that groups document templates for creating and linking to a parent record.

Before you begin
Role required: platform_document_management_admin

About this task

Note:
Only document templates can be linked to a list.

Procedure

1. Navigate to **Documents** > **Documents** > **List Entries**.
2. Select **New**.
3. On the form, fill in the fields.

List entry fields

Field	Description
Document	Name of the document template.
Document List	Name of the list.
Description	A brief description about the document list entry.

4. Click **Submit**.

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Create documents using document lists for a target table record

You can create and reference documents on a target table record through the `DocumentListService` API.

Before you begin

See the DocumentListService API topic

Role required: admin

> **Note:**
> You cannot create documents through Document Lists with the user interface (UI). It must be done with APIs.

Document attachments in an activity stream

Include documents in activity streams to include and track updates on attached documents to any record.

You can include and track attached documents in activity stream journal fields like work notes or comments that display task records.

To add and attach documents to a record's activity stream, you would need to complete the following tasks:

- Enable Document actions in activity stream
- Enable Documents in the record
- Add documents to the record

Include document actions in an activity stream

Include document actions in an activity stream to view and track updates to attached documents in a record.

Before you begin

Role required: admin

About this task

To add and attach documents to a record's activity stream, you would need to complete the following tasks:

- Enable Document actions in activity stream
- Enable Documents in the record
- Add documents to the record

Procedure

1. Enter `sys_properties.list` in the navigation filter.
2. Select the **glide.documents.journal.enabled** property.
3. On the form, set the **Value** field to **true**.
4. Select **Update**.
5. Select the **glide.documents.attach.fields**.
6. On the form, in the **Value** field, add the field name that you want the record to reflect. For example, you would enter work_notes for the **Work notes** field.

   Use a comma to add multiple field names.

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Note:
Document updates are pushed only if the field names exist.

7. Select **Update**.

Redact sensitive data from documents

Manually mask sensitive content or data from your PDF documents. Data redaction is available in configurable workspaces.

Data redaction

Only documents in the Published or Draft state are eligible for data redaction.

Sensitive data can be redacted by searching for a keyword or by selecting and drawing over any area in PDF that needs to be masked. The search and redact option is applicable only for text and not for images.

Note:

- Paragraphs or keywords split into multiple consecutive lines can't be redacted together while using the search and redact option for a keyword or phrase.
- In some instances search and redact might not hide special characters that are prefixed or suffixed with the text, such as "manual:" or ".PDF".
- In some cases during manual redaction, the text or redaction marks may overlap other sections of the PDF. This overlap can cause the original text to be removed and replaced with white space.
- Data redaction is not possible if the PDF includes non-parseable images, like those in JBIG2 format.

Redact data from documents

Redact sensitive data from PDF documents by either searching keywords or selecting text.

Before you begin

Documents related list should be configured for the workspace.

Role required: none

Procedure

1. From the workspace, navigate to the required record (for example, Incident).
2. Select the **Documents** tab.
3. Select the document and version.
4. Select and open the attached PDF document.
5. Select the redact icon to enable data redaction.
6. Enter a keyword under **Search a keyword to redact** and select the search icon .

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Note:

Searching and redacting data manually is applicable only for text and not for text within images or any other line art.

If the redaction is unsuccessful, then check if there's an issue with the PDF format, manually redact by highlighting the text.

7. To select and draw over an area to redact data, select **Draw and redact**.
8. To undo, select the undo .
9. Select **Apply redaction**.
10. Select **Save changes**.
11. To discard, select the close icon in the Redact document pane.

Document Management integration with external content providers

Integrate Document Management with external cloud providers for editing, sharing, and collaborating over documents for Core UI.

Integration with external cloud

Edit, share, and collaborate on documents in:

- Microsoft OneDrive
- Microsoft SharePoint
- Google Drive

Authentication

Authentication enables users to authenticate with their accounts within ServiceNow using a secure connection between the user's identity and their corresponding Microsoft OneDrive or Google Drive account, allowing users to access, view, and manage their files directly from ServiceNow.

For personal authentication, see Personal authentication.

Configure system properties to access files and folders from external content providers

Configure system properties to enable access to files and folders from external content providers like Microsoft OneDrive V3.1 and Google Drive V3.1 when using the *sn-document-explorer-connected* component in Document Management with Personal authentication.

Before you begin
Role required: mp_document_admin

Procedure

1. Navigate to **All** > **System Properties** > **All Properties**.
2. Search for and select the system property related to the external provider that you're integrated with.

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- For Google Drive V3.1:
  - sn_docs_gdrive.google_drive.base_alias
  - sn_docs_gdrive.google_drive.current_alias
- For Microsoft OneDrive V3.1:
  - sn_docs_onedrive.one_drive.base_alias
  - sn_docs_onedrive.one_drive.current_alias

3. In the **Value** field of the selected property, enter the base_alias and current_alias system IDs from the **sys_alias** table for the external provider.
   The base_alias is the system ID of the personal authentication connection alias and the current_alias is the system authentication connection alias.

Attach a document from an external provider

Attach documents from an external cloud like Microsoft OneDrive, Microsoft SharePoint, or Google Drive to Document Management.

Before you begin

Activate Multi Provider Document Services Framework

For Microsoft OneDrive:

- Setup Microsoft OneDrive for Document Services
- Register Microsoft OneDrive as an OAuth provider for Document Services

For Google Drive, Set up Document Services framework for Google Drive.

Configure permission for roles or groups by selecting the **mp_document_admin** from the document list.

Role required: mp_document_admin

Procedure

1. Navigate to **All** > **Documents** > **Documents**.
2. Select an existing record or create a document record.
3. Select the **Connect With External Provider** check box.
4. Select **Attach from Provider**.
5. Select the External Provider.
   - For Microsoft OneDrive, enter the Folder Path and the File Name.

     To get the Folder Path, go to the file in Microsoft OneDrive and check the folder path.
   - For Google Drive, enter the File Name and the File URL.

     To get the File Name, go to the file in Google Drive, right click and select **Share** > **Share** > **Copy link**.
6. **Optional:** If you only want to link the URL, select the **Link Only URL of the external file to the document** check box.

   Note:
   All Google Drive file formats are supported for link only URL.

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7. Select **Attach**.

   Note:
   - Only the latest version from the provider is attached.
   - For unsupported format URLs can be linked but the version will not be available in the versions table.

   A new version is created. Select the **Versions** tab to view the versions and the attached document.
8. Select the **External Provider Settings** tab to view the provider details and the external file URL.
9. Select **Open Cloud URL** at the top to open the document in the external cloud.

Upload to a cloud

Upload documents from Document Management to an external cloud like Microsoft OneDrive, Microsoft SharePoint, or Google Drive.

Before you begin

Activate Multi Provider Document Services Framework

For Microsoft OneDrive:

- Setup Microsoft OneDrive for Document Services
- Register Microsoft OneDrive as an OAuth provider for Document Services

For Google Drive, Set up Document Services framework for Google Drive.

Configure permission for roles or groups by selecting the **mp_document_admin** from the document list.

Role required: mp_document_admin

Procedure

1. Navigate to **All** > **Documents** > **Documents**.
2. Select an existing record or create a document record.
3. For a newly created record, create a document version.
4. Select the **Connect With External Provider** check box.
5. Select **Upload to Cloud**.
6. Select the external cloud and enter the folder path.
7. Select **Upload default version** to upload a default version or select **Upload local file** to attach a local file.

   Note:
   Uploading a local file creates a version in the instance.

8. **Optional:**
   - For uploading a default version you can select **Remove from instance** check box to remove the attached version from the database.

     Note:
     The removed attachment version will still appear for tracking.

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- For uploading a local version you can select **Do not store instance** check box not to store the attachment in the database.

  Note:
  The attachment won't be stored in the database, but a new version is created for tracking.

9. Select **Upload**.

   Note:
   Only the latest version is uploaded.

10. Select the **External Provider Settings** tab to view the provider details and the external file URL.
11. Select **Open Cloud URL** at the top to open the document in the external cloud.

Download versions from cloud

Download document versions from an external cloud to Document Management.

Before you begin

Configure permission for roles or groups by selecting the **mp_document_admin** from the document list.

Role required: mp_document_admin

Procedure

1. Navigate to **All** > **Documents** > **Documents**.
2. To download the documents from cloud, select the **Versions** tab and select **Down from Cloud**.
3. Select **Download**.
   If the external cloud document has been updated, then a new version will be created under the **Versions** tab.
4. Select the **External Cloud Settings** tab to view the provider details and the external file URL.
5. Select **Open Cloud URL** at the top to open the document in the external cloud.

Upload versions to an external cloud

Upload document versions Document Management to an external cloud.

Before you begin

Configure permission for roles or groups by selecting the **mp_document_admin** from the document list.

Role required: mp_document_admin

Procedure

1. Navigate to **All** > **Documents** > **Documents**.
2. To upload documents on an external cloud, select the **Versions** tab and select **Upload to cloud**.
3. Select the default version if available or attach a local file.
4. **Optional:**

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- Select **Remove from instance** check box to remove the attached version from the database

  Note:
  The removed attachment version will still appear for tracking.

- Select **Do not store instance** check box not to store the attachment in the database.

  Note:
  The attachment won't be stored in the database, but a new version is created for tracking.

5. Select **Upload** to proceed.
6. Select the **External Cloud Settings** tab to view the provider details and the external file URL.
7. Select **Open Cloud URL** at the top to open the document in the external cloud.

References

The following sections describe the installed components and roles for Document Management, along with domain separation and supported browser information.

Components installed with Document Management

Several types of components are installed with activation of the Document Management plugin, including tables and user roles.

Demo data is available for this feature.

Roles installed

Role title [name]	Description	Contains roles
Admin	Provides Create, Read, Update, and Delete access to the document and its related tables. Admin users have access to List and List Entries modules.	platform_document_management_admin

Sharing permission roles

Role Name	Description
dm_sharing_levels_user	This role contains the following roles: • dm_user_role_read • dm_user_group_read • dm_user_criteria_read Provides the ability to share documents at all levels (group, role, and user criteria).

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Sharing permission roles (continued)

Role Name	Description
dm_user_role_read	Provides read access to the user role table and the ability to share documents based on user roles.
dm_user_group_read	Provides read access to the User Group table and the ability to share documents based on user groups.
dm_user_criteria_read	Provides read access to the User Criteria table and the ability to share documents based on user criteria.

Tables installed

Table	Description
ds_document	Stores document records containing document metadata.
ds_document_version	Stores document versions containing the actual document file or URL to the file.
ds_document_references	Stores references between document records and other records. **Note:** The records can be from any other table and record on the platform Supports a many-to-many relationship between documents and target records.
ds_document_lists	Stores document lists, which are a collection of template documents used to create and link documents to other records.
ds_document_list_entry	Stores mappings between template documents and document lists.
ds_document_user_can_access_mtom	Stores permissions provided to users to access documents as a Reader, Writer, or Owner.
ds_document_ug_can_access_mtom	Stores permissions provided to user groups to access documents as a Reader, Writer, or Owner.
ds_document_ur_can_access_mtom	Stores permissions provided to user roles to access documents as a Reader, Writer, or Owner.
ds_document_uc_can_access_mtom	Stores permissions provided to user criteria to access documents as a Reader, Writer, or Owner.

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Table	Description
ds_document_permalink	Stores the permalink and expiration date for the document.

Note:
The Documents [ds_document] and Versions [ds_document_version] tables can be extended.

Document Management roles

Document Management is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Administrator [platform_document_management_admin]

Provides Create, Read, Update, and Delete access to the document. Admin users have access to List and List Entries modules.

Contains Roles

List of roles contained within the role.

- dm_sharing_levels_user
- dm_user_role_read
- dm_user_group_read
- dm_user_criteria_read

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Domain separation and Document Management

Domain separation is supported for Document Management. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard

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

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

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

Overview

Document Management provides an access level approach to controlling the document access and providing security to the users.

How domain separation works in Document Management

When domains are separated in Document Management, users can see and manage documents and give access privileges only in their own (tenant) domain.

A user in the parent domain has access to documents in the child domain.

When a user creates a document, document list or document entries, then their domain is the same as the user's domain.

When the owner of the document changes then the related versions, references, and permission record's domain is updated with the domain of the parent document.

Use cases

- **Documents**

  Documents can be edited or accessed only within their domain. Access to a document can become void if a user belongs to a different domain from the document's domain.

  - Users in the global domain can access documents in all domains when the read access is granted to the user.
  - Users in a non-global domain can access documents only in the same domain and global domain when document access is granted to the user.
- **Versions, References and Permissions table**
  - Users can access the versions, references, and, permissions table records only if they have access to the parent document.
  - If a user has access to the target record in the references table, access to the parent document is granted only if inherited access is enabled for the document and the user is in the same domain as the parent document.
- **List and List Entries**

  List and List Entries have domain pointing to the current user domain and can be accessed by the users with document admin rights.

Known issues

If a document contains references and if the owner of the document is changed and does not have access to the target record of one of the references, then the reference record might not be visible to the new owner.

For example, if the document owner, User A (Domain: D1) is changed to User B (Domain: D2) and User B does not have access to the target record of the reference table, User B might not be able to see the reference record.

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Related topics

Domain separation for service providers

Document Viewer

Document Viewer enables you to view documents directly in the ServiceNow AI Platform rather than having to download them.

Document Viewer supports viewing various file types in the platform including a UTF-8 character encoded PDF file. The maximum document file size is 50 MB. To use Document Viewer, enable it at instance level and for the tables for which you want to use it.

Note:
Document Viewer also supports FedRAMP instances.

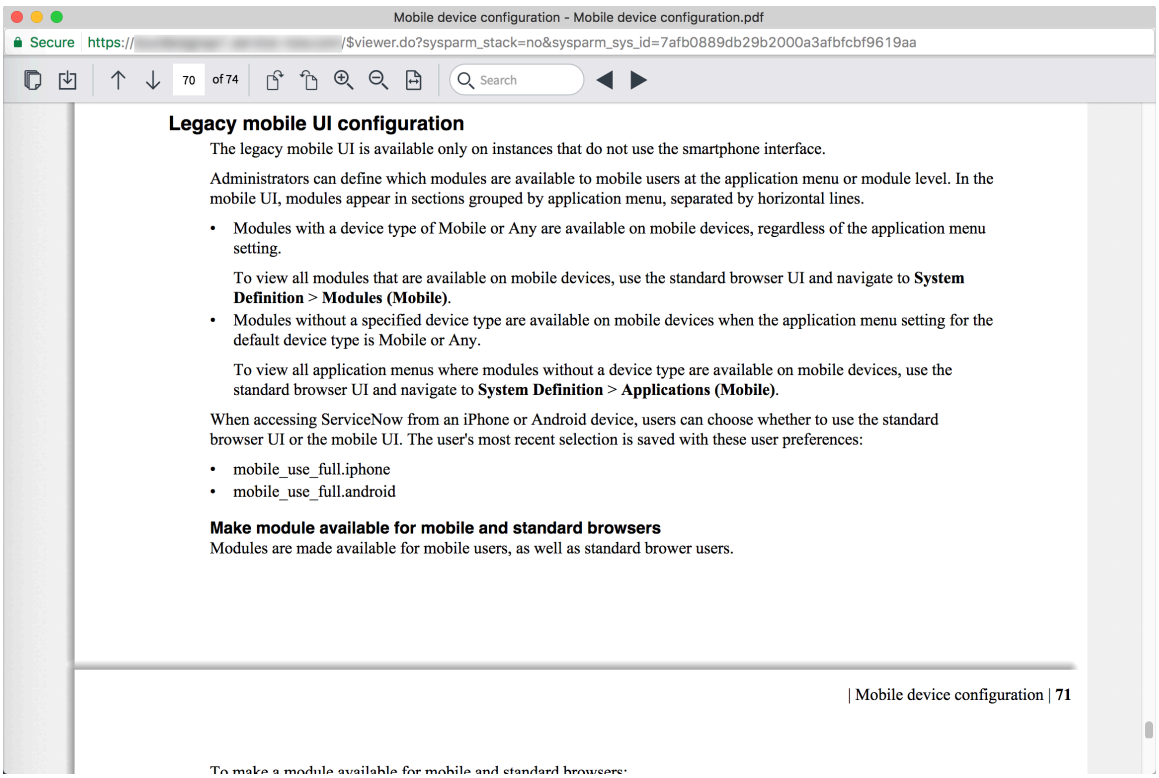
You can view the following file types:

- MS Word (.doc) and (.docx)
- MS PowerPoint (.ppt) and (pptx)
- MS Excel (.xls) and (.xlsx)
- PDF
- PNG
- JPEG

Note:
The rotate option doesn't work for images.

Other document types, for example, .zip or .exe files, are automatically downloaded without requiring Document Viewer. Document viewer converts word documents and spreadsheets to pdf first in order to view them. This might take some time to render the file the first time.

PDF view in Document Viewer



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Note:

You can only download PDF attachments with in the document.

The following table describes the icons used in Document Viewer.

Icons in Document Viewer

Icon	Description
	Toggle the sidebar to see a preview of all the pages in the document.
	Download the attachment.
	Page up or down using the arrow buttons. You can also scroll or use your keyboard arrow keys.
	Rotate the page to the right.
	Rotate the page to the left.
	Zoom in or out of the document.
	Increase the page to the full width of Document Viewer.
	Search for keywords in the document. Use the arrows to toggle to the next search result.

Related topics

View attachments with Document Viewer

Enable Document Viewer

Enable Document Viewer

Enable Document Viewer to view documents directly rather than download them to view them in their native applications.

Before you begin

Role required: admin

About this task

Document Viewer is enabled by default. Activate it at the instance level and then enable it at the table level for the tables where you want to use it. Ensure that the system property **com.snc.documentviewer.enable_document_viewer** is set to true or create it if it does not already exist. To de-activate Document Viewer, create the system property **com.snc.documentviewer.enable_document_viewer** manually and set it to false.

Procedure

1. Activate Document Viewer at the instance level
   a. Navigate to **All** > **System Definition** > **All Available Applications** > **All**.
   b. Enter `ServiceNow Document Viewer` or `com.snc.documentviewer` in the Search field.
   c. Select **Install**.

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2. Activate Document Viewer for the tables where you want to use it.
   a. Navigate to **System Definition** > **Dictionary**.
   b. Search for the table, open the record with the type field **Collection**.
   c. Enter `Use Document Viewer` in the **Attribute** field.
   d. Enter `true` in the **Value** field.
   Document Viewer is enabled at the table level. Repeat this procedure for each table for which you want to enable Document Viewer.

Related topics

Disable Document Viewer

Document Viewer plugins

With Document Viewer, you can view documents directly in the ServiceNow Platform rather than having to download them. Two new plugins enhance the experience and provide more options for document viewing. You can collaborate with other people, copy, delete, restore, and view version history directly in a ServiceNow instance.

Overview

In previous ServiceNow releases, not all documents could be shared and used for team collaboration. With new plugins for the Platform Document Viewer, now you can:

- Collaborate (edit, share) with Microsoft OneDrive and copy documents to your ServiceNow instance.
- Upload a policy document authored in your ServiceNow instance as a Microsoft 365 document in Microsoft 365 SharePoint.
- Attach shared links to a record. Clicking the link opens the document in Microsoft 365 SharePoint.
- ○ The link can be shared with a co-worker, who can view and edit the document in real time.
  ○ The current version is also viewable in the ServiceNow instance.
- Use collaboration tools such as Microsoft 365 for review and co-authoring documents.

Plugins

To use this feature, install the following plugins:

- Microsoft OneDrive Spoke
- Microsoft OneDrive document service Spoke
- Microsoft Azure AD Spoke for Integration Hub
- Multi Provider Document Service Framework

See List of plugins (Rome) for a complete list of ServiceNow plugins.

After installation, you can use the base system subflows or customize them. Configure the subflows in the Document actions table. Once configured, they can be invoked as UI actions from List views or can be invoked through Script Include APIs.

Microsoft OneDrive integration plugin

Collaborate in Microsoft OneDrive and perform copy, delete, restore, and version actions on documents directly in a ServiceNow instance. This integration is bi-

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directional (performs in both directions): Changes are reflected in both Microsoft OneDrive and in the instance.

Microsoft Azure AD Spoke for IntegrationHub

The Microsoft Azure AD Spoke for Integration Hub provides actions that a Process Analyst can use when designing flows. The actions allow them to automate the management of users, security groups, and office groups. User management includes applying licenses that result in user provisioning into Office 365.

Multi Provider Document Service Framework plugin (glide plugin)

Plugin contains the data model needed to integrate with third-party document service providers.

Note:
To activate a plugin:

1. Navigate to **System Definition** > **Plugin**.
2. Enter the plugin name in the Search field.
3. Select **install**.

Tables

mp_provider_details

- Provider Details Name
- Provider Name
- Attributes

mp_document_version

- Version
- Document
- Version Modified By
- Version Last Modified

mp_document_activity

- Document Name
- Document sys_id
- Document Version sys_id
- Document Action
- Provider Detail
- Notes

mp_documents

- Document name
- Provider Details
- Attachment
- URL
- Description

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mp_document_action

- document_action_name
- provider_detail
- subflow
- provider_permission

mp_permission_configuration

- Entity_type
- Entity_id
- Attributes
- Provider_group_id
- Provider_group_name
- permission

mp_provider_permission

- permission
- provider
- Attributes
- description

mp_collaborator

- collaborator_attributes
- collaborator_email
- collaborator_id
- collaborator_name
- Provider_detail
- user

Related topics

Document Viewer

Enable accessibility features for DOCX to PDF conversion

Enable the *com.snc.document.conversion.accessibility_enabled* system property to enable accessibility features for DOCX to PDF conversion. If the DOCX files have accessibility support, then accessibility support is retained in the Document Viewer while viewing the files.

Before you begin

Role required: admin

Procedure

1. In the navigation filter, enter `sys_properties.list`.
2. Open the *com.snc.document.conversion.accessibility_enabled* system property.

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3. In the value field, update the value to `true`.
4. Select **Update**.

View attachments with Document Viewer

View documents within the platform using Document Viewer rather than having to download them to your own file system.

Before you begin

Make sure that Document Viewer is enabled for the table containing the record. For more information, see Enable Document Viewer.

Role required: none

About this task

Document Viewer supports inline viewing of certain document types within the platform.

Procedure

1. Navigate to a record (incident, form, list, and so on) with an attachment.
2. Click View next to the file attachment name.

   Document Viewer displays the document.

   If the document does not display, Document Viewer does not support inline viewing in your situation and a message instructs you to download the document. The possible reasons are:

   - The document uploaded is platform encrypted or edge encrypted.
   - The file size exceeds the maximum allowed value of 50 MB.
   - The document is password-protected but it is not a PDF file.

   Click **Download Document** to view the document in the relevant external application.

Related topics

Enable Document Viewer

Disable Document Viewer

Disable Document Viewer at the instance level to disable it or at table level to disable it for specific tables within the instance.

Before you begin

Ensure the Add a system property (com.snc.documentviewer.enable_document_viewer) exists in your instance.

Role required: admin

Procedure

Disable Document Viewer at the instance level or for specific tables.

Related topics

Enable Document Viewer

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PDF generation and accessibility

PDF generation settings support accessibility features such as accessibility tags for screen readers, customizable export formats, and image retrieval timeouts for optimized HTML to PDF conversion.

Note:
PDF generation with accessibility is unavailable for on-premise customers.

Accessible PDF

To enable accessibility for PDF generation, add the accessibility property *com.snc.pdf.generation.accessibility* and set the value to `true`. Only users with admin roles can set the property. For more information, see Add a system property.

For PDF generation API, see PDFGenerationAPI - Scoped, Global

Image retrieval timeout in HTML to PDF conversation

To specific the time out duration for HTML to PDF conversion update the timeout value for the system property *com.snc.pdf.html2pdf.image_retrieval_timeout*. This property enables you to specify an image retrieval timeout in seconds.

Export to PDF

Export an individual record or list of records into a PDF format that supports accessibility. When this feature is enabled, accessibility tags are available in the PDF tag tree to help users who rely on-screen readers to navigate, understand, and interact with the generated PDF documents.

Export to PDF for list of records

Export a list of records in a variety of formats. The **Export** option is available in the column heading context menu in List v2. In List v3, it's available in the list title menu.

PDF export orientation includes:

- Portrait
- Landscape
- Detailed Portrait (exports the list and the associated form for each record).
- Detailed Landscape (exports the list and the associated form for each record).

When the accessibility property is enabled, you get a pop-up when they export to PDF where they can specify whether to create an accessible PDF or not.

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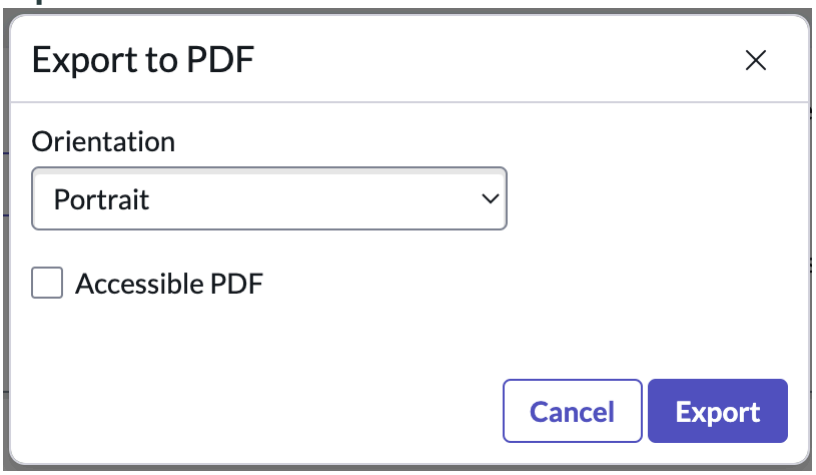
Export to PDF



To enable accessibility, select the **Accessible PDF** check box.

Note:
Adding accessibility tags to a PDF increases the file size.

To export a PDF list, see Export data from a list.

Export to PDF for a single record

To export an individual record from a form, select and hold (or right-click) a form header bar and select the export type.

PDF export orientations include:

- Portrait
- Landscape

When the accessibility property is enabled, you get a pop-up when they export to PDF where they can specify whether to create an accessible PDF or not.

To enable accessibility, select the **Accessible PDF** check box.

Note:
Adding accessibility tags to a PDF increases the file size.

To generate a single PDF record, see Export data from a record.

Guardrails for PDF generation and accessibility

Static and dynamic guardrails are safeguards that help maintain stability during PDF generation. Static guardrails enforce fixed limits like maximum PDF size, while dynamic guardrails monitor real-time memory usage and terminate exports when memory pressure exceeds a defined threshold.

Static guardrail for PDF generation and accessibility

A static guardrail helps prevent instance instability during PDF generation. If the size of a generated PDF exceeds a maximum threshold the export process is automatically terminated to help prevent large PDF exports from consuming excessive memory.

The system property `com.snc.pdf.generation.maxsize_mb` limits the generated PDF size in MB. The default maximum PDF size is 30MB.

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Note:
If the value is increased might create memory pressure on the instance to generate the PDF and the node may crash

.

Dynamic guardrail for PDF generation and accessibility

A dynamic guardrail helps prevent instability in PDF generation by monitoring and responding to excessive memory consumption. Dynamic guardrails are triggered only when certain memory usage thresholds are crossed during PDF generation.

The dynamic guardrail can be enabled for PDF generation by adding system properties. When enabled, the system continuously monitors the node's memory usage.

To enable accessibility for PDF generation, in the navigation filter, enter sys_properties.list, and add the following properties:

glide.robustness.memory_guard_enabled

When set to `true`, this enables the dynamic guardrails for PDF generation and accessibility

- Type: true | false
- Default Value: false

glide.robustness.memory_guard_thresholdpercentage

- Type: integer
- Default Value: 90
- Minimum threshold percentage = 1
- Maximum threshold percentage = 100

glide.robustness.memory_guard_time

- Type: integer
- Default Value: 60
- Minimum memory guard time = 1
- Maximum memory guard time = 900

If the memory usage reaches the configured value (default value is 90%) for the system property, the platform automatically terminates the ongoing PDF export and new PDF export requests are rejected. The guardrail continues to block PDF exports until the memory usage drops below the safe threshold.

Managed Documents

Use the ServiceNow® Managed Documents application to control electronic documents within your instance.

After parameters have been set by the administrator and the Knowledge Document plugin installed, documents can move through the managed document cycle.

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Important:
From Yokohama onwards, the workflows have been configured and standardized to follow the new workflow and design experience.

Existing customers can continue using deprecated OOB workflows, but ServiceNow recommends adopting the new OOB flows. Custom workflows will still be supported, while customized OOB workflows are deprecated, with a recommendation to switch to new flows. Customers can also create workflows, though ServiceNow advises using flows for new requirements.

Managed Document features

Managed Documents is a lightweight, ITIL-based solution for creating and managing electronic documents within your instance.

This application adds a layer of control around any document by providing workflow, storage, security, and categorization options. It can be used for a variety of internal documents, such as policies and procedures, compliance documentation, and knowledge articles. Because it is integrated within the instance, Managed Documents offers a seamless alternative to 3rd-party systems.

Features

Feature	Description
Check-in/Check-out	Track revisions, approval history, and automated notifications for approvers and reviewers. Useful for compliance and risk authors, policy and procedure writers, and contract administrators.
Categorization	Classify documents for organization and search.
Access control	Share documents with selected users.
Revision control	Track changes to documents.
Digital signature for approval	Integration with the Approval with E-Signature plugin.
Workflow	Support consistent content review and approval.
Security	Use high security setting.

Managed Document concepts

The following concepts explain Managed Documents: Managed Document, Document Collection, Document Revisions, and Document Parameters.

Concepts

Concept	Description
Managed Document	The **Document [dms_document]** table contains the documents controlled through the managed documents process.
Document Collection	The **Document Collection [dms_collection]** table allows related documents to be grouped together.
Document Revisions	Because managed documents must have clear records of individual versions of a document, revisions (including the file) are attached to the primary document

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Concepts (continued)

Concept	Description
	record through a related list. Document revisions are controlled to keep a standard naming scheme and consistent version numbers. Once a document revision is ready, it can be submitted for review.
Document Parameters	**Important:** Parameters do not control application or document security. Parameters only organize documents, they do not affect who can access documents. To grant access to the Managed Documents application, you can assign a role. To grant access to a specific document, set user and group permissions. Each document can be associated with predefined parameters. The parameters can help with grouping documents. • Type: Defines the type of document being controlled. Documents of the same type use the same controls. • Classification: Defines document restriction level, such as public, restricted, or confidential. • Audience: Defines the groups with access to the document, such as internal or external. • Name Formats: Defines the format of document names, ensuring that documents of the same type have the same name scheme assembled from name components. • Name Components: Defines the document values used in the name formats. • Approval Rules: Defines the approvals the document must have before it can be published.

Defining Document Workflow

In the base system, all managed documents use the **Managed Documents** workflow after the **Active** check box is selected.

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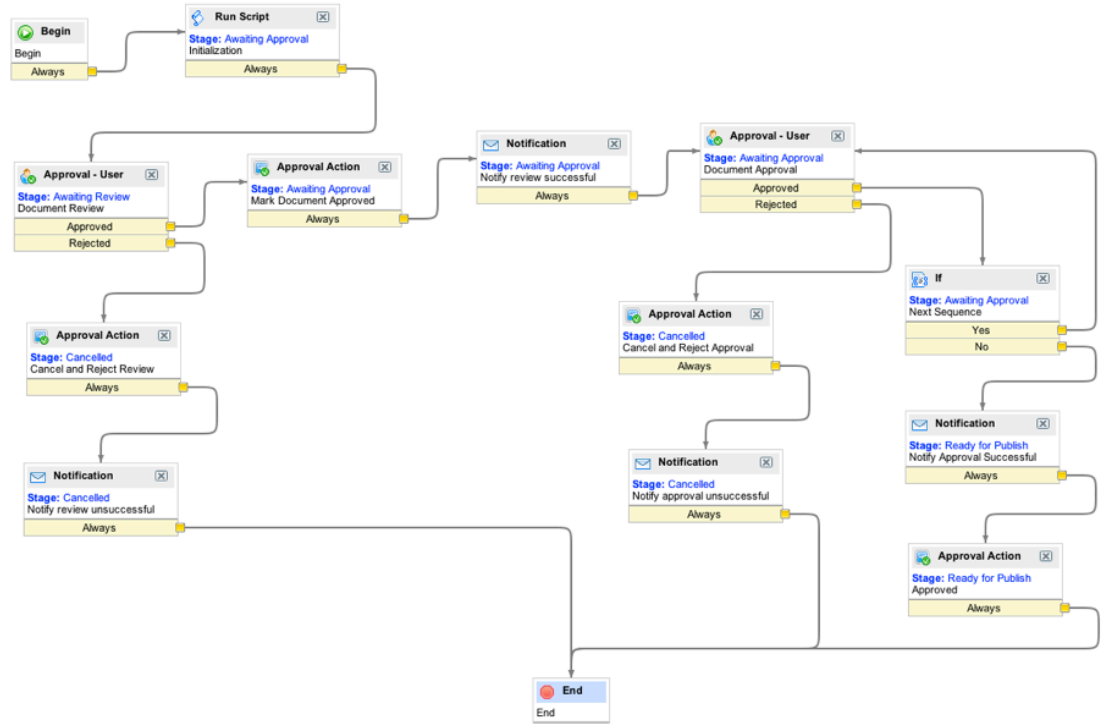
Document workflow



The document parameters defined in the workflow are often used as conditions to trigger more specific workflows, such as type-specific workflows or classification-specific workflows. If different kinds of documents should follow different workflows, use the Graphical Workflow Editor to create new workflows.

Defining Document Parameters

Before using the Managed Documents application, the user with the `document_management_admin` role needs to set the parameters that define the kinds of documents to be managed through the application. Managed Documents provides both base and custom parameter options.

Defining Document Parameters

The following document parameters should be defined:

- **Type:** identifies the purpose of the document. The type also determines the default document format and name format.
- **Classification:** indicates the security level assigned to the document and determines who can view or edit the document.
- **Audience:** specifies the intended readers of the document.
- **Name format:** specifies the name format to use when a document revision is added.
- **Name components:** are individual identifiers used inside a name format. Name components define a reference path (often by dot-walking) that holds the value specific to the document.
- **Approval rules:** determine which approvers are added to documents (in addition to the **Reviewers** specified on the document record).

Defining Types

To define a new type, navigate to **Managed Documents** > **Administration** > **Type** and click **New**.

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Field	Description
Name	A unique name for the type.
Code	A short code for the type. Referenced as a name component for the name format.
Label	A label to display in the **Type** choice list.
Name Format	The name format that documents of this type will use.
Order	A number indicating the type's sequence in the choice list.

The following types are available in the base system.

Name	Code	Label	Name format	Order
-- None --	null	-- None --	null	1
policy	POL	Policy	Default Policy	2
guideline	GUI	Guideline	Default	3
procedure	PROC	Procedure	Default	4
contract	CON	Contract	Default	5

Note:
For documents with a **Type** of **Contract**, a **Contracts** related list appears on the document record, listing any contracts the document is associated with.

Defining Approval Rules

To define a new approval rule, navigate to **Managed Documents** > **Administration** > **Approval Rules** and click **New**.

Field	Description
Name	A unique identifier for the approval rule.
Active	A check box indicating whether this approval rule is used.
Condition	A condition builder that determines which documents use this approval rule.
Description	A short description of the approval rule.

Once the approval rule is saved, the **Approvers** related list defines which approvers are added if the conditions in the **Condition** field are met.

The following approval rules are available in the base system.

Name	Condition
Internal policy	type=Policy ^ audience=Internal
Development policy	type=Policy ^ department=Development

Related topics

Defining Document Parameters

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Defining Audiences

To define a new audience, navigate to **Managed Documents** > **Administration** > **Audience** and click **New**.

Field	Description
Audience Name	A unique name for the audience.
Audience Code	A short code for the audience. Referenced as a name component for the name format.
Label	A label to display in the **Audience** choice list.
Order	A number indicating this audience's sequence in the choice list.

The following audiences are available in the base system.

Audience	Audience code	Label	Order
internal	INT	Internal	1
external	EXT	External	2

Related topics

Defining Document Parameters

Defining Classifications

Define a new classification on the Classification form.

Navigate to **Managed Documents** > **Administration** > **Classification** and click **New**.

Field	Description
Name	A unique name for the classification.
Code	A short code for the classification. Referenced as a name component for the name format.
Label	A label to display in the **Classification** choice list.
Order	A number indicating this classification's sequence in the choice list.

The following classifications are available in the base system.

Name	Code	Label	Order
public	P	Public	1
restricted	R	Restricted	2
confidential	C	Confidential	3

Defining Name Components

Name components define the document values used in the name format.

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For example, the name component `document.audience.code` dot-walks from the document record to the audience **Code**.

To define a new name component, navigate to **Managed Documents** > **Administration** > **Components** and click **New**.

Field	Description
Name	A unique identifier for the name component.
Short Description	A short description of the name component value.
Value	The path to the field holding the value used for the name format. Defined relative to a current revision record. For example: • Enter `revision` to use the revision **Number** field on the revision record. • Enter `document.name` to use the **Name** field on the revision's referenced document. • Enter `document.audience.code` to use the **Code** field for the audience referenced by the document. This dot-walking approach makes it possible to get any value related to the revision into the name format.

Note:
The **revision** component is a special component replaced by the appropriate revision number (rather than querying a value related to the current record). The revision is either automatically incremented or uses the latest revision number, depending on the setting on the document form.

The following components are defined in the base system.

Name	Short description	Value
Audience code	Displays the code assigned to the document audience.	document.audience.code
Classification code	Displays the classification code.	document.classification.code
Document name	Displays the document name.	document.name
Revision	Displays the document revision.	revision
Type code	Displays the code assigned to the document type.	document.type.code

Defining Name Formats

The name format automatically generates a name for a document revision by arranging name components in a standard code to match naming conventions.

For example, a name format with the name components **Type Code**, **Document Name**, and **Revision Number** and the separator **-**, would be formatted as:

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`TYPECODE-Name-RevNumber.fileformat`

In this example, a policy (code POL) named `IT Off-Boarding Policy`, with revision number **1.0**, and uploaded as a **.docx** file would have the name:

`POL-IT Off-Boarding Policy-1.0.docx`

To define a new name format, navigate to **Managed Documents** > **Administration** > **Name Formats** and click **New**.

Field	Description
Name	A unique name for the name format.
Separator	A separator to put between each of the components. Hyphens (-) and underscores (_) are commonly used. Using alphanumeric characters can create a confusing name format.
Description	A description of the name format.

Use the related list to add name components. Use the **Order** field to set the sequence in which name components are used.

The following name formats are defined in the base system.

Name	Separator	Description
Default	_	The default format. Document name and revision separated by an underscore.
Default Policy	_	The format for the policy document type.
Development documentation	(no separator)	The format for the software documentation type.
Development Sources	(no separator)	The format for the development and code sources type.
Intranet Improvement	(no separator)	The format for documents that describe intranet use.

Domain separation and Managed Documents

Domain separation is unsupported in Managed Documents. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: No support

- The domain field may exist on data tables but there is no business logic to manage the data.
- This level is not considered domain-separated.

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

Related topics

Domain separation for service providers

Managed Documents plugin

This page describes the applications and modules, database table structure, scripts, and roles.

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Database table structure

The following tables are added:

Tables

Display Name (Table Name)	Description
Document [dms_document]	The document details.
Revision [dms_revision]	The document revisions.
Audience [dms_audience]	The intended document readers.
Classifications [classification]	The document restriction level, such as public or confidential. (Does not define access to the document. Document security is set in user and group permissions.)
Type [dms_type]	The document purpose.
Component [dms_component]	The components of name formats. The value field is a dot-walking expression that is evaluated. An exception is made for the revision because it does not exist when the revision name is generated.
Name format [dms_name_format]	The composition of components to generate revision names.
Approval sequence [approval_sequence]	The approval sequences that users must follow.
Approval Rule [dms_approval_rule]	The criteria that records of the dms_document table must match. Used to automatically add approvers to a document.
Collection [dms_collection]	The document groups created by the user.

Scripts

Business rules that are added to sys_script

Rule	Description
Update Document	Changes the state of a document depending on its revisions.
Add Approvers	Populates the list of approvers in the document.

Script includes that will be added to sys_script_include

Script include	Description
DocumentManagement	Contains the main logics for the Managed Documents plugin.
DocumentManagementDB	Contains methods to perform CRUD operations on the database.

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Script includes that will be added to sys_script_include (continued)

Script include	Description
DocumentManagementSecurity	Helps manage the security of the Managed Documents system.
DocumentManagementAjax	Updates the details of the temporary revision that is created when opening the upload/check in revision form.
DocumentAttachmentAjax	Renames an attachment file.
DocumentRevisionWorkflowHelper	Helps perform basic workflow operations on a revision.
DocumentManagementApprovalMatcher	Helps obtain the user and group approvers for a document that matches approval rules.
DocumentApproverHelper	Contains logics to handle document approvers.
DocumentManagementUtils	Useful methods.
DocumentReferenceQualifiers	Static methods that return reference qualifiers.

Client script that is added to sys_script_client

Rule	Description
Document type change	Updates the name format field in the revision settings section of the document. Each type has a default name format.

Roles

This plugin introduces two new roles:

Roles

Role	Description
document_management_user	This role enables a user to access the Managed Documents plugin, create documents, and search for documents. Document reviewers and approvers need the document_management_user role to access the Managed Document plugin. (Please note that reviewers and approvers can also access a document revision from an approval record.)
document_management_admin	This role enables a user to change administrative settings for the Managed Documents plugin.

Note:
Each document has individual permissions, so even if a user is given the document_management_user role and has permissions to the application, the user can only view documents to which they have been given access.

Install the Managed Documents plugin

The Managed Documents plugin is available for activation by users with the admin role.

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Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Application** > **All Available Applications** > **All**.
2. Find the Managed documents (com.snc.document_management) plugin and select **Activate/ Upgrade**.

   If the plugin depends on other plugins, these plugins and their activation status are listed.
3. **Optional:** Select the **Load demo data** check box.

   (Optional) Some plugins include demo data—sample records that are designed to illustrate plugin features for common use cases. Loading demo data is a good policy when first activating the plugin on a development or test instance. You can load demo data after the plugin is activated by repeating this process and selecting the check box.
4. Select **Activate**.

Knowledge Document plugin

The Knowledge Document plugin extends the Managed Documents plugin by providing the functionality for managed documents to be published to the Knowledge Base.

Installed with Knowledge Document plugin

These elements are installed with the Knowledge Document plugin.

Dependencies

The Knowledge Document plugin depends on the Managed Documents plugin. Activating Knowledge Document activates Managed Documents.

Tables

Tables

Display Name [table_name]	Description
Knowledge Records [m2m_document_knowledge]	A many-to-many table storing the relationship between a document and a knowledge article.

UI Actions

UI actions

UI action	Description
Link to Knowledge	Creates or updates a knowledge article related to the current document, depending on whether a knowledge article already exists.

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Scripts

Script includes

Script include	Description
KnowledgeDocument	Holds the main logic for the Knowledge Document plugin.
KnowledgeDocumentDB	Class that gets, inserts, and updates data for the Knowledge Document plugin.

Link documents to Knowledge articles

Manage a document and access the latest version of the document from an article by linking the document to a Knowledge article.

Before you begin

Your administrator must have activated the following plugins:

- Knowledge Document plugin (com.snc.knowledge_document)
- Knowledge Management Advanced plugin (com.snc.knowledge_advanced)

The document is already uploaded and published. For more information, see Upload a document and Publish an approved revision.

You must have contribute access to the Knowledge Base within which the article linked to the document is stored.

If a Knowledge article is already linked to the document, you must have contribute access to the article.

Role required: document_management_user and knowledge

About this task

You can link the initial or revised version of a document to a Knowledge article. The document appears as an attachment to the linked article. Revising a document doesn't automatically update the document attached to the linked Knowledge article. Therefore, every time you revise a document, you must again link the revised document to the Knowledge article.

Note:

As the owner of a document or an administrator, you can link the document to a published article. If the article is checked out by another user, you can't link the document to the associated article, unless the article is published.

A managed document can only be linked to one article.

Procedure

1. Navigate to **Managed Documents** > **Documents** > **All**.
2. Click the document.
3. In the Knowledge Settings related list, fill in the fields.

Knowledge settings

Field	Description
Behavior	Process performed when the **Link to Knowledge** related link is clicked. A behavior is one of the following types:

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Field	Description
	○ **Always create record**: A new Knowledge article is created and linked with the latest published revision of the document as an attachment. ○ **Update existing record**: The linked Knowledge article is updated with the latest published revision of the document as an attachment. If no Knowledge articles exist for the document, a new Knowledge article is created. **Note:** Once you select a behavior setting for a document, you can't modify it later when revising the document.
Knowledge Base	Knowledge Base in which the Knowledge article is stored. You can associate a Knowledge article with one Knowledge Base only. If you are using an article template, you can modify this value only if the template is available in the other Knowledge Base.
Type	Article template to create a Knowledge article using defined fields and values. **Note:** when a Knowledge article is created, the **Type** field becomes read-only.
Valid to	Date that the article expires. Adds valid to date information to the same field in the Knowledge article.
Short description	A few words or short phrase describing the Knowledge article. Adds the short description to the same field in the Knowledge article.

4. Click the **Link to Knowledge** related link.
5. **Optional:** In the information message that is displayed, click the message link to view the Knowledge article.

Result

The uploaded document is added as an attachment to a Knowledge article. Depending on the **Behavior** field value specified in the Knowledge settings related list, the Knowledge article is created or updated with the document.

Create a document

After Managed Documents parameters have been set by the administrator, documents can be created, requested, checked out, edited, checked in, copied, and, if necessary, rolled back to an earlier version.

Once documents have been added to the Managed Documents application, they can be grouped into document collections.

Document approval

During the approval process, the approver approves or rejects the document. A document goes through the approval process after the review process.

Approval workflow

After the document has been reviewed, submit the document for approval. If the document does not have an approver, the approval process is omitted.

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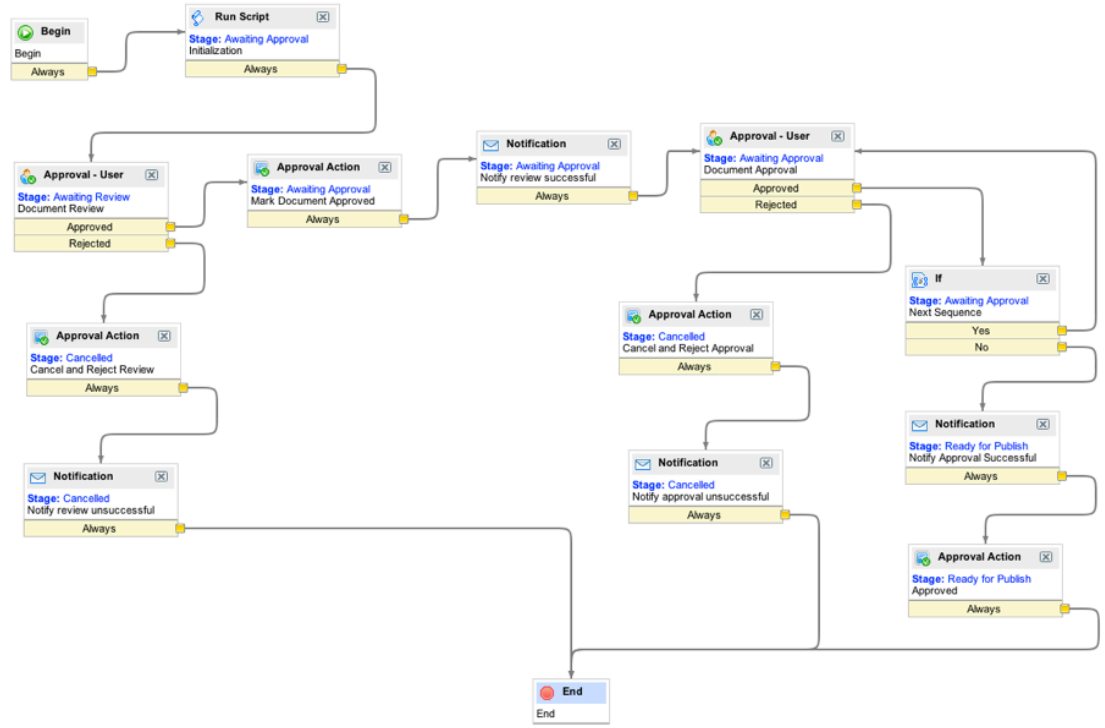
When the document is *Active*, the workflow *Document Management Default* is used to manage approvals:

Document Management Default workflow



If the approver rejects the document, the author and owner are notified and the document review is cancelled. The author, owner, and approver should discuss what changes need to be made to the document. When the document is ready, a new review can be initiated.

If the final approver approves the document, the author and the owner are notified. Once final approval is successful, the document stage changes to *Ready for Publishing* in the Document Revisions list:

Document Management Default workflow result

Process modification for multiple approvers

If there are multiple approvers, the approval process works in sequence and multiple approvers can be assigned to a single sequence. For example:

- Sequence 1: approvers A and B
- Sequence 2: approvers C and D
- Sequence 3: approver E

Because the sequences take place in ascending chronological order, approvers A and B receive the approval request first (approvers C, D, and E are not part of the process yet). Similar to the review process, the first approver to act within a sequence dictates what happens to the document. If approver A acts first and rejects the document, the approval process stops and the state is set to Cancelled. Approver B's status is changed to No Longer Required. If approver A acts first and approves the document, the process stops and approver B's status is changed to No Longer Required. Then, the document moves to approval sequence 2. After at least one approver in each sequence approves the document, the author and the owner are notified that the document has been approved.

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Review process

During the review process, the reviewer approves or rejects the document. Sometimes a document will have multiple reviewers.

If the reviewer rejects the document, the author and owner are notified and the review is cancelled. The author, owner, and reviewer should discuss what changes need to be made to the document. If the reviewer approves the document, the author and owner are notified that the review was successful and the document can move to the approval stage.

If multiple reviewers are assigned to a document, the first reviewer to act dictates what happens to the document. For example, there are two reviewers, A and B. If reviewer A acts first and rejects the document, the review process stops and the revision state is set to Cancelled. Reviewer B receives a notification email stating that the review was rejected and their status is changed to No Longer Required. If reviewer A acts first and approves the document, the review process stops and the document can move to the approval stage. Reviewer B's status is changed to No Longer Required.

Enable electronic signature for approval

Enabling electronic signatures for approval. Electronic signatures are helpful if you must obtain a digital signature for compliance or auditing purposes.

Before you begin

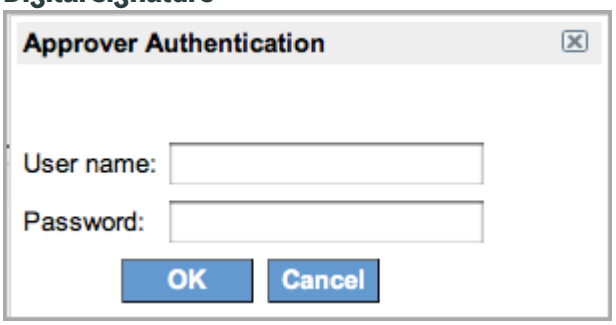
Role required: admin

About this task

You can activate the Approval with e-signature plugin to require that users type in a user name and password when reviewing and approving documents.

The digital signature is not tracked or stored in the document record. Users must simply type in a user name and password after clicking the **Approve** or **Reject** button.

Digital signature



After activating the Approval with E-Signature plugin, ensure that a row in the e-signature registry table is created for the dms_document_revision table.

Procedure

1. Navigate to **All** > **System Definition** > **e-Signature Registry**.
2. Check if *dms_document_revision* is already listed and **Enabled** is set to *true*.
3. If not listed, click **New**.
4. In **Table name**, select *Document Revision*.
5. Select *Enabled*.

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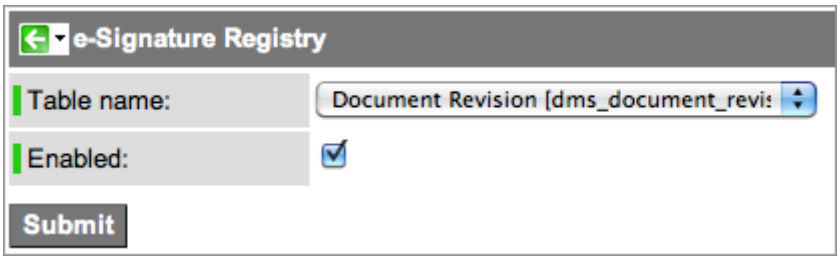
Example



6. Click **Submit**.

Publish an approved revision

Publish a document revision that has been approved.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

About this task

Once a document has been created and edited, a specific revision can be submitted for draft review and final approval. After final approval, the document can be published.

Publish the approved revision from the Document Revisions list.

Note:
Publishing documents to the Knowledge Base requires the Knowledge Document Plugin.

Procedure

1. Navigate to the document record.
2. In the Document Revisions List, click the revision marked **Ready for Publishing**.
3. Click **Publish Revision** to display the **Publish** dialog box.

   The revision number matches the latest revision number. If your standard is to change the revision number when the document is published, such as incrementing the version number to 1.1 or 1.0.1, the change can be made on this dialog box manually.

4. Click **Publish**.

   The published revision is highlighted in green and the stage of previous revisions is automatically changed to *Retired*:

   Note:
   If the approval and publishing process is repeated, the published revision is retired when the new revision is published. Any workflows running against previous revisions are canceled when the document is published.

Submit a revision for draft review

Submit a document draft for review.

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Before you begin
Role required: document_management_admin

or

Role required: document_management_user

About this task
Once a document has been created and edited, a specific revision can be submitted for draft review and final approval. After final approval, the document can be published.

When a draft of the document is ready, submit the draft for review. If the document does not have reviewers identified in the Reviewers field of the document record, the review process is omitted.

Procedure
1. Navigate to the document record.
2. Right-click the appropriate revision.
3. Select **Submit Revision**.

   The revision stage is set to *Awaiting Review*.

   The document name and parameters are changed to read-only. The document state is set to *Active*.

Create or request a new document

Once an administrator has set parameters for the Managed Documents application, you can create or request new documents.

Before you begin
Role required: document_management_admin

or

Role required: document_management_user

Procedure
1. Navigate to **All** > **Managed Documents** > **Create New**.
2. Complete the following fields:

New document fields

Field	Input value
Number	An identifying number for the document. Automatically generated using number maintenance.
Name	A name for the document. Note that the name for the document is combined with other naming components (as defined by the name format) to create the names for each document revision.
Requested by	The person asking that the document be created or updated.
Owner	The approver of the document request. Also responsible for setting completion date with requesters and authors.
Reviewers	The user or users who review the document and provide feedback to owners and authors.

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Field	Input value
Department	The department responsible for the document.
Type	The document purpose. This is a choice list derived from the type parameters.
Classification	The document classification, based on security, audience, and confidentiality. This is a choice list derived from the classification parameters. **Note:** This does not drive any functionality.
Audience	The document readers, such as external or internal. This is a choice list derived from the audience parameters. **Note:** This does not drive any functionality.
State	The current status of the document in the editing and publication process.
Checked out by	The user who currently has the document checked out.
Description	A short description of the document.
Revision Settings	
Name format	The format for the name of each individual revision of the document. For more information, see name format.
Revision format	A choice between the two digit (0.x) or the three digit (0.0.x) revision format.
Auto increment revision	If selected, the revision number automatically increments each time the document is revised.

The *User Permissions* related list determines which users have rights to view and contribute to the document:

User permissions

Field	Input value
User	A reference to a user who is entitled to read but not contribute to a document.
Type	A choice list describing how the user can interact with the document. Options are: ○ Reader - The user can read the document versions. ○ Editor - The user can upload new versions. ○ Owner - The user can edit the document.

The *Group Permissions* related list determines which groups have rights to view and contribute to the document:

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Group permissions

Field	Input value
Group	A reference to a group of users who are entitled to read and contribute to the document.
Type	A choice list describing how group members can interact with the document. Options are: ○ Reader - Group members can read the document versions. ○ Editor - Group members can upload new versions. ○ Owner - Group members can edit the document.

Specify an approver

You can specify approvers for a document record after you save it.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

About this task

You can have one approver or multiple approvers. For example, set multiple approvers to have one person do a quality check of the document and a different individual to serve as a final approver. Approvers are assigned a number. The lowest number (usually number one) approver always goes first, then any other approvers in ascending chronological order. Multiple approvers can have the same sequence number. For example, two approvers can do a quality check and be assigned sequence number 1. Then, two individuals can be final approvers and be assigned sequence number 2.

Procedure

1. Navigate to the document record.
2. Select the additional actions icon and select **Add Approver**.
3. Add a user name.
4. Select a sequence number from the drop-down list.
   Lower numbers approve before higher numbers. For example, approver number one approves before number two.
5. Click **Add User**.
6. Repeat steps 2-5 to add more approvers.

Check in a document

Check in the document after you revise it so other users can check out the document.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

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Procedure

1. Navigate to the document record.
2. Select the **Upload/Check In Revision** related link.
3. Click **Browse** and navigate to the revised file.
4. Click **Open**.
5. Check the Name and Revision Number.
6. Click **OK**.

Copy a document

A document can be duplicated at any time. This is useful if you have an existing document that you want to use as a base for a new document.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to the document record.
2. Right-click the header bar and select **Copy Document**.

   An information message with a link to the new document displays:

3. Click **OK**.

Result

The new document is renamed and includes the word "Copy".

Note:
Only the latest revision is copied.

Deactivate a document

To change the document state to *Inactive*, deactivate the document. This is useful when changes to a document have been put on hold. An inactive document can be reopened at any time.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to the document record.
2. Right-click the header bar and select **Deactivate Document**.

Note:
To activate a document, right-click on the header and click **Reopen Document**.

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Reopen a deactivated document

A document that has been deactivated can be reopened.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to the document record.
2. Right-click the header bar and select **Reopen Document**.

Roll back a document

A document can be rolled back to an earlier revision at any time. Before rolling back to an earlier revision, ensure that the document is not checked out and that you have Editor or Owner permissions for the document.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to the document record.
2. In the Document Revisions list, click the revision that you want to roll back to.
3. Right-click the header bar and select **Rollback**.
   The Rollback to Revision dialog box displays. The name and revision number are new. The note specifies the revision to which you are rolling back.
4. Change any information on the Rollback to Revision dialog box as necessary.
5. Click **OK**.
   The latest revision is now the revision that you selected for rollback.

Cancel a document

Change the document state to *Cancelled* when no more changes will be made to the document.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

About this task

When canceling a document, there is no confirmation message, so ensure that you want to cancel the document.

Procedure

1. Navigate to the document record.
2. Right-click the header bar and select **Cancel Document**.

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An info message confirms the cancellation:

The **State** is set to **Cancelled**.

Check out a document

Documents in the Managed Documents application can only be revised by one user at a time. Check out the document to revise it.

Before you begin

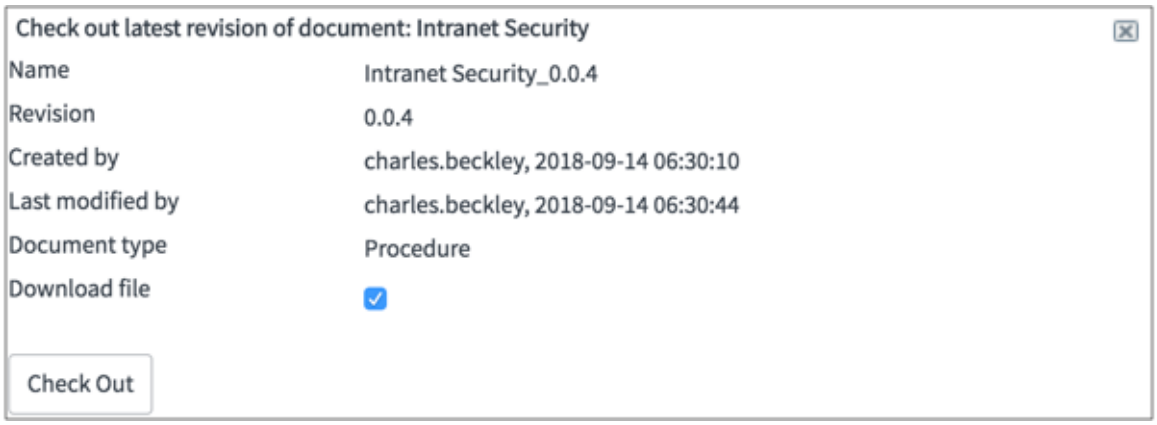
Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to the document record.
2. Select the **Check Out Document** related link.
3. Select **Download file** to download the current version of the document when it is checked out.



4. Click **Check Out**.

After checking out a document, you can edit the document and make any necessary changes.

Create a document collection

A document collection is a set of individual documents. After documents have been uploaded into Managed Documents, organize the documents by grouping them into collections.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to **All** > **Managed Documents** > **Document** > **My Collections**.
2. Select **New**.
3. Enter a *Name*.

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4. **Optional:** Enter a *Description*.
5. Click **Submit**.
6. Click the name of the collection that you created.
7. Click **Edit**.
8. On the left, double-click an available document or select a document and click **Add**.
9. Click **Save**.
   The Document Collection page displays and the individual documents in the collection are listed.

Upload a document

Upload a document into a saved record. You can upload text files, spreadsheets, presentations, PDF files, and more.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to the document record.
2. Click the **Upload/Check In Revision** related link.
3. Click **Choose File** and navigate to the file.
4. Click **Open**.
5. Check the Name and Revision Number.
6. Click **OK**.

   After the initial document is uploaded, subsequent revisions can be created by checking out the document.

Create a new managed document record

Configure the properties and policies for a managed document.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Navigate to **All** > **Managed Documents** > **Create New**.
2. In the **Name** field, type `Policy`.
3. In the **Requested by** field, add your name.
4. In the **Owner** field, add your name.
5. In the **Reviewer** field, add your name.
6. In the **Type** field, select **Policy**.

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7. In the **Classification** field, select **Confidential**.
8. In the **Audience** field, select **Internal**.
9. Under **Revision Settings**, select the **Auto increment revision** option.

   Example

10. Click **Submit**.

Check in a document after making changes

After making changes to a document, check the revised document into Managed Documents.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Open the document record.
2. Click the **Upload/Check in Revision** related link.
3. Click **Choose File**, select the revised file, and click **Open**.
4. Check that the **Name** and **Revision Number** contain the updated number.
5. Ensure that the **Check in** option is selected.
6. Click **OK**.
   The Document Revisions list updates to contain the most recent revision.

Check out a document to make changes

After a document is added to a managed document record, check the file out to make changes. Checking documents in and out keeps a record of document changes and ensures that only one person at a time is editing the document.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Open the document record.
2. Select the **Check Out Document** related link.

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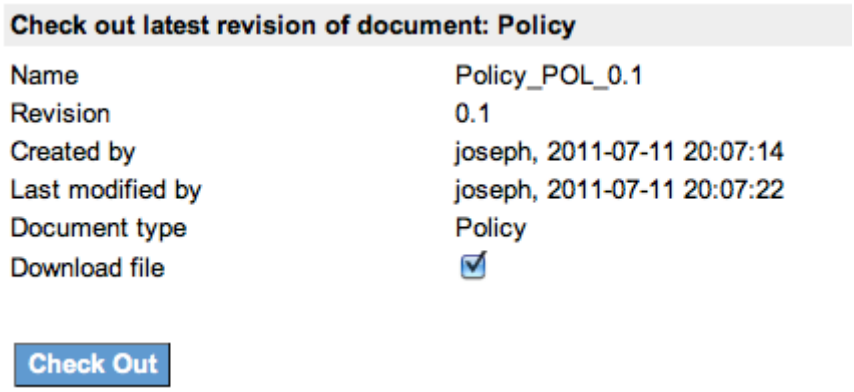

3. Select **Download file**.
4. Click **Check Out**.
5. Open the file and make a small change.
6. Save the document with the same name, but a new revision number.
   For example, `Policy_POL_02.txt`.

Publish a document in Managed Documents

After the document is reviewed and approved, publish the document within Managed Documents.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Open the document record.
2. In the Document Revisions list, click the name of the revision that was approved and is listed in the Ready for Publishing stage.
3. In the header bar, click **Publish Revision**.
4. In the Publish revision dialog box, check that the name and revision number are correct and click **Publish**.
   In the Document Revisions list, the revision you just published is now in the Published stage.

Send a document out for review and approval

When a document is ready, send it out for review and approval. If a reviewer or approver is not identified in the document record, the document is moved directly to the publishing stage.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

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Procedure

1. In the Document Revisions list, right-click the revised document and select **Submit Revision**. Because you identified yourself as the reviewer, you receive an approve request email message.
2. In the email message, click the link next to **Click here to view Approval Request**.
3. **Optional:** View the document by clicking the attachment name under **Document Revision**.
4. Click **Approve**.
   The Approvals page displays and lists the document you just approved.
5. Open the document record.
6. In the Document Revisions list, the revision you approved is now in the Ready for Publishing stage.

Upload a document as an attachment

After creating a document record, add the document to the record as an attachment.

Before you begin

Role required: document_management_admin

or

Role required: document_management_user

Procedure

1. Open the document record.
2. Select the **Upload/Check in Revision** related link.
3. Click **Choose File**.
4. Select a simple document, such as a text file, and click **Open**.
5. Check that the name reads `Policy_POL_0.1`.
6. Click **OK**.

   The document is listed under Document Revisions.

Multi Provider Document Services Framework

Enable your team to collaborate in real time and add versions, store, copy, delete, restore, and upload documents by integrating document providers with your ServiceNow instance.

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Get started

Explore	Activate	Integrate
Explore Multi Provider Document Services Framework	Activate Multi Provider Document Services Framework	Integrate with Microsoft OneDrive, Google Drive, and Microsoft SharePoint
Use	**Reference**	
Use Multi Provider Document Services Framework	Reference Multi Provider Document Services Framework	

Troubleshoot and get help

- Ask or answer questions in the Platform community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Explore Multi Provider Document Services Framework

Add versions, store, copy, delete, restore, and upload documents by integrating document providers with your ServiceNow instance.

Multi Provider Document Services Framework overview

Collaborate in real time and add versions, store, copy, delete, restore, and upload documents by integrating document providers with your ServiceNow instance.

Multi Provider Document Services Framework benefits

Multi Provider Document Services Framework benefits

Benefit	Feature
Use Microsoft OneDrive and Microsoft SharePoint to copy, delete, restore, and get version actions on documents directly in your ServiceNow instance.	Document Services Framework for Microsoft OneDrive

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Multi Provider Document Services Framework benefits (continued)

Benefit	Feature
Use Google Drive to manage, collaborate and sync your documents, and get version actions on documents directly in your ServiceNow instance	Document Services Framework for Google Drive
Create provider details for multi provider documents.	Provider details
Create document actions for multi provider documents.	Document actions
Add provider permissions for multi provider documents.	Provider permissions
Configure permission for roles and groups for multi provider documents.	Configure permissions

What to explore next

To learn more about configuring and using Multi Provider Document Services Framework, see:

- Activate Multi Provider Document Services Framework
- Integrate with Document Services
- Using Multi Provider Document Services Framework
- Reference Multi Provider Document Services framework

Activate Multi Provider Document Services Framework

You can activate the Multi Provider Document Services Framework plugin (com.snc.multiprovider_documents) for Document Services if you have the admin role.

Before you begin

Role required: admin

About this task

The following items are installed with the Multi Provider Document Services Framework:

- Plugin
- Roles
- Tables

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Multi Provider Document Services Framework plugin (com.snc.multiprovider_documents) using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

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Note:
When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Integrate with Document Services

Integrate Microsoft OneDrive, Microsoft SharePoint, and Google Drive with Document Services.

Integration overview

- Microsoft OneDrive integration with Document Services

1. Document Services Framework for Microsoft OneDrive
2. Setup Microsoft OneDrive for Document Services
3. Register Microsoft OneDrive as an OAuth provider for Document Services

- Google Drive integration with Document Services

1. Document Services Framework for Google Drive
2. Set up Document Services framework for Google Drive

Microsoft OneDrive integration with Document Services

Use Microsoft OneDrive to copy, delete, restore, and get version actions on documents directly in your ServiceNow instance.

Benefits of Microsoft OneDrive integration

Increase collaboration by integrating Microsoft OneDrive with your ServiceNow instance.

With Microsoft OneDrive integration you can do the following:

- Edit, share, and copy documents from Microsoft OneDrive to your ServiceNow instance.
- Edit, share, and copy documents from a ServiceNow instance to Microsoft OneDrive.
- Push a document authored in your ServiceNow instance to Microsoft SharePoint.
- Attach a shared link to a record.
- Share links to collaborate and edit documents in real time.
- Fetch the current version of the document.
- Collaborate with Microsoft 365 for reviewing, approving, or co-authoring documents.
- Migrate documents from Microsoft SharePoint to your ServiceNow instance.

Activation information

To integrate Microsoft OneDrive with Document Services, install the Multi Provider Document Services Framework plugin (com.snc.multiprovider_documents). For more information, see Activate Multi Provider Document Services Framework.

You also need to install the Document Services Framework for Microsoft OneDrive.

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Document Services Framework for Microsoft OneDrive

Integrate the Document Services Framework with Microsoft OneDrive.

Request apps on the Store

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

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft OneDrive spoke for Document Services Framework spoke v 1.2.2 is the latest version.

Supported versions

This spoke was built for Microsoft OneDrive Spoke for Document Services Framework V1.1, but might be compatible with later versions.

Key features

Microsoft OneDrive Spoke for Document Services Framework enables a flow designer to do the following:

- Upload documents to Microsoft OneDrive
- Collaborate
- Manage versions
- Download documents

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- IHUB Spoke Util Pack (com.snc.ihub_spoke_util_pack)
- Multi Provider Document Services Framework (com.snc.multiprovider_documents)
- Remote Directory Sync (com.snc.remote_directory_sync)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note:
Some of these plugins are licensable features and require appropriate licenses if used outside the spoke implementation.

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Spoke subflows

The Microsoft OneDrive Spoke for Document Services Framework provides sample subflows to demonstrate the automation of Document Services tasks. To customize a sample subflow, copy it to a new application scope. The following tables list the available sample subflows for V1 and V2.

Note:
Only V2 subflows support the Microsoft SharePoint site.

V1 Subflows

Subflow	Description
Add Collaborator To Group	Adds the supplied CollaboratorID as the Member or Owner specified by Type.
Collaborate Document	Associates a document with a group or a user on Microsoft OneDrive.
Collaborate Document With Recipient Type	Associates a document with a specified Recipient Type
Connect Document From OneDrive Using Path	Connects the Microsoft OneDrive document.
Copy OneDrive Document Version	Copies the document with the specified version from Microsoft OneDrive to an attachment in the ServiceNow instance.
Create Document	Copies the document to Microsoft OneDrive, creates a record in the Multi Provider Document [mp_document] table, and adds a version in the Multi Provider Document Version [mp_document_version] table.
Create Group	Creates a group as specified in Microsoft OneDrive and updates the Multi Provider Permission Configuration [mp_permission_configuration] table.
Delete Document	Deletes the document in Microsoft OneDrive and removes its corresponding records in the Multi Provider Document Version [mp_document_version] tables.
Delete Document Version	Deletes the specified version of the document in Microsoft OneDrive and the ServiceNow instance and deletes a record in the Multi Provider Document Version [mp_document_version] table.
Get All Document Version	Retrieves all document versions from Microsoft OneDrive and creates and updates records in the Multi Provider Document Version [mp_document_version] table.
Get Document from OneDrive	Copies the document from Microsoft OneDrive to the specified document name. It also creates a record in the Multi Provider Document [mp_document] table and in all document versions in the Multi Provider Document Version [mp_document_version] table.

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V1 Subflows (continued)

Subflow	Description
Restore Document Version	Restore the document to the version in Microsoft OneDrive.
Sync Collaborators	Syncs all Microsoft Azure users into the Multi Provider Collaborators [mp_collaborators] table. If the user is deleted or updated, the user's record in the Multi Provider Collaborators [mp_collaborators] table is checked, if it's present then the record is deleted or updated. If the user is newly added, then it creates an entry in the Multi Provider Collaborators [mp_collaborators] table under Multi Provider Documents. **Note:** The scheduled job with the name **Sync Collaborators** triggers the subflow for Sync Collaborators. You can choose from the available run a script option. The default option is **On Demand**. The job is run based on the set schedule and collaborators are synchronized accordingly. For more information, see Automatically run a script of your choosing.
Delete Collaborator Record	Deletes the specified collaborator record from the Multi Provider Collaborators [mp_collaborators] table.
Update Document Content	Updates the specified document with the provided attachment in Microsoft OneDrive that corresponds to the document ID. The attachment name should match the name of the document in Microsoft OneDrive.
Upload Large File	Uploads an attachment to Microsoft OneDrive. The maximum size of the file can't exceed 60 MB.
Get Latest URL	Gets the latest URL to a document in the Microsoft OneDrive.
Reconnect Document from Microsoft OneDrive	Reconnects to a document in Microsoft OneDrive. **Note:** Before using the subflow, ensure that the corresponding Microsoft OneDrive connection and credential are created and the Microsoft OneDrive authorization token is available.

V2 Subflows

Subflow	Description
Get Document Latest URL V2	Gets the latest URL from Microsoft OneDrive for the referred document ID.
Update Document Content V2	Updates the specified document with the provided attachment content in Microsoft OneDrive corresponding to the document ID from table Multi Provider Document sys_id.

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V2 Subflows (continued)

Subflow	Description
	The attachment name should match with the name of the document in Microsoft OneDrive.
Collaborate Document V2	Associates a document with a specified recipient type.
Connect Document From OneDrive Using Path V2	Connects the Microsoft OneDrive document that can also be tracked under Multi Provider Documents.
Copy OneDrive Document Version V2	Copies the document with the specified version from Microsoft OneDrive to an attachment in the ServiceNow instance.
Create Document V2	Copies the document to Microsoft OneDrive and creates a record in the Multi Provider Document [mp_document] table and the Multi Provider Document Version [mp_document_version] table for Multi Provider Documents.
Delete Document V2	Deletes the document in Microsoft OneDrive and removes its corresponding records in the Multi Provider Document [mp_document] table and the Multi Provider Document Version [mp_document_version] tables.
Delete Document Version V2	Deletes the particular version of the document in bothMicrosoft OneDrive and deletes a record in the Multi Provider Document Version [mp_document_version] table under Multi Provider Documents.
Get All Document Versions V2	Retrieves all the document versions from Microsoft OneDrive and creates or updates records in the Multi Provider Document Version [mp_document_version] table under Multi Provider Documents. This subflow supports documents from different sources supported by Microsoft OneDrive.
Get Document from OneDrive V2	Copies the document from Microsoft OneDrive to the specified document name. It also creates a record in the Multi Provider Document [mp_document] table and all its versions in the Multi Provider Document Version [mp_document_version] table under Multi Provider Documents.
Reconnect Document from Microsoft OneDrive V2	Reconnects to a document in the Microsoft OneDrive.

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V2 Subflows (continued)

Subflow	Description
	Note: Before using the subflow, ensure that the corresponding Microsoft OneDrive connection and credential are created and the Microsoft OneDrive authorization token is available.
Restore Document Version V2	Restores the document to the version provided in the Microsoft OneDrive.
Sync Collaborators V2	Syncs all Microsoft Azure users into the Collaborators [mp_collaborators] table under Multi Provider Documents.
Upload Large File V2	Uploads an attachment to Microsoft OneDrive. The maximum size of the file can't exceed 60 MB.
Remove Document Collaboration	Removes collaboration on a Microsoft OneDrive document.
Update Document Collaboration	Updates collaboration on a Microsoft OneDrive document.

Note:
The V2 subflows work only for documents attached to the platform using the Create Document V2 or Connect Document V2 subflows.

Spoke Actions

The Microsoft OneDrive Spoke for Document Services Framework provides sample actions to automate Document Services tasks when events occur in ServiceNow. The following table lists the available sample actions.

Action	Description
Delete Collaborator Record	Deletes the specified collaborator record from the Multi Provider Collaborators [mp_collaborators] table.
Delete document	Deletes the document record from the Multi Provider Document [mp_document] table.
Delete document and versions	Deletes the specified document and all of its versions from the Multi Provider Document Version [mp_document_version] table.
Delete document version	Deletes specified versions of a document from the Multi Provider Document Version [mp_document_version] table.
Delete versions of document	Deletes all versions of a specified document.
Look up Target Record Existence	Checks for the existence of a target record in the specified target table.

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Action	Description
Look Up Incremental Files and Folders	• Retrieves the list of files and folders under the given Folder ID for the selected Source and Source ID. If no source is selected, then it lists the contents of the root folder by default. • Retrieves the list of files and folders based on the given search query. Hierarchical search is also supported, allowing navigation through folder structures. **Note:** Search results may vary due to Microsoft OneDrive 's indexing behavior.
Look up Sites Based On Query String Stream	Lists all the sites satisfying the specified query string.
Update Delta Token	Updates the system property *deltaToken* with the specified delta token.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up Microsoft OneDrive spoke.

Setup Microsoft OneDrive for Document Services

Integrate the ServiceNow instance and Microsoft OneDrive for Document Services by creating a custom OAuth application in Document Services to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Set up and connect Microsoft Entra ID Spoke, see Set up Microsoft Entra ID spoke and Microsoft OneDrive Spoke.

Microsoft OneDrive requirements:

- Microsoft OneDrive account
- Microsoft Azure account
- Microsoft OneDrive tenant administrator credentials

Role required: admin

About this task

Complete these steps from your Azure Developer account. See the Azure product documentation for instructions on creating and configuring custom applications.

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Procedure

1. Log in to the Microsoft Azure registration portal with your organization credentials.
   For more information, see the Microsoft documentation on the Microsoft Azure App registration portal.
2. Register a new custom application.
   a. Provide the application name and the supported account type.
   b. Select **Register**.
   c. Enter the redirect URL in the following format: `https://<instance>.service-now.com/oauth_redirect.do`.
   An overview of the application's basic information is Displayed.
3. Copy the application ID to a text file.
   You will use this ID and the client secret generated in the next step to register the app as a third-party OAuth provider on your ServiceNow instance. The application ID is the client ID when you connect the application to your ServiceNow instance.
4. Add a client secret.
   a. In Microsoft Azure, navigate to **Manage** > **Certificates & secrets**.
   b. Provide a description and an expiration date.
   c. Select **Add**.
5. Enable the permissions you want the application to support.
   For more information, see the Microsoft Graph permissions reference documentation.
   a. In Microsoft Azure, navigate to **Manage** > **API permissions**.
   b. Click the Microsoft Graph tile.
   c. Select the delegated or application permissions that the application supports.

      Delegated permissions enable the application to access the API as a signed-in user.

      Application permissions enable the application to run as a background service or daemon without a signed-in user.

      You must mention these API permissions in the **OAuth Entity scopes** tab while configuring the application registry.
   d. Ensure that required API permissions are provided for your custom app.

Name	OAuth scope
Files.Read	Files.Read
Files.Read.All	Files.Read.All
offline_access	offline_access
Files.ReadWrite	Files.ReadWrite
Files.ReadWrite.All	Files.ReadWrite.All
AuditLog.Read.All	AuditLog.Read.All
Directory.AccessAsUser.All	Directory.AccessAsUser.All

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Name	OAuth scope
Directory.Read.All	Directory.Read.All
User.Read	User.Read

e. Select **Add permissions**.

What to do next

Register Microsoft OneDrive as an OAuth provider for Document Services

Register Microsoft OneDrive as an OAuth provider for Document Services

Use the information generated during Microsoft OneDrive account configuration to register Microsoft OneDrive as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Select **New**.
3. On the screen titled **What kind of OAuth application**, select **Connect to a third-party OAuth Provider**.
4. On the form, fill in the fields.

Application Registries form

Field	Value required
Name	Name to uniquely identify the record.
Client ID	Application ID of the OneDrive application you created in Microsoft Azure.
Client Secret	The Client Secret you generated when you created the application in Microsoft Azure.
Default Grant type	This value should be **Authorization Code**.
Authorization URL	`https://login.microsoftonline.com/common/oauth2/v2.0/authorize` Note that you have to unlock this field and then lock it again.
Token URL	`https://login.microsoftonline.com/common/oauth2/v2.0/token` Note that you have to unlock this field and then lock it again.
Redirect URL	`https://<instance>.service-now.com/oauth_redirect.do`

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Field	Value required
	Note that you have to unlock this field and then lock it again.

5. Right-click in the form header and select **Save**.
   An OAuth Entity Profile record is created.
6. In the OAuth Entity Scopes related list, add scopes to match the permissions you defined when you configured the Microsoft OneDrive application.

   a. Select **Insert a new row**.

   b. Enter the name and the OAuth scope of the permission, which for these Document Services scopes are the same for both values.
      - Files.Read
      - Files.Read.All
      - offline_access
      - Files.ReadWrite
      - Files.ReadWrite.All

7. Right-click in the form header and select **Save**.
8. Select **Update**.

Result
The system validates the OAuth credentials.

Google Drive integration with Document Services

Use Google Drive to manage and sync your documents, and get version actions on documents directly in your ServiceNow instance. You can also collaborate on documents and manage attachments hosted within Google Drive.

Benefits of Google Drive integration

Increase collaboration by integrating Google Drive with your ServiceNow instance.

With the Google Drive integration, you can do the following:

- Edit, share, copy, and delete documents from Google Drive to your ServiceNow instance.
- Edit, share, copy, and delete documents from a ServiceNow instance to Google Drive.
- Fetch the current version of the document.
- Collaborate for reviewing, approving, or co-authoring documents.
- Integrate with Google Drive to create, update, and collaborate on documents within the platform

Activation information

To integrate Google Drive with Document Services, install the Multi Provider Document Services Framework plugin (com.snc.multiprovider_documents). For more information, see Activate Multi Provider Document Services Framework.

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Document Services Framework for Google Drive

Integrate the Document Services with Google Drive.

Request apps on the Store

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

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

This Spoke was built for Document Services Framework V1.0, but may be compatible with Utah and later versions.

Key features

Document Services Framework for Google Drive enables a flow designer to:

- Upload the document to Google Drive
- Collaborate
- Manage versions
- Download documents

Spoke requirements

- Google Drive Spoke
- Google Directory Spoke
- Google Docs Spoke

Spoke dependencies

If you're having trouble installing the app, verify that these dependent plugins are installed:

- IHUB Spoke Util Pack (com.snc.ihub_spoke_util_pack)
- Multi Provider Document Services Framework (com.snc.multiprovider_documents)
- Remote Directory Sync (com.snc.remote_directory_sync)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note:
Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

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Spoke subflows

The Document Services Framework for Google Drive provides sample subflows to demonstrate automating Google Drive tasks for My Drive and Shared drives. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Create Document	Copies the document to Google Drive and creates a record in the Documents table with the folder ID and created version in Version table under Multi Provider Documents.
Create Document V1	Copies the document to Google Drive and creates a record in the Documents table with shareable folder URL and created version in Version table under Multi Provider Document Services Framework Documents. **Note:** For shared drive copy the URL and the URL should be in the below the format and anything in between drive and folder needs to be removed while copying the URL. https://drive.google.com/drive/folders/<folder ID>
Create Group	Creates a group as specified in Google Drive and updates the Permission Configurations table under Multi Provider Documents.
Add Collaborator To Group	Given a Group ID from Google Drive, this subflow will add the given collaborator as specified by role.
Collaborate Document	Adds a permission to a given user, group or domain, or to anyone, for a file. This permission is based on a permission type and role and is how collaboration is configured in Google Drive. If **User** or **Group** is selected, the email address is required for those users and groups. If **Domain** is selected, the domain name to create permission for is required. If **Anyone** is selected, then anyone has permission to the file or folder.
Connect Document From Google Drive Using ID	Connects the Google Drive document using the ID and can be tracked under Multi Provider Document Services Framework documents
Connect Document From Google Drive V1	Connects the Google Drive document using the shareable URL for the document and can be tracked under Multi Provider Document Services Framework documents.
Copy Google Drive Document Version	Copies the document with the given version from Google Drive to an attachment in ServiceNow.

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Subflow	Description
Delete Document	Deletes the document in Google Drive and remove its corresponding records in documents and versions tables.
Delete Document Version	Deletes the document in Google Drive and remove its corresponding records in documents and version tables.
Get All Document Versions	Gets all the document versions from Google Drive and creates or updates records in the Versions table under Multi Provider Documents.
Get Document From Google Drive	Copies the document from Google Drive to the Document Name referred by creating a record in the documents table and all its versions in the Versions table under Multi Provider Documents.
Get Document Latest URL	Constructs the web view URL and web edit URL for the file by verifying if the file actually exists in Google Drive. Consuming APIs are required to verify if the file is present or not.
Get Oldest Document Version	Returns the oldest version of the document.
Reconnect Document From Google Drive	Reconnects the Google Drive document that can be tracked under Multi Provider Documents.
Sync Collaborator	Syncs all Google Drive users in a domain with the Collaborators table under Multi Provider Documents.
Update Document Content	Updates the document with the attached content in Google Drive corresponding with the document ID from table Multi Provider Documents sys_id.

Spoke actions

The Document Services Framework for Google Drive provides actions to automate Document Services tasks when events occurs in your ServiceNow instance. Available actions include:

Action	Description
Delete document and versions	Deletes the specified document along with versions from Multi Provider document and versions table.
Look Up Incremental Files and Folders	• Returns a list of Google Drive files and folders under the given folder ID. • Retrieves the list of files and folders based on the given search query. Hierarchical search is not supported. **Note:** Search results may vary due to Google Drive 's indexing behavior.

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Action	Description
Look Up Files and Folders Stream	Retrieves the list of files and folders under the given folder.
Copy File Revision as Attachment	Copies the given Revision ID for a File ID to any record in ServiceNow.
Delete document version	Deletes the specified versions of a document from Multi Provider document versions table.
Look Up Target Record Existence	Checks for the existence of the target record in the specified target table.
Copy Doc File to Attachment	Copies the Google doc file toServiceNow as an attachment.
Copy Doc Revision as Attachment	Copies the given revision ID for a Google document file ID to any record in ServiceNow.
Get File Type Info	Returns the file type and information for the input mime-type.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up Document Services framework for Google Drive.

Set up Document Services framework for Google Drive

Integrate a ServiceNow instance and Google Drive spoke for Google Drive by using Google Drive credentials to authenticate ServiceNow requests.

Before you begin

Request a Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Role required: admin

Procedure

1. Set up and connect Google Drive Spoke.
   For more information, see Set up Google Drive spoke.
2. Set up and connect Google Directory Spoke.
   For more information, see Google Directory Spoke.
3. Set up and connect Google Doc Spoke.
   For more information, see Google Docs Spoke.
4. Activate Document Services for Google Drive Spoke.
   For more information, see Document Services Framework for Google Drive.

Personal authentication

Personal authentication enables individual users to authenticate with their personal accounts within ServiceNow using a secure connection between the user's identity and their

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corresponding Microsoft OneDrive or Google Drive account, allowing users to access, view, and manage their personal files directly from ServiceNow.

Personal authentication for Microsoft OneDrive

Personal authentication allows users to securely connect their individual Microsoft OneDrive accounts to Document Management. This enables user-specific access to files stored in Microsoft OneDrive, supporting personalized document handling such as attaching, viewing, or managing files directly within ServiceNow records.

This authentication method uses OAuth 2.0 to authorize each user, ensuring that file access and operations are performed under their unique identity. Each user connects to their own Microsoft OneDrive account, ensuring privacy and personalized access.

For more information, see Personal authentication.

Personal authentication for Google Drive

Personal authentication for Google Drive enables users to securely link their individual Google accounts with Document Management. This integration allows users to access, upload, and manage files from their personal Google Drive within ServiceNow, ensuring that all document interactions are authenticated under the user's unique identity.

For more information, see Personal authentication.

Personal Authentication dashboard

Use your personal credentials to connect to third-party integrations. View, authenticate, revoke, and renew your personal authentications through a simplified, consolidated interface. For more information, see Using the Personal Authentication dashboard.

Note:
The personal authentication dashboard can be accessed by users with `sn_personal_auth.personal_auth_user` role.

Configure personal authentication for Multi Provider Document Services Framework

Configure and enable personal authentication for Microsoft OneDrive and Google Drive accounts in Multi Provider Document Services Framework.

Before you begin
Role required: admin

About this task
For Microsoft OneDrive:

1. Install the Microsoft OneDrive Spoke for Document Services Framework
2. Setup Microsoft OneDrive for Document Services
3. Register Microsoft OneDrive as an OAuth provider for Document Services

For Google Drive

1. Install the Google Drive Spoke for Document Services Framework
2. Set up Document Services framework for Google Drive

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Procedure

1. Activate Personal Authentication Dashboard
2. Set up personal authentication.

Authenticate Microsoft OneDrive account

Enable personal authentication for Microsoft OneDrive for Multi Provider Document Services Framework.

Before you begin
Role required: sn_personal_auth.personal_auth_user

Procedure

1. Navigate to **All** > **IntegrationHub** > **Personal Authentication** > **Personal Integrations**.
2. Go to Microsoft OneDrive Spoke Credential tile, select **Authenticate**.

Authenticate Google Drive account

Enable personal authentication for Google Drive for Multi Provider Document Services Framework.

Before you begin
Role required: sn_personal_auth.personal_auth_user

Procedure

1. Navigate to **All** > **IntegrationHub** > **Personal Authentication** > **Personal Integrations**.
2. Go to Google Drive Spoke Credential tile, select **Authenticate**.

Using Multi Provider Document Services Framework

Create provider details, document actions, provider permissions and configure permission.

Create provider details

Create provider details for multi provider documents.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Multi Provider Document** > **Admin** > **Permission Configurations**.
2. Select **New**.
3. In the Attributes field, enter Name and Value.
4. In the Provider details name field, enter the name.
5. Select the Provider Name from the drop-down.
6. Select **Submit**.

Note:
Once the provider details are created, it automatically creates the document actions and provider permissions.

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Create document actions

Create document actions for multi provider documents.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Multi Provider Document** > **Admin** > **Document Actions**.
2. Select **New**.
3. Enter the Document Action Name.
4. Select Provider permission, Subflow, and Provider Details.
5. In the Description field, enter the description.
6. Select **Submit**.

Create provider permissions

Create provider permissions for multi provider documents.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Multi Provider Document** > **Admin** > **Permission Configurations**.
2. Select **New**.
3. On the form, fill in the fields.

New provider permissions fields

Field	Description
Permissions	Name of the document.
Description	A brief description about the provider permission.
Provider details	Select the provider details.
Attributes	Name and value of the attribute.

4. Select **Submit**.

Configure permissions

Configure permission for roles and groups for multi provider documents.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Multi Provider Document** > **Admin** > **Permission Configurations**.
2. Select **New**.
3. Select the Entity Type.

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4. Select the Entity id by selecting the search icon.
5. Go to the Documents field, select the role from the document list.
6. Select **OK**.
7. Enter Provider group attributes Name and Value.
8. In the Permissions field, select the permissions that you want to grant.
9. Select **Submit**.

Reference Multi Provider Document Services framework

Installed with Multi Provider Document Services Framework

Several types of components are installed with activation of the Multi Provider Document Services Framework plugin, including tables and user roles.

Roles installed

Roles installed with multi provider framework

Role	Description
Admin mp_document_admin	Configures multiple providers, remote document actions, and corresponding subflows.
Document User mp_document_user	Creates, updates, and deletes documents managed for providers

Tables installed

Tables installed with multi provider framework

Table	Description
Multi Provider Document mp_document	The documents connected with the third-party provider.
Multi Provider Document Version mp_document_version	The versions related to documents.
Multi Provider Document Activity mp_document_activity	Logs the activity for document and document versions table and can be used to troubleshoot the actions taken on documents and versions.
Multi Provider Collaborators mp_collaborators	Third-party users collaborating on the ServiceNow instance.

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Tables installed with multi provider framework (continued)

Table	Description
Multi Provider Detail mp_provider_detail	Details of the thirty-party providers that have been configured.
Multi Provider Document Action mp_document_action	The actions associated with each subflow.
Multi Provider Permission mp_provider_permission	Permissions allowed by the provider.
Multi Provider Permission Configuration mp_permission_configuration	Role/group mapping to permissions provided from the mp_permission table for each provider.

Multi Provider Document Services Framework Framework roles

Multi Provider Document Services Framework Framework is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Administrator [mp_document_admin]

Configure multi provider, remote document action, and corresponding subflows.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

User [mp_document_user]

Create, update, and delete documents managed for providers.

Contains Roles

List of roles contained within the role.

None.

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Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Now Assist in Document Management

Use ServiceNow Now Assist in Document Management to get key insights from the document through interactive Q&A, and auto- generated common questions. You can enable your agents to understand the documents so that they can give quick insights.

Get started

Explore	Configure	Use
Learn more about Now Assist for Document Services	Configure Now Assist for Document Services	Use Now Assist for Document Services

Troubleshoot and get help

- ServiceNow Community on AI and Intelligence
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support.

AI limitations

This application uses artificial intelligence (AI) and machine learning, which are rapidly evolving fields of study that generate predictions based on patterns in data. As a result, this application may not always produce accurate, complete, or appropriate information. Furthermore, there is no guarantee that this application has been fully trained or tested for your use case. To mitigate these issues, it is your responsibility to test and evaluate your use of this application for accuracy, harm, and appropriateness for your use case, employ human oversight of output, and refrain from relying solely on AI-generated outputs for decision-making purposes. This is especially important if you choose to deploy this application in areas with consequential impacts such as healthcare, finance, legal, employment, security, or infrastructure. You agree to abide by ServiceNow's AI Acceptable Use Policy, which may be updated by ServiceNow.

Data processing

This application requires data to be transferred from ServiceNow customers' individual instances to a centralized ServiceNow environment, which may be located in a different data center region from the one where your instance is, and potentially to a third-party cloud provider, such as Microsoft Azure. This data is handled per ServiceNow's internal policies and procedures, including our policies available through our CORE Compliance Portal.

Data collection

ServiceNow collects and uses the inputs, outputs, and edits to outputs of this application to develop and improve ServiceNow technologies including ServiceNow models and AI products. In addition, this application will collect case information (for chat summarization, resolution notes generation, knowledge generation, call

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summarization), chat transcripts (for chat recommendation), and email information (for email response). Customers can opt out of future data collection at any time, as described in the Now Assist Opt-Out page.

For more information, see the Now Assist documentation.

Explore Now Assist in Document Management

Now Assist in Document Management uses generative AI to extract key insights from documents through seamless conversational interactions, reducing manual effort while improving accuracy and consistency.

Now Assist in Document Management overview

Once activated and configured, Now Assist in Document Management uses generative AI capabilities available to generate key insights of the document through conversational interactions.

Now Assist in Document Management users

Users

User	Description
Admin	The sn_nowassist_admin.nsa_admin can configure the skills for Now Assist in Document Management

Now Assist in Document Management benefits

Now Assist in Document Management benefits

Benefit	Feature	Users
Generate instant summaries and key document insights	Generate a document summary by using Now Assist in Document Management	Admin
Extract key document insights through conversational interactions, powered using generative AI capabilities	Generate summary and ask questions using Now Assist in Document Management	Admin

What to explore next

To learn more about configuring and using Now Assist in Document Management, see:

- Configure Now Assist in Document Management
- Use Now Assist in Document Management

Configure Now Assist in Document Management

If you have the admin role, you can configure Now Assist in Document Management in the application enabling the use of its generative AI skills within the application workspace.

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Configuration overview

Configure how agents use generative AI capabilities to generate the document insights.

Configure the Smart Documents Skill for Now Assist in Document Management

Configure the Smart Documents Skill for Now Assist in Document Management

Configure the Smart Document skill to get document insights through seamless conversational interactions by using Now Assist in Document Management application.

Before you begin

Role required: sn_nowassist_admin.nsa_admin

Procedure

1. Navigate to **All** > **Now Assist Admin** > **Skills**.
2. In the workflow list, select **Platform**.
3. In the Now Assist skills for Platform, go to the Smart Documents skill and select **Activate skill**.
4. In the Define availability section, select the tables that you want to activate the smart documents for.
5. Select **Save and continue** to go to the next step in the guided setup.
   A guided setup leads you through the configuration of the general details, input, prompt, availability, display, review, and activation of the customized skill. If you complete the entire walk-through, the skill is activated.
6. In the Define access section, determine the roles that have access to this skill.
7. Select **Save and continue** to go to the next step in the guided setup.
8. In the select display section, choose where to display the smart documents.
9. Select **Save and continue**.
10. Review your selection and select **Activate**.
    The guided setup is complete and the skill is activated.

What to do next

System property to use Smart Documents skill features System property for Smart Documents skill.

System property for Smart Documents skill

Configure and set the system property to use Smart Documents skill.

System Property for Smart Documents skill

Role required: Admin

Note:
To view the System Properties table, enter `All Properties` in the navigation filter.

System property

System Property	Description
glide.ui.seismic.attachment.dialog	Set the value to `True` to use Smart documents skill.

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Use Now Assist in Document Management

If you have a sn_nowassist_admin.nsa_admin role, you can use Now Assist in Document Management to quickly summarize documents and get insights.

Generate a document summary by using Now Assist in Document Management

Generate a document summary to get quick insights into key information from documents by using Now Assist in Document Management.

Before you begin

Configure the Smart documents skill. For more information, see Configure the Smart Documents Skill for Now Assist in Document Management.

Role required: sn_nowassist_admin.nsa_admin

Procedure

1. Navigate to your workspace.
2. In the list section, go to the table that has the Smart documents skill activated and open the record.
   For example, an incident record.
3. Open the attached document to view it in the document viewer.
4. Generate a summary of the document by selecting **Ask Now Assist**.

   Note:
   The Summarize button is now integrated into the Ask Now Assist button.

   This gives the option to generate document summary with extract key insights.
5. **Optional:** Copy the summary by selecting the copy icon .
   The summary is copied and can easily be shared across emails, reports, or collaboration tools.

Generate summary and ask questions using Now Assist in Document Management

Generate summary and ask questions to gain quick insights from your documents by using Now Assist in Document Management.

Before you begin

Configure the smart document skill. For more information, see Configure the Smart Documents Skill for Now Assist in Document Management.

Role required: sn_nowassist_admin.nsa_admin

Procedure

1. Navigate to your workspace.
2. In the list section, go to the table that has the smart documents skill activated and open the record.
   For example, an incident record.
3. Open the attached document to view it in the document viewer.

   Note:
   The maximum supported document size is 10MB and the page limit is 200 pages.
   Supported file types are pdf, docx, pptx, xlsx, doc, ppt, xls, jpeg, and png.
4. Ask questions and view common questions of the document by selecting **Ask Now Assist**.

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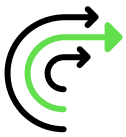
The document insights is generated based on the question.

5. **Optional:** Copy the response by selecting the copy icon .
   The responses are copied and can easily be shared across emails, reports, or collaboration tools.
6. **Optional:** Provide feedback on whether the result is helpful or not by selecting the liked icon or the not liked icon .

Knowledge Management

The ServiceNow® Knowledge Management (KM) application enables the sharing of information in knowledge bases. These knowledge bases contain articles that provide users with information such as self-help, troubleshooting, and task resolution.

Get started

Explore Explore Knowledge Management	Configure Plan and configure your Knowledge Management implementation	Use Knowledge Management Search and find information on self-help, troubleshooting, and task resolution
Create and maintain articles Create and maintain articles in the knowledge base	Knowledge Management Reference Additional information to configure and administer Knowledge Management	 Analytics and Reporting Solutions Platform Analytics Solutions and Demand Insights dashboards to improve your business processes and practices
Explore Explore Knowledge Center		

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Troubleshoot and get help

- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring Knowledge Management

Learn more about Knowledge Management with a sample workflow and review the benefits it can provide for different users in your organization.

Knowledge Management overview

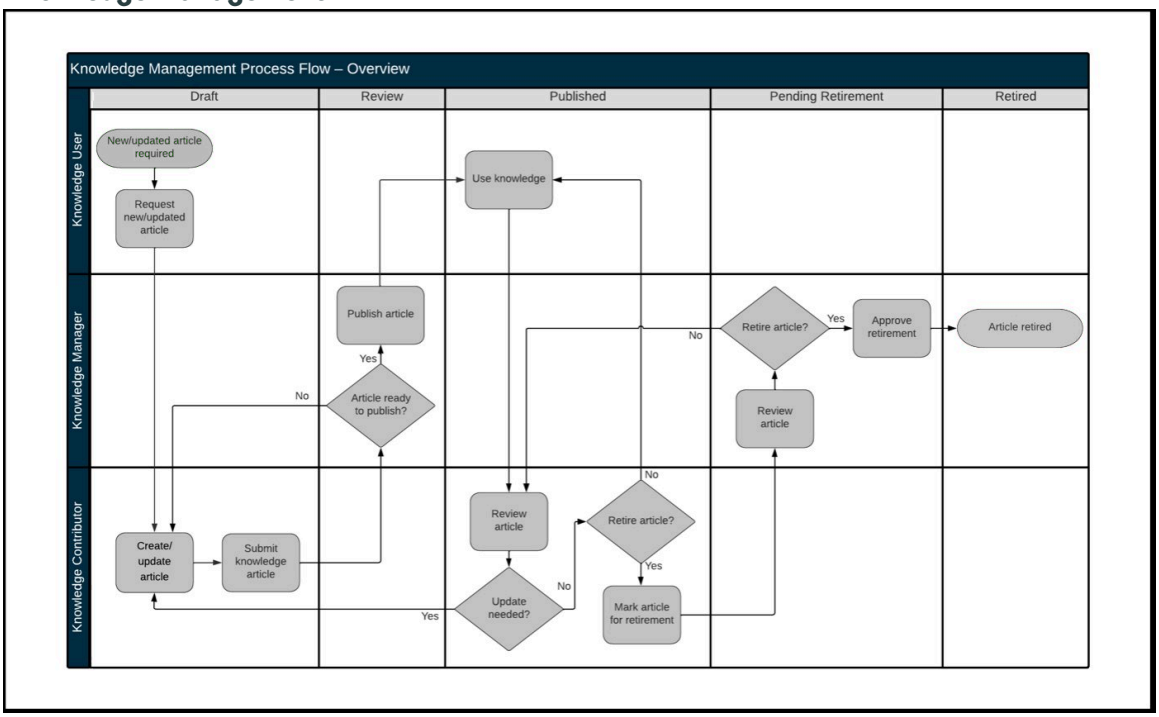
Knowledge Management supports processes for creating, categorizing, reviewing, and approving articles. Users can search and browse articles as well as provide feedback.

To support multiple groups, knowledge bases can be assigned to individual managers. Separate workflows can be used for publishing and retiring articles, and separate access controls can be used to control reading and contributing.

Knowledge Management workflow

This infographic shows a sample end-to-end workflow of how different users in an organization work together to create, share, use, and manage articles.

Knowledge Management



In this workflow:

1. The knowledge user needs a new or updated knowledge article and requests it.
2. The knowledge contributor creates or updates an article and then submits it for review.
3. The knowledge manager reviews the article and either publishes it or sends it back to the knowledge contributor for revisions.
4. The knowledge user reads and shares the article. In parallel, a knowledge manager continuously reviews articles to determine their relevancy.

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5. The knowledge manager marks articles that are no longer needed for retirement.
6. A knowledge manager reviews and approves or rejects the article retirement.

Knowledge Management benefits

Benefit	Feature	Users
Create a consistent structure for knowledge articles	Knowledge article templates	Knowledge manager
Create multiple knowledge bases for different groups within your organization	Knowledge bases	Knowledge administrator and manager
Create a category structure for each knowledge base with any number of levels	Knowledge article categories	Knowledge manager
Define permissions per knowledge base	User criteria, Scoped knowledge bases	Knowledge administrator and manager
Integrate with and search external knowledge sources	External content integration feature and Indexing and searching external content in AI Search	Administrator
Create knowledge articles using generative AI	Now Assist in Knowledge Management	Knowledge contributor
Import Word documents into knowledge articles and/or author knowledge in Word	Knowledge Management - Add-in for Microsoft Word, Word document importing	Knowledge contributor
Subscribe to relevant articles	Knowledge subscriptions	Knowledge user
Provide feedback and rate articles	Feedback and ratings	Knowledge user
Maintain a high quality of content and enable constant improvement	Article quality index (AQI)	Knowledge administrator (creates AQI), knowledge coach or domain expert (performs AQI reviews)
Identify knowledge gaps and improve the content of your knowledge base	Knowledge demand insights	Knowledge manager or domain expert
Determine the usage of knowledge content and confirm that the proper processes and procedures are being followed for content creation	Knowledge Management Platform Analytics Solutions	Knowledge manager

Sitemap Generator for the Knowledge Portal

The ServiceNow® Sitemap Generator application enables you to efficiently define and automatically generate XML sitemaps.

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Sitemap Generator configuration requirements for the Knowledge Portal

The sitemap is generated from a script or static XML. Validating sitemaps isn't handled automatically, so verify when creating a sitemap that its contents meet the following requirements:

- Includes only the knowledge base configured for the Knowledge Portal
- Includes only Knowledge Portal pages with unauthenticated user access
- Excludes Knowledge Portal URLs that aren't publicly accessible
- Excludes pages that respond with a 301 redirect
- Excluded retired and expired knowledge base articles

For information about sitemap requirements for search engine optimization (SEO), see Build and submit a sitemap in the Google documentation.

I18N - Knowledge internationalization

The optional knowledge internationalization features enable knowledge users to view articles in multiple languages.

Beginning with the San Diego release, the I18N: Knowledge Management Internationalization v2 (com.glideapp.knowledge.i18n2) plugin is installed when any language pack is activated. In versions prior to San Diego, this plugin was installed along with the Internationalization (com.glide.i18n) plugin.

Knowledge internationalization enables the knowledge management team to create language-specific knowledge articles and keep translations of the same article related to each other so they are easy to manage. Users can view and search within their own language while still being able to view articles in other languages when necessary.

Set a custom language for the article

Beginning with the San Diego release, users with elevated privileges can add a custom language by adding language entries in the Choice [sys_choice] table to display the selected article in multiple languages. On the article page, the **Language** list shows all the languages for which the article language translation is available.

Set the search language for articles

You can set the default language for searching articles to a language different from the logged-in language by specifying the language as the value of the *glide.knowman.search.default_language* system property. For example, if French is the logged-in language and you want to set English as the default language for searched articles, specify English in the system property. You can also switch to French in the UI to see the French articles. If the system property is not set, the logged-in language of the user is set as the default article language. For more information, see Other knowledge properties.

To enable search for different languages simultaneously, navigate to **Knowledge Administration** > **Knowledge Search** > **Properties** > **Enable multi language search** and select the **Yes** check box. For information about performing a search on all available languages simultaneously, see Search using Knowledge Management v3.

Note:
If the *glide.knowman.search.default_language* system property is inactive, you can search one language at a time. If the property is enabled, you can search for multiple languages simultaneously.

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Scoped knowledge bases

To protect knowledge bases containing sensitive articles, use a scoped knowledge base. Even system administrators and knowledge administrators can't administer scoped knowledge bases unless explicitly authorized through user criteria.

For example, say you have a knowledge article with sensitive payroll information that should be seen only by the Payroll department and not by a system administrator or knowledge administrator. You could create a knowledge article with the sensitive information in a scoped knowledge base within the Human Resources: Core application.

Only users with the admin role of an application and the knowledge_admin role can administer a scoped knowledge base. You control access to knowledge bases of an application with application administration enabled, such as HR, through the Access Control Lists (ACLs) of the knowledge tables in the application instead of global ACLs. To define access to a scoped knowledge base, specify appropriate user criteria for users, including system administrators and knowledge administrators.

Note:
For Scope Master tables to derive scope and execute scoped ACLS, you must set the *glide.enforce_security_scope.<scope_name>* system property to true.

You can't modify the scope of existing knowledge bases. They remain in the global scope. However, you can create a scoped knowledge base to protect sensitive knowledge articles.

To create a scoped knowledge base for an application, in addition to the knowledge_admin or admin role, you must have access to view and select that application in the application picker (see Application picker). For example, before you create a knowledge base in the Human Resources: Core application, you must select the Human Resources: Core application in the application picker, and then create the knowledge base. Then, when you create a knowledge base, on the Knowledge base form, the application scope of the knowledge base is set in the **Application** field.

Related topics

- Create a knowledge base
- Select an application from the application picker
- Application administration
- Control access at the knowledge base level through user criteria

Machine learning solutions for Knowledge Management

Machine learning in Knowledge Management helps improve knowledge governance and quality of your knowledge base.

Machine learning in Knowledge Management has the following benefits:

- Improves the quality of your knowledge base by avoiding duplicate articles and makes the knowledge base more Knowledge-Centred Service (KCS) compliant.
- Suggests related articles to help you solve an issue or resolve a question.
- Identifies knowledge gaps and improves content of your knowledge base using the Knowledge Demand Insights feature.

Predictive Intelligence for Knowledge Management

The Predictive Intelligence for Knowledge Management capability uses machine-learning algorithms to provide various Knowledge Management capabilities, such as similar articles and knowledge demand insights.

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Solution definitions for Predictive Intelligence for Knowledge Management

The solution definitions for Predictive Intelligence for Knowledge Management capability are available in the Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml). For more information about the plugin, see Additional plugins for Knowledge Management.

Solution definition and solution type

Solution Definition	Solution Type	Description
Knowledge Similar Articles **Note:** This solution definition is available as a template on instances where both the Predictive Intelligence for Contextual Search plugin (com.snc.contextual_search_ml) and Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml) are activated.	Similarity	Suggests related articles based on the short description of articles. You can see the results in the following places: • The Knowledge results section on the Knowledge form when creating an article in the Knowledge Management Service Portal. If the Knowledge results section isn't displayed on the Knowledge form, you may need to configure the form, to add the **Contextual Search Results** field. For more information, see Configuring the form layout. • The Related Articles section on the knowledge article view page in the Knowledge Management Service Portal and Now Mobile applications. • The Agent assist in Agent Workspace when the **Similar Articles (ML)** option is selected.
Demand Insights: Case Clusters Need Knowledge	Clustering	Populates collections of closed and resolved customer service cases on the Demand Insights for Cases dashboard.
Demand Insights: Incident Clusters Need Knowledge	Clustering	Populates collections of closed and resolved incidents on the Demand Insights for Incidents dashboard.
Demand Insights: Similar Cases and Knowledge	Similarity	Compares similarity of incidents with knowledge bases and identifies similar

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Solution definition and solution type (continued)

Solution Definition	Solution Type	Description
		closed and resolved customer service cases as candidate knowledge gaps.
Demand Insights: Similar Incidents and Knowledge	Similarity	Compares similarity of incidents with knowledge bases and identifies similar closed and resolved incidents as candidate knowledge gaps.

Related topics

- Train the similarity solution for Knowledge Management to find related articles
- Create a knowledge article in Agent Workspace
- Knowledge demand insights
- Demand Insights for Cases dashboard

Knowledge article templates

Article templates have pre-defined fields structured in a specific order. These templates help create a consistent structure for knowledge articles.

Using the Knowledge Article Templates feature, as a knowledge administrator (a user with knowledge_admin role), you can create article templates, add or customize fields in a template, and activate or deactivate a template.

As a security administrator (a user with security_admin role), you can configure field-level security in any template to make it visible to specific users.

As an author, you can create articles using pre-defined article templates or any newly created article templates.

Pre-defined knowledge article templates

Use either the standard template or one of the pre-defined How To, What Is, FAQ or KCS article templates.

Note:

When you upgrade Knowledge Management to Kingston or later releases, all the existing articles from the earlier version automatically use the standard template of the upgraded version. For example, if you upgrade Knowledge Management from Jakarta to Kingston, all existing articles use the standard template available in the Kingston version.

All pre-defined templates are inactive by default. If you do not activate a template, the articles automatically use the standard template. As a knowledge admin, you can activate a template by navigating to **Knowledge** > **Administration** > **Article Templates**. Then in the article template list, set the **Active** field to true for one or more templates you would like to activate.

Templates are associated with knowledge bases. Only templates which are active and associated with a knowledge base are shown.

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The template structure is stored in kb_article_template while the fields for each template are stored in kb_article_template_definition. For creating and manipulating templates navigate to **Knowledge** > **Administration** > **Article Templates**.

The table below lists the fields available in each template and the name of the template table.

Pre-defined knowledge article templates

Template name	Template fields	Maps to table	SEO Description Tag
FAQ	• Question • Answer	FAQ [kb_template_faq]	Question
How To	• Introduction • Instructions	How To [kb_template_how_to]	Introduction
What Is	• Introduction • Explanation	What Is [kb_template_what_is]	Introduction
KCS Article	• Issue • Environment • Cause • Resolution	KCS Article [kb_template_kcs_article]	Issue
Standard	Text	kb_knowledge	Text

Activating knowledge article templates

The Knowledge Article Templates feature is activated with the Knowledge Management Advanced (com.snc.knowledge_advanced) plugin. After the feature is activated, when creating an article, option to choose a template for the article appears. For details, see Activate the Knowledge Management Advanced plugin.

Deactivating knowledge article templates

You cannot delete an article template because article templates have an associated child table. Deleting a template would also require deleting the child table. Due to the limitations on dropping tables, article templates and template columns are explicitly made non-deletable. Instead, you can disable the Knowledge Article Templates feature by clearing the **Active** check box on the Article Template form.

Note:
The Standard template is available by default and can't be made inactive.

Related topics

Configure knowledge article templates

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Knowledge blocks

Knowledge blocks are reusable pieces of content secured by customizable user criteria that you can add to knowledge articles in a knowledge base. The user criteria determine which user roles can or can't read the block content in an article, enabling only relevant content to be visible to that user.

Knowledge blocks are available for use in ServiceNow AI Platform only.

How to use knowledge blocks

To use knowledge blocks, a knowledge administrator or manager must enable the knowledge blocks feature for each knowledge base in which the blocks will be used.

Enable knowledge blocks for each knowledge base

Knowledge contributors can create knowledge blocks and insert them into articles in a knowledge base:

Note:
Knowledge blocks are not supported in articles of type wiki. By default, knowledge block doesn't show files attached to it. However, you can see images and text are visible on KB's created from block files.

- Create a knowledge block
- Add knowledge blocks to a knowledge article
- Preview a knowledge article with knowledge blocks by user or date

Knowledge block content can be read or not read in an article or search based on user criteria set at the knowledge base and knowledge block level. See Select user criteria for a knowledge block for more information.

Example: Holiday calendar with location-specific knowledge block content

You are part of an enterprise HR organization that maintains a company knowledge base. You want to create a holiday calendar so that employees know which days of the year are company holidays. Since the company has multiple locations and holiday dates vary based on where the employee is located, there are several ways that you could create the knowledge article.

One way is that you could create a knowledge article for each location, with an article for Location A, Location B, and so on.

- Pros: simplified consumption. Employees have a single article to search for and read.
- Cons: more work for HR. HR has multiple articles to manage and update for each location where the company has employees.

Another way is that you could create a single knowledge article that includes sections for each location.

- Pros: simplified authoring. HR has a single article to manage and update.
- Cons: more work for employees. Employee must scroll through and disregard extraneous content to find the section in the article that pertains to them.

With knowledge blocks, you can create a single knowledge article with location-specific block content secured by user criteria. This approach helps to reduce the workload for both HR and employees. As an HR agent, you have a single article to manage and update. Employees have a

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single article to search for and read, with the user criteria ensuring that they only view content that is relevant to them.

If you are using a custom search or knowledge article viewer

If you are using a custom search or knowledge article viewer with your application, you should integrate it with the appropriate knowledge or knowledge blocks API. (Integration is only necessary if you are using a custom search or knowledge article viewer.)

Integrating a custom search or knowledge article viewer with knowledge blocks

Activation information

To use knowledge blocks in your application, you must activate knowledge blocks. For information on what components are installed with the feature, see Components installed with knowledge blocks.

Note:
Activating knowledge blocks automatically activates Knowledge Management Advanced, which enables advanced features such as article versioning. Knowledge blocks can be used with or without the article versioning feature. To disable the feature, see Disable the article versioning feature.

Knowledge subscriptions

Subscribe to knowledge bases and knowledge articles to receive email notifications about new articles and article revisions or comments.

- Subscribed to a knowledge base:
  - Knowledge base owners are auto-subscribed to all articles in the knowledge bases they own. They receive email notifications when new articles are created or revised (published) in the knowledge base.
  - Users who subscribe to a knowledge base receive email notifications when new articles are created in the knowledge base or if the existing articles are revised (published).
- Subscribed to a knowledge article:
  - Knowledge authors are auto-subscribed to the articles they create. They receive email notifications when the articles they created are checked out or revised (published) by other authors, and if the articles receive user comments.
  - Users who subscribe to an article receive email notifications when the article is revised (published).

Users can set their Knowledge notification preferences using **System Settings**. For more information, see Managing email notifications in Knowledge Management and Set knowledge notification preferences.

The knowledge subscription feature is available for both the Knowledge Management v3 user interface and the Knowledge Management Service Portal.

If the article versioning feature is enabled, the following notifications are also sent:

- An article is checked out
- An article is revised
- A new version of an article is published

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Activation information

The knowledge subscriptions feature requires the Knowledge Management Advanced plugin (com.snc.knowledge_advanced). For more information, see Configure knowledge subscriptions.

Related topics

- Use knowledge subscriptions
- Knowledge article version numbers
- Article versioning

Knowledge demand insights

Identify knowledge gaps and improve content of your knowledge base using the Knowledge Demand Insights feature.

The Knowledge Demand Insights feature automates the discovery of knowledge gaps in your knowledge bases. Knowledge gaps are topics on which knowledge bases are missing knowledge articles.

Addressing knowledge gaps has the following benefits:

- Improve effectiveness of self-service: Self-service users get more relevant information for research, troubleshooting, and how to queries.
- Increase case or incident resolutions: Having relevant information available helps you deflect future cases.
- Improved case resolution: Agents can find more relevant knowledge articles to solve cases, incidents, problems, and so on.

Activation information

The Knowledge Demand Insights feature requires the Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml). For more information, see Predictive Intelligence for Knowledge Management and Additional plugins for Knowledge Management.

Demand insights dashboards

You can use a demand insights dashboard for your tasks to analyze candidate knowledge gaps and create knowledge gap feedback tasks. By default, the Knowledge Demand Insights feature includes **Demand Insights for Incidents**, **Demand Insights for Cases**, and **Demand Insights: Similar HR Cases and Knowledge** dashboards for incidents, customer service cases, and HR cases, respectively. For other tasks, you can create a dashboard. To access a demand insights dashboard, you must have read access to the tasks and the sn_km_ml.knowledge_curation_user role. For more information, see Analyze knowledge gaps from a demand insights dashboard and create knowledge gap feedback tasks.

Related topics

- Demand Insights for Cases dashboard
- Demand Insights for Incidents dashboard
- Demand Insights for HR Cases dashboard

Self-Service Analytics

The Self-Service Analytics framework enables you to gather information about user activities and deflection outcomes related to those activities.

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Display the effectiveness of self-service channels by using reports and dashboards based on the data generated by the Self-Service Analytics framework. This Self-Service Analytics data is used by the Self-Service Analytics dashboard for customer service. You can also use the Self-Service Analytics framework in dashboards of other applications that use the Subscriptions and Activity Feed Framework. For more information, see Self-Service Analytics dashboard for customer service.

Analyzing self-service deflection metrics has the following benefits:

- Measure self-service effectiveness through self-service KPIs.
- Quantify successful self-service engagements to take corrective actions.
- Define custom self-service KPIs tailored to your organization.

Activation information

The Self-Service Analytics framework requires the Self-Service Analytics Core plugin (com.snc.self_service_analytics_core). For more information, see Activate Self-Service Analytics.

Note:
The data for the Communities and Virtual Agent channels are generated when the Communities plugin (com.sn_communities) and Glide Virtual Agent plugin (com.glide.cs.chatbot) are activated respectively.

Related topics

Configure Self-Service Analytics

Self-Service Analytics concepts

Platform Analytics Solutions for Self-Service Analytics for Customer Service

Self-Service Analytics concepts

You can quantify your self-service effectiveness by measuring case deflections.

The Self-Service Analytics framework enables you to measure case deflection by defining user activity patterns for a deflection outcome. A case deflection is when you are able to provide a resolution using one of the self-service channels, such as Knowledge, Communities, Catalog, and Virtual Agent, to a user who intended to create a case and as a result, no case is created.

By default, the Self-Service Analytics framework is used by the Self-Service Analytics dashboard for customer service. The framework can also be used in dashboards of other applications that use the Subscriptions and Activity Feed Framework.

The system includes predefined configurations for the Self-Service Analytics framework components associated with consumers and customer contacts. You can also configure these components for other user entities.

Self-service analytics components

Self-service analytics is based on the activity pattern associated with a deflection outcome. It consists of the following main components:

- Activity pattern (see Activity pattern components)
- Deflection outcome (see Deflection outcome components)

Activity pattern components

Activity pattern

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A combination of pattern element, pattern element group, or both for a user entity such as consumers or customer contacts that is linked to an outcome. Each pattern element or pattern element group is implemented as regular expressions.

Example: The activity pattern Contacts: Case: Confirmed Deflection is a combination of pattern element groups Self-Service: Helpful and Self-service actions: Optionally Many.

Deflection outcome

An activity pattern can lead to a deflection outcome. See Deflection outcome components.

Primary activity

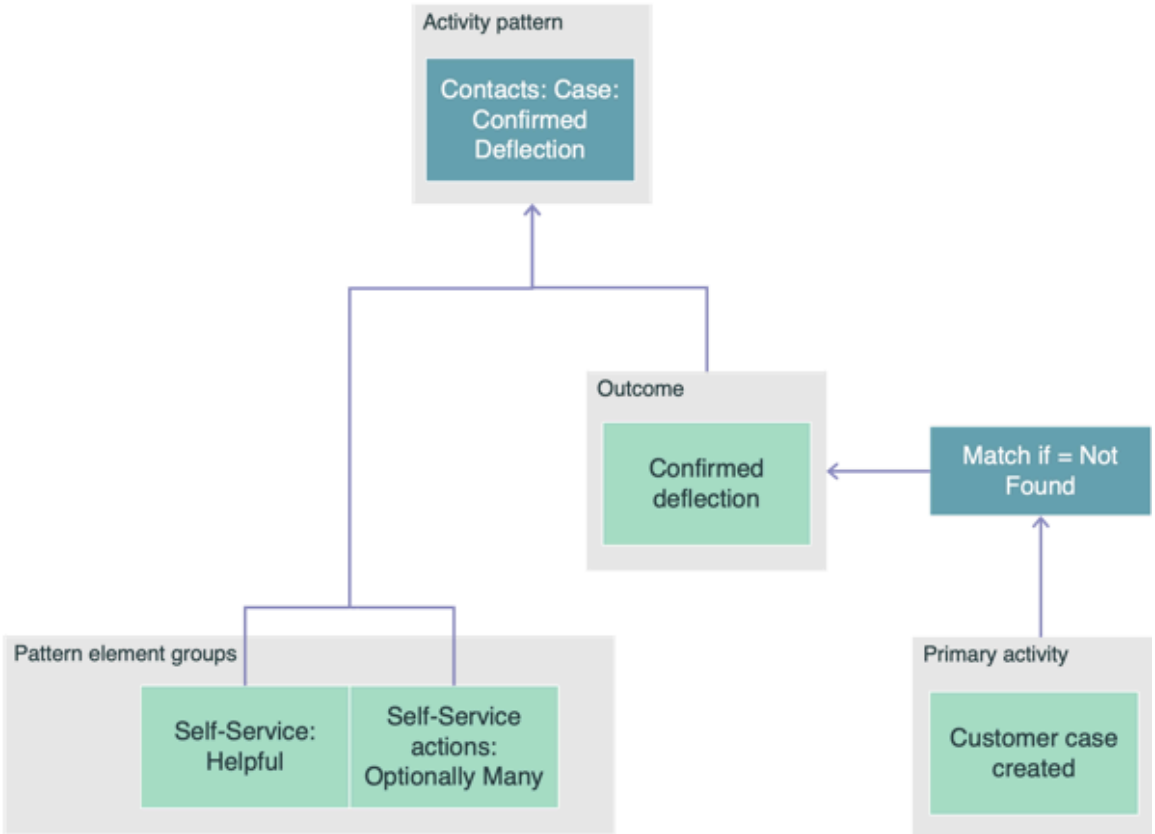
The final activity that determines the outcome associated with an activity pattern based on whether it happens or not.

Example: For the primary activity Customer created a case if the system does not find a match (that is a case was not created), the outcome Confirmed deflection is associated with the activity pattern Contacts: Case: Confirmed Deflection.

Pattern element group

A logical combination of two pattern elements, pattern element group, or both and how many times the combination occurs. For more information, see Pattern element group components.

The following figure illustrates the components of the activity pattern Contacts: Case: Confirmed Deflection.



Pattern element group components

Pattern element group

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A logical combination of two pattern elements, pattern element group, or both and how many times the combination occurs. Each pattern element group is implemented as regular expressions.

The occurrence of the logical combination result is one of the following types:

- Once
- Optionally Once
- Optionally Many
- At Least Once
- Range

Example 1: In the following table, the Knowledge engagements once pattern element group is true when it occurs only once and either Article viewed once is true or Article marked with positive feedback once is true.

Pattern element group example 1

Pattern element group	First Element	Second Element	Operator	Occurrence
Knowledge engagements once	Article viewed once	Article marked with positive feedback once	Or	Once

Example 2: In the following table, the Self-service engagements optionally many pattern group is true when engagements either have not occurred or have occurred multiple times and either the Knowledge or catalog engagements once is true or the Communities or virtual agent engagements once is true.

Pattern element group example 2

Pattern element group	First Element	Second Element	Operator	Occurrence
Knowledge or catalog engagements once	Knowledge engagements once	Catalog engagements once	Or	Once
Communities or virtual agent engagements once	Communities once	Virtual agent engagements once	Or	Once
Self-service engagements optionally many	Knowledge or catalog engagements once	Communities or virtual agent engagements once	Or	Optionally Many

Pattern element

Denotes a single activity type and how many times it occurs. Each pattern element is implemented as regular expressions.

Example: The pattern element Article viewed once denotes that the activity Viewed a knowledge article must occur once.

Activity type

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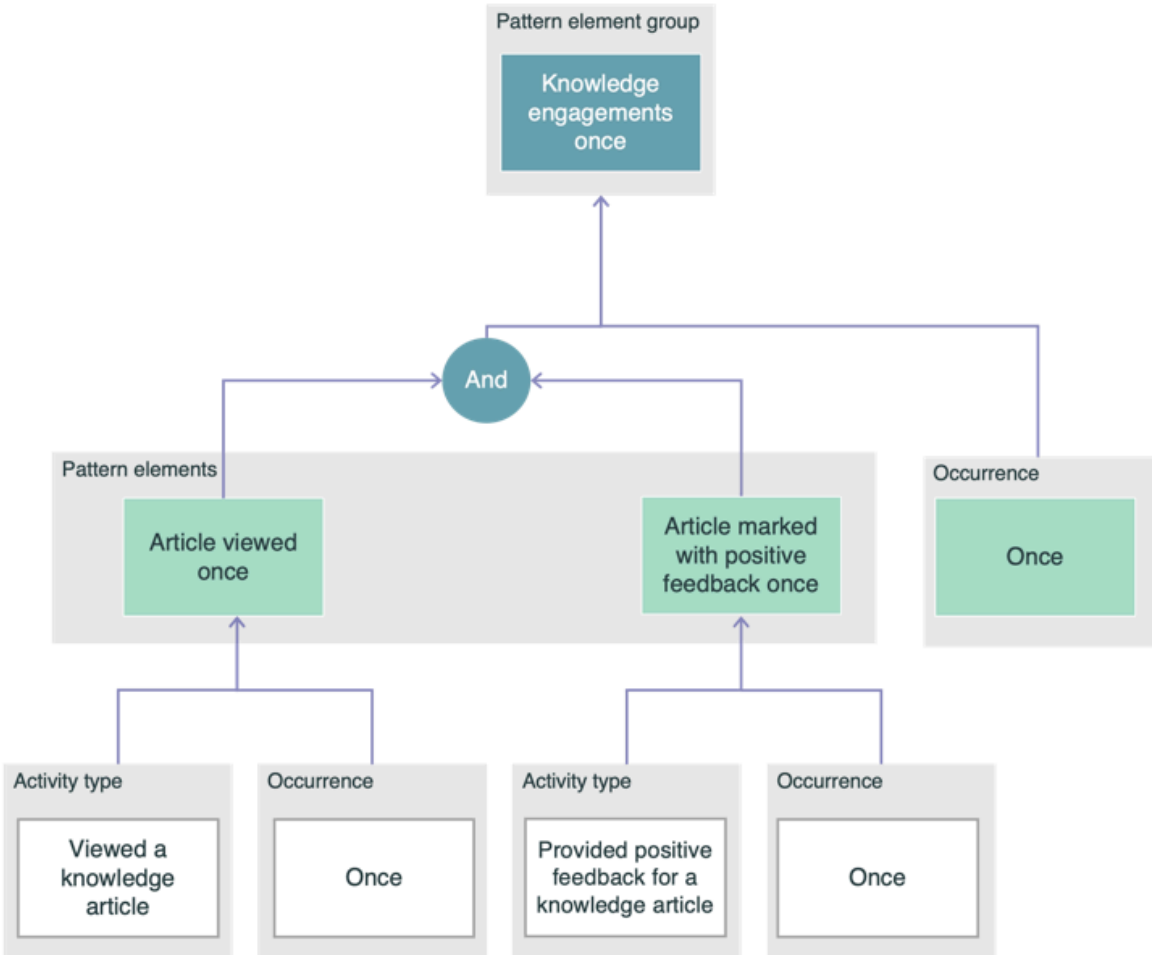
An action that a user (consumer or customer contact) performs.

Example: The activity type Viewed knowledge article occurs when a user views a knowledge article.

The following figure illustrates the components of the pattern element group Knowledge engagements once.



Activity context components

Activity context

A collection of activity groups a user might perform such as Catalog, Knowledge, Case, Communities, and Virtual Agent.

Example: The activity context Contact is a collection of activity groups Catalog, Knowledge, Case, Communities, and Virtual Agent associated with the customer contact.

Activity group

A logical grouping of activity types performed on the same object type such as a knowledge article, community answer, or customer service case.

Example: The activity group Knowledge is a logical grouping of the activities Viewed knowledge article and Marked the article helpful performed on a knowledge article.

Activity context group

An activity group that has been added to a context.

The following figure illustrates the components of the activity context Contact.

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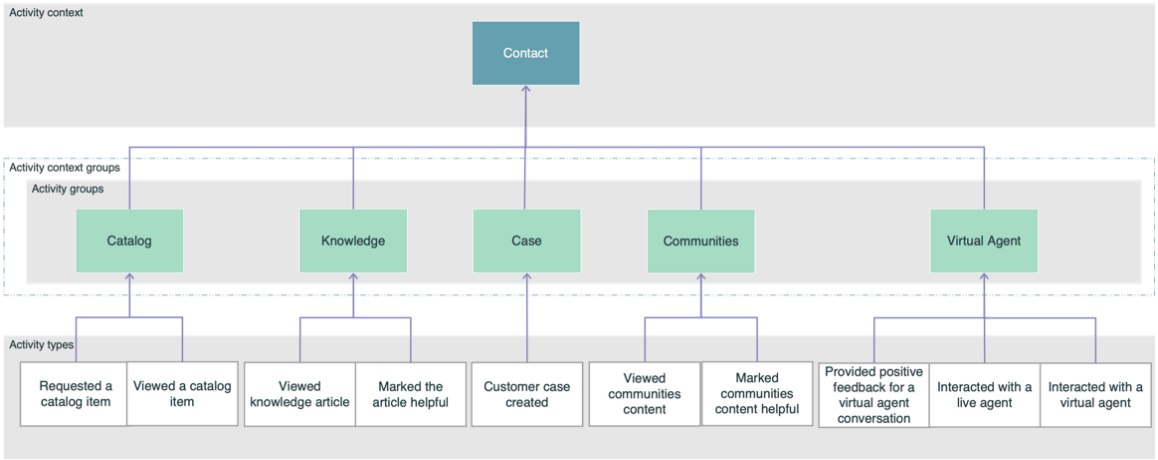

Deflection outcome components

Deflection outcome

In the context of deflection, an activity pattern can lead to one of the following three outcomes:

Confirmed deflection

The self-service content definitely prevented a case from getting created.

Potential deflection

The self-service content was viewed and no case was created, but it's unclear whether the content is the factor that prevented the case from getting created.

No deflection

A case was created after the self-service content was viewed.

Deflection configuration

Associates a window (duration) with an activity context. The window defines how long a system will wait for a case to be created to match with a deflection pattern.

Example: To track the create case activity for a consumer within a day, set the window as 1 day.

- If the consumer created a case within that window, the deflection pattern matched is a No deflection.
- If the consumer did not create a case within that window, the deflection pattern matched is a Potential deflection.
- If the consumer did not create a case and the last activity is submitted positive feedback for any self-service channel content within that window, the deflection pattern matched is a Confirmed deflection.

Deflection metrics

A transactional table that stores the outcome of matched patterns. By default, the scheduled job for Self-Service Analytics captures data and stores the generated data in the Deflection Metric [ssa_deflection_metric] table.

Deflection pattern

Associates deflection configuration with an activity pattern. A deflection pattern is implemented as a table.

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Related topics

Configure Self-Service Analytics

Translation management

Knowledge articles are authored and published in many languages and translating these articles to languages other than the language they are authored in requires creating translation tasks. Translation management enables you to manage these translation tasks.

The translation management feature enables the following translation activities:

- Translate published knowledge articles that are missing translations manually or use the machine translation option to automatically translate them.
- Create translation tasks automatically for specified languages.
- Configure assignment rules and auto-assigned tasks for a language, knowledge base, or category to a translator or a group of translators.

For information about activating translation management, see Activate translation management.

Enabling the *glide.knowman.translation.enable_translation_task* property adds the following menu options to the Translation Management submenu under the Knowledge menu:

- **All Open Tasks**
- **My Assigned Tasks**
- **Translator Mapping**

You can choose a default language when you log in to an instance. The available languages are based on the internationalization language plugins you have installed.

Related topics

Translate a knowledge article from a translation task

I18N - Knowledge internationalization

Activate the knowledge management internationalization plugin

Knowledge-Centered Service configuration

Knowledge-Centered Service (KCS) is a method for the creation and continuous improvement of knowledge based on the experience of agents and the patterns observed by knowledge reuse.

ServiceNow Knowledge Management is a KCS (V6) verified product. As a KCS (V6) verified product, Knowledge Management provides features to improve knowledge, such as article quality reviews, in-context knowledge capture, and feedback management.

Visit the following page on the ServiceNow Community for information about getting started with Knowledge Management and KCS: Knowledge Management Getting Started .

Activation information

The Knowledge-Centered Service configuration is activated with the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities). For more information, see Activate Knowledge Management KCS Capabilities.

Related topics

Managing KCS article states

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Article quality index for knowledge management

Assess the quality of knowledge articles with the article quality index (AQI). The AQI helps maintain consistent quality of knowledge articles attached to a knowledge base where articles are written by various authors.

Using AQI feature, a knowledge administrator (a user with knowledge_admin role) creates a checklist and adds a set of true or false questions to the checklist to assess the quality of knowledge articles. For each question, the knowledge_administrator assigns a weight based on its importance to the quality measurement and then attaches the checklist to a knowledge base.

A knowledge reviewer (a user with knowledge_coach and knowledge_domain_expert role) performs AQI review on knowledge articles attached to the knowledge base by answering the true or false questions in the checklist. The article quality is then scored based on the cumulative weight of all answers set to true in the checklist.

The average AQI scoring is displayed on the Content Quality tab of the Knowledge Management dashboard (see Knowledge Management dashboard).

Activating article quality index

The article quality index feature is activated with the Knowledge Management Advanced (com.snc.knowledge_advanced) plugin. For details see, Activate the Knowledge Management Advanced plugin.

Related topics

Use Article Quality Index

Article versioning

Use the Knowledge Management article versioning feature to create and maintain multiple versions of a knowledge article.

Knowledge contributors can create a new version of a knowledge article from an existing published version. This existing version can be either the latest published version or an older outdated version. All changes are stored in the new version of the article and the information in the existing article remains the same.

If you import published knowledge articles from a ServiceNow instance that does not support article versioning, you must run the *Initialize Versions on Articles* fix script to enable article checkout and editing.

With the article versioning feature, a knowledge user can:

- Check out a published article and create another version.

  Note:
  Only an author (who checks out an article for revision), knowledge base owner, and user with knowledge_admin role can edit an article in the draft state.

- Select a previously published (outdated) version of an article and make it current.
- Recall an article that is being reviewed or scheduled for publication.
- Retire the latest published version of an article.

Note:
Only an author (who checks out an article for revision), knowledge base owner, and user with knowledge_admin role can edit an article in the draft state.

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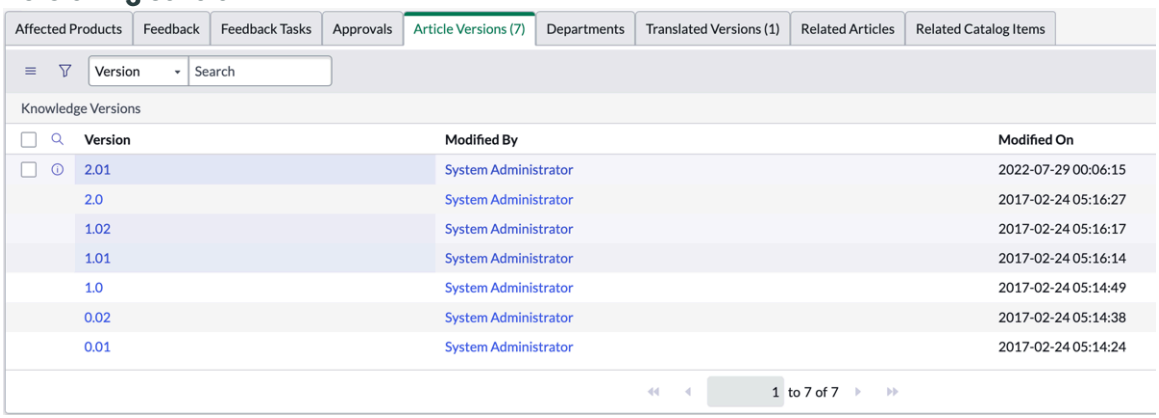
There are two types of article revisions: major and minor. Minor revisions include updates to an article that has not yet been published. Major revisions include updates to an article that has been published and is available to customers. To track the different revisions, the article versioning feature introduces version numbering. For more information, see Knowledge article version numbers

With the article versioning feature, the knowledge article number also includes the version number. All references to knowledge articles use this number format. For example, KB0010003 v2.0. To access all the versions of knowledge article, navigate to **All** > **Knowledge** > **Articles** > **All** and open article with multiple versions. In the Related list, you can access all the versions.

Versioning control



Activation information

The article versioning feature requires the Knowledge Management Advanced plugin (com.snc.knowledge_advanced) to be activated and the *glide.knowman.versioning.enabled* property to be set to true (default value). For more information, see Activate the Knowledge Management Advanced plugin and Article versioning properties.

Related topics

Use article versioning

Knowledge Management FAQ

Ownership groups

Configure ownership groups and associate them with knowledge articles to maintain article quality, manage approvals, and for timely resolution of feedback.

For the ease of maintenance of knowledge articles, you can assign an ownership group to a knowledge article and shift the ownership of an article from a single person to a group. An ownership group consists of a group of members and a manager who are responsible for knowledge articles. Responsibilities include: approving knowledge articles, performing AQI checks to ensuring article quality, and managing feedback tasks for knowledge articles.

When a knowledge article is assigned to an ownership group:

- Only ownership group members have contribute access to the article even if they don't have contribute access to the knowledge base of the article. They can edit, approve, publish, and retire the knowledge article with which they are associated.
- Users who aren't a member of the ownership group and not an author or editor can't contribute to the article even if they have **contribute** access to the knowledge base of the article.

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When Create a knowledge article from an incident in ITSM Agent Workspace or editing a knowledge article, you may need to configure the Knowledge form to add the **Ownership Group** field.

Activation information

To enable the use of ownership groups, enable the *glide.knowman.ownership_group.enabled* property. This property is available when the Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated. By default, the property is disabled.

Note:
If you use ownership groups, try not to disable the *glide.knowman.ownership_group.enabled* property later. If you must disable the property later, ensure that you manually reassign all knowledge articles associated with any ownership group, close all article approvals sent to ownership groups, and resolve all open feedback tasks assigned to ownership groups.

Contribute access to published articles

If an ownership group is associated with a knowledge article, the author or reviser of the article can't contribute to the article after the article is published. You can override this behavior by enabling the *glide.knowman.ownership_group.override* property. When the property is set to `true`, the authors or revisers of knowledge articles associated with ownership groups retain contribute access to their published articles. By default, the property is set to false.

Approval of self-authored articles for ownership group members

With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. You can override this behavior by disabling the *glide.knowman.ownership_group.allow_self_approval* property. By default, the property is set to true. When the property is set to `false`, ownership group members can't approve self-authored knowledge articles.

Related topics

- Manage ownership groups
- Knowledge Management properties

Automating feedback management to improve content

Manage high volumes of article feedback by enabling task generation for negative feedback. When an article is rated poorly or marked as unhelpful, a feedback task is generated.

If an ownership group is assigned to the article, the feedback task is assigned to the manager of the ownership group. Ownership group managers can reassign tasks to another group member, or group members can assign a feedback task to themselves.

If no ownership group is assigned to the article, the feedback task is assigned to the author or reviser of the article.

The task assignees can update the article, create a new article, request additional feedback, or reassign the task and receives notification after the feedback is updated or resolved.

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Note:
The actionable feedback feature is available in the Knowledge Management Service Portal and Agent Workspace. To use the actionable feedback feature in other service portals, you can activate the **Knowledge Article View** page route map.

Beginning with New York, the **Knowledge Article View** page route map is activated by default. Existing customers on release versions prior to New York can activate the **Knowledge Article View** page route map. For more information, see Activate the Knowledge Article View page on upgrade.

Related topics

- Enable actionable knowledge feedback
- Work on a feedback task
- Track the progress on a feedback task

Migrate to Knowledge Management v3

When you migrate to Knowledge Management v3 from v2, you must migrate legacy knowledge content and any customizations you have made to the Knowledge Base applications.

The following video provides more information on how to migrate from Knowledge Management v2 to v3.

Migrating from Knowledge Management v2 to v3

Knowledge Management v3 migration process

When you upgrade from knowledge v2, consider a multi-step migration process. This process ensures you can access existing knowledge content and allows you to fully migrate at your own pace.

Review automatic changes before upgrading. These changes are applied immediately when upgrading and may impact existing functionality.

1. Migrate knowledge functionality to use your customized functionality with the Knowledge Management v3 enhancements.
2. Migrate knowledge content to use the Knowledge Management v3 enhancements with your existing knowledge articles.

Configuring Knowledge Management

Plan and configure your Knowledge Management implementation.

Configuration overview

Visit the following page on the ServiceNow Community for information on setting up Knowledge Management: Knowledge Management Getting Started.

You can also use Knowledge Management capabilities within a website built on Adobe Experience Manager (AEM). For more information, see Integration with Adobe Experience Manager.

Using guided setup to implement Knowledge Management

Guided setup provides a sequence of tasks that help you configure Knowledge Management on your instance. To open guided setup for Knowledge Management, navigate to **Knowledge** > **Administration** > **Guided Setup**. For more information, see Using guided setup.

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Activate the Knowledge Management Advanced plugin

Activate the Knowledge Management Advanced plugin (com.snc.knowledge_advanced) to enable advanced features for Knowledge Management.

Before you begin

Role required: admin

About this task

The Knowledge Management Advanced plugin includes feature code and demo data.

The Knowledge Management Advanced Installer plugin (com.snc.knowledge_advanced.installer) is used to activate the Knowledge Management Advanced plugin.

Starting with the Xanadu release, the Knowledge Management Advanced plugin is automatically activated for new customers.

Note:
The Knowledge Management Advanced plugin isn't automatically activated with the Knowledge Management v3 application.

The Knowledge Management Advanced Installer plugin performs two validation steps prior to activation.

- Determines whether there are any active Knowledge Management v2 knowledge bases.
- Determines whether there's a unique database index on the **Number** field. If a unique constraint has been added to the **Number** field, the plugin activation fails. Resolve this issue by following the instructions in the Installation of the Knowledge Management Advanced Plugin fails if unique index already exists in article number [KB0634959] article in the Now Support Knowledge Base.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

The Knowledge Management Advanced plugin activates the following features:

- Article versioning
- Article subscriptions
- Article quality index
- Article templates
- Ownership groups
- In context article creation
- Translation management

Demo data is included as part of the Knowledge Management Advanced plugin. If the validation step performed by the Knowledge Management Advanced Installer plugin completes successfully, the Knowledge Management Advanced plugin is activated automatically. However, the demo data isn't included in this activation. To load the demo data, go to the Knowledge Management Advanced plugin page, select the **Load Demo Data Only** related link, and then select **OK**.

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Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Knowledge Management setup guide for admins

Before users in your organization can start creating knowledge bases and knowledge articles, you must set up Knowledge Management. Work with stakeholders to define requirements for setting up Knowledge Management effectively to meet the needs of users.

Requirements

Role required: admin.

Before you begin

Meet with the stakeholders

Stakeholder	Responsibilities
Knowledge manager	Defines and oversees the knowledge management processes for day-to-day operations related to content publishing and usage.
Knowledge admin	Configures advanced settings for specific Knowledge Management features
Knowledge coach	Enables users to adhere to content standards.
Knowledge domain expert	Provides domain knowledge expertise.
Version author	Contributor to a particular version of an article.
Content creators and reviewers	Create, review, and update articles in the knowledge bases.
Community managers	Focus on the creation and curating of social content.
Line managers	Manage teams that create and use knowledge articles

With stakeholders, determine the following requirements

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- Who are the consumers of the content in the knowledge bases?
- Who are the writers, editors, and managers for the knowledge base articles?
- What are the required workflows to publish and retire articles?
- What are the unique behaviors required for your knowledge management implementation? For example, should attachments appear in search results?
- Do you want to translate knowledge articles into other languages?

What to do

Assign knowledge roles to users and groups

Determine which Knowledge Management roles are appropriate for each user, and then assign those roles .

Create custom Knowledge workflows

If the default knowledge workflows for publishing and retiring knowledge articles are not appropriate for your knowledge bases, create custom workflows for those knowledge bases.

Configure Knowledge properties

If the default knowledge properties do not fulfill the requirements of users, reconfigure the properties as necessary.

Activate support for other languages besides English

If languages other than English must be supported, activate the Knowledge Management Internationalization plugins.

Coordinate with knowledge managers for knowledge base setup

Let knowledge managers and administrators know that they can start configuring their knowledge bases. For details, refer them to the Knowledge base setup guide for knowledge admins and managers.

Next steps

Depending on any other requirements for the knowledge bases, you may be asked to help with additional tasks, such as configuring knowledge landing pages.

Using guided setup to implement Knowledge Management

Knowledge Management guided setup provides a sequence of tasks that help you configure Knowledge Management on your instance. To open Knowledge Management guided setup, navigate to **Knowledge** > **Administration** > **Guided Setup**.

For more information about using the guided setup interface, see Using guided setup .

Knowledge base setup guide for knowledge admins and managers

After basic Knowledge Management setup is completed, you can set up a knowledge base for users to create and publish knowledge articles.

Create multiple knowledge bases for different groups within your organization to share information within and between those groups. Create scoped knowledge bases to enable only application administrators to administer the knowledge bases and restrict unauthorized access to application-specific data.

Administrators create knowledge bases, and assign them to individual managers responsible for controlling the behavior and organization scheme of each knowledge base.

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Each knowledge base contains knowledge articles that provide information for users, such as policy, release notes, or instructions for a task. Each knowledge base can also use a separate workflow for publishing and retiring articles.

Requirements

Role required: knowledge_administrator, knowledge_manager, or admin.

Before you begin

Determine the following requirements for each knowledge base that you want to set up:

- Whether to create a scoped knowledge base? For more information, see Scoped knowledge bases.
- Who are the knowledge base managers that are responsible for approving articles?
- Who are the users and contributors for that knowledge base? Access for these users is defined through user criteria.
- What are the categories to be used to classify articles? Will users be able to create categories?
- Will users of the knowledge base be able to create new content?

What to do

Set up the knowledge base

1. Create the knowledge base.
2. Set up which users can read, create, or edit knowledge articles by selecting user criteria for the knowledge base.
3. Define the approval process for articles using workflows.
4. Define the knowledge categories that are needed for organizing articles in the knowledge base.
5. If you want a custom knowledge homepage, ask your ServiceNow administrator to create it.

Next steps

Let users in your organization know that they can start creating and searching articles in the knowledge base. For details, refer users to the Knowledge Management guide for users.

If you have the knowledge_manager role, there are many other tasks that you can perform to maintain the knowledge base. You can pin articles so they are featured prominently in the search results and on landing pages. You can also assign other users as managers of a knowledge base. For details, see Configuration tasks for knowledge managers.

Activate the sitemap configuration and definition records for the Knowledge Portal

Include knowledge articles in your sitemap by activating the sitemap configuration and definition records.

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Before you begin

- Activate Sitemap Generator
- Verify that an unauthenticated user can access the knowledge base article by accessing it as a guest user.
- Verify that the Public option is selected on the Knowledge Article View form.

Role required: admin

About this task

Beginning with the Zurich release, the Sitemap Generator configuration is available with the base system and is inactive by default.

Procedure

1. Navigate to **All** > **Sitemap Generator** > **Sitemap Configuration**.
2. In the UX Sitemap Configurations [sys_ux_seo_sitemap_config] table, select the sitemap_config_KB record.
3. Enable the generation of sitemaps.
   a. On the form, select the **Active** check box.
   b. In the Sitemap Config Definition related list, double-click the **Type** field and select the **true** option from the list.
   c. Select the Save icon ( ).
4. Select **Update**.

Result

All active sitemaps regenerate once in a day and include content from any of their active sitemap definitions.

Activate the knowledge management internationalization plugin

To enable translation of knowledge articles, you must activate multiple plugins.

- Knowledge Management Advanced (com.snc.knowledge_advanced) plugin. For more information, see Activate the Knowledge Management Advanced plugin
- I18N:Knowledge Management Internationalization Plugin v2 (com.glideapp.knowledge.i18n2) plugin. For more information, see Activate a plugin.
- Internationalization plugins for each appropriate language. For more information, see Activate a language.

Note:

- Activating internationalization plugins for the available languages automatically activates the I18N: Internationalization plugin (com.glide.i18n) that instead activates the I18N: Knowledge Management Internationalization Plugin v2 (com.glideapp.knowledge.i18n2) plugin.
- Beginning with the San Diego release, you can request ServiceNow personnel to customize your Languages [sys_language] table. You can create translations of knowledge articles into any combination of language and region configured in the table. These combinations must be in compliance with the Internet Engineering Task Force (IETF) BCP-47 standard. For more information, see The region subtag.

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Installed components

The I18N:Knowledge Management Internationalization Plugin v2 (com.glideapp.knowledge.i18n2) plugin installs the following components:

- A relationship named *Translated Versions* that creates a related list on the Knowledge form showing other articles that have the same parent article.
- A business rule named *knowledge query* that automatically filters the knowledge portal and search results based on the user's selected language.
- A UI macro named *kb languages*.
- Two fields, named *Language* and *Parent*, in the Knowledge [kb_knowledge] table and the Knowledge form.

Knowledge form changes

The I18N:Knowledge Management Internationalization Plugin v2 (com.glideapp.knowledge.i18n2) plugin adds the following fields to the Knowledge form:

- **Language**: Language in which you are creating the knowledge article. The list is populated based on the languages enabled for the selected knowledge base.
- **Parent**: The article number that represents the base language article. This setting keeps translations of the same article related to each other. Consider choosing the same language consistently for the parent article.

> **Note:**
> The **Parent** field tracks translations of articles.

Additionally, the Translated Versions related list is automatically added to the Knowledge form after you save an article.

Activate knowledge blocks

You can activate knowledge blocks [com.snc.knowledge_blocks] if you have the admin role. This plugin includes demo data and activates related plugins if they are not already active.

Before you begin

Role required: admin

About this task

Knowledge blocks activates these related plugins if they are not already active.

Plugins for knowledge blocks

Plugin	Description
Knowledge Management Advanced [com.snc.knowledge_advanced]	Enables advanced features for Knowledge Management, such as article versioning. For a full list of features, see activate the Knowledge Management Advanced plugin. **Note:** Knowledge blocks can be used with or without the article versioning feature. To disable the feature, see Disable the article versioning feature.

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Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Enable knowledge blocks for each knowledge base

Enable the knowledge blocks feature for each knowledge base where you plan to use the blocks. Once enabled, you can create knowledge blocks to add to knowledge articles within a knowledge base.

Before you begin

Make sure that the knowledge blocks [com.snc.knowledge_blocks] plugin is activated.

Role required: knowledge_admin or knowledge_manager

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge Bases**.
2. Open the knowledge base record.
3. In the Knowledge Base form, select the **Enable blocks** check box.

   Note:
   If the **Enable blocks** check box is not visible, you can add the field to the form by right-clicking the form header and navigating to **Configure** > **Form Layout**.

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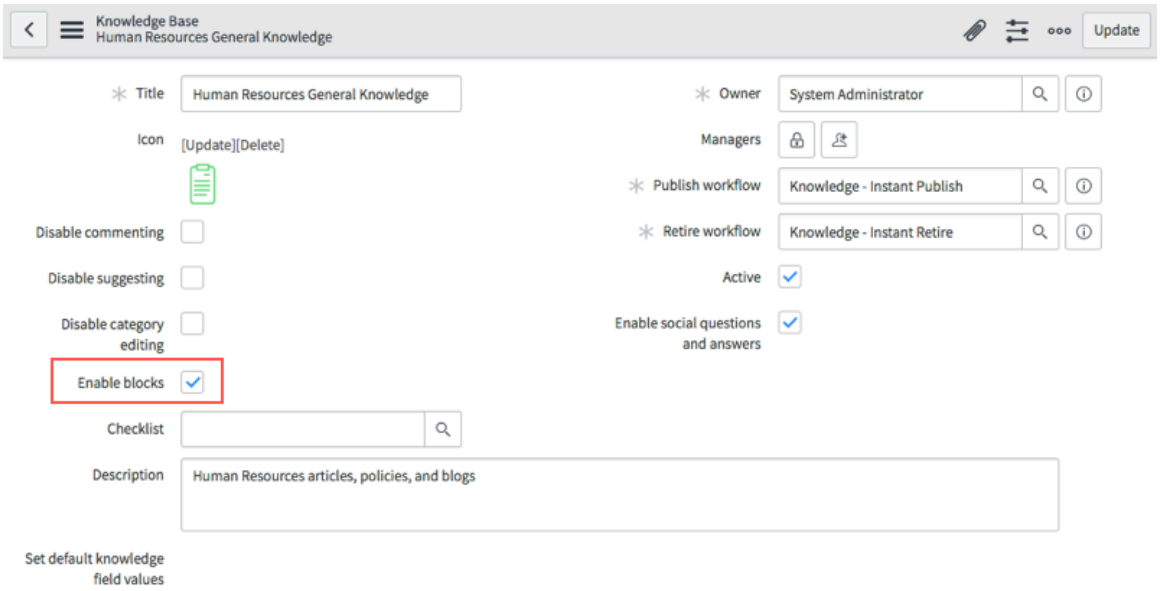

4. Click **Update**.

> **Note:**
> If you decide to later disable the knowledge blocks feature, all knowledge blocks within the knowledge base must be deleted before you can clear the box.

What to do next

Create knowledge blocks to use within the enabled knowledge base.

Related topics

Knowledge blocks

Using knowledge blocks

Knowledge blocks authoring in Agent Workspace

Configure translation management

Configure translation management to create translation tasks.

Activate translation management

You can activate the Knowledge Management Advanced (com.snc.knowledge_advanced) and I18N:Knowledge Management Internationalization Plugin v2 (com.glideapp.knowledge.i18n2) plugins for translation management if you have the admin role.

Before you begin

Role required: admin

- Translation management requires the following plugins. Ensure that these plugins are activated before you install translation management.

  Required ServiceNow plugins

  Knowledge Management Advanced plugin [com.snc.knowledge_advanced]

  I18N:Knowledge Management Internationalization Plugin v2 [com.glideapp.knowledge.i18n2]

  The internationalization plugin for the languages you want to make available. The is automatically activated once any of the language plugins are activated.

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Translation management also requires enabling the *glide.knowman.translation.enable_translation_task* property to add translation task options to the Translation Management submenu under Knowledge menu.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Add a custom Localization Framework setting to enable bulk translations

Add a custom Localization Framework setting to translate multiple knowledge articles manually.

Before you begin

- Activate the Knowledge Management Advanced plugin.
- Activate Localization Framework.
- Activate a language.
- Bulk Translation is available with the base Zurich release. If you are upgrading from a previous release, you must configure the following settings:
  - Enable the Localization Framework by setting the *glide.knowman.translation.enable_lf_article_translation* system property to true.
  - Set the *glide.knowman.translation.enable_translation_task* system property to false.
  - Set the *glide.knowman.translation.enable_localization_framework* system property to true.

Role required: admin

Procedure

1. Navigate to **All** > **Localization Framework** > **Settings**.
2. In the Setting list, select **New**.
3. Enter a name for the setting.
4. Select **Knowledge** from the **Artifact** list.
5. Select the languages into which you want the articles translated.
6. Select the **Workflow Preferences** tab.
7. Select **Translation -> Publish** from the **Workflow** list.

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8. Select the **Project Preferences** tab.
9. Enable the creation of bulk translation localization projects.
   - To enable manual creation, select **Enable projects**. For more information, see Create translation projects.
   - To enable the auto-creation of the localization projects, select **Enable projects** and **Enable auto creation**.

     If auto creation is enabled, selected localization requested items (LRITMs) are automatically bundled into a single localization project.
10. Select **Update**.

What to do next

Request bulk translations for multiple knowledge articles.

Add a custom Localization Framework setting to enable machine translation

Add a custom Localization Framework setting to enable machine translation for bulk translations of knowledge articles.

Before you begin

- Activate the Knowledge Management Advanced plugin.
- Activate Localization Framework.
- Activate a language.
- Bulk Translation is available with the base Zurich release. If you are upgrading from a previous release, you must configure the following settings:
  - Enable the Localization Framework by setting the *glide.knowman.translation.enable_lf_article_translation* system property to true.
  - Set the *glide.knowman.translation.enable_translation_task* system property to false.
  - Set the *glide.knowman.translation.enable_localization_framework* system property to true.

Role required: admin

Procedure

1. Navigate to **All** > **Localization Framework** > **Settings**.
2. In the Setting list, select **New**.
3. Enter a name for the setting.
4. Select **Knowledge** from the **Artifact** list.
5. Select the languages into which you want the articles translated.
6. In the **Translation Preferences** tab, select the **Enable machine translate** check box to enable machine translation for knowledge articles.
7. Select the desired translator in the **Translator** field.
8. Select the **Workflow Preferences** tab.
9. Select **Auto Translation** > **Auto Publish** from the Workflow list.

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10. Select the **Project Preferences** tab.
11. Enable the creation of bulk translation localization projects.
    - To enable manual creation, select **Enable projects**. For more information, see Create translation projects.
    - To enable the auto-creation of the localization projects, select **Enable projects** and **Enable auto creation**.

      If auto creation is enabled, selected localization requested items (LRITMs) are automatically bundled into a single localization project.
12. Select the group that includes the localization_manager role in the **Localization manager group** field.
    The **Localization manager group** field appears only when the **Enable projects** and the **Enable auto creation** options are selected.
13. Select **Update**.

What to do next

Translate knowledge articles using Dynamic Translation

Activate Knowledge Management KCS Capabilities

You can activate the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities) to enable the use of certain KCS roles and KCS article states.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Enable languages for a knowledge base

Select the languages you want enabled at a knowledge base level. Users can then create articles only for selected languages.

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Before you begin

You must activate the Knowledge Management Advanced (com.snc.knowledge_advanced) plugin, and I18N: Knowledge Management Internationalization Plugin v2 (com.glideapp.knowledge.i18n2) plugin.

Role required: knowledge_admin or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge Bases**.
2. Select an existing knowledge base.
3. Click the lock icon to unlock the **Languages** field in the Knowledge base form.

   Note:
   You may need to configure the knowledge base form to include the **Languages** field.

   Click the form context menu icon ( ) and navigate to **Configure** > **Form layout**. Use slushbucket to add the Languages field.

4. Click **Submit**.

Configure the Knowledge Management Service Portal

The Knowledge Management Service Portal enables users to perform the same operations that are available with the Knowledge Management V3 plugin. From the portal, users can view knowledge bases and articles, search for information, sort and filter search results, and provide feedback.

- For new customers on the Madrid and later releases, the Knowledge Management Service Portal plugin (com.snc.knowledge_serviceportal) is active by default.
- For existing customers on release versions prior to Madrid, activate the plugin, if required.
- Configure the Knowledge Management Service Portal properties, including the property that directs users to the Knowledge Management homepage in the Knowledge Management Service Portal.

- Navigate to **Service Portal** > **Portals** and click **Knowledge Portal** (Knowledge Management Service Portal is named as Knowledge Portal). See Service Portal for more information about creating a custom interface.
- System administrators can configure portal pages and configure widgets for searching, sorting, and filtering knowledge base information. To configure widget instance options and configure search, sort, and filter features, see Knowledge Management Service Portal widgets
- To add knowledge bases to the Knowledge Service Portal, complete the following steps.
  1. Navigate to **Service Portal** > **Portals**, and click **Service Portal**.
  2. Click the **Knowledge Bases** related list.

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3. Click **Edit** to map one or more knowledge bases to the portal.

Note:
If no knowledge bases are added, all knowledge bases are available in the portal.

If knowledge bases are mapped, only those knowledge bases are available in the portal. All search results and all widgets display results from the mapped knowledge bases only.

- **Note:**

  Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Section 508 compliance features

Users can view and interact with the Knowledge Management article view page in the Knowledge Management Service Portal using Section 508 compliance features. See Enabling accessibility features for more information.

Related topics

Knowledge Management FAQ

Import a Word document to a knowledge base

Import a Word document to a knowledge base using Knowledge Management v3

Enable external or public users to view knowledge articles from the Knowledge Management Service Portal

Enable knowledge articles on the Knowledge Management Service Portal to be visible to external or public users.

Before you begin

The Knowledge Management Service Portal plugin (com.snc.knowledge_serviceportal) must be enabled.
Role required: admin

About this task

If you are using Knowledge Management within the Customer Service Management (CSM) application, you can automatically make knowledge articles public by activating and running the *`Make KM Service Portal Pages Public`* fix script after you install the Customer Service Management plugin (com.sn_customerservice).

If you are using Knowledge Management as a standalone application, perform the steps in this procedure.

Procedure

1. Navigate to **All** > **Service Portal** > **Pages**.
2. In the Pages list, search for and select **kb_home**.

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Note:
If the application scope isn't set to Knowledge Management - Service Portal, you cannot edit the form and a warning message appears. To make the form editable, click the word **here** at the end of the message.

3. Enable public or external users to view knowledge articles from the Knowledge Management Service Portal.

Action	Description
Make knowledge service portal pages visible to public users	**a.** On the Page form, select the **Public** check box. **b.** Click **Update**.
Make knowledge service portal pages visible to external users	**a.** On the Page form, in the **Roles** field, click the edit user roles icon . **b.** On the Roles form, move **snc_external** from the available roles in the **Available** column to the **Selected** column. **c.** On the Roles form, click **Done**. **d.** On the Page form, click **Update**.

4. Repeat the steps 2 and 3 for **kb_article_view** and **kb_search** pages.
5. Manage access to the articles for the Knowledge Management Service Portal pages.

Action	Description
Enable access to the knowledge base for public.	After you set the page to public as described in step 3, ensure that the Cannot Read and Can Read user criteria are not set and the *glide.knowman.block_access_with_no_user_criteri* property is set to false for the knowledge bases you want to give access to public users.
Enable access to the knowledge base for external users.	After you add the snc_external role to the page as described in step 3, ensure that external users have read access to the knowledge bases for which you want to give access.

For more information about providing access to knowledge bases, see Managing access to knowledge bases and knowledge articles.

Knowledge Management Service Portal widgets

The Knowledge Management Service Portal uses a number of widgets to enable searches, display search results, and display articles, related articles, and related items.

In the Knowledge Management Service Portal, the Knowledge Management homepage, search results page, and article view page honor the Knowledge Management V3 system properties. If configured, widget instance options can override the system properties.

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Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Users with the knowledge_admin or admin role can configure the widget instance options used on the Knowledge Management Service Portal pages. Use the control + right-click menu to access the widget instance options and configure a widget instance. For more information, see Configure widget instance options.

Note:
Before configuring widget instance options, switch to the Knowledge Management - Service Portal scope.

Homepage widgets:

- Knowledge Homepage Search

  Customize search features for the homepage.

- Knowledge Bases Browse

  Displays knowledge base tiles in the homepage.

- Knowledge Featured Articles

  Displays a list of featured articles in the homepage.

- Knowledge Most Useful Articles

  Displays a list of most useful articles in the homepage.

- Knowledge Most Viewed Articles

  Displays a list of most viewed articles in the homepage.

Search results page widgets:

- Knowledge Breadcrumbs

  Displays navigation path to the current page and a search box for users to search the knowledge base.

- Knowledge Search
- Knowledge Facet Header

  Displays the title for the filter facets.

- Knowledge Field Facet

  Display search results filtered by knowledge base, knowledge category, and author.

- Knowledge Tags Facet

  Display search results filtered by article tags.

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- Knowledge Resource Facet

  Display search results filtered by article resource.

- Knowledge Query Facet

  Display search results filtered by article rating, number of article views, and last modified.

- Knowledge Result Sort

  Displays search results filtered by sort options for returned results.

- Knowledge Selected Filter

  Displays the selected facet filters and allows you to clear the selections.

- Knowledge Result

  Displays search results filtered by returned results.

Article view page widgets:

- Knowledge Breadcrumbs

  Displays navigation path to the current page.

- Knowledge Article Content

  Customize what information users can view and what actions they can perform in the article view page.

- Knowledge Article Helpful

  Enables users to mark the article as helpful.

- Knowledge Article Comments

  Enables users to add comments for the article.

- Knowledge Attachments

  Displays article attachments if the **Display Attachment** field for the article is enabled.

  Note:
  You must add the Knowledge Attachments widget to any page in addition to Knowledge Article Content widget. After upgrade, if this widget does not get added automatically, you must add it manually.

- Related Catalog Item

  Displays a list of catalog items mapped to the article. The widget appears only when the related catalog items are available for the selected article.

- Knowledge Related Articles

  Displays a list of related articles with information similar to the selected article. The related articles are manually mapped, automatically predicted, or both. The manually mapped articles appear first in the widget. The widget appears only when the related articles are available for the selected article.

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- Affected Products

  Displays the products related to the knowledge articles available in the **Affected Products** related list for the article. The widget appears only when the affected products are available for the selected article.

- Most Recent Tasks

  Displays the tasks attached to the articles available in the **Attached Tasks** related list for that article. The widget appears only when the related tasks are available for the selected article.

- Most Useful

  Displays a list of knowledge articles that users found most useful.

Activate the Knowledge Management Service Portal plugin

The Knowledge Management - Service Portal plugin (com.snc.knowledge_serviceportal) is active by default for customers on Madrid and later releases. Existing customers on release versions prior to Madrid can activate the plugin, if required.

Before you begin
Role required: admin

About this task
This plugin requires the following plugins:

- Knowledge Management V3 (com.snc.knowledge3)
- Service Portal for Enterprise Service Management (com.glide.service-portal.esm)

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

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Configure search widget instance options

Configure widget instance options for the search widgets on the Knowledge Management Service Portal homepage and search results page.

Before you begin

Role required: sp_admin or admin

About this task

The homepage uses the Knowledge Homepage Search widget and the search results page uses the Knowledge Search widget. Use the widget instance options to customize the search feature for these pages.

Procedure

1. Navigate to the Knowledge Management Service Portal homepage or search results page.
2. Control + right-click the search bar.
3. Click **Instance Options**.
4. Configure the search widgets settings.

Instance option	Page(s)	Description
Title	Knowledge Management Service Portal homepage	The title of the search widget. The default for the homepage is Welcome to Knowledge.
Search Placeholder	Knowledge Management Service Portal homepage	Default text that appears in the search bar.
Bootstrap color	Search result page	The color of the search widget.
Bootstrap size	Search result page	The size of the search widget.
Allow Empty Search	Search result page	Allow empty knowledge base searches. The default for the homepage uses the system property. The default for the search results page is Yes.
Allow Instant Search On Keypress	Search result page	Enables instant search results as you type a search term. The default for the search results page uses the system property.
Wait time (ms) between searches, if instant search is enabled	Search result page	The time, in milliseconds, to wait between searches if the instant search feature is enabled. The default wait time is 500 ms.
Alternate URL Parameters for Search	Search result page	Alternate parameters that appear in the search results URL. By default these parameters include keyword and query.

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Instance option	Page(s)	Description
Alternate URL Parameters for Language	Search result page	Alternate parameters that appear in the URL denoting the selected language.
Minimum Number of Characters for Search	Both	The minimum number of characters required to generate a search.
Glyph	Both	An icon that appears in the search bar.
CSS	Both	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.

5. Click **Save**.

Configure knowledge base tile widget instance options

Configure widget instance options for the knowledge base tile widgets on the Knowledge Management Service Portal homepage.

Before you begin
Role required: sp_admin or admin

About this task
The homepage uses the Knowledge Bases Browse widget to display knowledge base tiles.

Procedure

1. Navigate to the Knowledge Management Service Portal homepage.
2. Control + right-click a knowledge base tile.
3. Click **Instance Options**.
4. Configure the desired settings for the knowledge base tile widgets.

Instance option	Description
Title	The title that appears above the knowledge base tiles. The default is **Explore our Knowledge Bases**.
Bootstrap color	The color of the widget.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Order By	The order in which the knowledge base tiles appear on the homepage. Use any field on the Knowledge table. If this field is empty, tiles are displayed in alphabetical order. Other available options include article_count.

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Instance option	Description
Reverse Order	Enable this check box to display knowledge base tiles in the reverse order.
Post Question Label	The label on the button used to post a question. The default is **Ask a Question**.
Create Article Label	The label on the button used to create an article. The default is **Create Article**.
Post Question URL	The parameters that appear in the URL when posting a question.
Create Article URL	The parameters that appear in the URL when creating an article.

5. Click **Save**.

Configure the home page widget instance options

Configure widget instance options for the widgets used to display popular articles on the Knowledge Management Service Portal homepage.

Before you begin

Role required: sp_admin or admin

About this task

The homepage displays links to the featured, most viewed, and most useful articles using several widgets. The featured articles are displayed based on the keywords associated with the articles. For information on displaying articles in the Featured content section, see Pin a knowledge article. Most viewed and most useful articles are displayed based on the highest view and use count of the articles.

Procedure

1. Navigate to the Knowledge Management Service Portal homepage.
2. Control + right-click one of the widgets.
3. Click **Instance Options**.
4. Configure the desired settings for the widget.

Instance option	Description
Title	The title of the widget.
Bootstrap color	The color of the widget.
Glyph	An icon that appears in the widget.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Table	The table that contains the **Source Field** used to provide the featured, most viewed, and most useful articles widget options. The default table is Knowledge (kb_knowledge).

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Instance option	Description
Display Field	The title displayed for each article in the list. By default, this is the article short description.
Secondary Fields	Additional information displayed for each article in the list below the title. By default, this information includes the author, view count, the date that the article was last modified, and the article rating.
Max number of records to show	The maximum number of articles to include in the list.
Show even when empty	Enable this check box to display the widget even if there are no articles in the list.
Show Secondary Fields Label	Enable this check box to display the field labels for the additional information displayed for each article.
Knowledge Base	To restrict the articles that appear in this list to a specific knowledge base, select the knowledge base from the knowledge base list.

5. Click **Save**.

Configure sort widget instance options

Configure widget instance options for the knowledge sort widget on the Knowledge Management Service Portal search results page.

Before you begin
Role required: sp_admin or admin

About this task
The search results page uses the Knowledge Result Sort widget to provide sort options for the returned list of results. Use the widget instance options to customize the sort options.

Procedure
1. Navigate to the Knowledge Management Service Portal search results page.
2. Control + right-click the sort options at the top of the results list.
3. Click **Instance Options**.
4. Configure the desired settings for the sort widget.

Instance option	Description
Bootstrap color	The color of the search widget.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Hide Relevancy	Removes the relevancy sort option.

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Instance option	Description
Table	The table that contains the fields used to sort the list of knowledge items. The default table is **Knowledge**.
Sort Fields	The fields used for sorting the list of knowledge items.
Sort Field Labels	The labels for the fields that appear in the sort options. The default is **Views:desc,Newest:desc,Alphabetical**. The sort order for the sort field labels is ascending. To use a descending order, denote **:desc**.

5. Click **Save**.

Configure article list widget instance options

Configure widget instance options for the article lists on the Knowledge Management Service Portal homepage.

Before you begin
Role required: sp_admin or admin

About this task
The homepage uses the Article List widget to display different lists of articles, including Featured, Most Useful, and Most Viewed.

Procedure
1. Navigate to the Knowledge Management Service Portal homepage.
2. Control + right-click one of the article list headers.
3. Click **Instance Options**.
4. Configure the desired settings for the article list widget.

Instance option	Description
Title	The title of the article list.
Bootstrap color	The color of the widget.
Glyph	An icon that appears in the widget.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Table	The table that stores the list articles.
Display Field	The title displayed for each article in the list. By default, this is the article short description.
Secondary Fields	Additional information displayed for each article in the list below the title. By default, this information includes the author, view

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Instance option	Description
	count, the date that the article was last modified, and the article rating.
Max number of records to show	The maximum number of articles to include in the list.
Show even when empty	Enable this check box to display the article list even if it does not contain any articles.
Show Secondary Fields Label	Enable this check box to display the field labels for the additional information displayed for each article.
Knowledge Base	To restrict the articles that appear in this list to a specific knowledge base, select the knowledge base from the knowledge base list.

5. Click **Save**.

Configure search results list widget instance options

Configure widget instance options for the results list widget on the Knowledge Management Service Portal search results page.

Before you begin
Role required: sp_admin or admin

About this task
The search results page uses the Knowledge Result widget to provide display options for the returned list of results. Use the widget instance options to customize the display options.

Procedure
1. Navigate to the Knowledge Management Service Portal search results page.
2. Control + right-click the list of returned search results.
3. Click **Instance Options**.
4. Configure the desired settings for the results list widget.

Instance option	Description
Glyph	An icon that appears in the search bar.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Show Relevancy Score	Shows how relevant each search result is based on the search term. The default setting uses the system property.
Breadcrumb: Hide Categories	Hides the category in the breadcrumb that appears below the article short description in the results list. The default setting uses the system property.

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Instance option	Description
Breadcrumb: Knowledge Base Separator	The character used as a separator between the knowledge base and the category in the breadcrumb.
Breadcrumb: Category Separator	The character used as a separator between categories in the breadcrumb.
Default Sort Order	The default sort order for the list of returned results. The default sort order is **sys_view_count:desc**, which sorts the results by the number of views in descending order.
How to Display Attachments in Knowledge Search Results	How attachments are shown in the list of returned results. The default uses the system property.
Label for Show Pinned Articles Link	The text used for the pinned articles link.
Table	The table that stores the information returned in the search results.
Knowledge Secondary Fields	Fields that display additional information for each article in the search results.
Show Secondary Fields Label	Enable this check box to display the field labels for the additional information displayed for each result.
Pagination Type	Controls how additional knowledge article search results are displayed. ○ **Standard Pagination:** displays the search results in multiple pages. ○ **Infinite Scroll:** displays the search results while scrolling. The default pagination type is set to **Infinite Scroll**.
Maximum no. of articles displayed per page with standard pagination	The maximum number of items included in a page when the search results list is displayed using standard pagination.
Maximum no. of articles displayed after first fetch during infinite scroll	The maximum number of items included when the search results list is first displayed using infinite scroll.
Maximum no. of articles displayed at subsequent fetches during infinite scroll	The maximum number of items included when the search results list updates as the user scrolls to the bottom.
No. of links in pagination bar	The number of links displayed in the pagination bar.

5. Click **Save**.

Configure filter facet widget instance options

Configure widget instance options for the filter facet widgets on the Knowledge Management Service Portal search results page.

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Before you begin
Role required: sp_admin or admin

About this task
The homepage uses several widgets to filter the items in the search results list. There are two types of facet widgets:

- Simple field facets based on the Knowledge table fields
- Advanced query facets based on custom queries of the Knowledge table

Use the widget instance options to customize these facet widgets:

- Knowledge Field Facet (for filtering by knowledge base, knowledge category, and author)
- Knowledge Tags Facet (for filtering by tag)
- Knowledge Resource Facet (for filtering by resource, such as articles)
- Knowledge Query Facet (for filtering by rating, last modified, and number of views)

Note:
Query facets are displayed when there's at least one knowledge field facet added to the page.

Use default Knowledge Language Widget to include language filters in the knowledge Search Result page. To add a custom language widget, you need to deactivate the Knowledge Language Widget on the Knowledge Search Result page.

Procedure
1. Navigate to the Knowledge Management Service Portal search results page.
2. Control + right-click a filter facet widget.
3. Click **Instance Options**.
4. Configure the desired settings for the selected type of facet widget.

Instance option	Description
Title	Title of the filter facet widget.
Glyph	Icon that appears to the left of the title.
Order	Order in which the filter facet widgets appear on the left side of the search results page. If empty, the filter facet widgets sort alphabetically.
Bootstrap color	Color of the filter facet widget header.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Source Table	Table that contains the **Source Field** used to provide the filter facet widget options. The default table is Knowledge (kb_knowledge).
Source Field	Field in the **Source Table** that provides the filter facet widget options. Field types that

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Instance option	Description
	can be used as a source field include string, glide list, integer, reference, and boolean.
Facet Identifier	Unique name for the custom query facet that can be used in script code.
Facet Template	Template that determines the type of facet interaction. Knowledge Field Facet widget templates: ○ **Single Select**: users can select only one filter from this widget. ○ **Multi Select**: users can select more than one filter from this widget. ○ **Dropdown Select**: users can select more than one filter from a drop-down menu. Knowledge Query Facet widget templates ○ **Simple Query**: shows a label for each facet value. ○ **Rating**: shows rating stars.
Custom Template	Custom template that determines facet interaction and value selection.
Facet Options	Custom query in JSON format for the label, ID, order, and query for each facet value. Includes the table, value (encoded query), and display value (encoded query).
Order by	Order of the filter options within the facet widget. The default order is **label**, which sorts the options in alphabetical order. For reference fields, you can also state an order from the reference field table.
Minimum results for showing filter search bar	Minimum number of results required to display a search bar at the top of the filter facet widget.
Minimum results for showing scroll bar	Minimum number of results required to display a scroll bar in the filter facet widget.
Maximum length for string field	Maximum field length. Only fields whose length is less than this value are allowed to be added as a filter facet.
Alternate URL Parameters	Names of the URL parameters used to initialize this filter facet, if used in the URL as a search parameter.
Fetch Maximum Values	Option to fetch filter values from all knowledge articles in the search results. Selecting the **Fetch Maximum Values** option might impact the load time for search results. If this option is disabled,

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Instance option	Description
	the load time improves based on the *glide.knowman.search.facet_depth* property value. If the *glide.knowman.search.apply_acls* property is set to true, a filter value can appear in a filter facet even when there are no search results for that filter value. For example, a knowledge base without any articles might appear as a value in the knowledge base filter facet.
Show Empty Value	If enabled, shows an empty filter facet option that users can select to filter for articles that do not have this field set. For example, if an article does not have an assigned category, clicking the empty option lists all articles with no assigned category.
Show Only Facet Values Matching Results	Creates a dynamic filter facet widget that displays only those filter values that match the search results rather than showing all values. If you disable this instance option, the time needed to load the filter facet data is reduced.
Show category hierarchy (valid for kb_category only)	If enabled, shows categories with their hierarchy list up to the fourth-level. When you enable this option, you can select only one category at a time. Any articles that are included in the subcategories beyond the fourth-level also appear in the fourth-level of category. The search results filtered on a selected parent category include articles within that category and all the associated child categories.

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Instance option	Description
	Note: ○ If the number of knowledge articles returned in search results is greater than the search facet depth, all categories are displayed in this facet. Therefore, some categories shown in this facet might not be associated with any knowledge articles in the search results. By default, the facet depth is set to 300 and configured by an administrator in the *glide.knowman.search.facet_depth* property. ○ To configure the knowledge Search Results page widgets by adding more filters. Specifically if filters on language need to be applied they should be using the OOB Knowledge Language Widget. The field facet widget can be configured using language field in instance options for similar behaviour but in that case OOB Knowledge Language Widget instance should be inactivated on the Knowledge Search Results page.

5. Click **Save**.

Related topics

Knowledge Management properties

Configure a user action for the article view page

Configure a user action for the Knowledge Management article view page in the Knowledge Management Service Portal.

Before you begin

Role required: sp_admin or admin

About this task

The article view page uses the Knowledge Article Content widget to provide user actions. Use the widget instance options to customize these actions.

Ensure that the application scope on the ServiceNow AI Platform is set to Knowledge Management Service Portal.

User actions available for the article view page appear in a menu after clicking the overflow icon (⋯) in the article header. These actions enable users to flag an article, edit an article, or create an incident for an article.

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Procedure

1. Navigate to the Knowledge Management Service Portal article view page.
2. Control + right-click the article header.
3. Click **Instance Options**.
4. Configure the desired settings for the Knowledge Article Content widget.

Instance option	Description
Bootstrap color	The color of the widget header.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Hide All Actions	Hides the user actions in the article header including the **Subscribe/Unsubscribe** button and the overflow icon.
Show Version Information	Displays version information for the selected article. Requires the Knowledge Management Advanced plugin (com.snc.knowledge_advanced).
Show Create Incident Action	Displays the **Create Incident** user action when a user clicks the overflow icon in the article header.
Create Incident Action Label	The label for the user action that appears in the overflow icon menu. The default is **Create Incident**.
Create Incident Action URL	The target URL for the **Create Incident** user action. If no URL is specified, the system uses the URL in the *glide.knowman.create_incident_link* system property.
Redirect to the latest article	Redirects the article view page to the latest accessible version of the article, if available. Disable the **Show Version Information** option to hide the version information on the article view page because any version link will redirect to the latest version only.

5. Click **Save**.

Configure article helpful widget instance options

Configure the Knowledge Article Helpful widget instance options for the Knowledge Management article view page in the Knowledge Management Service Portal.

Before you begin

Role required: sp_admin or admin

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About this task
The article view page uses the Knowledge Article Helpful widget to allow users to provide feedback on the helpfulness of the article, display a confirmation message after a feedback is provided, and display the percentage of users who found the article to be useful. Use the widget instance options to customize these actions.

Procedure
1. Navigate to the Knowledge Management article view page in the Knowledge Management Service Portal.
2. Control + right-click **Helpful?**
3. Click **Instance Options**.
4. Configure the desired settings for the Knowledge Article Helpful widget.

Instance option	Description
Bootstrap color	The color of the widget header.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Show helpful percentage information	Check box to enable the display of percentage of users who found this article to be helpful.
Helpful Action Label	Label for marking this article as helpful or not.
Feedback Message	Text that displays when the user marks the article as helpful or not.

5. Click **Save**.

Configure article comments instance options
Configure the Knowledge Article Comments widget instance options for the Knowledge Management article view page in the Knowledge Management Service Portal.

Before you begin
Role required: sp_admin or admin

About this task
The article view page uses the Knowledge Article Comments widget to allow users to rate an article, add a comment, or view existing comments for the article. Use the widget instance options to customize these actions.

Procedure
1. Navigate to the Knowledge Management article view page in the Knowledge Management Service Portal.
2. Control + right-click the comments section.
3. Click **Instance Options**.
4. Configure the desired settings for the Knowledge Article Comments widget.

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Instance option	Description
Bootstrap color	The color of the widget header.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Other Options	
Show User Comments	Displays the field for users to enter comments. Available options: ○ Yes - displays the field that enables users to enter comments for the article. ○ No - hides the field that enables users to enter comments for the article. ○ Use system property - display or hide the comments field using article view properties.
Add Comment Label	Label for the field to add comments.
Maximum number of attachments that can be attached to a comment	Maximum number of attachments that can be attached to a comment included for a knowledge article.
Maximum attachment file size in MB that can be attached to a comment	Maximum attachment file size in MB that can be attached to a comment included for a knowledge article.

5. Click **Save**.

Configure related catalog item widget instance options

Configure the Related Catalog Item widget instance options for the Knowledge Management article view page in the Knowledge Management Service Portal. These options relate to the list of catalog items mapped to an article.

Before you begin
Role required: sp_admin or admin

About this task
The knowledge article view page displays the Related Items section when an article has related catalog items. Use the widget instance options to customize the Related Items section on the article view page.

Procedure

1. Navigate to the Knowledge Management homepage in the Knowledge Management Service Portal by adding `/kb` to the end of your instance URL.

Note:
Your administrator might have changed this default navigation.

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2. Search for and click the article for which you want to modify the instance options for the Related Catalog Item widget.
3. Press Control and right-click the Related Items section.
4. Click **Instance Options**.
5. Configure settings for the Related Catalog Item widget.

Instance option	Description
Source Table	Source table containing related catalog items. The source table specified in the base system is Related Catalog Items (kb_2_sc).
Source Column	Field in the source table referring to the source record. The source column specified in the base system is Knowledge article (kb_knowledge).
Title	Title that appears on the widget header. The default title is Related Items.
Max Number	Maximum number of catalog items to include in the Related Items section on the article view page. The maximum number specified in the base system is 5.
Use Full Width	Option for displaying the widget in a 12-column grid at 100% of the available width. If you clear the check box, the widget displays at 75% of the available width.
Target Column	Field in the source table referring to the target record. The target column specified in the base system is Catalog item (sc_cat_item).
Source Id	URL parameter containing the unique record identifier (sys_id) of the source record. For the article view page, the URL parameter containing the source ID is sys_kb_id.

6. Click **Save**.

Related topics

Map catalog items related to an article

Configure knowledge related articles widget instance options

Configure the Knowledge Related Articles widget instance options for the Knowledge Management article view page in the Knowledge Management Service Portal. These options relate to the list of related articles mapped to an article.

Before you begin

Role required: sp_admin or admin

About this task

The knowledge article view page displays the Related Articles section when an article has related articles. Use the widget instance options to customize the Related Articles section on the article view page.

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Procedure

1. Navigate to the Knowledge Management homepage in the Knowledge Management Service Portal by adding `/kb` to the end of the URL for your instance.

   Note:
   You can change the default navigation by configuring the property *`sn_km_portal.glide.knowman.serviceportal.portal_url`*.

2. Click to open the article for which you want to modify the instance options for the Knowledge Related Articles widget.
3. On the article page, press Control+right-click and select **Page in Designer**.
4. In the Service Portal Designer page, click the edit icon ( ) on **Knowledge Related Articles** widget to add the related articles.

   Note:
   You can also add **Knowledge Related Articles** widget using **Widgets** search field and drag-and-drop the widget to the blank field.

5. Configure settings for the Knowledge Related Articles widget.

Instance option	Description
Title	Title that appears on the widget header. The default title is Related Articles.
Bootstrap color	Color scheme of the widget header. Select a color for your widget from a list of common bootstrap colors.
Glyph	Icon that appears beside each list item displayed in the widget. To skip this field, select the empty glyph.
CSS	Custom configurations that determine the look and feel of the elements in the widget. For more information, see Service Portal SCSS Primer.
Use Full Width	Option for displaying the widget in a 12-column grid at 100% of the available width. If you clear the check box, the widget displays at 75% of the available width.
Table	The table that contains the knowledge articles associated with the **Display Fields** and **Secondary Fields**. By default, the table is Knowledge (kb_knowledge).
Display Field	The title displayed for each article in the related articles list. The display field specified in the base system is the article short description.
Secondary Fields	Additional information displayed for each article in the list below the title. The secondary fields specified in the base system

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Instance option	Description
	are author, view count, the last modified date of the article, and the article rating.
Max number of records to show	The maximum number of articles to include in the Related Articles section on the article view page. The maximum number specified in the base system is 5.
Show even when empty	Option for displaying the widget even if no articles are in the list.
Show Secondary Fields Label	Options for displaying the field labels for the additional information displayed for each article.
Knowledge Base	To restrict the articles that appear in this list to a specific knowledge base, select the knowledge base from the knowledge base list.
Source Table	Source table containing related articles. The source table specified in the base system is Knowledge (kb_2_kb).
Source Column	Field in the source table referring to the source record. The source column specified in the base system is Knowledge article (kb_knowledge).
Target Column	Field in the source table referring to the target record. The target column specified in the base system is Knowledge article (kb_knowledge).
Source Id	URL parameter containing the unique record identifier (sys_id) of the source record. For the article view page, the URL parameter containing the source ID is sys_kb_id.

6. Click **Save**.

Related topics

Map related articles

Knowledge Management Service Portal properties

Search using the Knowledge Management Service Portal

Enter one or more words in the search bar on the Knowledge Management Service Portal homepage to view all search results.

Search results include items in which the short description, content, or attached files include the search term. By default, knowledge search results include articles, pinned articles, and social Q&A.

You can also filter the search results.

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Enable multi-language search

The multi-language search facet is available when more than one supported language is enabled. All available languages are displayed in the facet and you can select which languages you want your search results to appear in. Your selection is maintained per session, but not across logins.

1. To enable different languages, activate the I18N: Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) or activate one of the internationalization plugins for the language you require.

   Note:
   Activating internationalization plugins for any of the available languages automatically activates the I18N: Knowledge Management Internationalization Plugin v2 plugin.

2. Navigate to **Knowledge** > **Administration** > **Knowledge Search Properties** > **Enable multi language search**.
3. Select the **Yes** check box to enable the feature.

   Note:
   If this property is not enabled, you can only search for one language at a time.

Search auto-correct feature

The Knowledge Management Service Portal homepage search tool also includes an auto-correct feature. When enabled, users can auto-correct a typing error in a search term by clicking one of the suggestions.

When a search term contains a misspelling, the search tool displays the search results page and includes one or more suggested terms at the top of the page under the heading **Did you mean**. Clicking one of these suggestions shows all the search results that match the selected term.

Users with the system administrator role can enable this feature.

1. Navigate to **System Properties** > **Text Search**.
2. Set the following properties to **true**:
   - Suggest alternate search spellings for knowledge or global search (glide.ts.dym.enable_spell_correct).
   - Suggest related searches for knowledge or global search (glide.ts.dym.enable_chain_suggest).
3. Click **Save**.

Integrating Knowledge Management features with the Service Portal

To create a consistent user experience for Knowledge Management, integrate Knowledge Management Service Portal in your end-user facing Service Portal.

The Knowledge Management Service Portal includes the following features:

- Multiple knowledge bases
- A Knowledge Management article view page with feedback options
- A Knowledge Management search results page with options to filter and sort search results
- A number of widgets to enable searches, display search results, display knowledge articles, and so on

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By default, all knowledge articles in the Service Portal are redirected to the Knowledge Management article view page using the **Knowledge Article View** page route map. If upgrading from a previous release, a system administrator can activate the **Knowledge Article View** page route map to take advantage of the features of the Knowledge Management article view page. For more information, see Activate the Knowledge Article View page on upgrade.

Note:
The Knowledge Management Service Portal supports only Zing search and not AI search.

System administrators perform the following tasks to integrate the Knowledge Management Service Portal features with the Service Portal:

- Integrate the Knowledge Management homepage with the Service Portal homepage.
- Integrate the Knowledge Management search results page with the Service Portal search results page.
- Add the Knowledge Management Service Portal widgets to quickly access knowledge articles from the Service Portal homepage (Optional).

Note:
These configurations apply to the base system pages within the Service Portal only.

Related topics

Service Portal pages

Knowledge Management Service Portal homepage features

Using search in Knowledge Management Service Portal

Knowledge Management Service Portal article view page features

Integrate the Knowledge Management homepage with the Service Portal homepage

Use a page route map to access the enhanced Knowledge Management homepage from the Service Portal homepage.

Before you begin

The Knowledge Management - Service Portal plugin (com.snc.knowledge_serviceportal) is activated.

Note:
This plugin is activated by default for customers on Madrid and later releases. Existing customers on release versions prior to Madrid must activate the plugin to perform this configuration task. For more information, see Activate the Knowledge Management Service Portal plugin.

Role required: admin

About this task

The Knowledge Management homepage displays knowledge articles organized by knowledge base and category, featured content, and popular articles. You use a page route map to access the Knowledge Management homepage from the Service Portal homepage.

Procedure

1. Navigate to **All** > **Service Portal** > **Page Route Maps**.
2. Click **New**.
3. On the Page Route Map form, fill in the fields.

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Page Route Map form

Field	Value
Service Portal(s)	Service Portal
Route from	kb_view2
Route to	kb_home
Active	Selected

Note:
On the Page Route Map form, you can fill in the **Short Description** and **Order** fields as appropriate.

4. Click **Submit**.

Result
You can now open the Knowledge Management homepage from the Service Portal homepage by clicking the Knowledge link or Knowledge Base icon link.

Integrate the Knowledge Management search results page with the Service Portal search results page

Use a custom knowledge search widget to access the enhanced Knowledge Management search results page from the Service Portal search results page.

Before you begin
Role required: admin

About this task
The Knowledge Management search results page in the Knowledge Management Service Portal includes options to filter and sort search results and a number of widgets to enable searches, display search results, display articles, and so on. In this procedure, to access the Knowledge Management search results page from the Service Portal search results page, you create a custom knowledge search widget named Search Within and add it to the Service Portal search results page.

Procedure
1. Create a custom knowledge search widget named Search Within.

   a. Navigate to **Service Portal** > **Service Portal Configuration**.

   b. On the Service Portal page, click **Widget Editor**.

   c. Click **Create a new widget**.

   d. In the Add a Widget dialog box, in the **Widget Name** field, enter `Search Within`.
   The **Widget ID** field is automatically populated based on the widget name.

   e. Click **Submit**.

   The widget HTML template, client script, and server script display in the widget editor.

   f. In the widget editor, enter the following field values to replace any existing text.

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- In the **HTML Template** field, enter the following code to add a link to the Knowledge Management search results page in the Search Within widget from the Service Portal.

```
<div role="list" class="list-group">
  <span class="list-group-item active">${Search
 Within}</span>
  <a role="link" class="list-group-item"
 ng-href="{{data.url}}">${Knowledge}</a>
</div>
```

- In the **Server Script** field, enter the following code to set the URL parameters for the Knowledge Management search results page:

```
(function(){
 var q = encodeURIComponent($sp.getParameter('q'));
 var kb = $sp.getValue('kb_knowledge_base') || "";
 data.url = '/sp?id=kb_search';
 if(q)
  data.url += "&keyword="+q;
 if(kb)
  data.url += "&kb_knowledge_base="+kb;
})();
```

Note:
For more information about these fields, see Widget developer guide.

g. Click **Save**.

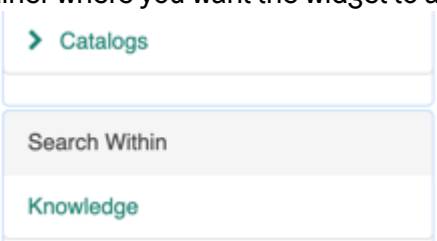
2. Add the custom knowledge search widget to the Service Portal search results page.

a. Navigate to **Service Portal** > **Service Portal Configuration**.

b. Click **Designer**.

c. In the **Filter by title or Id** field, enter `sp_search`, the ID for the Service Portal search results page, and then select **Search**.

d. In the **Filter Widget** field, search for the Search Within widget and drag it onto the container where you want the widget to appear on the Service Portal search results page.



Tip:
To verify the location and appearance of the newly added Search Within widget on the Service Portal search results page, click the **Preview** tab.

The Search Within knowledge search widget is added to the Service Portal search results page. Clicking **Knowledge** in the widget and searching for a keyword will redirect you to the Knowledge Management search results page in the Knowledge Management Service Portal.

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Add widgets to access knowledge articles from the Service Portal homepage

Add the Knowledge Management Service Portal widgets Featured Articles, Most Useful Articles, and Most Rated Articles to the Service Portal homepage to quickly access knowledge articles.

Before you begin
Role required: admin

About this task
For more information about Knowledge Management Service Portal widgets, see Knowledge Management Service Portal widgets.

Procedure
1. Navigate to **All** > **Service Portal** > **Service Portal Configuration**.
2. Click **Designer**.
3. Select the Service Portal homepage.
4. In the **Filter by title or Id** field, enter `index`, the ID for the Service Portal homepage, and then select **Service Portal**.
5. In the **Filter Widget** field, search for the following Knowledge Management Service Portal widgets, and then drag them onto the container where you want them to appear on the Service Portal homepage.

Tip:
To verify the location and appearance of the added widgets on the Service Portal, click the **Preview** tab.

Result
Clicking a knowledge article link from one of the added widgets on the Service Portal homepage opens the Knowledge Management article view page in the Knowledge Management Service Portal.

Configure custom SEO tags for canonical URLs and localized knowledge articles

Discover relevant knowledge articles through search engines by adding custom SEO tags for canonical URLs and *`hreflang`* tags to the knowledge article view page.

Before you begin
Role required: admin

About this task
Update the *`SPSEOHeaderTagsArticleView`* script include to add canonical URLs and *`hreflang`* tags to the knowledge article view page. You can also add custom header tags to the knowledge article view page by implementing the *`generateCustomTagsForSEO`* function.

Note:
The metatags will be added to the Knowledge Article View [kb_article_view] only when viewed by the user agents mentioned in *`glide.knowman.serviceportal.seo_user_agent`* system property. For more information, see Create and edit a page using the Service Portal Designer.

For information about the default behavior of canonical URLs and *`hreflang`* tags for the knowledge article view page, see SEO for canonical URLs and localized versions of knowledge articles.

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Procedure

1. Navigate to **All** > **System Definitions** > **Script Includes**.
2. Search for `SPSEOHeaderTagsArticleView`.
3. In the **Name** column, click the **SPSEOHeaderTagsArticleView** link.
4. On the Script Include form, modify the functions for knowledge articles.

Functionality	Implementation
Return a canonical URL for a knowledge article	Modify the *`generateCanonicalURL`* function to return the fully qualified canonical URL of a knowledge article as a string. For example, use the following URL format for a knowledge article in the customer service portal: `"https://<instance name>.servicenow-com/csp?id=kb_article_view&sysparm_article=<article number>"`
Return an *`hreflang`* tag for translated versions of a knowledge article	Modify the *`generateHrefLangArray`* function to return an *`hreflang`* array for the current language and the available translations for a knowledge article. For example, use the following format for a knowledge article translated in French in the customer service portal: `[{locale:'fr', href:'https://<instance name>.servicenow-com/csp?id=kb_article_view&sysparm_article=<article number>'}]`
Return a custom header for a knowledge article	Modify the *`generateCustomTagsForSEO`* function to return any custom header tags as an array of strings used for the knowledge article view page. For example, use the following format for a custom tag for a knowledge article: `['<meta custom-tag="" property="og:title" content="Service Portal">']`
Return a SEO optimized HTML content for SEO bots	Modify the *`generateSEOTags`* function to return the SEO optimized HTML content in *`items.customSEOHTML`*.

For more information about configuring script includes, see Script includes.

5. Click **Update**.

Enable and configure AI Search for Knowledge Management Service Portal

Enable and define the AI Search experience in Knowledge Management Service Portal.

Before you begin

Role required: sp_admin or admin

About this task

All new and existing customers must manually enable AI Search in the Knowledge portal. If you leave AI Search inactive, the portal uses Zing search by default.

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Procedure

1. Navigate to **Service Portal** > **Portals** and open the **Knowledge Portal** record.
2. On the form, select the **Enable AI Search** check box.
3. In the **Search Application** field, select the Knowledge Portal Search Configuration to use for the portal.
   A search application configuration defines search experience settings such as the search engine, search results limit, and suggestions limit.
4. In the **Search Results Configuration** field, determine how search results are displayed by selecting the Knowledge Portal Search.
5. Select **Update**.

Important:

- The **View count** and **Rating** facets that are available in Zing search aren't available for AI Search.
- If you select a Knowledge Base from the Knowledge Portal, you will be directed to the AI Search results page. Because you are not entering a search term, the placeholder "***" will be displayed instead of a search term. You can enter a search term on the search results page or select additional filters as needed to refine your results within the selected knowledge base.

Result

AI Search is enabled throughout the Knowledge portal. Customers can use AI Search from the search bar on the portal.

Create a knowledge base

Create a knowledge base to provide a self-service platform for users to store, share, and manage content. Configure knowledge bases into product or service categories and manage user access based on permissions. Customize workflows for publishing and retiring articles in the knowledge base.

Before you begin

Understand the requirements for setting up a knowledge base.

Role required: knowledge_admin or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge bases**.
2. In the Knowledge Bases list, click **New**.
3. On the Knowledge base form, fill in the following fields as appropriate:

Knowledge base form

Field	Description
Title	Unique name for the knowledge base.
Article Validity	Number of default days articles will be valid for after their created date.

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Field	Description
	Note: The **Article Validity** field is configured to set the **Valid to** date for an article. The **Valid to** date is the date this knowledge article expires. When you create an article within a knowledge base, the date value in the **Valid to** field of the article is calculated as follows: Created (sys_created_on) + Article Validity (in days). An article author or editor can select whether to keep or change the **Valid to** date (see Create a knowledge article). If the **Article Validity** field is blank, the date in the **Valid to** field date is set to January 1, 2100.
Icon	An image that provides a visual reference to describe the knowledge base. This image is displayed next to all articles from this knowledge base in the article search results page.
Disable commenting	Option to disable commenting. If selected, users cannot comment on articles in the knowledge base.
Disable suggesting	Option to disable edit suggestions. If selected, users cannot suggest edits to articles in the knowledge base.
Disable category editing	Option to disable editing of knowledge categories. If selected, only knowledge managers can add or edit knowledge categories for the knowledge base.
Disable rating	Option to disable the rating for knowledge articles. If selected, users cannot rate the article in the knowledge base.
Disable mark as helpful	Option to disable the mark as helpful. If selected, user cannot mark any article as helpful in the knowledge base.
Enable blocks	Option to enable the knowledge blocks feature. If selected, you can create knowledge blocks to add to knowledge articles within a knowledge base.
Checklist	Checklist to evaluate the quality of articles in the knowledge base.
Application	Application scope of the knowledge base.

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Field	Description
	Note: This field is automatically set to the application selected in the application picker. For information about a scoped knowledge base, see Scoped knowledge bases.
Owner	The user responsible for the knowledge base. A knowledge base owner can assign other roles to the knowledge base.
Managers	Users who perform administrative functions on the knowledge base.
Publish workflow	The workflow for publishing the articles in the knowledge base. ○ **Knowledge - Instant Publish:** publishes articles in the knowledge base without requiring an approval. ○ **Knowledge - Approval Publish:** requests approval from the manager of the knowledge base before moving the articles to the published state.
Retire workflow	The workflow for retiring the articles in the knowledge base. ○ **Knowledge - Instant Retire:** retires articles in the knowledge base without requiring an approval. ○ **Knowledge - Approval Retire:** requests approval from the manager of the knowledge base before moving the articles to the retired state.
Active	Option to indicate that the knowledge base is active. If not selected, only users with the admin role or knowledge administrators can create, search for, or view its articles.
Description	A short description to describe the knowledge base.
Set default knowledge field values	Default configuration settings for the knowledge base.
Related products	List of products related to the knowledge base content.
Auto-create translation tasks	Option to enable creating translation tasks automatically after an article is published. If this option is selected, when a knowledge article is published in this knowledge base, translation tasks are automatically created for the configured languages.

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Field	Description
	This field appears only when the translation management feature and *glide.knowman.translation.enable_translati* property are enabled. For more information, see Translation management and Knowledge Management properties.
Languages	Languages enabled for the knowledge articles in this knowledge base. If your system has more languages, use this option to select only those languages in which you want to translate knowledge articles in this knowledge base. You can add more languages later. However, you can remove languages only when no knowledge articles exist in that language. This field appears only when the translation management feature and *glide.knowman.translation.enable_translati* property are enabled. For more information, see Translation management and Knowledge Management properties.

4. Right-click the form header and click **Save**.
5. In the related list section, view or configure the following items related to the knowledge base:

Name	Description
Knowledge	List of knowledge articles stored in this knowledge base.
Can Read	List of user criteria that grants read access and enables user matching the criteria to read articles in a knowledge base. **Note:** It is recommended to assign appropriate user criteria to secure read access. See, Select user criteria for a knowledge base.
Can Contribute	List of user criteria that grants contribute access and enables user matching the criteria to create and modify articles in a knowledge base.

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Name	Description
	Note: It is recommended to assign appropriate user criteria to secure contribute access. See, Select user criteria for a knowledge base.
Article Templates	If you have activated the Knowledge Management Advanced (com.snc.knowledge_advanced) plugin, the **Article Templates** related list is displayed. If there are article templates in the related list, articles in that knowledge base can only be created using one of the article templates listed. If the **Article Templates** related list is empty, articles can be created using any article template. Click **Edit** to map article templates to the knowledge base. **Note:** Admins, knowledge admins, and knowledge managers can edit the article templates for the knowledge base.
Featured Content	List of knowledge articles that appear in the homepage **Featured Content** section based on the corresponding keyword search set for each article.
Knowledge Categories	List of knowledge categories associated with this knowledge base. **Note:** If the category is marked as inactive then you can't associate articles to the category. However, it does not have any effect on the existing articles of that category.

6. Click **Submit**.

Related topics

- Control access at the knowledge base level through user criteria
- Explicit roles
- Knowledge workflows
- Knowledge Management properties

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Create a custom knowledge homepage

I18N - Knowledge internationalization

Configure knowledge bases for a portal

Select which knowledge bases are displayed in a portal to view the associated knowledge articles. If no knowledge bases are configured, users can view articles from all knowledge bases in the portal.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Portal** > **Portals**.
2. Select the portal for which you want to enable search for the desired knowledge bases.
3. In the Knowledge Bases related list, click **Edit**.
4. On the Edit Members form, move the desired knowledge bases from the available items in the **Collection** column to the **Knowledge Bases List** column.
5. Click **Save**.

Related topics

Create a knowledge base

Configure knowledge subscriptions

Configure knowledge subscriptions by activating the Knowledge Management Advanced plugin and setting the subscription properties.

Before you begin

Ensure that the Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated.

Note:
The Knowledge Management Advanced plugin activates the Subscriptions and Activity Feed Framework plugin (com.snc.activity_subscriptions).

Role required: knowledge_admin or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Properties**.
2. In the **KM Subscription Properties** section, configure the following properties.

Property	Description
Enable subscribe feature for KM [glide.knowman.enable_km_subscription]	Enables or disables the Knowledge Management knowledge subscriptions feature.
List of roles (comma-separated) who can have subscription feature [glide.knowman.enable_km_subscription.roles]	A comma-separated list of the roles that can use the knowledge subscriptions feature and subscribe to knowledge bases and articles.

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Property	Description
List of workflow states (comma-separated) that can have subscription feature [glide.knowman.enable_km_subscription.workflow_state]	A comma-separated list of the article states for which the knowledge subscription feature is available. The default states include **Draft**, **Review**, and **Published**.

3. Select **Save**.

Configuration tasks for knowledge managers

Having multiple knowledge bases allows an organization to spread management responsibilities across multiple users, known as knowledge managers.

As a knowledge manager, you can assign other managers, define category structures, configure which users can read and contribute articles, move and pin articles, and modify most fields on the Knowledge Base form. You can also approve the publishing or retiring of knowledge articles in those knowledge bases.

The primary manager of a knowledge base is the owner of that knowledge base. Each knowledge base must have one owner. There may be any number of additional managers for each knowledge base. The owner and all managers of a knowledge base automatically receive the knowledge_manager role. If the knowledge base is made inactive later, the knowledge_manager role is not automatically removed for these users.

Add a knowledge article to featured content

Add a knowledge article to appear in the Featured content section of the knowledge homepage and at the top of knowledge search results page.

Before you begin

Role required: knowledge_manager, knowledge_admin, or admin

About this task

Adding an article to featured content requires associating an article to specific keywords. You can search a keyword in the knowledge service portal or search results page to display articles in the Featured content section or at the top of the knowledge search results list.

Note:
The articles added to the Featured content section do not appear in the global search results and Virtual Agent conversations.

- To display articles in the Featured content section, add a default keyword in the **glide.knowman.default_keyword** property **Value** field and add the same keyword to all articles you want to display in that section.
- To display articles at the top of the knowledge search results list, add a list of keywords to each article you want to display at the top of the list (it is not applicable for AI search).

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge Bases**.
2. Select a knowledge base.
3. On the Knowledge form, click the Featured content related list.
4. Select **New**.
5. On the Knowledge keyword form, in the Knowledge field, search for and select the article.

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6. In the Keywords field, click the unlock keywords icon ( ).
7. Select the lookup icon () to open the **Knowledge keywords** list.
8. Select the keyword to add for this article.

   Note:
   If you're creating a new keyword, it must be a single word and cannot contain spaces.

9. Select the unlock keywords icon ( ) to add the keywords to the article.
10. Select **Submit**.

Result
The featured content on the knowledge service portal displays the article.

Define a knowledge article category

Each knowledge base has a hierarchy of categories that organizes the articles.

Before you begin
Role required: knowledge_admin, knowledge_manager, **CanContribute** access to the knowledge base

About this task
Define a hierarchy for categories by creating parent-child relationships. Each hierarchy consists of a top-level category and a structure of subcategories, which are also named the child categories. The category hierarchy is saved in the **Full category** field in the Knowledge Category [kb_category] table.

You can create and edit categories separately for each knowledge base.

Procedure
1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge Bases**.
2. Select a knowledge base you manage.
3. Create a top-level category.
   a. In the Knowledge Categories related list, click **New**.
   b. On the Knowledge Category form, fill in the fields.

Knowledge Category form

Field	Description
Label	Label for the category. The label appears as the name of the category.
Value	Value for the category you use when referencing the category in scripts.
Parent ID	Top-level component associated with the category. This field is automatically set to the top-level component ID.

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Field	Description
Active	Option to enable the category.

c. Click **Submit**.

4. **Optional:** Create a child category.
   a. Expand an existing category and click **New** within the expanded section.
   b. Fill in the Knowledge Category form.
   c. Click **Submit**.

What to do next
In addition to using categories defined by a knowledge manager, knowledge contributors can add and edit categories when editing an article.

Related topics
Select a knowledge article category

Assign a knowledge base manager

You can assign users as managers of a knowledge base.

Before you begin
Role required: knowledge_admin, or admin

Procedure
1. Navigate to **All** > **Knowledge** > **Knowledge Bases**.
2. Select a knowledge base you manage.
3. In the **Managers** field, click the unlock icon.
4. Add one or more users.
5. Click **Update**.
   After you save the knowledge base record, users selected as managers automatically receive the knowledge_manager role if they do not have it already.

What to do next
You can remove a knowledge base manager by removing that user from the **Managers** field. If the user is not a manager of any other knowledge base, the knowledge_manager role is removed from that user.

Configure Self-Service Analytics

Configure the Self-Service Analytics framework so you can use the generated metrics in a dashboard.

Before you begin
Role required: admin

About this task
Complete the following tasks to use the metrics generated by the Self-Service Analytics framework in a dashboard of an application:

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Procedure

1. Activate Self-Service Analytics.
2. Configure activity contexts for Self-Service Analytics.
3. Configure pattern elements for Self-Service Analytics.
4. Configure pattern element groups for Self-Service Analytics.
5. Configure activity patterns for Self-Service Analytics.
6. Set up the deflection configuration for Self-Service Analytics.
7. Configure scheduled jobs for Self-Service Analytics.

Related topics

Self-Service Analytics dashboard for customer service

Activate Self-Service Analytics

Activate the Self-Service Analytics Core plugin (com.snc.self_service_analytics_core) if you have the admin role. This plugin activates related plugins if they are not already active.

Before you begin

Role required: admin

About this task

The Self-Service Analytics Core plugin provides the Self-Service Analytics framework for configuring deflection contexts and activity patterns to collect the case reduction (deflection) metrics. The metrics are used in the Self-Service Analytics dashboard.

The Self-Service Analytics Core plugin activates these related plugins if they are not already active.

Plugins for Self-Service Analytics Core

Plugin	Description
Subscriptions and Activity Feed Framework [com.snc.activity_subscriptions]	Provides a generic set of artifacts to handle subscriptions for any defined subscribable object. Any entity can be defined as a subscribable object and a set of subscribers can subscribe to the objects. When a event occurs related to the subscribable object, activities can be tracked and subscribers can be notified.

Note:
The Self-Service Analytics Core plugin is also installed when you activate the Platform Analytics Solution for Self-Service Analytics for Customer Service. For more information, see Activate the Platform Analytics Solution for Self-Service Analytics for Customer Service.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

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3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Configure activity contexts for Self-Service Analytics

Define the type of activities you want to collect as Self-Service Analytics data for a user entity such as consumers and customer contacts.

Before you begin
Role required: sn_ssa_core.self_service_manager

About this task
The activity types you add to an activity context are already predefined for use in applications that use the Subscriptions and Activity Feed Framework. This framework is available when you install the Subscriptions and Activity Feed Framework plugin (com.snc.activity_subscriptions). The plugin is activated when you activate the Self-Service Analytics Core plugin (com.snc.self_service_analytics_core).

Procedure
1. Navigate to **All** > **Self-Service Analytics** > **Configuration** > **Activity Context**.
2. In the Activity Contexts list, search for and select the activity context for your user entity.
   - For consumers, select **Consumer**.
   - For customer contacts, select **Contact**.
   - For user entities other than consumers and customer contacts, click **New** to create another activity context.

   Note:
   To get the activity contexts Consumer and Contact by default, you must install Self-Service Analytics for Customer Service (com.snc.pa.self_service_analytics_csm) plugin.

3. On the Activity Context form, verify the default field values for consumers and customer contacts, or fill in the values for a custom configuration.

Activity Context form

Field	Description
Name	Unique name for your activity context.
Context Table	Table that includes the user entity whose actions need to be tracked and displayed on the Self-Service Analytics dashboard. For example, if you want to track all actions for a customer contact, select the Contact [customer_contact] table. Similarly, if you want to track all actions for a consumer, select the Consumer [csm_consumer] table.
Module	Module associated with the application that stores the activities data.

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Field	Description
Application	Scope of the application. This field is automatically set based on the application scope selected in the application picker.
Domain	Domain in which the activities records exist.

4. If you are creating a new activity context, click **Submit** and then select the newly created activity context link from the Activity Contexts list.
5. In the Activity Context Groups related list, map an activity context with activity groups.
   - For consumers and customer contacts, verify the default field values for an existing configuration.
   - For user entities other than consumers and customer contacts, click **New** to create another activity group or map with an existing activity group.

   For a new activity group mapping, on the Activity Group form, fill in the fields and click **Submit**. In the Activity Context Groups related list, you then have to select the newly created activity group and add available activity types to the activity group.

Activity Group form

Field	Description
Activity Context	Activity context associated with the activity group.
Activity Group	Option to search for and select an activity group.
Application	Defines the scope of the application. This field is automatically populated based on the application scope.
Domain	Domain in which the activities records exist.

6. In the Activity Context Types related list, map an activity context with an activity type.
   - For consumers and customer contacts, verify the default field values for an existing configuration.
   - For user entities other than consumers and customer contacts, click **New** to create another mapping or use an existing configuration.

   For a new activity type mapping, on the Activity Source Context Mapping form, fill in the fields and click **Submit**.

Activity Source Context Mapping form

Field	Description
Activity Context	Activity context associated with the activity source.
Context Table	Table that includes the user entity whose actions need to be tracked and displayed on the Self-Service Analytics dashboard. This field is auto-populated based on the selected activity context.
Activity Type	Activity type you want to associate with the activity context.
Source Table	Table from which the data for the activity context is populated.

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Field	Description
Filter Criteria	Filter conditions applied on the source table.
Advanced Mapping	Option to enable advanced mapping of activity source and activity context. You enter a script in the **Advanced Mapping Script** field.
Advanced Mapping Script	Script to use if the source and context mapping is not sufficient. This field appears only when the **Advanced Mapping** option is selected.
Module	Module associated with the application that stores the activities data.
Application	Scope of the application that contains the user entity. This field is automatically set based on the application scope selected in the application picker.
Domain	Domain in which the activities records exist.
Fetch from Activities	Option to enable a business rule defined for an activity type.

7. On the Activity Context form, click **Update**.

What to do next
Configure pattern elements for Self-Service Analytics.

Configure pattern elements for Self-Service Analytics

Configure a pattern element to specify a single activity type and how many times it occurs. Each pattern element is implemented as regular expressions.

Before you begin
Configure activity contexts for Self-Service Analytics.

Role required: sn_ssa_core.self_service_manager

About this task
By default, the system includes pattern elements for analyzing activity patterns within Knowledge, Catalog, Communities, or Virtual Agent self-service channels. These pattern elements are available with the Self-Service Analytics for Customer Service plugin [com.snc.pa.self_service_analytics_csm].

Procedure
1. Navigate to **All** > **Self-Service Analytics** > **Configuration** > **Pattern Element**.
2. In the Pattern Elements list, modify an existing pattern element or click **New** to create another pattern element.
3. On the Pattern Element form, fill in the fields.

Pattern Element form

Field	Description
Name	Name to identify the pattern element.
Activity Type	Activity type you want to associate with the pattern element.

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Field	Description
Application	Scope of the application that contains the user entity. This field is automatically set based on the application scope selected in the application picker.
Occurrence	Frequency with which an activity should occur. An activity occurrence is one of the following types: ○ **Once**: An activity must have occurred only once. For example, an article was marked with positive feedback only once. ○ **Optionally Once**: An activity might not have occurred, but if it has, then it has occurred only once. For example, either no catalog request was created or only one was created. ○ **Optionally Many**: An activity might not have occurred but if it has, then it has occurred multiple times. For example, either no catalog request has been created or multiple requests have been created. ○ **At Least Once**: An activity has occurred at least once. For example, a community blog was viewed one or more times. ○ **Range**: An activity has occurred as many times as is specified in a range. You specify a range using the **Minimum** and **Maximum** fields. For example, if you specify a range of 2 to 4 Virtual Agent interactions, only 2, 3, or 4 interactions can have occurred.
Minimum	Minimum occurrence of an activity. This field appears only when **Range** is selected from the Occurrence list.
Maximum	Maximum occurrence of an activity. This field appears only when **Range** is selected from the Occurrence list.

4. Submit or update the pattern element.
   - Click **Submit** if you created a new pattern element.
   - Click **Update** if you modified an existing pattern element.

What to do next
Configure pattern element groups for Self-Service Analytics.

Configure pattern element groups for Self-Service Analytics

Define a logical combination of two pattern elements, pattern element group, or both and how many times the combination occurs. Each pattern element group is implemented as regular expressions.

Before you begin
Configure pattern elements for Self-Service Analytics.

Role required: sn_ssa_core.self_service_manager

About this task
By default, the system includes pattern element groups for analyzing activity patterns within the Knowledge, Catalog, Communities, and Virtual Agent self-service channels. These pattern elements are available with the Self-Service Analytics for Customer Service plugin [com.snc.pa.self_service_analytics_csm].

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Procedure

1. Navigate to **All** > **Self-Service Analytics** > **Configuration** > **Pattern Element Group**.
2. Either configure an existing group or create a new group.
   - Select an existing group in the Pattern Element Groups list.
   - Create a new group by clicking **New**.
3. On the Pattern Element Group form, fill in the fields.

Pattern Element Group form

Field	Description
Name	Name to identify the pattern element group.
First Element	Conditional regular expression consisting of a pattern element or pattern element group.
Second Element	Another conditional regular expression consisting of a pattern element or pattern element group.
Application	Scope of the application that contains the user entity. This field is automatically set based on the application scope selected in the application picker.
Operator	Logical operator that returns the result of the combination of the first and second elements. Valid values are: ○ **And**: Both the first and second elements are true. ○ **Or**: Either the first or second element is true.
Occurrence	Frequency with which a pattern element or pattern element group must occur. An occurrence is one of the following types: ○ **Once**: Must have occurred only once. ○ **Optionally Once**: Might not have occurred but if it has, then it has occurred only once. ○ **Optionally Many**: Might not have occurred but if it has, then it has occurred multiple times. ○ **At Least Once**: Has occurred at least once. ○ **Range**: Has occurred within a range. You specify a range using the **Minimum** and **Maximum** fields.
Minimum	Minimum occurrence of the result of the logical combination of the first and second elements. This field appears only when Occurrence is set to **Range**.
Maximum	Maximum occurrence of the result of the logical combination of the first and second elements. This field appears only when Occurrence is set to **Range**.

4. Save the pattern element group settings.
   - Save a new pattern element group by clicking **Submit**.
   - Save the changes to an existing pattern element group by clicking **Update**.

What to do next

Configure activity patterns for Self-Service Analytics.

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Configure activity patterns for Self-Service Analytics

Configure an activity pattern to combine the pattern element, pattern element group, or both for a user entity and link them to an outcome.

Before you begin

Configure pattern element groups for Self-Service Analytics.

Role required: sn_ssa_core.self_service_manager

About this task

By default, the system includes activity patterns for the activities Consumer created a case and Customer created a case. These pattern elements are available with the Self-Service Analytics for Customer Service plugin [com.snc.pa.self_service_analytics_csm].

Procedure

1. Navigate to **All** > **Self-Service Analytics** > **Configuration** > **Activity Pattern**.
2. Either configure an existing activity pattern for your user entity or create a new one.
   - Select an existing activity pattern in the Activity Patterns list.
   - Create a new activity pattern by clicking **New**.
3. On the Activity Pattern form, verify the default field values for an existing activity pattern or fill in the values for a custom configuration.

Activity Pattern form

Field	Description
Name	Name to identify the activity pattern.
Description	Summary of the activity pattern.
Primary Activity	Activity to be tracked in the activity sequence after a pattern matches with an outcome using the pattern recognition. An activity sequence is a stream of activities a user performs.
Outcome	Result of an activity pattern.
Application	Scope of the application that contains the user entity. This field is automatically set based on the application scope selected in the application picker.
Match If	Pattern recognition using the Match If function to associate the pattern with an outcome. For example, you can indicate that if the activity Consumer created a case is not found, you want to match it with the Confirmed Deflection outcome.
Domain	Domain in which the activities records exist.

4. Click **Submit** and then select the newly created activity pattern link from the Activity Patterns list.
5. In the Elements related list, select elements to map with the primary activity and use the **Order** column to decide the order of each element mapping.
   - To use an existing element, select an element, modify the fields and click **Update**.
   - To create another pattern element or pattern element group, click **New** and select the type of element, fill in the fields on the form, and then click **Submit**.

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An element can be a pattern element or pattern element group. For more information, see Configure pattern elements for Self-Service Analytics and Configure pattern element groups for Self-Service Analytics.

In the **Order** column, the following conditions apply:

- If there is only one matching table map, the system uses that map.
- If there are multiple matching table maps with the same order, the system uses the map with the older created date.
- If there are multiple matching table maps with different orders, the system uses the map with the highest order.

6. On the Activity Pattern form, click **Update**.

What to do next

Set up the deflection configuration for Self-Service Analytics.

Set up the deflection configuration for Self-Service Analytics

Associate a period of time with an activity context that defines how long a system will wait for a case to be created to match a deflection pattern.

Before you begin

Configure activity patterns for Self-Service Analytics.

Role required: sn_ssa_core.self_service_manager

Procedure

1. Navigate to **All** > **Self-Service Analytics** > **Configuration** > **Deflection Configuration**.
2. In the Deflection Configurations list, search for and select the deflection configuration for your activity context.
   - For customer contacts, select **Contact Case Deflection Configuration**.
   - For consumers, select **Consumer Case Deflection Configuration**.
   - For user entities other than consumers and customer contacts, click **New** to create another deflection configuration or modify an existing configuration.
3. On the Deflection Configuration form, verify the default field values for an existing configuration or fill in the values for a custom configuration.

Deflection Configuration form

Field	Description
Name	Name for your deflection configuration.
Activity Context	Type of activities for which you want to collect data. For more information, see Configure activity contexts for Self-Service Analytics.
Description	Summary of the configuration.
Application	Scope of the application that contains the user entity. This field is automatically set based on the application scope selected in the application picker.
Window	Activity context window (duration) for tracking activities that match a deflection pattern. Example: To track the create case activity for a consumer within a day, set the window as 1 day.

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Field	Description
	○ If the consumer created a case within that window, the deflection pattern matched is not a deflection. ○ If the consumer did not create a case within that window, the deflection pattern matched is a potential deflection. ○ If the consumer did not create a case and the last activity is submitted positive feedback for any self-service channel content within that window, the deflection pattern matched is a confirmed deflection.

4. In the Deflection Patterns related list, add or modify existing deflection patterns to associate them with the deflection configuration or add a new pattern.
   This related list appears only if a deflection configuration exists.
5. In the Deflection Metrics related list, add or modify an existing deflection metric table that stores the deflection data for an activity pattern associated with a deflection type.
   This related list appears only if a deflection configuration exists. Alternatively, you can also configure a deflection metric table by navigating to **Self-Service Analytics** > **Deflection Metric**.
6. On the Deflection Configuration form, click **Update**.

What to do next

Configure scheduled jobs for Self-Service Analytics.

Configure scheduled jobs for Self-Service Analytics

Schedule when to run the deflection configuration to generate the activities that match an activity pattern within an activity window.

Before you begin

Set up the deflection configuration for Self-Service Analytics.

Role required: admin

About this task

You configure the duration of processing the deflection configuration for a user entity. This configuration is optional for consumers and customer contacts. The scheduled job captures data for Self-Service Analytics and stores the generated data in the Deflection Metric [ssa_deflection_metric] table.

Procedure

1. Navigate to **All** > **System Definition** > **Scheduled Jobs**.
2. Configure the scheduled script processed for a user entity in a scheduled job.
   - For consumers, select **Deflection Analytics for Consumers**.
   - For customer contacts, select **Deflection Analytics for Contacts**.
   - For user entities other than consumers and customer contacts, click **New** and select **Automatically run a script of your choosing** to create another scheduled job or modify an existing schedule job.
3. On the Scheduled Script Execution form, verify the default field values for consumers and customer contacts or fill in the values for a custom configuration.

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Scheduled Script Execution form

Field	Description
Name	Name to identify the scheduled script execution.
Active	Option to activate the script at the scheduled date and time. By default the job is inactive.
Run	Type of schedule to execute the script on. Choices are: ○ Daily ○ Weekly ○ Monthly ○ Periodically ○ Once
Day	○ If you select **Weekly** as the **Run** value, the day of the week. ○ If you select **Monthly** as the **Run** value, the day of the month.
Repeat Interval	If you select **Periodically** as the **Run** value, the duration between each script execution. **Note:** This setting does not account for Daylight Savings Time changes. For example, if you select a period of one day, this adds 24 hours to the starting time of the job. If the start time was configured during a period with Daylight Savings Time, the job executes with a one hour offset on days when that time zone is not in Daylight Savings Time.
Time	If you select **Daily**, **Weekly**, or **Monthly** as the **Run** value, the time of day, based on a 24-hour clock.
Starting	Date and time of the first scheduled script execution.
Application	Application that contains the script.
Conditional	Option to run a scheduled job if certain conditions are met in the associated script.
Condition	Conditional script that determines whether a scheduled job must run. The last expression of the script should evaluate to a Boolean (true or false) value. This field appears only when the **Condition** check box is selected.
Run this script	Script to run at the scheduled date and time. For a new scheduled script, copy the script from the existing script (Deflection Analytics for Consumers or Deflection Analytics for Contacts) and modify the `deflectionAnalyticsService.captureDeflectionAnalytics('sys_ID')` field value to include the sys_id of your deflection configuration record. For information about identifying the sys_id, see The unique record identifier (sys_id).

4. Click **Update** for consumers and customer contacts or **Submit** to save a custom configuration.

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Managing access to knowledge bases and knowledge articles

Determine whether certain users or categories of users can access knowledge bases and knowledge articles by controlling contribute and read access.

As a knowledge administrator, manager of a knowledge base, or owner of a knowledge base, you can assign user criteria to control contribute and read access at the knowledge base level, where:

- Read access determines the ability to view knowledge articles in a knowledge base.
- Contribute access determines the ability to create, modify, and retire knowledge articles in a knowledge base.

As a knowledge administrator, manager of a knowledge base, or owner of a knowledge base, you can assign user criteria, or roles, or both, to control read access at the knowledge article level.

Try to use only user criteria, which were introduced in Knowledge Management v3, to control access to knowledge articles. Roles were used for this purpose in Knowledge Management v2. If no user criteria is selected for a knowledge base, all users can read and all users with roles can contribute to that knowledge base.

Note:
By default, when contribute access isn't provided for a knowledge base, a user must meet both roles and user criteria conditions for read access. However, you can override roles set for a knowledge article and provide access through user criteria only by setting the *`glide.knowman.search.apply_role_based_security`* system property to `false`. Because this property isn't available by default, you must add it. For more information, see Add a system property.

User criteria for knowledge access

As a knowledge administrator, manager of a knowledge base, or owner of a knowledge base, you control access to knowledge bases or knowledge articles for a user through user criteria, which are described in the following table.

User criteria definitions

User criteria	Result
Cannot Contribute	Cannot contribute (that is can't create, modify, or retire) knowledge articles within a knowledge base. The Cannot Contribute user criteria is available only for knowledge bases.
Can Contribute	Can contribute (that is can view, create, modify, or retire) knowledge articles within a knowledge base. The Can Contribute user criteria is available only for knowledge bases.
Cannot Read	At the knowledge base level, cannot view knowledge articles within a knowledge base. At the knowledge article level, cannot view a knowledge article.
Can Read	At the knowledge base level, can view knowledge articles within a knowledge base. At the knowledge article level, can view a knowledge article.

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The access to knowledge base and its articles are defined based on the user criteria status for a user as described in the following table.

Combining knowledge base and knowledge article user criteria

Status	Access
The user matches both Can Contribute and Cannot Contribute at the knowledge base level	The user is denied contribute access to the knowledge base and its articles.
The user matches both Can Read and Cannot Read at the knowledge base level	The user is denied read access to the knowledge base and its articles.
The user matches Can Read at the knowledge base level and Cannot Read at the knowledge article level	The user is denied read access to the knowledge article.
The user matches Cannot Read and Can Read at the knowledge article level	The user is denied read access to the knowledge article.

Users with special knowledge privileges

Users with special knowledge privileges aren't evaluated based on user criteria and have knowledge bases and knowledge articles access as described in the following table.

Access of users with special privileges to knowledge bases and knowledge articles

User	Access
Knowledge administrator	• Contribute to and read all knowledge bases and their articles. • Modify the definition of all knowledge bases and assign user criteria to them. **Note:** This access doesn't apply to scoped knowledge bases. For more information, see Scoped knowledge bases.
Owner of a knowledge base	• Contribute to and read that knowledge base. • Modify the definition of that knowledge base and assign user criteria to it.
Manager of a knowledge base	• Contribute to and read that knowledge base. • Modify the definition of that knowledge base and assign user criteria to it. **Note:** If the article versioning feature is enabled, the manager of a knowledge base can’t modify knowledge articles of other authors that are in the **Draft** state. For more information, see Article versioning.

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Access of users with special privileges to knowledge bases and knowledge articles (continued)

User	Access
Members of an ownership group associated with a knowledge article	Read, modify, approve, and retire that knowledge article (see Ownership groups).

Explicit roles and user criteria

Explicit roles (snc_external and snc_internal) are added to your instance when your administrator installs a plugin, such as the Customer Service plugin (com.sn_customerservice), that also activates the Explicit Roles plugin (com.glide.explicit_roles). If you create a knowledge base with the Explicit Roles plugin (com.glide.explicit_roles) activated, the application automatically adds the following predefined user criteria at the knowledge base level:

- **Users with 'snc_internal' role** – Added to the Can Read user criteria enabling only users with the snc_internal role have read access to the knowledge base.
- **Users with snc_internal' and another role** – Added to the Can Contribute user criteria enabling only users with the snc_internal role and at least one additional role have contribute access to the knowledge base.

When you upgrade to product versions (from Rome onwards) that offer the Explicit Roles plugin (com.glide.explicit_roles), the predefined user criteria **Users with 'snc_internal' role** and **Users with 'snc_internal' and another role** aren't automatically added to any existing knowledge bases created prior to the activation of the Explicit Roles plugin. To add these predefined user criteria to an existing knowledge base, run the *`Fix unsecured knowledge bases`* fix script. For more information about explicit roles and fix scripts, see Explicit Roles and Fix scripts.

Determining contribute access to a knowledge base and its articles using user criteria

The flowchart in this section illustrates the user criteria checks that determine contribute access at the knowledge base and article levels.

Note:
In order for an unauthenticated user to view knowledge articles within the knowledge base, ensure that the audience for the Knowledge Management Service Portal pages is set to public; that is, the page can be accessed without the need for authentication. For more information, see Create and edit a page using the Service Portal Designer.

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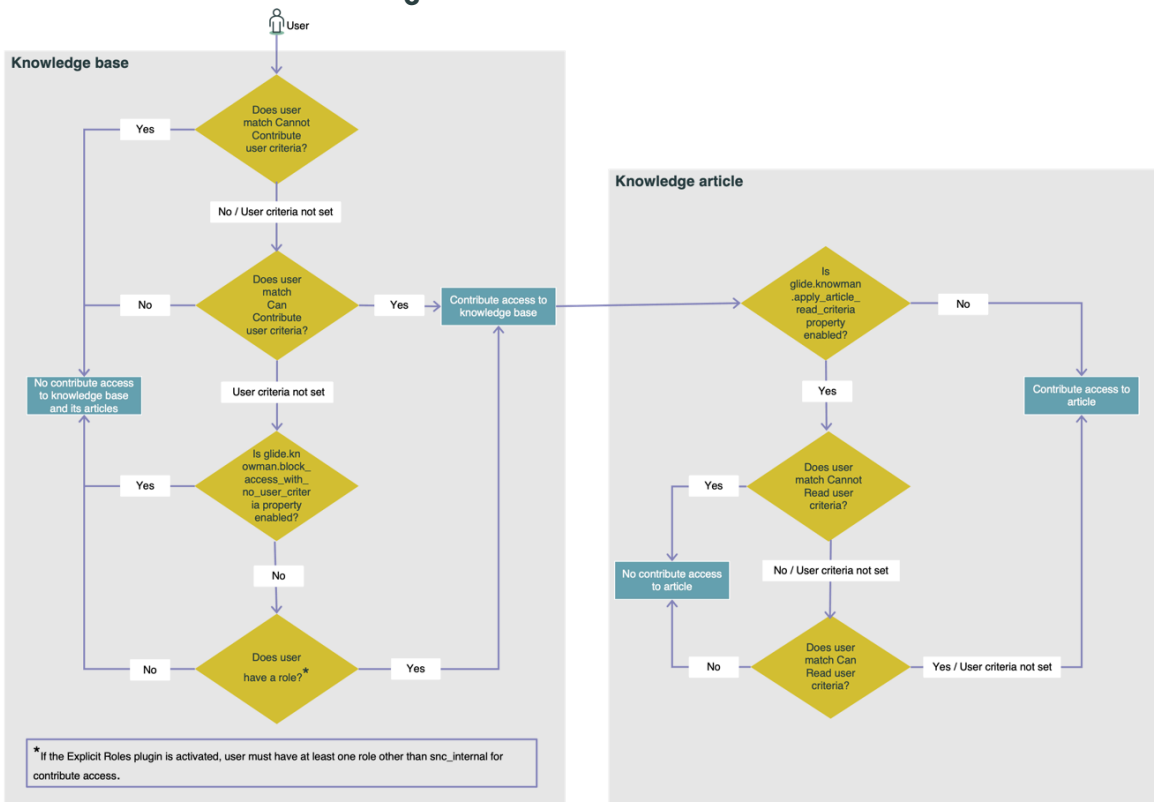
Contribute access to a knowledge base and its article flowchart



When either Cannot Contribute isn't set or a user doesn't match Cannot Contribute and additionally Can Contribute is not set, the *glide.knowman.block_access_with_no_user_criteria* property value is further evaluated to determine contribute access, as explained in the following table.

Contribute access to a knowledge base when user criteria for a knowledge base aren't set

Property value	Result
true	No user has contribute access to the knowledge base except users with special knowledge privileges.
false	All users, including unauthenticated users, with at least one role can contribute to the knowledge base. If the Explicit Roles plugin (com.glide.explicit_roles) is activated, users who have at least one role other than snc_internal can contribute to the knowledge base. To check knowledge bases accessible to unauthenticated users, use the User Criteria Diagnostics feature. For more information, see Configure access to knowledge bases for unauthenticated users.

When a user has contribute access to a knowledge base, the *glide.knowman.apply_article_read_criteria* property is evaluated to determine contribute access to an article in the knowledge base, as explained in the following table.

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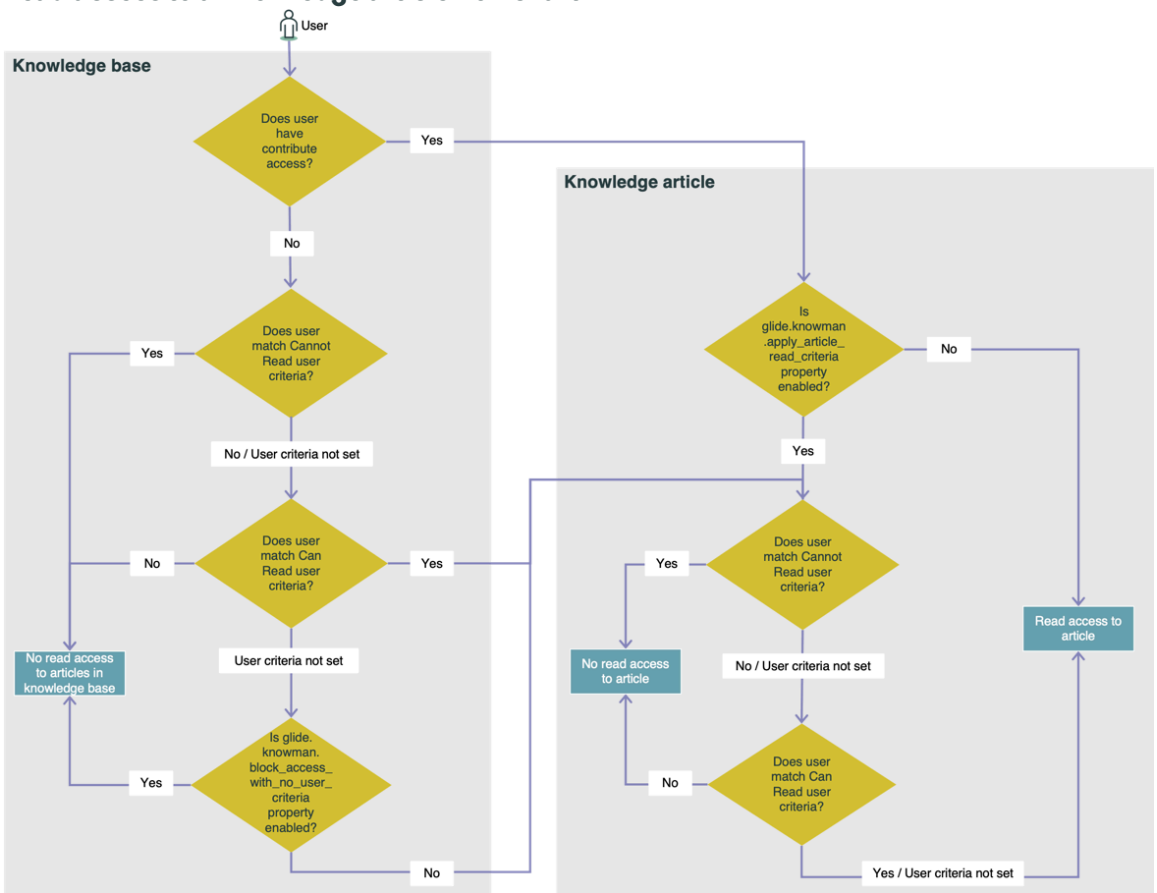
Contribute access to an article when a user has contribute access to a knowledge base

Property value	Result
true	Article-level read access overrides the default contribute permission granted by contribute access at the knowledge base level.
false	Contribute access at the knowledge base level takes precedence over article-level user criteria and the user has contribute access to every article in the knowledge base.

Determining read access to articles in a knowledge base using user criteria

The following flowchart illustrates the user criteria checks that determine read access to a knowledge article.

Read access to a knowledge article flowchart



When either Cannot Read isn't set or a user doesn't match Cannot Read and additionally Can Read is not set, the *glide.knowman.block_access_with_no_user_criteria* property value is further evaluated to determine read access, as explained in the following table.

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Read access when user criteria for a knowledge base aren't set

Property value	Result
true	No user has read access except users with special knowledge privileges and users who have contribute access to the knowledge base.
false	All users, including unauthenticated users, have read access to the knowledge base and the article-level user criteria are further evaluated. To check knowledge bases accessible to unauthenticated users, use the User Criteria Diagnostics feature. For more information, see Configure access to knowledge bases for unauthenticated users.

When a user has contribute access to a knowledge base, the *glide.knowman.apply_article_read_criteria* property is evaluated to determine read access to an article in the knowledge base, as explained in the following table.

Read access to an article when a user has contribute access to a knowledge base

Property value	Result
true	Article-level read access overrides the default read permission granted by contribute access at the knowledge base level.
false	Contribute access at the knowledge base level takes precedence over article-level user criteria and the user has read access to every article in the knowledge base.

Important:
After you add user criteria, you can use the user criteria diagnostics feature to verify the access that users have to a knowledge base or a knowledge article. For more information, see User criteria diagnostics for Knowledge Management.

Related topics

- Knowledge Management properties
- Configuration tasks for knowledge managers
- Knowledge Management FAQ
- Create user criteria for controlling access to knowledge bases and articles

Create user criteria for controlling access to knowledge bases and articles

Control access to knowledge bases and articles by creating user criteria.

Before you begin

Role required: user_criteria_admin

Note:
To create a user criteria record from the Knowledge module, you must have the user_criteria_admin role in addition to the knowledge role. For more information about access, see Managing access to knowledge bases and knowledge articles.

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Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **User Criteria**.
2. Click **New**.
3. On the User Criteria form, fill in the fields.

User Criteria form

Field	Description
Name	Unique name of the user criteria.
Users	Users that must match the user criteria.
Groups	Groups that must match the user criteria.
Roles	Roles to match the user criteria. **Note:** ○ Because the evaluation of a role is cached in the session, any change in the role requires you to log in again. ○ User criteria are not applicable for elevated privilege roles.
Advanced	Option to display or hide the advanced option that includes the **Script** field on the User Criteria form.
Script	Script to define any additional user criteria that returns true or false. This field is available when the **Advanced** option is selected on the User Criteria form. **Note:** ○ A script is evaluated in the scope that the user criteria are created in. ○ The evaluation of a script is cached in the session, so any change in the evaluation requires you to log in again. If a scripted user criterion is defined for a knowledge base, user access to knowledge bases is evaluated once per session. If the script results in changes after a session cache is built, the result takes effect in the next session. ○ Don't use `gs.getUser()` or other session APIs because they cause conflicts when used in diagnostic tools. Use the predefined `user_id` variable available in the script to get the user ID of the user being used to evaluate the script. ○ Scripts are evaluated dynamically. Therefore, including scripts in a user criteria can impact performance.
Active	Option to activate or deactivate the user criteria.
Companies	Companies that the user record must match.
Locations	Locations that the user record must match.
Departments	Departments that the user record must match.
Match All	Option to determine whether all elements from each populated user criteria field must match. If selected, only users who match all user criteria are given access. If cleared, the user must meet one or more of the set user criteria to be given access.

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Field	Description
	By default, this check box is cleared so that any condition met provides a match. For example, consider a user criteria record for the following: ○ Locations A or B ○ Company C or D With **Match All** selected, only users that meet all of these conditions are matched. For example, a user with a location A and a company C. If **Match All** isn't selected, users meeting any of these conditions are matched. For example, a user with a location B. **Note:** If you select **Match All**, ensure that you don't create contradictory conditions that can never be met. For example, if all users in location A work for company G, the conditions in this example can never be met.

4. Click **Submit**.

Related topics

Control access at the knowledge base level through user criteria

Control access at the knowledge article level through user criteria

Control access at the knowledge base level through user criteria

You specify user criteria for a knowledge base to control which users are granted access to read and contribute knowledge articles to that knowledge base.

Before you begin

Role required: knowledge_manager, knowledge_admin, or admin

Note:
To administer a scoped knowledge base, you must have the application-specific admin role in addition to the knowledge_admin or admin role. For more information, see Scoped knowledge bases.

About this task

You can assign user criteria to control read or contribute access. For example, you could enable all users in your Support department to have contribute access to a knowledge base by creating a user criteria record with the required department set to Support, and then including the user criteria record in the Can Contribute user criteria. For more information, see Managing access to knowledge bases and knowledge articles. Try to use only user criteria, which were introduced in Knowledge Management v3, to control access to knowledge bases. Roles were used for this purpose in Knowledge Management v2.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

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Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge Bases**.
2. Click the link to knowledge base you manage.
3. Add user criteria to the knowledge base.

   a. Depending on the user criteria you want to set, select one or more of the relevant related lists.

Related list	Description
Can Read	Users can read knowledge articles in the knowledge base.
Cannot Read	Users can't read knowledge articles in the knowledge base.
Can Contribute	Users can create, modify, and retire knowledge articles in a knowledge base. Contribute access to a knowledge base also provides read access to all articles in the knowledge base.
Cannot Contribute	Users can't create, modify, retire, or read knowledge articles in the knowledge base.

   Note:
   If the related lists aren't visible, configure the Knowledge form to display them. For more information, see Add a related list to a form.

   b. In the selected related list, add the required user criteria.

   - As a user with the admin role, to add a new user criteria record, click **New**, specify the required fields, and then click **Submit**.
   - As a user with the knowledge_manager, knowledge_admin, or admin role, to add an existing user criteria record, click **Edit**, move the required user criteria from the **Collection** column to the **Knowledge** column, and then click **Save**.

4. On the Knowledge Base form, click **Update**.

What to do next

After you add user criteria, you can use the user criteria diagnostics feature to verify the access that users have to a knowledge base or a knowledge article. For more information, see User criteria diagnostics for Knowledge Management.

Important:
After making user criteria additions or changes, you may need to log out and log back in to clear the prior configuration.

Related topics

Create a knowledge base

Create user criteria for controlling access to knowledge bases and articles

Control access at the knowledge article level through user criteria

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Control access at the knowledge article level through user criteria

You specify user criteria for a knowledge article to control which users are granted read access to the knowledge article.

Before you begin

Role required: knowledge_manager, knowledge_admin

Note:
You may need to configure the form to add **Can Read** and **Cannot Read** fields.

About this task

Try to use only user criteria, which were introduced in Knowledge Management v3, to control access to knowledge articles. Roles were used for this purpose in Knowledge Management v2. For more information, see Managing access to knowledge bases and knowledge articles.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

As a knowledge base owner or a manager if the *glide.knowman.apply_article_read_criteria* property is enabled and you don't satisfy the article level user criteria, then the article will not be visible in portal search. To be able to view the article in the portal search, you must configure article level user criteria accordingly.

If you are a part of the ownership group associated with the article then you can see the article in portal search, irrespective of the article level user criteria.

Procedure

1. Open a knowledge article.

   Note:
   You can update only the latest version of the knowledge article.

2. Assign access based on user criteria.

   Note:
   If the **Can Read** and **Cannot Read** fields aren't visible, configure the Knowledge form to display them. For more information, see Configuring the form layout.

3. On the Knowledge form, click **Update**, and then click **Publish** to apply the changes.

What to do next

After you add user criteria, you can use the user criteria diagnostics feature to verify the access users have to a knowledge base or a knowledge article. For more information, see User criteria diagnostics for Knowledge Management.

Important:
After making user criteria additions or changes, you may need to log out and log back in to clear the prior configuration.

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Related topics

Create user criteria for controlling access to knowledge bases and articles

Control access at the knowledge base level through user criteria

Configure Knowledge Management - Add-in for Microsoft Word

Configure the Knowledge Management - Add-in for Microsoft Word to author and access knowledge articles in Microsoft Word.

Before you begin

Complete the following tasks to use the Knowledge Management - Add-in for Microsoft Word.

Procedure

1. Activate Knowledge Management - Add-in for Microsoft Word.
2. Deploy Knowledge Management - Add-in for Microsoft Word.
3. Configure the security for Knowledge Management add-in for Microsoft Word.
4. **Optional:** Enable downloading of the source Microsoft Word document for a knowledge article.

Related topics

Authoring a knowledge article in Microsoft Word

Activate Knowledge Management - Add-in for Microsoft Word

Activate the Knowledge Management - Add-in for Microsoft Word plugin (com.snc.knowledge.ms_word) if you have the admin role. This plugin activates related plugins if they are not already installed.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Deploy Knowledge Management - Add-in for Microsoft Word

Deploy the Knowledge Management - Add-in for Microsoft Word for authoring knowledge articles from within the Microsoft Word.

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Before you begin

In addition to having one of the following roles on the ServiceNow instance, you must be an Office365 administrator to deploy the Knowledge Management - Add-in for Microsoft Word.

Role required: admin, sn_outlook_addin.outlook_addin_setup

Procedure

1. Navigate to **All** > **ServiceNow Add-Ins for Office** > **Office Add-In-Manifests**.
2. In the Add-In Name column, click **Knowledge Management**.
3. Click **Download Manifest** to download the add-in manifest file to your desktop.

> **Note:**
> For releases prior to the Paris Patch 3 release, the downloaded manifest reports validation errors in Office 365. For more information about resolving such errors, see the Enabling Knowledge MS-Word add-in fails validation [KB0858357] article in the HI knowledge base.

4. Deploy the Knowledge Management- Add-in for Microsoft Word.
   For more information, see Deploy add-ins in the admin center.

Related topics

Import a Word document to a knowledge base

Import a Word document to a knowledge base using Knowledge Management v3

Configure the security for Knowledge Management add-in for Microsoft Word

Use the *sn_km_word.glide.knowman.word.xframe* property to specify all the parent domains in the Microsoft Word Online application in which Knowledge Management - Add-in for Microsoft Word is embedded.

Before you begin

Ensure that you have activated the Knowledge Management - Add-in for Microsoft Word plugin and the application scope is set to Knowledge Management - Add-in for Microsoft Word.
Role required: admin

About this task

The domains you specify for the Microsoft Word application in the *sn_km_word.glide.knowman.word.xframe* property are used for setting the x-frame-options and content-security-policy headers. These settings securely display the Knowledge Management add-in for Microsoft Word in the online version of Microsoft Word documents.

> **Note:**
> If you don't set the *sn_km_word.glide.knowman.word.xframe* correctly, the Knowledge Management - Add-in for Microsoft Word fails to load in the Word document. For more information about resolving such errors, see the Knowledge Word Office Manifest fails validation [KB0860916] article in the HI knowledge base.

Procedure

1. In the navigation filter, enter `sys_properties.list`.
2. Search for the *sn_km_word.glide.knowman.word.xframe* property.
3. In the **Value** field, enter a domain.
   For multiple entries, separate the domains with commas.

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For example, to enter the Microsoft SharePoint and Microsoft OneDrive domains: `https://sitename.sharepoint.com,https://sitename-my.sharepoint.com,https://word-edit.officeapps.live.com`

4. Click **Update**.

Enable downloading of the source Microsoft Word document for a knowledge article

Set the *sn_km_word.glide.knowman.enable_document_download* property to enable users to download the source Microsoft Word document of a knowledge article from the knowledge article view page in a portal or workspace.

Before you begin
Role required: admin

About this task
When a knowledge article is created using Microsoft Word, users accessing the knowledge article view page in a portal or workspace can download the source Microsoft Word document when the *sn_km_word.glide.knowman.enable_document_download* property is set to true.

Note:
After you enable the *sn_km_word.glide.knowman.enable_document_download* property, the Microsoft Word source document of a knowledge article also might appear in search results as an attachment to the article. Therefore, enabling this property might affect the search relevancy of a knowledge article.

Procedure
1. In the navigation filter, enter `sys_properties.list`.
2. Search for the *sn_km_word.glide.knowman.enable_document_download* property.
3. In the **Value** field, enter `true`.
4. Click **Update**.

User criteria diagnostics for Knowledge Management

Manage user access to a knowledge base or an article using user criteria diagnostics. Understand what access users have to a knowledge base or an article and determine which user criteria define those permissions.

User access to a knowledge base or an article can be restricted based on:

- Domain separation
- Access control list (ACL) rules
- Knowledge workflows
- User criteria set for a knowledge base or an article

This feature considers domain separation and user criteria to determine the user access to knowledge bases and articles.

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Activation information

The user criteria diagnostics feature is activated with the Knowledge Management v3 plugin (com.snc.knowledge3). For more information, see Activate a plugin.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Diagnose user access to a knowledge base

Identify which users have access to a knowledge base and what enables that access.

Before you begin

Role required: knowledge_manager, knowledge_admin, or admin

Procedure

1. Access the **User Criteria Diagnostics** landing page using one of these options:

To access	Navigate to
Using the application navigator	**Knowledge** > **Administration** > **User Criteria Diagnostics**
From a knowledge base	**a.** **Knowledge** > **Administration** > **Knowledge Bases**. **b.** Select the knowledge base to diagnose user access. **c.** In the **Related Links** section, click **Run User Criteria Diagnostics**. The **User Criteria Diagnostics** landing page appears with the **Select knowledge base** field pre-populated.

2. To diagnose user access:

   a. In the **Select user** field, select a user.

   b. From the **Select record type** choice list, select **Knowledge base**.

   c. In the **Select knowledge base** field, select a knowledge base.
   Every time you select a different user, record type, or knowledge base, the page refreshes and displays data for the selected user.

   d. Click **Diagnose**.
   The page displays these details:

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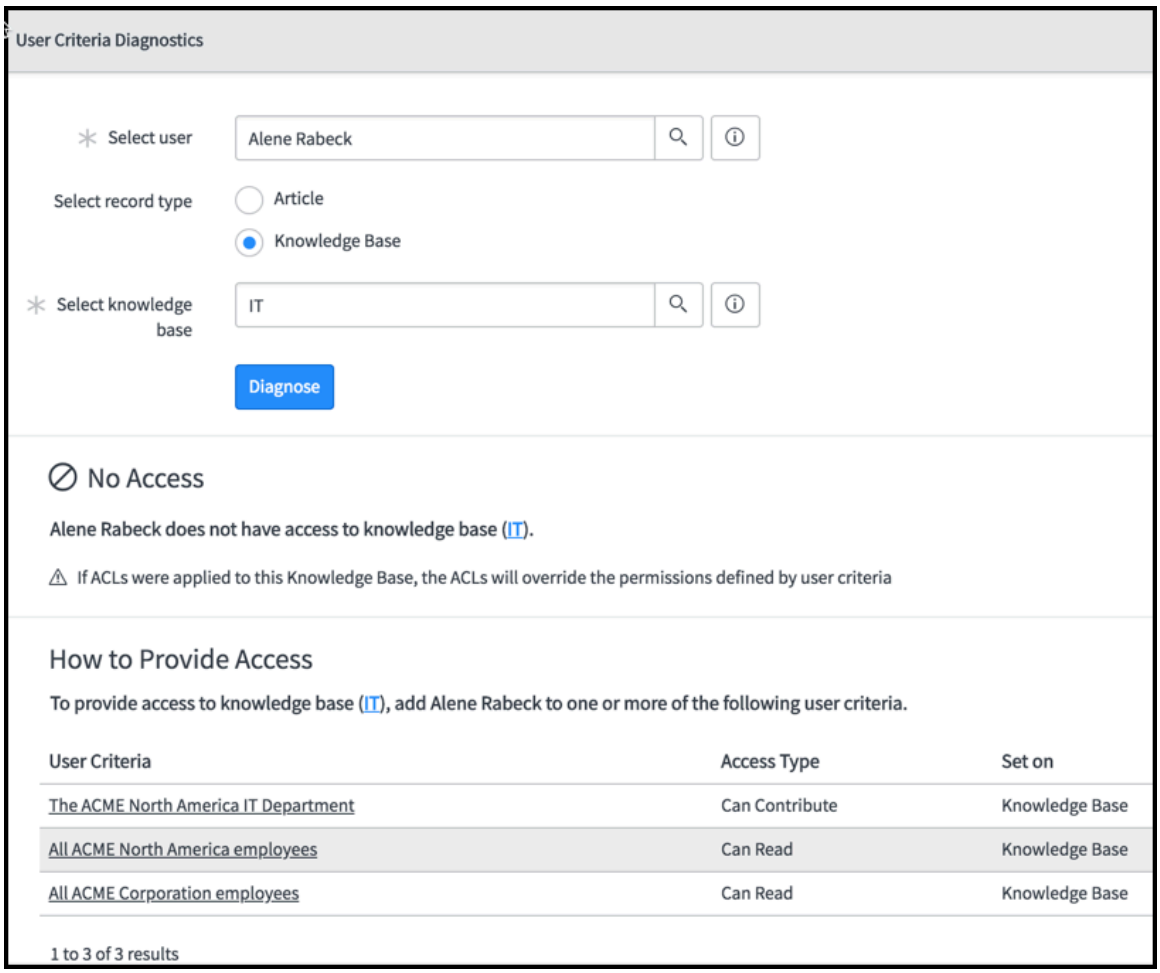
- Whether the user has access to the knowledge base based on their domain. Only system administrators can view domain information and change the domain to give access to a user.
- Which user criteria provides read or read and contribute access for this user to the knowledge base and what type of user criteria definition enables this access.
- Whether a role that the user has (knowledge_manager, knowledge_admin, or owner of the knowledge base) enables this access.
- For a user with no access to this knowledge base, which user criteria may be modified to grant the access.

Example:
The following image shows an example of a diagnosis where the user Alene Reback does not have access to the IT knowledge base.

Alena can get access to the knowledge base if:

- Alena is added to one of the existing user criteria defined in the knowledge base.
- Alena is added to a new user criteria that is defined and added to the knowledge base.

Click the IT knowledge base link and provide the access by adding Alena to a user criteria for this knowledge base.



Diagnose user access to an article

Identify which users have access to an article and what enables that access.

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Before you begin

Role required: knowledge_manager, knowledge_admin, or admin

Procedure

1. Access the **User Criteria Diagnostics** landing page using one of these options:

To access	Navigate to
Using the application navigator	**Knowledge** > **Administration** > **User Criteria Diagnostics**.
From an article	**a.** **Knowledge** > **Administration** > **Knowledge Bases**. **b.** Select the knowledge base that has the article to diagnose for user access. **c.** In the **Knowledge** related list, select the article. **d.** In the **Related Links** section, click **Run User Criteria Diagnostics**. The **User Criteria Diagnostics** landing page appears with the **Select article** field pre-populated.

2. To diagnose user access:

   a. In the **Select user** field, select a user.

   b. From the **Select record type** choice list, select **Article**.

   c. In the **Select article** field, select an article.
   Every time you select a different user, record type, or knowledge base, the page refreshes and displays data for the selected user.

   d. Click **Diagnose**.
   The page displays these details:

   - Whether or not the user has access to the knowledge article based on their domain. Only system administrators can view domain information and change the domain to give access to a user.
   - Which user criteria provides read or read and contribute access for this user to the article and what type of user criteria definition enables this access.
   - Whether a role of the user has (knowledge_manager, knowledge_admin, or owner of the knowledge base) enables this access.
   - For a user with no access to this article, which user criteria may be modified to grant the access.

   Note:
   Members of an ownership group are automatically given **Can Contribute** access to knowledge articles that their ownership group is associated with.

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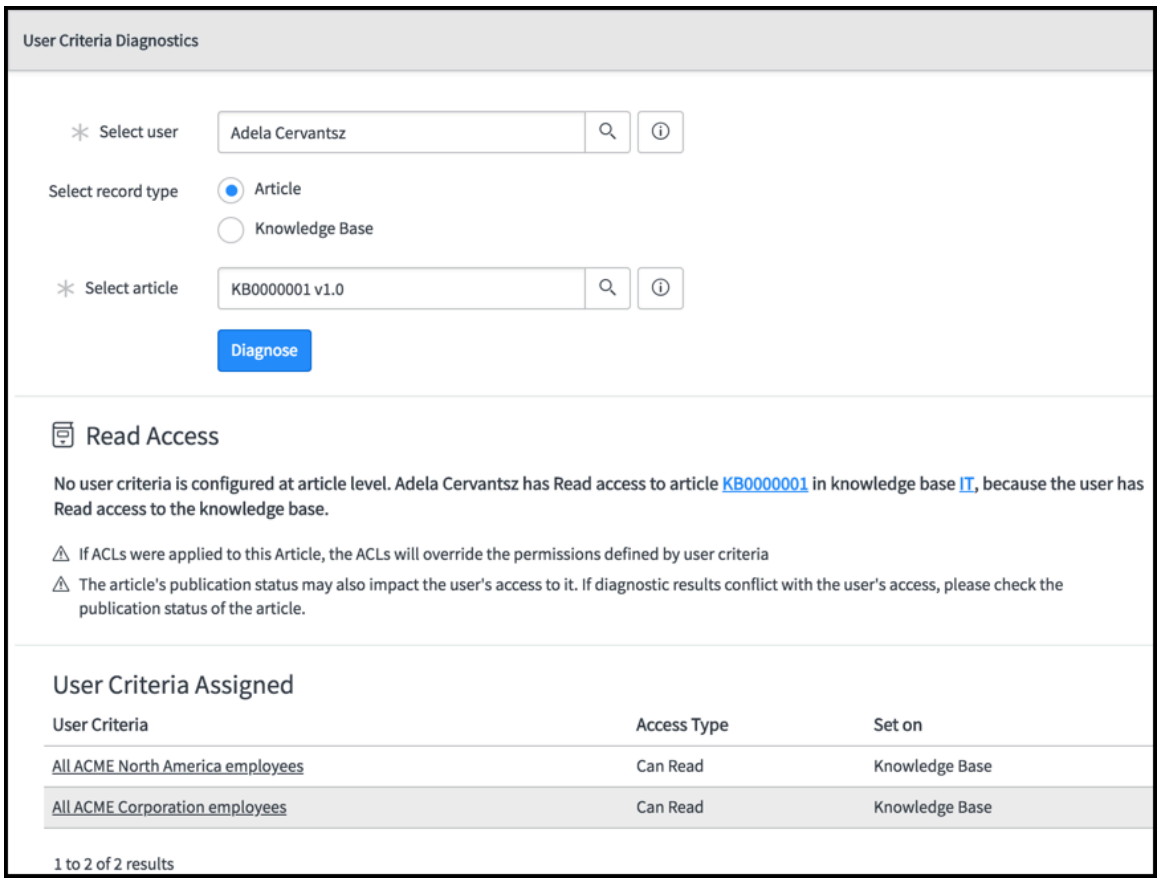
Example:
The following image shows an example of a diagnosis where the user Adela Cervantsz has read access to the KB article, KB0000001 v5.0, in the IT knowledge base because Adela belongs to one of the **Can Read** user criteria defined in the knowledge base.



Configure access to knowledge bases for unauthenticated users

Identify knowledge bases accessible to unauthenticated users based on the user criteria and the system property settings.

Before you begin

You must activate the Knowledge Management v3 plugin (com.snc.knowledge3).

Role required: knowledge_manager, knowledge_admin, or admin

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **User Criteria Diagnostics**.
2. Click the **View knowledge bases accessible to unauthenticated users** related link.
3. Review knowledge bases accessible to unauthenticated users.

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4. **Optional:** Restrict unauthenticated users to access a knowledge base by selecting the knowledge base and configuring its access settings.
   - Use user criteria to determine access to the knowledge base for unauthenticated users.

     (Optional) For more information, see Managing access to knowledge bases and knowledge articles.

   - If no user criteria is specified for the knowledge base, as an administrator, you can set the value of the *glide.knowman.block_access_with_no_user_criteria* system property to **true**.

     For more information, see Knowledge Management properties.

Collect knowledge usage metrics

Capture metrics such as article views, page views, and portal searches to track aggregated knowledge usage by users.

Before you begin

Set the duration over which the metrics are aggregated through the *glide.knowman.usage_metrics_duration* property. For more information, see Other knowledge properties. By default, the property value is set to 60 minutes.

You must activate the Knowledge Management v3 plugin (com.snc.knowledge3).

Role required: admin

About this task

Monitor the knowledge usage metrics to improve the overall effectiveness of the knowledge usage across the portals.

Procedure

1. Navigate to **All** > **System Definition** > **Scheduled Jobs**.
2. Search and open the **Knowledge Usage Metrics** scheduled job.
3. In the **Knowledge Usage Metrics** form, select the **Active** check box to activate the scheduled job.
   The scheduled job is inactive by default.
4. In the **Run** field, select **Periodically** as the frequency of the scheduled job.
   See the Scheduled jobs topic for other frequency options.
5. In the **Repeat Interval** field, enter the repeated time interval at which the scheduled job should run.
   By default, the duration is set to 60 minutes.
6. Click **Update**.

What to do next

Modify the data retention policy for knowledge usage metrics to remove unwanted and older data from the knowledge usage metrics [kb_usage_metrics] table.

Modify the data retention policy for knowledge usage metrics

Remove unwanted and older data from the knowledge usage metrics [kb_usage_metrics] table through the data retention policy.

Before you begin

Role required: maint and admin

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About this task
Activating the data retention policy for the kb_usage_metrics table deletes records that you no longer need.

Procedure
1. Navigate to **All** > **System Maintenance** > **Table Cleanup**.
2. In the **Tablename** column, search for `kb_usage_metrics` and click the **kb_usage_metrics** link.
3. On the Auto Flush form, activate the kb_usage_metrics table cleanup job by selecting the **Active** check box.
4. **Optional:** Adjust the duration the system waits before deleting the records by modifying the value in the **Age in seconds** field.
   By default, the **Age in seconds** field value is set to 2,592,000 seconds (equivalent to 30 days).
   For more information, see Autoflush form.
5. Click **Update**.

Configure knowledge article templates

Configure knowledge article templates to customize and display content as per your requirements.

Create an article template and use it to create a knowledge article

Create new article templates in addition to the pre-defined templates. Add new fields based on how you want to customize and display your content.

Before you begin
You must activate following plugins:

- Knowledge Management Advanced (com.snc.knowledge_advanced)
- Knowledge Management Advanced Installer (com.snc.knowledge_advanced.installer)

Role required: admin, knowledge_admin or admin, personalize_form

About this task
For each new article template, a child table of the Knowledge [kb_knowledge] table is created. When you add a new field to the template, a new column is added to that table created for the template.

Procedure
1. Navigate to **All** > **Knowledge** > **Administration** > **Article Templates**, and click **New**.
2. On the Article Template form, fill in fields.

Article Template form

Field	Description
Name	Name for the article template. The name can contain only lowercase, alphanumeric ASCII characters and underscores (_).
Description	Description for the article template.

Note:
The **Active** check box is selected by default making the template available for use.

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3. Right-click the form header and click **Save**.
4. In the Article Templates Field related list, add fields to the template.
   a. Click **New**.
   b. On the Article Template Field form, fill in the fields.

Article Template Field form

Name	Description
Field Name	Title to display on the template form.
Field Type	Available field types: ▪ HTML ▪ String ▪ Integer ▪ Date ▪ Date and time
Order	Position of the field in the article page view and the article edit view.
Article Template	(Read-only) Name of the article template associated with this field.
Template Table	(Read-only) Name of the table for this template.
Template Field	(Read-only) Name of the template column associated with this field.
Mandatory	Option to make this field as mandatory. When selected, this field is required to be filled.
Expand/Collapse	Defines whether the template field displays as collapsed or expanded by default.
Active	Option to display the field on the template.
Heading style	CSS formats applied to the template header. For example, to display the background of the template header in red, with a 24-px font size, Arial font family, and white text color, enter the following code: `background-color:red; font-size:24px; font-family:Arial; color:white;`
Field style	CSS formats applied to the template fields. Any CSS format applied at the field level is automatically applied to the header if not already specified in the **Heading style** field. For example, to display the 300px page width, 25px solid green border, 25px padding, and 25px page margin, enter the following code: `width:300px;`

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Name	Description
	`border:25px solid green; padding:25px; margin:25px;`
Preview text	Preview text displayed on the article template selector. Empty value will display random text.

c. Click **Submit**.

The field is added to the template.

5. **Optional:** In the **SEO Description Tag** field, search for and add article template field name. The content in this field is used as meta description tags to search for articles created using this article template.
6. Configure the Knowledge form to display the fields that you added to the template.
   a. Navigate to **Knowledge** > **Articles** > **Create New**.
   b. Select a knowledge base, and then the newly added article template.
   c. Right-click the header and select **Configure** > **Form Layout**.
   d. Select and move the fields you added to the article template from the **Available** column to the **Selected** column.
   e. Click the up or down icon to arrange the fields in the order in which you want them to appear in the Knowledge form.
   f. Click **Save**.

Note:
Authors who started a session before a template was created or activated will see the newly added template upon their next login.

What to do next

If you want to search for duplicate articles when creating an article from a new template, you must configure the article template table for contextual search. On the Table Configuration form, the **Search context** field must be set to **Knowledge ML Search**. For more information, see Configure table for a contextual search.

Configure the preview text setting for a standard article template

Configure the preview text setting to customize the default preview text for a standard article template.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Script Includes**.
2. On the Script Includes page, in the **Name** field, enter `ArticleTemplateUtilSNC`.
3. Open the ArticleTemplateUtilSNC record.
4. On the ArticleTemplateUtilSNC page, copy the following code from the **Script** field.

```
setPreviewTextForStandardArticle: function(){
            return null;
    },
```

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5. On the Script Includes page, in the **Name** field, enter `ArticleTemplateUtil`.
6. Open the ArticleTemplateUtil record.
7. On the ArticleTemplateUtil page, modify the code in the **Script** field by pasting the copied code as shown.

```
var ArticleTemplateUtil = Class.create();
                ArticleTemplateUtil.prototype =
 Object.extendsObject(ArticleTemplateUtilSNC,{
                type: 'ArticleTemplateUtil',
     setPreviewTextForStandardArticle: function(){
                        return null;
                },
                });
```

8. In the **Script** field, remove `null` and enter a preview text.
9. Select **Update**.

Result
The modified preview text displayed on the standard article template selector.

Example:
The following code is modified to show custom preview text. You can also include HTML tags to modify the appearance of preview text.

```
var ArticleTemplateUtil = Class.create();
                ArticleTemplateUtil.prototype =
 Object.extendsObject(ArticleTemplateUtilSNC,{
                type: 'ArticleTemplateUtil',
     setPreviewTextForStandardArticle: function(){
                        return 'Demo for standard article';
                },
                });
```

Restrict access to fields in an article template

Use encryption modules to set field-level security in article templates and display the fields based on role permissions.

Before you begin
Role required: security_admin

Note:
Use Knowledge blocks to restrict the content within the same field. For more information, see Knowledge blocks.

Procedure
1. Create an encryption module for the article template field to be encrypted.
   See Create a cryptographic module for details.
2. Associate the article template field with the encryption module.
   See Encrypting fields and attachments for details.

   a. Navigate to **System Security** > **Field Encryption** > **Encryption Field Configurations** and click **New**.

   b. On the form, fill in the fields.

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Encrypted Field Configuration form

Field	Description
Table	Table associated with the article template fields. For example, for the How to article template fields, select **How To [kb_template_how_to]**.
Column	Article template field to be encrypted. Only String, Date, Date/Time, and URL fields are supported. ▪ **String and URL fields**: You can add a new encryption configuration to either a parent table or a child table. ▪ **Date and Date/Time fields**: You can create encrypted field configurations to encrypt existing Date and Date/Time fields. You can add a new encryption configuration to a parent table only. You cannot add a new encryption configuration to a child table. **Note:** Depending on the number of records affected by the Date and Date/Time fields you are encrypting, it may take up to a few minutes to create the encryption configuration. Make sure that you create the encryption configuration for Date and Date/Time fields when transaction volume on the instance is low.
Encryption module	Encryption module you created for the article template field.
Method	▪ **Single Encryption Module**: Enables data to be encrypted with a single encryption module only. The field is encrypted with the encryption module defined in the **Encryption module** field. Users that do not have the encryption module cannot view or update field values. ▪ **Multiple Encryption Module**: Enables data to be encrypted with more than one encryption module. The field is encrypted by the encryption context of the first user to enter data. If the user has multiple encryption modules, the context defined in the encryption module selector is used. Because the encryption module is set on a per record basis, fields in a list can have different encryption modules. However, within a single record, the field can be encrypted by only one module. **Note:** Mass encryption is not available when using the **Multiple Encryption module** method. After a configuration is created using the single encryption module method, you can update the record to use multiple encryption modules. However, you cannot change a field using multiple encryption modules to use a single encryption module.

c. Click **Submit**.

3. Define role permissions for the encrypted field.

a. Navigate to **User Administration** > **Roles**.

b. In the **Name** column, click the link to the role you want to allow to view this field.

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c. In the **Encrypted context** field, search for and select the name of the encryption context for the article template field to apply for the selected role.

Note:
You may need to configure the Role form to add the **Encrypted context** field.

d. Click **Update**.

Result
Depending on their role permissions defined for the encrypted field, users can view the field on the article template.

Related topics

Field Encryption

Generate SEO information for articles using article templates

Improve the searchability of knowledge articles by using the content in an article template field to generate SEO tags for articles created using that template. Search Engine Optimization (SEO) optimise searches in public search engine.

Before you begin
Role required: knowledge_admin or admin

About this task

Note:
If you are using the **Standard** article template, the content of the Text field is used to generate the tags.

You can define the number of characters to be used as tags in the *glide.knowman.seo.pages.meta_description.length* system property.

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Article Templates**.
2. Select an article template.
3. In the **SEO Description Tag** field, search and select an article template field.
   The content in this field is used as meta description tags to search for articles created using this article template.
4. Click **Update**.

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Note:
You can change which article template field is used for generating SEO. Changes are applied only to knowledge articles created or updated after the change was made. To apply the update to all existing published articles created using this template, run the *Populate Meta Description on KB Articles* fix script.

Article template page

Integration with external knowledge sources

Use the external content integration feature to integrate content from various external sources and enable unified knowledge search results.

Users store and manage knowledge using various external sources and search each source separately for relevant results. External content integration enables acquiring and searching all WebDAV-compliant source content from a single location. This provides users with a seamless search experience across multiple knowledge sources and drives more usage to the platform.

Using this feature, knowledge administrators can define the external content to be imported into a knowledge base and periodically run a job to import the content. Knowledge users have a seamless user experience searching for relevant content across multiple knowledge sources.

Activate the External Content Integration plugin

The External Content Integration feature is activated with the Knowledge Management - External Content Integration plugin (com.snc.knowledge.external_integration).

Before you begin
Role required: admin
The Knowledge Management - External Content Integration plugin is not active by default.

The following plugins are automatically activated when the Knowledge Management - External Content Integration plugin is activated:

- Centralized Connection and Credentials plugin (com.snc.core.automation.connection_credential)
- Knowledge Management V3 plugin (com.snc.knowledge3)
- Knowledge Management Advanced Installer plugin (com.snc.knowledge_advanced.installer)

The **Knowledge** > **Administration** module displays the **External Knowledge Sources** and **External Knowledge Jobs** sub-modules when the Knowledge Management - External Content Integration plugin is activated.

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Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Define an external knowledge source

Before you import content, create and configure the connection between the a Web Distributed Authoring and Versioning (WebDAV) - compliant external knowledge source and the ServiceNow knowledge base into which you want to import content. Define import parameters for the external knowledge source.

Before you begin

Define Basic authentication credentials and Getting started with connections to the external source.

Caution:
This feature expects that the external source endpoint is a publicly accessible endpoint. Mid-server configuration is not supported.

Role required: admin

About this task

Only basic authentication is supported for the external content integration feature.

Procedure

1. Define the connection from the external source and the target knowledge base.

   a. Navigate to **Knowledge** > **Administration** > **External Knowledge Sources**.

   b. Click **New**.

   c. Fill in the following fields:

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Field	Instruction
Name	Enter unique name for the external source.
Target Knowledge Base	Select the knowledge base in which you want to create articles for the external content.
Connection Alias	Select the connection alias to connect to the external source.

d. Right-click the form header and click **Save**.

2. Set import parameters for the external content.

a. In the **Parameter** related list, click **New**.

b. In the **Name** field, select the name of the parameter from the drop-down list.

c. In the **Value** field, enter the desired value for the parameter.
The table below lists the parameters and the corresponding values that can be set for the external source.

Parameter Name	Instructions
Maximum size limit (in MB) for this source	Set maximum allowed content size for this source. Once this limit is reached, no further content is processed. Default value is 400 MB.
Maximum size limit (in KB) per file/content in this source	Set maximum allowed size limit for each file from this external source. If a file exceeds this limit, that file is not processed. Default value is 4000 KB.
Open search results in the original source system	Set value to **true** to open search results in the external source system. Set value to **false** to open search results in the target knowledge base. Default value is set to **false**.
Include folders with names that match these regex patterns	Enter a comma-separated list of regular expressions for folder names that need to be included from this external source.
Exclude folders with names that match these regex patterns	Enter a comma-separated list of regular expressions for folder names that need to be excluded from this external source.
Create articles when file names match these regex patterns	Enter a comma-separated list of regular expressions for file names that need to be included to create articles.
Do not create articles when file names match these regex patterns	Enter a comma-separated list of regular expressions for file names that need to be excluded to create articles.

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Parameter Name	Instructions
Maximum retry limit	Maximum number of retries to send request to the external source.

d. Click **Submit**.

Import content from an external knowledge source

Run an import job manually or set up a schedule to process the integrated external content.

Before you begin
Role required: admin or knowledge_admin

About this task
Each external source is associated with two handlers: the **Acquire handler** and the **Process handler**, for running the import job. The acquire handler uses a WebDAV client to acquire external content to create articles. You can customize the process handler to assign categories to articles or populate additional metadata for the knowledge articles.

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **External Knowledge Sources**.
2. Select the external knowledge source from which you would like to import content.
3. In the **Handler**tab, set a schedule to run the acquire and process handlers.
4. In the Related Links section, click **Run Scheduled Job**.
5. To view all jobs scheduled to run to import content for the external source, click the **Jobs**. You can open the most recent job to monitor the status.

Result
For each file in the external content source, a blank knowledge article is created and the external file is added as an attachment to the article. The short description of the article is derived from the file name of the external content source.

Note:
If the externally imported content is infected, a notification about each infected file is sent to the users with the knowledge_admin role and Knowledge Base owners. The notified users can then take required actions on the infected files.

Open knowledge search results in source system

While search results are aggregated within your instance, your users can also utilize features available in the source system (being able to edit in Microsoft SharePoint, for example). To open knowledge search results in a host system, configure the URL to the external source system to open articles from search results directly in the source system.

Before you begin
Make sure the **Open search results in the original source system** import parameter for the external knowledge source is set to **true**.

You can follow this procedure when you have a file as a knowledge article in Microsoft SharePoint, for example.

Role required: admin

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Procedure

1. Navigate to **All** > **System Definition** > **Script Includes**.
2. Open *KBWebDAVContentHandler*.
3. In the **Script** window, override the function *getFileURL* using script shown below.
   The *getFileURL* function is shown below.

```
//fileObj.getName() - Returns name of the file
     //fileObj.getPath() - Returns path to the file from root
folder
     //fileObj.getAbsolutePath() - Returns Absolute WebDAV URL
of the file
     //fileObj.getCreationDate() - Returns creation date of
the file as GlideDateTime object
     //fileObj.getModifiedDate() - Returns last modified date
of the file as GlideDateTime object
     //fileObj.getContentType() - Returns content type of the
file as GlideDateTime object
     //fileObj.getSize() - Returns size of the file
```

```
getFileURL: function(fileObj) {
     //write your logic here
},
```

4. Click **Update**.

Sample configuration for integrating external knowledge content

You can integrate content from multiple external sources so your users can acquire and search knowledge from a single location. Use this sample configuration to create a connection to your external account, configure external knowledge sources, and import content to enable search results for unified content.

Requirements for integrating external content

Make sure the Knowledge Management -- External Content Integration plugin (com.snc.knowledge.external_integration) is enabled and your external source is WebDAV-compliant.

Integrate external knowledge sources into the Knowledge Management application

Create authentication credentials and a connection alias to connect your external knowledge source to the ServiceNow Knowledge Management application. Define import parameters for your external source to import integrated content.

Before you begin

Role required: admin

Procedure

1. Enable basic authentication on your external account.

   Note:
   Your external account password is not affected when you enable basic authentication.

2. Create the connection to your external account using the basic authentication credentials.

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a. Navigate to **Connections and Credentials** > **Credentials**.

b. Click **New**.

c. Click **Basic Auth Credentials**.
Fill in the following fields:

Field	Description
Name	Name for the credential. For example, `Demo_Auth`.
User name	The external account user name created for basic authentication.
Password	The external account password for the user name.

d. Click **Submit**.

3. Create an HTTP connection to your external account.

a. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.

b. Select **New**.

c. In the **Name** field, enter the name of the connection alias.

Example
For example, `Demo_Account`.

d. Right-click the form header and click **Save**.

e. In the **Connections** related list, click **New**.
Fill in the following fields:

Field	Description
Name	Name for the HTTP connection. For example, `Demo_Connection`.
Credential	Credential created to connect to the external account. For example, `Demo_Auth`.
Connection URL	WebDAV URL to your external account. This is the WebDAV end point of your external account. **Note:** You can also import contents from a specific folder by appending the folder path to the URL. For example, https://<web link to your extermal_account>/KnowledgeIT.

f. Click **Submit**.

4. Configure the external knowledge source for importing content.

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a. Navigate to **Knowledge** > **Administration** > **External Knowledge Sources**.

b. Click **New** and fill in the following fields:

Field	Description
Name	Unique name for the external source. For example, `Demo_knowledge`.
Target Knowledge Base	Knowledge base in which you want to create articles for the external content. For example, `IT`.
Connection Alias	Connection alias to connect to the external source. For example, `Demo_Account`.

c. Right-click the form header and select **Save**.

d. In the Parameter related list, click **New**.

e. On the Parameter form, select the name of the import parameter that you want to configure for your external source and then set the value for the parameter.
The table below lists the parameters and the corresponding values that can be set for the external source.

Parameter name	Value
Maximum size limit (in MB) for this source	Maximum allowable content size to import from your external source. For example, `250 MB`.
Maximum size limit (in KB) per file/content in this source	Maximum allowable size for each article, including attachments, that you can import from this external source. For example, `2000 KB`.
Open search results in the original source system	Opens search results in the external source system if this value is set to **true**.
Include folders with names that match these regex patterns	Comma-separated list of regular expressions for folder names to include from this external source. For example, to include all folders names that start with the letters a and b, enter `a.*,b.*`.
Exclude folders with names that match these regex patterns	Comma-separated list of regular expressions for folder names to exclude from this external source. For example, to exclude all folders names that start with the letters a and b, enter `a.*,b.*`.
Create articles when file names match these regex patterns	Comma-separated list of regular expressions for file names that to include when creating articles. For example, to include all file names have `.docx` and `.pdf` extensions, enter `.*\.docx,.*\.pdf`.

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Parameter name	Value
Do not create articles when file names match these regex patterns	Comma-separated list of regular expressions for file names to exclude when creating articles. For example, to exclude file names have `.docx` and `.pdf`extensions, enter `.*\.docx,.*\.pdf`.
Maximum retry limit	Maximum limit for the number of times a connection request can be sent to the external source. For example, 5.

What to do next

Import content from an external knowledge source.

Related topics

- Open knowledge search results in source system
- Knowledge Management Service portal search results page

Duplicate knowledge article numbers

Importing knowledge articles into an instance can create articles with duplicate numbers.

The Knowledge **Number** field is auto-generated and is incremented every time you create a new article in an instance. The initial value for the **Number** field is 10,000. To customize this number:

1. Navigate to **System Definition** > **Number Maintenance**.
2. In the **Table** column, search for and select **Knowledge**.
3. Under **Related Links** select **Number Counter**, then update the Number field.
4. Select**Update**.

Importing knowledge articles from another instance or as part of the demo data for another application may introduce an article with a number that is already in use. Because the Knowledge **Number** field is not uniquely indexed, the import completes without error.

With duplicate knowledge article numbers present, links to article view pages that use the knowledge number can behave inconsistently. For example, if there are two articles with the same Knowledge number KB0000033, the following link may open either of these two articles randomly: *kb_view.do?sysparm_article=KB0000033*. This can happen in Knowledge search results where clicking on a result opens a different article instead of the article displayed in the search results.

Avoiding duplicate Knowledge article numbers

To avoid inserting Knowledge articles with duplicate numbers into a production environment:

- Do not import demo data articles in production environment.
- Verify the numbers of the articles to be inserted to make sure they are not already in use.
- Create a before insert business rule on the Knowledge table (kb_knowledge) to ensure the new number is not already in use.

You can also update the initial value for the Knowledge **Number** field so that newly created articles do not conflict with existing articles.

1. Navigate to **System Definition** > **Number Maintenance**.
2. In the **Table** column, search for and select **Knowledge**.

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3. In the Controls related list, in the **Number** field, update the count to a number greater than the largest value already in the system.
4. Click **Update**.

Create a custom knowledge homepage

As a system administrator, you can create a module allowing users to open a knowledge homepage for a specific knowledge base or category.

Before you begin

Role required: admin

About this task

Note:
This topic creates a legacy v3 knowledge homepage. You can create a portal homepage and configure it to get a new look and feel. For information, see Configure the Knowledge Management Service Portal.

Procedure

1. In the application navigator, point to the application name and click the edit application icon ( ).
2. In the **Modules** related list click **New**.
3. Enter a **Title** for the module.
4. In the **Link type** field, select **URL (from Arguments)**.
5. In the **Arguments** field, append one or more of the following values to `$knowledge.do#/search?`.

Option	Description
sysparm_kb=<knowledge base sys_id>	Enter the sys_id of a knowledge base to show knowledge articles from that knowledge base by default. If the specified knowledge base does not ex ist, the default knowledge homepage appears when accessing the custom homepage mod ule.
sysparm_category=<knowledge category sys_id>	Enter the sys_id of a knowledge category to show knowledge articles from that category by default. If the specified category does not exist, the default category for the selected knowledge base appears when accessing the custom homepage module.

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Option	Description
	Note: The category passed in this parame ter must belong to the knowledge base passed in the *sysparm_kb* parameter.
sysparm_order=<view_count, last_modi fied, or relevancy>	Enter the default sort order for articles to ap pear in.

Example:

Related topics

Configuring Knowledge Management

I18N - Knowledge internationalization

View knowledge logs

Knowledge logs display information about which users have viewed knowledge articles, what they looked for, and where.

Before you begin
Role required: knowledge_admin, knowledge_manager

About this task
Knowledge logs capture information from all the available sources where users can access knowledge articles, such as Customer Service Portal, Knowledge Management Service Portal, Now Mobile, Agent Workspace, and Knowledge Management v3.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Search Log** or **View Log**.
2. View the Search or View logs.

Knowledge logs

Log	Description
Search Log	View records of the search source, search terms, the highest click rank, and the number of search results of knowledge searches from all the available sources where users can access knowledge articles. The Search log displays data from the Knowledge Searches [ts_query_kb] table. For more information about the search source, see View the source of a knowledge article search.
View Log	View records showing who has viewed which knowledge articles, who has attached a knowledge article to a task and when, and identify final search terms when the

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Log	Description
	type-ahead search suggestions feature is enabled. The View log displays data from the Knowledge Use [kb_use] table. **Note:** ○ An administrator can activate the kb_use table cleanup job to delete any older records from the Knowledge Use [kb_use] table and improve the table performance. For more information, see Modify the data retention policy for View logs. ○ The View log record doesn't display information for a knowledge article accessed and viewed from the global search results.

Search Log fields and description

The knowledge search log stores the history of all knowledge searches performed by the users.

The Search log stores information from all the available sources where users can access knowledge articles. It displays data from the Knowledge Searches [ts_query_kb] table.

Note:
The Knowledge Search log captures data only from Zing searches. It does not work with AI searches.

As an administrator and knowledge manager, you can access the search log by navigating to **All** > **Knowledge** > **Administration** > **Search Log**.

The following table describes some of the fields in the Search log.

Search log field	Description
Search term	Search term used to perform the search.
Results	Number of matching knowledge articles returned by the search.
User	User ID of the user who performed the search.
Sort Order	Sort order (relevance, views, newest, or alphabetical) while performing the search.
Final Search Term	When this value is *true*, the value in **Search term** is the final successful search term used in the search session.
Highest Click Rank	The rank of the first search result the user clicked on to get the relevant search results. A lower search count indicates that the search operation is efficient.
Session Id	Unique identifier for the user session.

For information about finding the source used for searching a knowledge article, see View the source of a knowledge article search.

View Log fields and description

The knowledge View log stores the history of knowledge articles views and their usage.

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The View log shows who has viewed which knowledge articles and who has attached a knowledge article to a task and when. It identifies final search terms when the type-ahead search suggestions feature is enabled. The View log displays data from the Knowledge Use [kb_use] table.

As an administrator and knowledge manager, you can access the view log by navigating to **All** > **Knowledge** > **Administration** > **View Log**.

The following table describes some of the fields in the View log.

View log field	Description
Created	Date and time when the article was viewed or used by the user.
Article	Article that was viewed or used by the user.
User	User who viewed or used the article
Used	If set to true, the article was attached to a task (case, incident, and the like).
Viewed	If set to true, indicates that the article was viewed.
Search Id	Reference ID of the Search log (ts_query_kb). This links the search performed by a user to the article viewed from the search results.
Session Id	Unique identifier for user session.
Times Viewed	How many times the article was viewed.

View the source of a knowledge article search

Analyze knowledge searches by finding the source used for searching a knowledge article.

Before you begin

Role required: knowledge_admin, knowledge_manager

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Search Log**.
2. View the following data for a search record in the corresponding column of the Search log.

Search source details

Column	Search record data
Source Doc	Source record in the source table. For example, Problem: *problem_number*, Case: *case_number*, Incident: *incident_number*, Service Portal: *Customer Support*
Source Table	Label and name of the source table. For example, Knowledge [kb_knowledge], Service Portal [sp_portal], Case [sn_customerservice_case], Incident [incident], Problem [problem], KCS Article [kb_template_kcs_article]
Source Type	Application where the knowledge article search was performed.

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Column	Search record data
	The **Source Type** column is set to one of the following values: ○ **Portal**: Service Portal application ○ **Classic**: ServiceNow AI Platform application ○ **Workspace**: Agent assist in Workspace ○ **Knowledge Classic**: Knowledge Management v3 or v2 ○ **Other**: Unidentifiable source
Source URL	URL of the searched text query.

Related topics

View knowledge logs

Modify the data retention policy for View logs

Remove unwanted and older data from the Knowledge Use [kb_use] table through the data retention policy.

Before you begin

Role required: admin

About this task

The View log displays data from the Knowledge Use [kb_use] table. By default, all the records in the Knowledge Use [kb_use] table are retained. Activating the data retention policy for the kb_use table deletes records that you no longer need. The deleted data is not visible on the reports used in dashboards such as Self-Service Analytics for customer service and Knowledge Management dashboards.

Procedure

1. Navigate to **All** > **Instance Scan** > **Table Cleanup**.
2. In the **Tablename** column, search for `kb_use` and click the **kb_use** link.
3. On the Auto Flush form, activate the kb_user table cleanup job by selecting the **Active** check box.
4. **Optional:** Adjust the amount of time the system waits before deleting the records by modifying the value in the **Age in seconds** field.
   By default, the **Age in seconds** field value is set to 31,536,000 seconds (equivalent to 365 days). For more information, see Autoflush form .

   If the *glide.knowman.view_age.days* property, which sets the number of days used when summing article views, is active, the **Age in seconds** field value must be larger than that property's value. For more information, see Knowledge Management properties

   .
5. Click **Update**.

Use extension points for Knowledge Management

Use UI extension points to add knowledge article headers and footers to knowledge articles and to customize the email template for notifications when a knowledge article is commented on. Use scripted extension points to customize the feedback object used in the email template for notifications when a knowledge article is commented on.

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Before you begin

The Knowledge Management Advanced plugin (com.snc.knowledge_advanced) must be activated to view the KMFeedbackNotification UI extension point and the KMFeedbackObject scripted extension point. These notifications are part of the Subscriptions feature, which is activated with this plugin.

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Role required: admin

About this task

Using extension points makes it easier to integrate customizations without actually altering the base code. You can extend standard base functionality using customized scripts.

To use UI extension points in Knowledge Management, create an implementation and change the data as required. You can create multiple implementations per extension point, but for these scenarios, the use is limited to one implementation only. Example code is provided in the extension point, which can be edited, as required.

An implementation is delivered in the base system for scripted extension points. You can change the data and add additional fields, as required.

Procedure

1. To use UI extension points to customize headers and footers in knowledge articles, and the email notification that is sent when a knowledge article is commented on:

   a. Navigate to **System Extension Points** > **UI Extension Points**.

   b. Click the UI extension point you want to use.

   Note:

   - Use the KMArticleViewFooter and KMArticleViewHeader UI extension points to add knowledge article headers and footers to the knowledge article view pages (kb_view.do) in Knowledge Management v3.
   - Use the KMFeedbackNotification UI extension point to customize the email template for notifications when a knowledge article is commented on.

   c. Click **Create Implementation**.

   d. Change the data as required.

   e. Click **Update**.

2. To use scripted extension points to update the feedback object used in the email template for notifications when a knowledge article is commented on:

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a. Navigate to **System Extension Points** > **Scripted Extension Points**.

> **Note:**
> Use the KMFeedbackObject scripted extension point to customize the feedback object used in the email template for notifications when a knowledge article is commented on.

b. In the **API Name** column, click `global.KMFeedbackObject`.

c. In the **Implementations** related list, click the `KMFeedbackObjectBaseImpl` class.

d. Change the data and add additional fields, as required.

e. Click **Update**.

Related topics

Using extension points to extend application functionality

Using scripted extension points in server-side scripts

Using UI extension points in server-side UI macros

Using client extension points in client-side UI scripting

Train the similarity solution for Knowledge Management to find related articles

Train the Knowledge Similar Articles solution definition included within the Predictive Intelligence for Knowledge Management capability to find related knowledge articles when creating or viewing a knowledge article.

Before you begin

Ensure that the Predictive Intelligence for Contextual Search plugin (com.snc.contextual_search_ml) and Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml) are activated.
Role required: admin

> **Note:**
> This solution is only applicable to OOB (Out of Box) similarity solution and not to knowledge articles that are created manually.

Procedure

1. Navigate to **All** > **Predictive Intelligence** > **Similarity** > **Solution Definitions**.
2. In the Similarity Definitions list, search for and select the Knowledge Similar Articles solution definition (ml_sn_global_knowledge_similar_articles).
3. On the Similarity Definition form, verify the default field values for knowledge articles.

   For more information about the Similarity Definition form fields, see Create and train a similarity solution.

   > **Note:**
   > If the application scope isn't set to Knowledge Management - Machine Learning, you cannot edit the form and a warning message appears. To make the form editable, click the word **here** at the end of the message.

4. Click **Update & Retrain**.

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5. Open the Similarity Definition form for the Knowledge Similar Articles solution definition (ml_sn_global_knowledge_similar_articles).
6. In the ML Solutions related list, view the training solution progress in the **Progress** column. When **Progress** is 100%, in the ML Solutions related list, you can include more useful related articles by reviewing the similarity examples based on the similarity score and updating the similarity score threshold value.
7. **Optional:** Update the similarity score threshold.

   a. In the **Active** column, click the link for the solution.

   b. Review the similarity examples by clicking the **Similarity Examples** related link on the ML Solution form.
   For more information, see Review solution similarity examples.

   c. In the Solution Statistics related list on the ML Solution form, enter the required value in the **Similarity Score Threshold** field, right-click the ML Solution form, and then click **Save**.
   For more information, see Update your similarity score threshold.

Result

When the solution is complete, the related knowledge articles appear in the Knowledge results section on the Knowledge form in the ServiceNow AI Platform, in the Related Articles section on the knowledge article view page in the Knowledge Management Service Portal, and in Agent assist when the **Similar Articles (ML)** option is selected.

Related topics

- Predictive Intelligence for Knowledge Management
- Knowledge Management Service Portal article view page features
- Create a knowledge article
- Create a knowledge article in Agent Workspace
- Using Now Mobile for Knowledge Management

Enable actionable knowledge feedback

The actionable knowledge feedback feature is available when the Knowledge Management Service Portal (com.snc.knowledge_serviceportal) plugin is activated and the actionable knowledge feedback properties are enabled.

Before you begin

Role required: admin

About this task

The actionable feedback feature is available in the Knowledge Management Service Portal and Agent Workspace. To use the actionable feedback feature in other service portals, you can activate the Knowledge Article View page route map. For new customers, the Knowledge Article View page route map is activated by default.

Note:
The actionable knowledge feedback is not supported in Knowledge Management v3.

A feedback task is created for an article when the article is flagged. For generating feedback tasks when an article is marked as not helpful or rated below a set value, you must set the following associated properties.

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Note:
When you select **No** on the article form, an actionable feedback pop-up window appears. On the Actionable feedback form, choose one of the reasons to provide feedback. If you choose **Other** as a reason consider providing feedback details.

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Properties**.
2. In the **Actionable Feedback Properties** section, configure the following properties:

Property	Setting
Create actionable feedback task when an article is flagged	By default, the property is set to **Yes** and feedback tasks are created when the article is flagged.
Create actionable feedback task when an article is marked as not helpful	Select **Yes**.
Create actionable feedback task when an article is rated at or lower than this value. 0 or no value indicates that actionable feedback tasks are not enabled for Rating type feedback	Enter a value from 1 to 5 to specify the rating threshold for generating a feedback task. For example, if you set this value to 3, a feedback task is generated when a user selects three or less stars to rate an article. **Note:** If you enter '0', a negative article feedback does not generate a feedback task.
Create actionable feedback task only when feedback details are provided for the negative feedback	Select the check box to enable actionable feedback task generation for the negative feedback. Set this value to "True", to activate this feature.

3. Click **Save**.

Related topics

Actionable Knowledge Feedback Properties

Create field mapping from an HR case to a knowledge article

Copy information from an HR case into a knowledge article by creating custom mapping between the HR case table and the KCS article table.

Before you begin

Role required: admin

- Ensure that the Knowledge Advanced plugin (com.snc.knowledge_advanced) is active.
- Ensure that the Developer Application is set to **Human Resources: Core**.
- Ensure that the KCS Article template is active.

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1. Navigate to **Knowledge** > **Administration** > **Article Templates**.
2. Set the **Active** field to **true** for the KCS Article template.

Procedure

1. In the filter navigator, type `csm_table_map.list`.
2. Click **New**.
3. In the **Mapping Name** field, enter `HR Case KCS Article`.
4. In the **Source Table** field, enter `HR Case`.
5. In the **Target Table** field, enter `KCS Article`.
6. Right-click the form header and **Save**.
7. In the **Basic Field Mapping** related list, click **New**.
8. Create mappings for the following fields.

Source Field	Target Field
Sys ID	Source Task
Short description	Short description
Close notes	Resolution
Description	Cause

Note:
You can create field mappings for more fields, as required.

- In the **Source** field, select the field in the source HR Case table that contains the information to be copied to the field in the article template target table.
- In the **Target** field, select the field in the article template target table to which you need information copied to from the field in the source Incident table.

9. To customize when and how the **Knowledge** check box is displayed, click the **Condition** tab.
10. Set **Use Advanced Condition** to true.
11. In the **Advanced Condition** window, paste the following code.

```
(function(source) {

    //Only if selected article type is active
    var tem = new GlideRecord("kb_article_template");
    tem.addQuery("child_table", "kb_template_kcs_article");
    tem.addActiveQuery();
    tem.query();
    if (!tem.hasNext())
        return false;

    //Do not allow to create the knowledge again
    var now_GR = new GlideRecord("kb_knowledge");
    now_GR.addQuery("source", source.sys_id);
    now_GR.query();
    if (now_GR.next())
        return false;
```

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```
    return true;
})(source);
```

12. To map fields using advanced scripts, select the **Advanced Field Mapping** check box.
13. On the **Advanced field Mapping** tab, paste in the following code.

```
(function(source, target) {
    // Get the first comments from HR case and use it as Issue
 description for article
    target.short_description = source.short_description + '';
    target.kb_resolution = source.close_notes + '';
    target.kb_cause = source.description;
    target.text = "Working good";
    var notes = source.comments.getJournalEntry(-1);
    var entries = notes.split('\n\n');
    var comment = '';
    if (entries[entries.length - 2]) {
        comment = entries[entries.length - 2];
        var part = comment.toString().indexOf(')');
        if (part != -1) {
            comment = comment.toString().substring(part +
 2).replaceAll('\r\n', '<br/>');
        }
    }
    if (comment)
        target.kb_issue = comment;


})(source, target);
```

The first comment on an HR case is mapped to the **Issue Description** field in the knowledge article.

Note:
If the same source or target field is configured in both the basic and advanced field mappings, the advanced field mapping overrides the basic field mapping.

If the fields configured in the basic and advanced field mapping are different, the field configurations in the advanced field mapping are appended to the field configurations in the basic field mapping.

Add a property to enable creating knowledge articles from HR cases

Add a property, which is required to allow users to create a knowledge article from an HR case.

Before you begin

Role required: admin
Ensure that the Developer Application is set to **Human Resources: Core**.

Procedure

1. In the Filter navigator, enter `sys_properties.list`.
2. Click **New**.
3. Fill in the following fields.

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System Property form

Field	Description
Name	enable_kcs_hr
Description	Enable Knowledge Centered Services (KCS) for HR Service Delivery.
Type	true|false
Value	true

4. Click **Submit**.

Result
The property is added and you can now create knowledge articles from an HR case.

Create a UI action to enable creating knowledge articles from HR cases

Create a UI action to add the Knowledge check box to the HR case form.

Before you begin
Role required: admin
Ensure that the Developer Application is set to **Human Resources: Core**.

Procedure
1. Navigate to **All** > **System UI** > **UI Actions**.
2. Click **New**.
3. Fill in the following fields.

UI Action form

Field	Description
Name	Create Knowledge
Table	HR Case
Action name	create_knowledge

4. Select the **Client** check box.
5. Select the **List v3 Compatible** check box.
6. Select the **Form button** check box.
7. In the **Onclick** field, enter `createKnowledgeClient()`.
8. In the **Condition** field, enter `gs.getProperty("sn_hr_core.enable_kcs_hr") == 'true' && new global.CSMTableMapUtil (current).findMapByName("sn_hr_core.hr_case_kcs_article") && new global.KBKnowledge().canCreate()`.
9. In the **Script** field, enter the following code.

```
function createKnowledgeClient() {
    if (g_form.modified) {
        alert(new GwtMessage().getMessage('You have unsaved
 changes. Please save them to continue.'));
```

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```
    }else{
        //Call the UI Action again but skip the 'onclick'
 function
        gsftSubmit(null, g_form.getFormElement(),
 'create_knowledge');
//MUST call the 'Action name' set in this UI Action
    }
}

//Code that runs without 'onclick'
//Ensure call to server-side function with no browser errors
if (typeof window == 'undefined')
    CreateKnowledgeServer();

    function CreateKnowledgeServer(){
    current.update();

    var map = new global.CSMTableMapUtil (current);
    map.findMapByName("sn_hr_core.hr_case_kcs_article");
    var targetURL = map.getTargetURL();
    var referenceLink =
"&sysparm_collection=sn_hr_core_case&sysparm_collectionID="+cur
rent.sys_id+"&sysparm_collection_key=task&sysparm_link_collecti
on=m2m_kb_task&sysparm_collection_related_field=kb_knowledge&sy
sparm_referring_url=sn_hr_core_case.do%3fsys_id%3d"+current.sys
_id;
    if(targetURL)
        action.setRedirectURL(targetURL[0]+referenceLink);
}
```

10. Click **Submit**.

Enable creating an article from a customer service case

You can enable authors to reuse information in a case by copying case details into an article template. Use the pre-defined customer service source case table to article template target table configuration or create custom configurations between the two tables to copy information from a case to an article.

Before you begin

- The Knowledge Management Advanced plugin must be active.
- The Properties installed with Customer Service Management must be enabled
- The pre-defined KCS article template or a newly created article template must be active.

Note:
You can do one of the following to create an article from a case:

- Use the pre-defined **Case KCS Article** mapping as is or modify the field mappings between the case source table and article template target table.
- Create a new article template target table and map it to the case source table and customize the field mappings between them. For information on creating article templates, refer to Create an article template.

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- Knowledge users use the **Create Knowledge** button in a case form to create an article from a case and must have "can contribute" permission for at least one active knowledge base to create an article from a case. For information on user permissions, see Knowledge Management roles.

Role required: sn_customerservice.customer_admin or admin

About this task

The pre-defined **Case KCS Article** mapping is stored in the CSM Table Map [csm_table_map] table. This configuration has the sn_customerservice_case source case table configured to the kb_template_kcs_article target article template table with the four field mappings pre-configured between the tables. You can customize the existing field mappings or map additional fields between the tables.

Procedure

1. In the application filter navigator, type `csm_table_map.list`.
2. Click **Case KCS Article**.
3. From the **Target Table** list, use the pre-defined KCS article template table or select the newly created article template table.
4. Map each customer service case field that must be used to create knowledge articles.

   a. In the **Basic Field Mapping** related list, click **New**.
   To map fields, fill in the following fields:

   Customer service case table to article template target table field mapping

Field	Instructions
Source Field	Select the field in the source case table that contains the information to be copied to the field in the article template target table.
Target Field	Select the field in the article template target table to which you need information copied to from the field in the source case table.

   b. Click **Submit**.

   c. To map fields using advanced scripts, select the **Advanced Field Mapping** check box and then map the fields between the source and the target table using advanced scripts in the **Advanced Field Mapping** tab.

   Note:

   If the same source or target field is configured in both the basic and advanced field mappings, the advanced field mapping overrides the basic field mapping.

   If the fields configured in the basic and advanced field mapping are different, the field configurations in the advanced field mapping are appended to the field configurations in the basic field mapping.

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d. To customize when and how the **Create Knowledge** button is displayed, use the condition builder in the **Condition** tab or select **Use Advanced Condition** check box and configure using advanced scripts.

Note:
If you change the target table in the **Case KCS Article** mapping, also update the scripts with the configuration changes for display of this button.

5. Click **Update**.

Configuration tasks for knowledge demand insights

Review the following configurations tasks for knowledge demand insights.

Configure Knowledge Demand Insights

Configure the Knowledge Demand Insights feature to identify which topics are missing knowledge articles and creating actionable knowledge gaps for missing topics.

Before you begin

Activate the Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml). For more information, see Predictive Intelligence for Knowledge Management and Additional plugins for Knowledge Management.

About this task

To configure the Knowledge Demand Insights feature, use the Knowledge Management guided setup. The guided setup takes you through the entire setup and configuration process.

This task provides general steps to configure the Knowledge Demand Insights feature. For more information about the feature, see Knowledge demand insights.

Procedure

1. Configure similarity and clustering solution definitions to enable comparing knowledge bases with a task type.
2. Configure the combination of the task table and similarity and clustering solution definitions that are processed in a scheduled job for a task type.
3. Configure scheduled jobs for each task.
4. Configure assignment rules to automatically assign feedback tasks of type Knowledge gap.

Note:
If no assignment rules are configured, a knowledge admin or knowledge manager can later use the Feedback Management feature in the Knowledge module to manually assign a feedback task.

Related topics

Analyze knowledge gaps from a demand insights dashboard and create knowledge gap feedback tasks

Configure solution definitions to find gaps in a knowledge base

The Knowledge Demand Insights feature finds knowledge gaps by comparing knowledge bases with existing tasks. To enable comparing knowledge bases with a task type, you must first configure similarity and clustering solution definitions.

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Before you begin

This task describes the process for configuring a solution definition.
Instead of doing the configuration through this procedure, consider using a guided setup. Navigate to **Knowledge** > **Administration** > **Guided Setup**, click **Get Started**, and then scroll to the Knowledge Demand Insights section.

Role required: admin

About this task

Configure one similarity type and one clustering type solution definitions for each task type: incidents, customer service cases, or other tasks. A similarity solution definition collects and compares your existing records to new similar records. A clustering solution definition groups similar records into clusters so you can address them collectively or identify patterns.

Procedure

1. Navigate to **Knowledge Demand Insights** > **Solution Definitions**.
2. In the Solution Definitions (ML view) list, search for and select the similarity solution definition for the task type.
   - For customer service cases, select **Demand Insights: Similar Cases and Knowledge (ml_sn_global_similar_cases_and_kbs)**.
   - For incidents, select **Demand Insights: Similar Incidents and Knowledge (ml_sn_global_similar_incidents_and_kbs)**.
   - For HR cases, select **Demand Insights: Similar HR Cases and Knowledge (ml_x_sn_hr_core_global_demand_insights_similar_hr_cases_and_knowledge)**.
   - For tasks other than customer service cases, incidents, and HR cases, click **New** to create another similarity solution definition.
3. On the Similarity Definition form, verify the default field values for customer service cases or incidents, or fill in the values for a custom configuration.

Note:
If the application scope isn't set to Knowledge Management - Machine Learning, you cannot edit the form and a warning message appears. To make the form editable, click the word **here** at the end of the message.

Similarity Definition form

Field	Description
Label	Unique name for your similarity solution.
Word Corpus	Defines which knowledge articles and tasks are selected for knowledge gap analysis. If you don't have a relevant word corpus, follow the steps in Create a word corpus.
Table	Table that contains the knowledge article records. Set the value to Knowledge [kb_knowledge] unless you use a different table for storing knowledge articles. After you assign a table value, the number of records that match the filter conditions is displayed as a link.
Fields	Fields from the Knowledge table selected for knowledge gap analysis.

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Field	Description
Filter	Filter conditions applied on the Knowledge table to filter knowledge article records for knowledge gap analysis.
Test Table	Table that contains the task records that you want to compare with knowledge article records.
Test Fields	Fields from the task table selected for knowledge gap analysis.
Processing Language	Dominant language of the dataset you're training on the solution definition. By default, English processing is applied to all datasets. For example, if you select Italian, the system processes the data in both English and Italian. **Note:** The term processing indicates some of the language-specific steps used as part of training a solution. These steps might include tokenizing words, removing stop words, and stemming.
Stopwords	Common terms in the processing language that are excluded from the search, for example, prepositions. When you select your processing language, the system automatically adds a Stopwords list that uses the same language. For example, if your processing language is Italian, the **Default Italian Stopwords** list appears. The **Default English Stopwords** list also appears in your selection as well.
Training Frequency	Frequency with which the model for similarity solution definition must be retrained.
Update Frequency	Frequency with which to include new records in the model for the similarity solution definition.

4. Submit and train the solution definition.
   - For a new solution definition record, click **Submit & Train**.
   - For an existing solution definition record, click **Update & Retrain**.
5. **Optional:** Include more useful related articles by reviewing the similarity examples based on the similarity score and updating the similarity score threshold value.
   For more information, see Review solution similarity examples and Update your similarity score threshold.
6. In the Solution Definitions (ML view) list, search for and select the clustering solution definition for the task type.
   - For customer service cases, select **Demand Insights: Case Clusters Need Knowledge (ml_sn_global_cases_need_knowledge_cluster)**.
   - For incidents, select **Demand Insights: Incident Clusters Need Knowledge (ml_sn_global_incidents_need_knowledge_cluster)**.
   - For HR cases, select **Demand Insights: HR case clusters need knowledge (ml_x_sn_hr_core_global_demand_insights_hr_case_clusters_need_knowledge)**.
   - For tasks other than customer service cases and incidents, click **New** to create another clustering solution definition.
7. On the Clustering Definition form, verify the default field values for customer service cases or incidents, or fill in the values for a custom configuration.

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Note:
If the application scope isn't set to Knowledge Management - Machine Learning, you cannot edit the form and a warning message appears. To make the form editable, click the word **here** at the end of the message.

Clustering Definition form

Field	Description
Label	Unique name for your clustering solution.
Word Corpus	Which tasks are selected for collections.
Table	Table that contains the filtered tasks that require knowledge articles. Set the value to Task knowledge coverage [kb_task_knowledge_coverage] unless you use a different table for storing filtered tasks. After you assign a table value, the number of records that match the filter conditions is displayed as a link.
Fields	Fields from the Task knowledge coverage table selected for knowledge gap analysis.
Filter	Filter conditions applied on the Task knowledge coverage table to filter knowledge article records for knowledge gap analysis.
Processing Language	Dominant language of the dataset you're training on the solution definition. By default, English processing is applied to all datasets. For example, if you select Italian, the system processes the data in both English and Italian. **Note:** The term processing indicates some of the language-specific steps used as part of training a solution. These steps might include tokenizing words, removing stop words, and stemming.
Stopwords	Common terms in the processing language that are excluded from the search, for example, prepositions. When you select your processing language, the system automatically adds a Stopwords list that uses the same language. For example, if your processing language is Italian, the **Default Italian Stopwords** list appears. The **Default English Stopwords** list also appears in your selection as well.
Update Frequency	Frequency with which to include new and updated records in the model for the clustering solution definition.
Training Frequency	Frequency with which the model for clustering solution definition must be retrained.

8. Submit and train the solution definition.
   - For a new solution definition record, click **Submit & Train**.
   - For an existing solution definition record, click **Update & Retrain**.

What to do next
Complete the KB curation configuration form to define the scheduled jobs for demand insights. For more information, see Configure the mapping of solution definitions with task tables.

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Related topics

Predictive Intelligence for Knowledge Management

Create and train a similarity solution

Create and train a clustering solution

Analyze knowledge gaps from a demand insights dashboard and create knowledge gap feedback tasks

Configure the mapping of solution definitions with task tables

Configure the combination of the task table and similarity and clustering solution definitions that are processed in a scheduled job for a task type. You can create another demand insights configuration or modify an existing configuration to define a scheduled job for demand insights.

Before you begin

This task describes the process for configuring a scheduled job.
Instead of doing the configuration through this procedure, consider using a guided setup. Navigate to **Knowledge** > **Administration** > **Guided Setup**, click **Get Started**, and then scroll to the Knowledge Demand Insights section.

Ensure that you have configured a similarity type and clustering type solution definitions for a task type. For more information, see Configure solution definitions to find gaps in a knowledge base.

Role required: admin

About this task

A scheduled job for each task type runs business rules and then executes the similarity and clustering solution definitions. In the Demand Insights Configuration module, you configure the combination of the task table and similarity and clustering solution definitions that are processed in a scheduled job for a task type. This configuration is optional for customer service cases and incidents.

Note:
For task types other than customer service cases and incidents, a user with the admin role must also perform the following tasks:

- Assign the sn_km_ml.knowledge_curation_user role and the appropriate roles for the task type to the users performing the knowledge gap analysis. To assign roles, perform the Assign knowledge curator roles guided setup task, which are available in the Knowledge Demand Insights section of the Knowledge Management guided setup.
- Create a demand insights dashboard for the task type. To create a dashboard, see Create or configure a responsive dashboard.

Procedure

1. Navigate to **All** > **Knowledge Demand Insights** > **Demand Insights Configuration**.
2. Configure the combination of the task table and similarity and clustering solution definitions that are processed in a scheduled job.
   - For customer service cases, select **sn_customerservice_case**.
   - For incidents, select **incident**.
   - For HR cases, select **sn_hr_core_case**.
   - For tasks other than customer service cases, incidents, and HR cases, click **New** to create another combination.
3. On the KB curation configuration form, verify the default field values for customer service cases or incidents or fill in the values for a custom configuration.

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KB curation configuration form

Field	Description
Curation table	Name of the table you want the data to pull information from. For example, for customer service cases, select Case [sn_customerservice_case] and for incidents select Incident [incident].
Fields	Fields in the curation table that include the ID of knowledge articles, for example, the knowledge article ID KB07276660 in the field resolution notes,
Query condition	Conditions for filtering the number of tasks from the curation table. You can create conditions using the condition builder (see Condition builder).
Similarity solution definition	Similarity solution definition for your task type. For example, for customer service cases, select **Demand Insights: Similar Cases and Knowledge**.
Clustering solution definition	Clustering solution definition for your task type. For example, for customer service cases, select **Demand Insights: Case Clusters Need Knowledge**.

4. Click **Update** for incidents or customer service cases or **Submit** to save a custom configuration.

What to do next

Set the frequency of the scheduled job for your task. For more information, see Set the frequency of knowledge gap analysis.

Related topics

Configure solution definitions to find gaps in a knowledge base

Set the frequency of knowledge gap analysis

Set the frequency of the scheduled job for your task to automatically run knowledge gap analysis.

Before you begin

This task describes the process for setting the frequency of knowledge gap analysis. Instead of doing the configuration through this procedure, consider using a guided setup. Navigate to **Knowledge** > **Administration** > **Guided Setup**, click **Get Started**, and then scroll to the Knowledge Demand Insights section.

Role required: admin

Procedure

1. Navigate to **All** > **Knowledge Demand Insights** > **Scheduled Jobs**.
2. In the Scheduled Jobs list, select the scheduled job for your tasks in the **Name** column.
   - For customer service cases, select **[Knowledge Curation]: Generate Case Clusters**.
   - For incidents, select **[Knowledge Curation]: Generate Incident Clusters**.
   - For HR cases, select **[Knowledge Curation]: Generate HR Case Clusters**.
   - For tasks other than customer service cases, incidents, and HR cases, create another scheduled job. For more information, see Create a scheduled job .

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3. On the Scheduled Script Execution form, either accept the default value of running the analysis once a quarter (every 90 days) or change the frequency.

   Note:
   For best performance results, try not to perform knowledge gap analysis more frequently than once a month.

4. Click **Update**.

   Note:
   If the application scope is not set to Knowledge Management - Machine Learning, a warning message appears and the **Update** button is not available. Click the word **here** at the end of the message to change the scope and click **Update**.

5. **Optional:** To run the job immediately, click **Execute Now**.

Result
The knowledge gap analysis is repeatedly run at the duration as configured in the scheduled job.

What to do next
Create assignment rules to assign knowledge gap feedback tasks. For more information, see Assign knowledge gap feedback tasks to content authors.

Related topics
Analyze knowledge gaps from a demand insights dashboard and create knowledge gap feedback tasks

Assign knowledge gap feedback tasks to content authors

Create assignment rules to assign knowledge gap feedback tasks to authors or groups of content creators.

Before you begin
Role required: admin or assignment_rule_admin

About this task
Knowledge gap feedback tasks created through the Knowledge Demand Insights feature create feedback tasks of type **Knowledge gap**.

Procedure
1. Navigate to **All** > **Knowledge Demand Insights** > **Knowledge Gap Assignment**.
2. In the Assignment Rules list, click **New**.
3. On the Assignment rule form, fill in the fields.

Assignment rule form

Field	Description
Name	Descriptive name for the assignment rule.
Active	Option to activate the assignment rule. Only active assignment rules take effect.
Applies to tab	
Table	Table to store the feedback tasks on knowledge articles. This field is automatically set to **Knowledge Feedback Task [kb_feedback_task]**.

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Field	Description
Conditions	Conditions for assigning feedback tasks of the Knowledge gap type. This field is automatically set to **[Feedback Task Type] [is] [Knowledge gap]**. You can add more conditions as appropriate.
Assign to tab	
User	User assigned the feedback task type of knowledge gap.
Group	Ownership group assigned the feedback task type of knowledge gap.
Script tab	
Script	Script you can use to specify more complex conditions for assignment rules using dynamic variables and loops.

4. Click **Submit**.

Related topics

Create an assignment rule

Analyze knowledge gaps from a demand insights dashboard and create knowledge gap feedback tasks

Analyze knowledge gaps from a demand insights dashboard and create knowledge gap feedback tasks

Use the demand insights dashboard for your tasks to analyze candidate knowledge gaps and create knowledge gap feedback tasks.

Before you begin

You must have read access to the tasks that you want to analyze and the sn_km_ml.knowledge_curation_user role.

About this task

A demand insights dashboard displays tasks as topics for which your knowledge bases do not have adequate knowledge coverage. You can create and assign knowledge gap feedback tasks for a topic so your knowledge bases can better be used to solve and deflect any issues described in a task. Tasks represent customer service cases, incidents, problems, and so on.

Procedure

1. Navigate to **Knowledge Demand Insights** and select the demand insights dashboard for your tasks, or navigate to **All** > **Self-Service** > **Dashboards**.
   - For customer service cases, select **Demand Insights for Cases**.
   - For incidents, select **Demand Insights for Incidents**.
   - For HR cases, select **Demand Insights for HR cases**.

   Note:
   For tasks other than customer service cases, incidents, and HR cases, you can create another dashboard or update an existing dashboard. For more information, see Create and use dashboards.

2. To view similar tasks grouped together, click a bar in the Pareto chart.
   Each bar represents a collection of similar tasks grouped together because they are likely to be on the same topic. The bars covering the largest number of tasks start from the left in a descending order. The blue line indicates how many bars you must analyze to cover 80% of

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all tasks that don't have good knowledge coverage. For more information, see Pareto chart for Knowledge Demand Insights.

3. **Optional:** To generate a representative sample to see a smaller list, in the Knowledge Curation Tasks list, click **Generate Representative Sample**.
   If the Knowledge Curation Tasks list is large, you can generate a representative sample subset of a Knowledge Curation Tasks list. This smaller list aims to accurately reflect the characteristics of the tasks included in the main list.
4. Analyze the sample to create a knowledge gap feedback task or ignore the tasks within a collection.

Result

If tasks within a collection are reported as knowledge gaps, a common feedback task for all the selected tasks is created and appears in the Knowledge Management application. You can use the assignment rules to assign a feedback task to an ownership group or author. In the Knowledge Curation Tasks list, the **Is knowledge gap created** column value for the selected tasks is set to **true**.

If you select an ignored collection from the demand insights dashboard, you can no longer report tasks within the collection as knowledge gaps.

Related topics

Demand Insights for Cases dashboard

Demand Insights for Incidents dashboard

Using Knowledge Management

Use Knowledge Management to search and find information on self-help, troubleshooting, and task resolution in knowledge bases.

Knowledge Management guide for users

After knowledge bases are set up, you can start searching and creating articles.

Requirements

Role required: All users can read knowledge articles. Users with the knowledge or any other fulfiller role, such as sn_customerservice_agent, can create and edit knowledge articles in a knowledge base, unless the knowledge manager has restricted access to the knowledge base or knowledge articles.

If you need these permissions, contact the knowledge manager or knowledge administrator for the knowledge base.

What to do

Create knowledge articles

If you have the required permissions for a knowledge base, you can create articles for it. You can Create a knowledge article from an incident in Service Operations Workspace or by importing Word documents.

You can also create knowledge articles from incidents and problems.

Search for knowledge articles

From the Knowledge homepage, you can select a knowledge base to search for articles and answers. You can view only the knowledge bases to which you have access.

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Access to knowledge using your mobile device is supported.

Next steps

After articles are created, you can perform the following tasks to make sure that articles are organized in the right knowledge bases and retired when appropriate. If existing knowledge bases do not fit your needs, you can request a new knowledge base.

- Move a knowledge article
- Retire a knowledge article
- Request a knowledge base

Knowledge Management Service Portal homepage features

The Knowledge Management Service Portal homepage displays knowledge articles organized by knowledge base and category, as well as featured content and popular articles. Learn how to navigate the homepage to search for and find useful and relevant information quickly.

To use the Knowledge Management Service Portal, the Knowledge Management — Service Portal plugin (com.snc.knowledge_serviceportal) must be activated.

Note:
It's active by default for customers on the Madrid and later releases.
Existing or upgrade customers must activate the plugin and enable the *glide.knowman.serviceportal.enable_redirect* property.

To see the Knowledge Management Service Portal homepage, add `/kb` to the end of the URL for your instance. You can change the default navigation by configuring the system property *sn_km_portal.glide.knowman.serviceportal.portal_url*.

Your organization can customize the homepage, so it may look different to the following image. You must be logged in to view the knowledge homepage.

Knowledge Management Service Portal homepage features

UI component	Description
Knowledge profile menu	Click your profile photo to either view your knowledge profile or logout.
Search	Enter a search term to search knowledge bases.
Counters	Displays the number of available knowledge bases and the total number of knowledge articles.
Ask a question	This action is available to logged-in users with the knowledge role. Click **Ask a Question**, which opens a question page. Fill in the **Question** and **Question details** fields, and click **Post question** to post the question.
Overflow icon (⋯)	Click the Overflow icon and select **Create Article** to create a knowledge article.
Browse knowledge bases	Click a knowledge base to view knowledge articles and questions stored in it. View counters of how many articles and questions are stored in the knowledge base.

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Knowledge Management Service Portal homepage features (continued)

UI component	Description
	Click **Show All** to view up to eight available knowledge bases.
Subscribe	Click **Subscribe** to subscribe to that knowledge base. Unsubscribe by clicking **Unsubscribe**.
Featured	Lists any knowledge articles that were pinned. For more information, see Add a knowledge article to featured content.
Most Useful	Lists the top five articles that were marked as helpful.
Most Viewed	Lists the top five articles with the most views.

Note:
The Knowledge Management Service Portal homepage is mobile responsive.

Using search in Knowledge Management Service Portal

View a list of search results as well as options for sorting and filtering the items in the list. You can also use knowledge search in other Service Portals.

Note:
When you perform a new search, the filters you selected earlier on the Knowledge Management search results page are not saved. You must reselect the filters that you want to apply for every search.

Knowledge Management Service Portal search results page

UI component	Description
Search bar	Use the search bar at the top of the page to search for additional information.
Sort	Sort the items in a knowledge base or search results list using the Sort by options at the top of the list. • Views: sorts by number of article views. • Newest: sorts by the date created or updated. • Alphabetical: sorts alphabetically by the article Short description field. • Relevancy: sorts by relevance to the search term. The header displays the number of search results, which updates as the user selects and de-selects filters. When you navigate away from the search results page and then return, your last sort selection is retained.
Search results list	View knowledge articles and pinned articles. Knowledge article search results include articles in which the short description, text content, or attached file content includes the search term.

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Knowledge Management Service Portal search results page (continued)

UI component	Description
	View the knowledge article short description, the knowledge base in which the article is stored, author name, number of views, and rating information.
Language filter facet widget	Language: lists the languages that have been activated. Select one or more languages to display search results in. Your selection is maintained across logins. If multi-language search is enabled, you can search for multiple languages simultaneously.
Knowledge base filter facet widget	Knowledge Base: lists the available knowledge bases
Category filter facet widget	Category: lists the available knowledge categories. **Note:** Shows a hierarchy of categories if the administrator configured the Show category hierarchy (valid for kb_category only) instance option for the facet widget.
Other filter facet widgets	Use filter facets to refine your search results. The selections you make filter the items displayed in the search results list. The search results list updates to display only those items that match your selections. Deleting a selection from the filter facet or breadcrumb reverses the filtering in the list. Clear selected filter options by: • Deleting a single option from the search results list header. • Clicking Clear all in the search results list header. • Clicking Clear in the filter facet widget header. • Author: lists the names of the authors for the knowledge articles included in the search results list • Tags: lists the available knowledge tags • Resource: lists the types of items available, such as knowledge articles • Rating: lists article ratings from 0-5 stars (clicking a rating displays articles that have the selected rating and higher) • Last Modified: lists selections based on the timing of knowledge item modifications such as Past Month or Past Week • View Count: lists the knowledge item view counts such as More Than 50 or Less Than 10. Set the number of days to consider when calculating view count using the *glide.knowman.view_age.days* property. For more information on this property, see Knowledge portal properties.
View additional	Depending on the system setup, view additional search results using one of these options:

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Knowledge Management Service Portal search results page (continued)

UI component	Description
search results	• Standard Pagination: displays the search results in multiple pages. • Infinite Scroll: displays the search results while scrolling.

Note:
If a custom widget on the knowledge search results page uses the *KnowledgeSearchService* angular service, you must add the *sn.knowledgeApplication* dependency to enable the functionality of the custom widget.

1. Navigate to **Service Portal** > **Dependencies**.
2. In the **Name** field, search for the *sn.knowledgeApplication* dependency.
3. If a message appears, click **here** to edit.

   You have to be in the **Knowledge Management - Service Portal** application to edit.
4. Click **Update**.

The search functionality in Knowledge Management Service Portal pages uses the **Knowledge Base Search** search context to fetch results. As an administrator, you must not update the definition of this search context because it may impact the search behavior. For more information about contextual search, see Contextual search concepts.

Knowledge Management Service Portal article view page features

The knowledge article view page in Knowledge Management Service Portal displays the knowledge article details, including the article number, short description, and article content. You can also give feedback or comment on an article.

Knowledge article view page in Knowledge Management Service Portal

UI component	Description
Breadcrumb	View which knowledge base the knowledge article is in.
Header	View the knowledge article number.
Subscribed	Click **Subscribe** to subscribe to the knowledge article. Unsubscribe by clicking **Unsubscribe**.
Actions ···	Edit the knowledge article or flag an article that contains incorrect or inappropriate content. To edit the article, you must have contribute access to the knowledge article. **Note:** The flagged comment appears in the comment section without reloading the page. If the article was created using Microsoft Word, download the article as a Microsoft Word document to your computer by clicking **Download as Word**. This option appears only when the article was originally created using Microsoft Word and the system administrator has enabled the

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Knowledge article view page in Knowledge Management Service Portal (continued)

UI component	Description
	sn_km_word.glide.knowman.enable_document_download property.
Article title	View the short description of the article as the title of the article.
Language list	Select a language for the selected article. This field appears if the translations of the knowledge article in other languages are available.
Knowledge article content	View the text and images of the knowledge article. View who authored the article and when as well as the number of views (including multiple views from the same user) the article has.
Copy Permalink	Click **Copy Permalink** to copy the URL of the latest article version to the clipboard. **Note:** The version of the article that loads for the user using the permalink depends on their level of access to the article. Users with view access will see the most recent published version. Users with contribute access will see the most recent version of the article, even if it is a draft.
Helpful?	Provide feedback on an article by marking it as helpful or not. View a percentage value of how many other users found the article helpful.
Rate this article	Rate a knowledge article.
Click here to comment to this article	Add a comment to an article
Attachments	View a list of article attachments if the **Display Attachment** field for the article is enabled.
Related Items	View a list of catalog items mapped to the article. The section appears only when the related catalog items are available for the selected article.
Related Articles	View a list of related articles with information similar to the selected article. The related articles are manually mapped, automatically predicted, or both. The manually mapped articles appear first in the section. The section appears only when the related articles are available for the selected article.
Affected Products	View a list of which products were affected.
Most Recent tasks	View a list of tasks, such as incidents, cases, problems, and so on, recently associated with the article.
Most Useful	View a list of knowledge articles that users found most useful.
Search bar	Use the search bar to start a new search. The search is executed in the current portal where you are viewing the article.

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Note:

- If enabled, users can subscribe to articles, view article versions, and create feedback for articles that are rated as not helpful.
- The dynamic titles don't apply to the knowledge article view page in the Knowledge Management Service Portal.

Knowledge article URL parameters

You can add parameters to an article URL to view the latest version and an existing translation.

Knowledge article URL structure

The knowledge article URL appears in the following structures:

- Accessed from **Service Portal**: `https://<instance-name>.service-now.com/kb?id=kb_article_view&sysparm_article=<article number>&sysparm_language=<language code>`

  For example, the URL `https://yourbusiness.service-now.com/kb?id=kb_article_view&sysparm_article=KB0010053&sysparm_language=EN` returns the article with the most recent version in the selected language, if the translation for the selected language exists.

  Note:
  If you open an article with sysparm_article and sys_kb_id parameters that belong to different articles, the article loads based on a sysparm_article.

- Accessed from **Knowledge Base View (kb_view) UI page**: `kb_view.do?sysparm_article=<article number>&sysparm_language=<language code>'`

  For example, the URL `https://yourbusiness.service-now.com/kb_view.do?sysparm_article=KB0010044&sysparm_language=en`returns the article with the most recent version in the selected language, if the translation for the selected language exists.

Note:
The listed parameters can include the sys_id in the url parameter.

Parameters

The following parameters are available for knowledge article URLs.

Parameter	Possible values
sysparm_article	Returns the most recent article version. For example, `https://yourbusiness.service-now.com/kb?id=kb_article_view&sysparm_article=KB001005`
sysparm_language	Returns the most recent article version in the input language if a translation exists. For example, `https://yourbusiness.service-`

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Parameter	Possible values
	now.com/kb?id=kb_article_view&sys_id=3b07857187032100d

Managing email notifications in Knowledge Management

Reminders enable relevant users to review knowledge articles and complete tasks associated with them.

By default, the Knowledge Management application includes the following types of email notifications:

- Email notifications for knowledge article feedback tasks.
- Email notifications for knowledge subscriptions.
- Email notifications for knowledge article approval publishing workflow.
- Email notifications for translation tasks.
- Email notifications for expiring knowledge articles.
- Email notifications for article quality index (AQI) reviews.

You can decide if you must receive any knowledge notifications by setting notification preferences. For more information, see Set knowledge notification preferences.

Email notifications for knowledge article feedback tasks

The email notifications for knowledge article feedback tasks are available when your administrator activates the Knowledge Management Core plugin (com.glideapp.knowledge).

The following table describes the recipient list of notifications for knowledge article feedback tasks and the associated conditions when a notification is sent.

Recipient list of the email notification for knowledge article feedback tasks

Notification	Condition	Recipients
KM Feedback Task: Commented	A comment was added to a user feedback task.	User who was assigned the feedback task
KM Feedback Task: Created	A user feedback task was created.	User who was assigned the feedback task
KM Feedback Task: Info from Submitter	More information was requested from the submitter of a user feedback task.	User who submitted the feedback task
KM Feedback Task: Reassigned	A user feedback task was reassigned.	User who was reassigned the feedback task
KM Feedback Task: Resolution Accepted	A resolution described in a user feedback task was accepted.	User who was assigned the feedback task
KM Feedback Task: Resolution Rejected	A resolution described in a user feedback task was rejected.	User who was assigned the feedback task
KM Feedback Task: Resolved	A user feedback task was set as resolved.	User who submitted the feedback task

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Email notifications for knowledge subscriptions

The email notifications for knowledge subscriptions are available when your administrator activates the Knowledge Management Core plugin (com.glideapp.knowledge). For notifications associated with ownership groups, your administrator must also activate the Knowledge Management Advanced plugin (com.snc.knowledge_advanced).

The following table describes the recipient list of notifications for knowledge subscriptions and the associated conditions when a notification is sent.

Recipient list of the email notification for knowledge subscriptions

Notification	Condition	Recipients
KM Subscription Group: Article checkout	A subscribed knowledge article was checked out	• Author (if no Ownership group is associated with the article) • Ownership group manager and members (if an Ownership group is associated with the article) • Revisers **Note:** The user who checked out the article does not receive the notification.
KM Subscription Group: Article commented	A comment was added to a subscribed knowledge article	• Author (if no Ownership group is associated with the article) • Ownership group manager and members (if an Ownership group is associated with the article) • Revisers
KM Subscription: Article published	A knowledge article was created in a subscribed knowledge base	• knowledge base owner • Knowledge base subscribers
KM Subscription: Article revised	A subscribed knowledge article was edited	• Knowledge base owner • Knowledge article subscribers • Author • Revisers
KM Subscription: Article revised in subscribed KB	A knowledge article in a subscribed knowledge base was edited.	• Knowledge base owner • Knowledge article subscribers • Author • Revisers • Knowledge base subscriber

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Note:
An email notification is sent to a reviser of a knowledge article when the article versioning feature is enabled.

Email notifications for knowledge article approval publishing workflow

The email notifications for knowledge article approval publishing workflow are available when your administrator activates the Knowledge Management Core plugin (com.glideapp.knowledge).

The following table describes the recipient list of notifications for the knowledge article approval publishing workflow and the associated conditions when a notification is sent.

Recipient list of the email notification for the knowledge article approval publishing workflow

Notification	Condition	Recipients
KM: Approve article for publishing	A knowledge article was approved for publishing with the ownership group feature disabled.	Knowledge base owner and managers
	A knowledge article was approved for publishing with the ownership group feature enabled.	Ownership group manager and members
	Note: In Out-of-Box (OOB) configurations, the approval is sent only to the author.	
KM: Article approved for publish	A knowledge article was approved for publication.	User (author or reviser) who submitted the article for approval
KM: Article rejected for publish	A knowledge article was rejected for publication.	User (author or reviser) who submitted the article for approval

Note:
An email notification is sent to a reviser of a knowledge article when the article versioning feature is enabled.

Email notifications for translation tasks

The email notifications for translation tasks are available when your administrator activates the Knowledge Management Advanced plugin (com.snc.knowledge_advanced) and I18N: Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2). The 18N: Internationalization plugin (com.glide.i18n) activates the I18N: Knowledge Management Internationalization Plugin v2 plugin.

The following table describes the recipient list of notifications for translation tasks on knowledge articles and the associated conditions when a notification is sent.

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Recipient list of the email notification for translation tasks

Notification	Condition	Recipients
KM Translation Task: Assigned to me	A translation task was assigned.	User who was assigned the translation task
KM Translation Task: Closed	A translation task was closed after the translated version of the knowledge article was published.	• User who was assigned the translation task • User who submitted the translation task

Email notifications for expiring knowledge articles

The email notifications for expiring knowledge articles are available when your administrator activates the Knowledge Management Core plugin (com.glideapp.knowledge) and sets the value of the *glide.knowman.enable_article_expiry_notification* property to `true`. By default, the property value is set to false.

Knowledge articles have an expiration date set using the **Valid to** field when creating the article. Articles do not appear in search results after the Valid to date.

On the first day of each month, the application sends an email notification to a list of authorized recipients to remind them about articles that are scheduled to expire in the next month. The user can then determine whether to extend the **Valid to** date to continue providing access to the article.

Note:
To extend the **Valid to** date of a knowledge article, see Edit a knowledge article

The content of the email notification is determined by the number of articles expiring in the coming month.

- Up to 10 – The email notification includes a list of article links displayed in a tabular format and arranged in ascending order by their Valid to date. Clicking a link opens the article in ServiceNow AI Platform.
- More than 10 – The email notification includes a **View the list of expiring articles** link, which when accessed opens a list in ServiceNow AI Platform of all articles expiring in the next month.

The following table describes the recipient list of notifications for expiring knowledge articles and the associated conditions when a notification is sent.

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Recipient list of the email notification for expiring knowledge articles

Notification	Condition	Recipients
KM: Article Expiry Warning	An article is scheduled to expire in the next month with the ownership group feature disabled.	• Author • Knowledge base owner and managers • Reviser for the updated and checked-out versions
	An article is scheduled to expire in the next month with the ownership group feature enabled.	• Author • Knowledge base owner and managers • Reviser for the updated and checked-out versions • Ownership group manager and members

Note:
An email notification is sent to a reviser of a knowledge article when the article versioning feature is enabled.

Email notifications for article quality index (AQI) reviews

The email notifications for an article quality index review on knowledge articles are available when your administrator activates the Knowledge Management Advanced plugin (com.snc.knowledge_advanced).

The following table describes the recipient list of notifications for an AQI review on knowledge articles and the associated conditions when a notification is sent.

Recipient list of the email notification for AQI reviews

Notification	Condition	Recipients
KM: AQI on Article	An AQI was performed and submitted on a knowledge article with the ownership group feature disabled.	User (author or reviser) who last updated the article
KM: AQI on Ownership Group Article	An AQI was performed and submitted on a knowledge article with the ownership group feature enabled.	• User (author or reviser) who last updated the article • Ownership group

Note:
An email notification is sent to a reviser of a knowledge article when the article versioning feature is enabled.

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Related topics

- Activate the Knowledge Management Advanced plugin
- Additional plugins for Knowledge Management
- Ownership groups
- Validity of a knowledge article
- Knowledge subscriptions

Set knowledge notification preferences

Set notification preferences for knowledge bases and knowledge articles.

Before you begin

Role required: knowledge

About this task

Users can set notification preferences from the Knowledge menu or from the Knowledge Management Service Portal.

Procedure

1. Navigate to the Notification Settings page.
2. Click the Notification Preferences tab.
3. Click **Knowledge Base** and enable or disable the knowledge base notification options.
4. Click **Knowledge Articles** and enable or disable the knowledge article notification options.

Using the homepage of Knowledge Management v3

The Knowledge Management v3 homepage displays knowledge articles organized by knowledge base and category, as well as featured content and popular articles.

To view the default knowledge homepage, navigate to **Self-Service** > **Knowledge**.

Note:

- The knowledge homepage is not compatible with Internet Explorer 9 or earlier. Using one of these browsers will cause you to be redirected to the legacy knowledge portal.
- The Knowledge v3 home page is not customizable. Use the Knowledge Management Service Portal for an easily configurable user experience.
- Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

If you access knowledge from a service management application, the knowledge homepage for the associate application opens.

Only published and not yet expired knowledge articles (that is the valid do date not yet reached) appear on the homepage.

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From the homepage, you can import a Word document to a knowledge base by clicking **Import Articles**.

Note:
From Madrid, you can import a word document from the Import Articles module available in the Application Navigator. This feature is active by default for customers on Madrid and later releases. Existing customers on release versions prior to Madrid use the Word import functionality on the Knowledge V3 homepage. Upgrade customers use the Word import functionality on the Knowledge V3 homepage by default. If required, add the Import Articles module to the Application Navigator. If you add the module, the **Import Articles** button does not appear on the Knowledge v3 homepage.

You can also create a new article using the **Create An Article** button.

- Import a Word document
- Create a knowledge article from an incident in Service Operations Workspace

Note:
You must have contribute access to at least one active knowledge base, otherwise these buttons do not appear. See Configuration tasks for knowledge managers.

You can select a knowledge base to browse articles within that knowledge base. You can view only knowledge bases you can access.

Articles are organized by category or by tag. Categories are listed alphabetically. You can sort content by most recent update or by number of views.

You can comment on an article. There is no HTML formatting available for comments on the Knowledge V3 homepage.

Existing customers on release versions prior to New York can view knowledge article feedback comments in the following ways.

- On the Knowledge v3 homepage.
- If the Knowledge Management — Service Portal plugin (com.snc.knowledge_serviceportal) is installed, on the Knowledge Service Portal.
- If the Use Live Feed for knowledge feedback property is active, in the Live Feed.

For new customers on New York and later releases, comments can only be viewed in the Knowledge Service Portal.

An administrator can configure the knowledge homepage to display the number of articles within each category. This count includes articles from subcategories. To display the article count, set the *glide.knowman.show_number_on_categories* property to `true`.

Related topics

Define a knowledge article category

Import a Word document to a knowledge base using Knowledge Management v3

Import a Word document to a knowledge base

Search using Knowledge Management v3

Search for knowledge articles from the knowledge homepage using the search bar on the Knowledge Management v3 homepage.

Search results include only articles and questions you are authorized to read. The search results count do not take into consideration any security rules set for the articles. The number of articles

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you can access may be lower than the count displayed in the search results page. Documents that are attached to articles are also listed in the search results.

Note:

- To change how the attachments are displayed in the search results, set the **How to display attachments in Knowledge Search Results** *glide.knowman.search.attachment* property. Attachments can be displayed with a text snippet, link only, or not at all.

  Warning:
  Attachments set to display with a text snippet may cause slowness.

- To use wildcards in your search, navigate to **Contextual Search** > **Search Contexts** > **Knowledge Base Search** and select **Enable wildcard searches**.

Sort knowledge content by relevancy, most recent update, or number of views.

Filter results using the check boxes that appear. Filtering options appear depending on the search text. Knowledge homepage; browsing and searching for articles; viewing articles, providing feedback; posting questions; importing/creating articles

Filtering options

Field	Description
Knowledge Bases	Select a knowledge base to search. You can select only knowledge bases you can access. If you do not select a specific knowledge base, search results include articles and questions from all knowledge bases that you can access. You can also select a knowledge base from the choice list in the search bar. For pinned articles, only those in the selected knowledge base in the corresponding language appear.
Categories	Select one or more knowledge categories. Categories are listed alphabetically.
Authors	Select one or more authors.
Language	The multi-language search feature is available when more than one supported language is enabled. **1.** To enable multi-languages, activate the I18N: Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) or activate one of the internationalization plugins for the language you require. **Note:** Activating internationalization plugins for any of the available languages automatically activates the I18N: Knowledge Management Internationalization Plugin v2 plugin. **2.** To display search results in all available languages simultaneously, enable the *glide.knowman.enable_multi_language_search* property.

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Filtering options (continued)

Field	Description
	a. Navigate to **Knowledge** > **Administration** > **Properties** > **Knowledge Search Properties** > **Enable multi language search** and select the **Yes** check box. **b.** Enter `sys_properties.list` in the filter navigator, search for the property to configure, and in the **Value** field, enter `true`. **Note:** By default, the *`glide.knowman.enable_multi_language_search`* property is not enabled. Search results are displayed based on the language you select in the language filter on the Search page.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Related topics

Knowledge Management properties

Import a Word document to a knowledge base using Knowledge Management v3

Import a Microsoft Word document using Knowledge Management v3 homepage to create a knowledge article.

Before you begin

You must have contribute access for at least one active knowledge base.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

The **Import Articles** button does not appear in the following conditions:

- The Import Articles module is available in the application navigator.

  Note:
  Beginning with Madrid, the Import a Word document feature is enabled by default and the Import Articles module is displayed in the application navigator. The Import a Word document feature isn't enabled automatically for the existing customers who can continue using the **Import Articles** option on the Knowledge Management v3 page. For more information, see Import a Word document to a knowledge base.

- You cannot contribute to any knowledge base.

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Note:
An administrator can control the visibility of the **Import Articles** button by setting the other knowledge property **Hide the 'Import' functionality (button and drag-n-drop) for all users** (*glide.knowman.import.hide_import_functionality*) to true.

Role required: None

About this task

You can import Microsoft Word documents in the .doc and .docx file formats.

Note:
The file extension must be lowercase.

When you import a document, text content from the document is used to create the knowledge article. The articles support all editing functions supported by the TinyMCE editor. All HTML supported by TinyMCE such as tables, lists, and links, as well as styling such as bold and italics, are preserved. Images from the document are added as attachments to the knowledge article and embedded in the article body.

Note:

You can import multiple files at a time. Closing the browser or navigating away cancels any in-progress uploads but does not delete articles created from completed imports.

You cannot import documents to knowledge from mobile devices.

The following styles and elements are preserved when importing a .doc or .docx file into a knowledge base. Styles and elements not included in this list may not be preserved when importing a document.

- Titles
- Headings

  Note:
  Only default heading settings are supported. For any headings and subheadings with numbers, the numbers are not imported.

- Images

  Note:
  Images may not be aligned exactly as in the Word document you import.

- Links

  Note:
  Links are preserved for documents with .docx format only.

- Bold text
- Italic text
- Underlined text
- Ordered and unordered lists

  Note:
  After import, the bullets in an unordered list are replaced with dots.

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- Tables

> **Note:**
> Only default heading settings are supported. Custom heading styles are imported using the default settings for those styles. Table styling and borders are not supported.

Procedure

1. Navigate to **All** > **Self-Service** > **Knowledge**.
2. Select one or more document files and drag onto the knowledge homepage.
3. Select the **Knowledge base** to add the new article to.
   You can select only knowledge bases you can contribute to.
4. **Optional:** Select a **Category** from within that knowledge base.

   > **Note:**
   > Use the category picker to add a category. The picker does not differentiate between the different category levels. You can select a category or sub category and add it to the **Category** field.

5. **Optional:** Select the **Publish** check box to start the publishing workflow for each imported article immediately after the import finishes.
   This check box applies only when importing to v3 knowledge bases and only if the **Show publish checkbox on the knowledge import pop-up** property is set to **Yes** on the Knowledge Management properties form. You cannot automatically publish articles imported to v2 knowledge bases.

   Knowledge v2 articles go into **Draft** state. Knowledge v3 articles go into **Review** or **Published** state, depending on the workflow attached to the knowledge base (Approval Publish or Instant Publish).

6. Select **Import**.

   A new article is created in the selected knowledge base and category using the content from the uploaded document. If you uploaded multiple documents, one article is created for each. If you use knowledge internationalization, the language of the new article is set to the currently selected system language.

   After the upload completes, a popup window appears displaying the number and short description of the newly-created articles. Click an article to view the full record.

   If any errors occur during the upload, a popup window appears to display the error.

Related topics

Import a Word document to a knowledge base

Request a knowledge base

If existing knowledge bases do not fit your needs, you can request a new knowledge base through the service catalog. If the request is approved, you are added as the owner of the new knowledge base.

Before you begin

Role required: none

About this task

If no knowledge base exists that fit your needs, all users can request a new knowledge base.

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Procedure

1. Navigate to **All** > **Self-Service** > **Service Catalog**.
2. Select **Can We Help You?**.
3. Select the **Request Knowledge Base** catalog item.
4. Enter the reason you want the knowledge base, and a name for the knowledge base.
5. Click **Submit**.

What to do next

You are notified when the request is approved or rejected. If the request is approved, you are added as the owner of the new knowledge base. You can then assign managers and manage articles in the new knowledge base.

Knowledge bases created through this request process are inactive by default, so you must activate the knowledge base to make it available for users.

Related topics

Assign a knowledge base manager

Add a knowledge article to featured content

Create a knowledge article

Import a Word document to a knowledge base

Import a Word document to create a knowledge article.

Before you begin

You must have **Can Contribute** access to at least one active knowledge base.

Role required: knowledge

About this task

Beginning with Madrid, the Import a Word document feature is enabled by default and the Import Articles module is displayed in the application navigator. All existing customers will be able to use the **Import Articles** option on the Knowledge Management v3 homepage. For customers who are in versions prior to Madrid can enable the Import a Word document feature, an administrator must first disable the **Import Articles** option on the Knowledge Management v3 homepage by setting the *glide.knowman.import.hide_import_functionality* property to true and adding the Import Articles module to the application navigator.

These styles and elements are preserved when importing a .doc or .docx file into a knowledge base. Styles and elements not included in this list may not be preserved when importing a document.

- Titles
- Headings

> **Note:**
> Only default heading settings are supported. For any headings and subheadings with numbers, the numbers are not imported.

- Images

> **Note:**
> Images may not be aligned exactly as in the Word document you import.

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- Links
- Bold text
- Italic text
- Underlined text
- Ordered and unordered lists

Note:
After import, the bullets in an unordered list are replaced with dots.

- Tables

Note:
Only default heading settings are supported. Custom heading styles are imported using the default settings for those styles. Table styling and borders are not supported.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **Import Articles**.
2. Enter the knowledge base to add the article to.
3. **Optional:** Select a **Category** from within the knowledge base.

   Note:
   Use the category picker to add a category. The picker does not differentiate between the different category levels. You can select a category or sub category and add it to the **Category** field.

4. **Optional:** Select the **Publish** check box to start the publishing workflow for each imported article immediately after the import finishes.

   Note:
   The **Publish** check box appears only when the **Show publish checkbox on the knowledge import pop-up** property is enabled. To enable the property, navigate to **Knowledge** > **Administration** > **Properties** and select the check box for the **Show publish checkbox on the knowledge import pop-up** property.

5. Select one or more Word files to import.
6. Click **Import**.
   An article is created in the selected knowledge base and category using the content from the uploaded document.
   - If you uploaded multiple documents, one article is created for each.
   - If you use knowledge internationalization, the language of the article is set to the system language selected.

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- When the upload completes, a pop-up window displays the number and short description of the articles. Click an article to view the full record.
- If any errors occur during the upload, a pop-up window displays the error.
- If the **Publish** check box is activated, knowledge articles go into **Review** or **Published** state, depending on the workflow attached to the knowledge base.
- If the **Publish** check box is not activated, the knowledge articles go into **Draft** state and are then reviewed before publishing.

Related topics

Import a Word document to a knowledge base using Knowledge Management V3

Use knowledge on mobile devices

All users can access knowledge from mobile devices to search for and view knowledge articles.

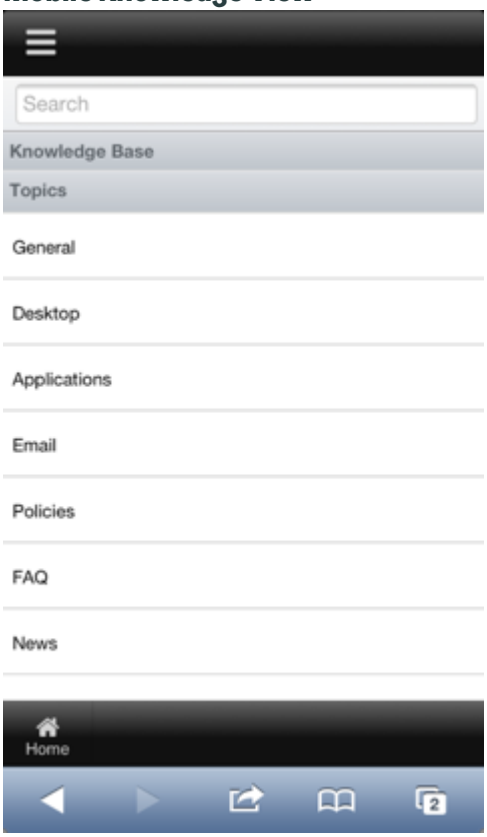
You can also view recently viewed and most popular articles, search for articles, browse articles by category, and provide feedback to knowledge articles from Now Mobile. For information, see Using Now Mobile for Knowledge Management.

Browse knowledge on mobile devices

You can browse knowledge bases using a mobile device.

Navigate to **SELF-SERVICE** > **Knowledge Base**.

Mobile Knowledge View



Browse Knowledge by tapping on a category and browsing articles or subcategories.

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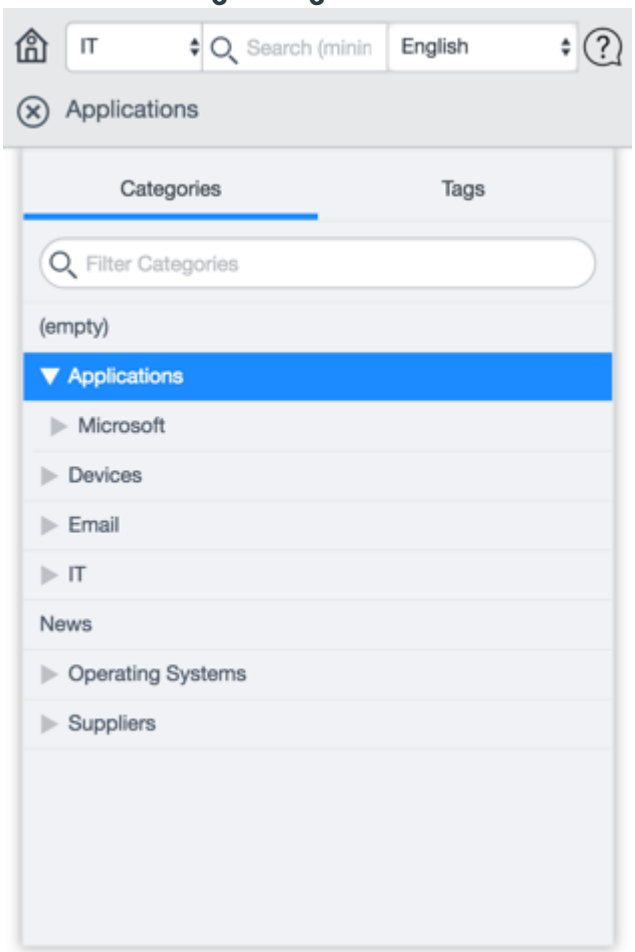
Mobile Knowledge Categories



Note:

Select the desired category and click the close icon (⊗) for the selected category to reflect in the search results.

View knowledge articles on mobile devices

You can read knowledge content using a mobile device.

Tap a title to view the article.

Note:

You cannot edit or add comments to knowledge articles on the mobile interface.

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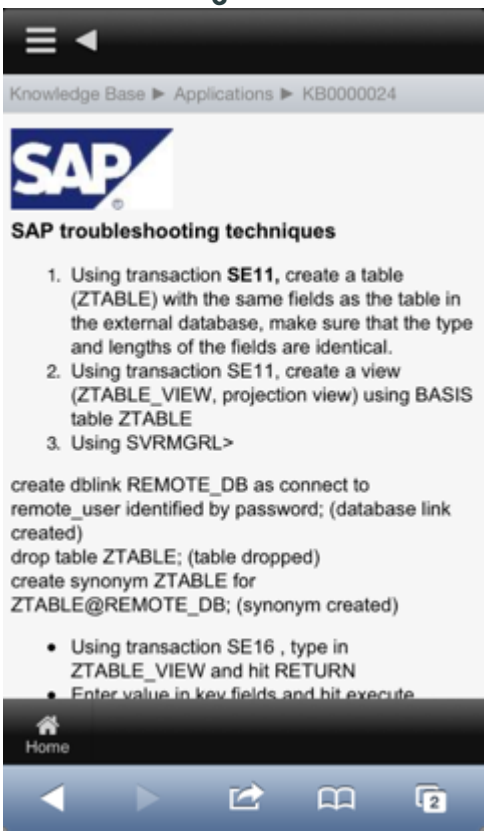
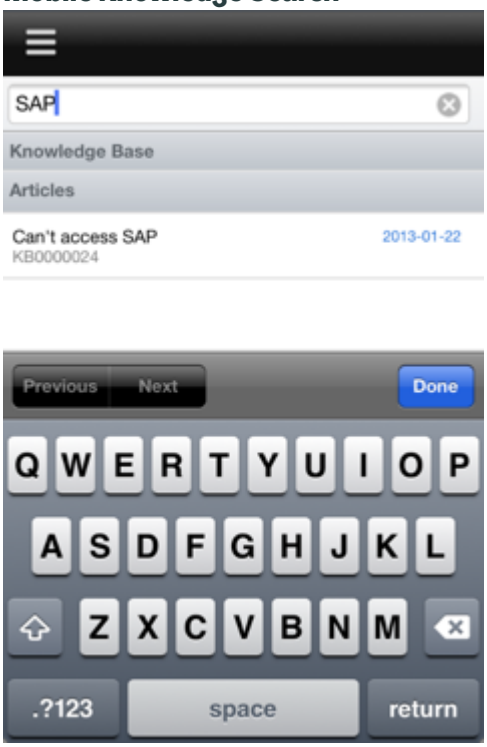
Mobile Knowledge Article View



Search knowledge on mobile devices

Find a specific article by searching on a particular term.

Mobile Knowledge Search



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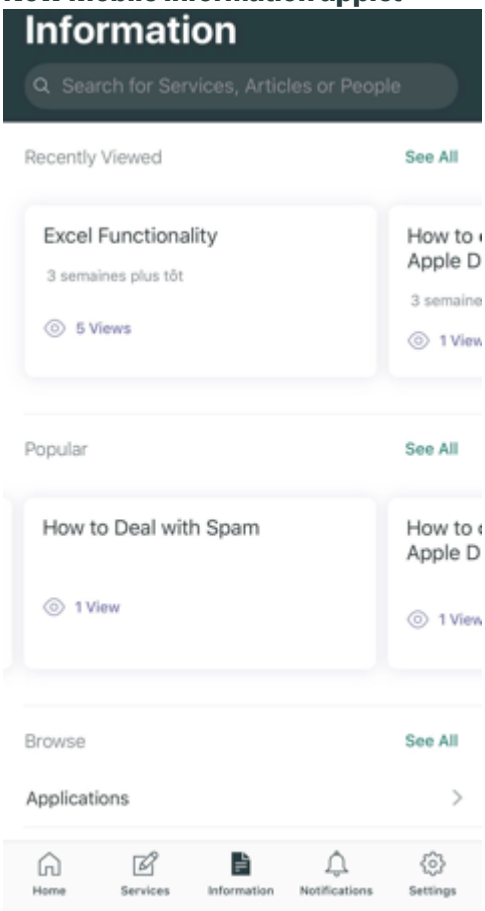
Using Now Mobile for Knowledge Management

Access knowledge articles from anywhere using the Information applet on the Now Mobile app. You can view recently viewed and most popular articles, search for articles, browse articles by category, and provide feedback for articles.

To access articles from the Information applet on the Now Mobile app, you must first download the ServiceNow mobile application on an iOS platform from the Apple App Store or on an Android platform from the Google Play Store.

Now Mobile Information applet



Make sure your administrator has activated the Now Mobile app. For more information, see Now Mobile app.

After you access an article, you can view the author, published date, number of views, and the overall rating details of the article. In addition, you can respond to and evaluate articles and view related items, related articles, and attachments.

Using Now Mobile app, even external users can access and provide feedback to the knowledge articles. For more information about external user functionalities and capabilities, see Mobile external users.

Activation information

The Information applet is available on the Now Mobile app. The ServiceNow Mobile Request - Knowledge Management Screens and Applet Launcher plugin (com.glideapp.knowledge.mobile_requestor) activates the Information applet. The Information applet is activated by default for both new and upgrade customers.

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Related topics

- Configure knowledge bases
- Now Mobile app
- View the most popular or recently viewed articles in the Now Mobile Information applet
- View an article in the Now Mobile Information applet
- Provide feedback for a knowledge article in the Now Mobile Information applet

View the most popular or recently viewed articles in the Now Mobile Information applet

The Information applet on the Now Mobile app enables you to access knowledge articles from a mobile device.

Before you begin

You can specify user criteria for an article to control which users can read the article. If no user criteria is defined for an article, all users can read the article.

Procedure

1. Access your instance using the mobile application.
2. On the Now Mobile app, tap **Information**.
3. Access your recently viewed or the most popular knowledge articles

Information applet article views

Section	Description
Recently Viewed	Up to five of the articles you viewed within the last 30 days.
Popular	Up to five of the most popular knowledge articles. The Now Mobile app homepage includes a similar section that displays up to three of the most popular articles.

Note:
Tap **See All** to view the complete list of articles within the selected section.

Related topics

- Browse articles in the Now Mobile Information applet
- Search for an article in the Now Mobile Information applet
- Control access at the knowledge article level through user criteria

Browse articles in the Now Mobile Information applet

You can browse articles within a category in the Now Mobile Information applet to see articles related to a particular subject or grouping.

Before you begin

You can specify user criteria for an article to control which users can read the article. If no user criteria is defined for an article, all users can read the article.

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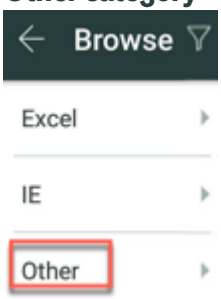
Procedure

1. Access your instance using the mobile application.
2. On the Now Mobile app, tap **Information**.
3. In the Browse section, tap a category from the categories list to view articles and child categories associated with the selected category.

   Note:
   Tap **See All** to view the complete categories list.

4. Tap further categories until you view the articles list associated with the desired category. The articles associated with a parent category are grouped under a dummy child category labeled as **Other**.

   Other category

5. To view an article, tap the article in the articles list.

Related topics

View an article in the Now Mobile Information applet

Control access at the knowledge article level through user criteria

Search for an article in the Now Mobile Information applet

You can search for an article in the Now Mobile Information applet.

Before you begin

You can specify user criteria for an article to control which users can read the article. If no user criteria is defined for an article, all users can read the article.

Procedure

1. On the Now Mobile app, tap **Information**.
2. Tap **Search for Services, Articles or People**, and enter a search term related to the article.
3. Tap the search icon on your app keyboard.
   The app displays search results.
4. Tap **Articles** to view only articles in the search results.
5. Tap an article in the search results to view the article content.

Related topics

View an article in the Now Mobile Information applet

Control access at the knowledge article level through user criteria

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View an article in the Now Mobile Information applet

You can view the author, published date, number of views, and the overall rating details of the article in the Now Mobile Information applet. In addition, you can respond to and evaluate articles and view related items and related articles.

Before you begin

You can specify user criteria for an article to control which users can read the article. If no user criteria is defined for an article, all users can read the article.

Procedure

1. On the Now Mobile app, tap **Information**.
2. Search for or select the desired article from the sections available in the Information applet. The article page displays the content and associated information for the selected article such as author, published date, number of views, and the overall rating. The page also displays the following sections:

UI component	Description
Related Articles	Up to five related articles that are manually mapped, automatically predicted, or both. The manually mapped articles appear first in the Related Articles section. This section appears only when related articles are available for the selected article.
Related Items	Up to five related items that are manually mapped. This section appears only when related items are available for the selected article.
Attachments	Files attached to an article. This section appears only when the attachments are available for the selected article. To view a file, tap the file name. If an article contains more than two attachments, tap the number of attachments indicator and then tap the file name.

Note:
Tap **See All** to view the complete list of articles within the Related Articles or Related Items section.

3. **Optional:** Respond to and evaluate the article.

Related topics

Provide feedback for a knowledge article in the Now Mobile Information applet

Control access at the knowledge article level through user criteria

Provide feedback for a knowledge article in the Now Mobile Information applet

You can contribute to feedback on knowledge articles by rating an article, marking an article as helpful or not helpful, and posting and replying to comments for an article in the Now Mobile Information applet.

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Before you begin

You can specify user criteria for an article to control which users can read the article. If no user criteria is defined for an article, all users can read the article.

Procedure

1. On the Now Mobile app, tap **Information**.
2. Select the desired article.
3. Contribute to the article feedback by rating it, marking it as helpful or not helpful, or leaving a comment.

Action	Description
Rate the article	Tap the star icons displayed on the article to indicate its effectiveness on a scale of 1 to 5. For ratings between 1 to 3 stars, a feedback task is automatically created for the article and assigned to the author or ownership group, as configured.
Mark an article as helpful or unhelpful	Tap the helpful icon ( ) or the not helpful icon ( ).
Enter your comment	Enter a comment in the **Type your comment here** box and tap **Submit**.
View all comments and replies posted for the article	Scroll down to the Comments section.
Like a comment on the article	Underneath a comment, tap the like icon ( ).
Reply to a comment on the article	Underneath a comment, tap the reply icon ( ), enter your comment in the text box that appears, and then tap **Submit**.
Delete any previous comments or replies you posted earlier	Go to a comment or reply, and then tap the delete icon ( ). If a message appears, tap **OK**. Only users who have posted the comment, knowledge administrators, and knowledge owners can delete a comment.
View an attachment to a comment	View files, if available, attached to a comment. To view a file, tap the file name. If a comment contains more than two attachments, tap the number of attachments indicator and then tap the file name.

Related topics

View an article in the Now Mobile Information applet

Control access at the knowledge article level through user criteria

Manage ownership groups

Create ownership groups and associate them to knowledge articles. Knowledge group managers or knowledge administrators can edit ownership groups.

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Before you begin

The Knowledge Management Advanced plugin (com.snc.knowledge_advanced) must be activated.

Role required: Users with the knowledge_domain_expert or knowledge_admin roles can create ownership groups.

Users with the knowledge_group_manager or knowledge_admin roles can edit ownership groups.

About this task

Create an ownership group by adding members and a manager. Knowledge administrators approve ownership groups.
When knowledge articles are created, ownership groups can be associated to them. Ownership groups manage article approvals and feedback and can edit and retire knowledge articles that they are associated with.

Knowledge group managers can edit ownership groups managed by them by adding or removing members without the need for approval. They cannot change the manager assigned in their groups. Only knowledge administrators can reassign managers.

Procedure

1. Navigate to **All** > **Knowledge** > **Ownership Groups** > **Manage Group**.
2. To create an ownership group, from the Request Type list, select **Create Ownership Group**.

   Note:
   To edit an existing ownership group, from the Request Type list, select **Edit Ownership Group**.

3. Fill in the fields on the form.

Manage Knowledge Ownership Group form

Field	Description
Name	Name of the ownership group.
Group email	An email address for the ownership group. Emails are sent to group members in these cases. ○ Activity on articles they are associated with, for example, comments. ○ Article quality checks (AQI) performed on articles they are associated with. If no group email is defined, emails are sent to individual group member emails.
Description	Description that defines the ownership group.
Manager	Manager for the ownership group.
Group members	Members of the ownership group.

4. Click **Order Now**.

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The ownership group is sent to the knowledge administrator for approval. Once approved, the ownership group is ready to use and associate to a knowledge article.

Note:
You can also create an ownership group from an existing group.

a. Navigate to **System Security** > **Users and Groups** > **Groups**.

b. Click a group.

c. In the **Type** field, enter `Knowledge`.

Note:
If the **Type** field does not appear on the form, configure the form layout to add it.

d. In the **Manager** field, enter a manager and add the role knowledge_group_manager.

e. In the Roles related list, click **Edit** and add the role knowledge_group_member to the group.

Use article versioning

Use article versioning to create and maintain multiple versions of a knowledge article.

Manually update customized files

If you have customized any of the files that are updated as part of the Knowledge Management Advanced Installer plugin, these files are skipped during plugin activation and must be updated manually.

Manually update your customization to include the article versioning-related changes.

- Add the **Version** field to the Knowledge form layout and the Knowledge list view, if it is not already present.
- Add the **outdated** choice to the **Workflow** choice list field on the Knowledge form, if it is not already present. Keep the value as **outdated** because of dependencies that article versioning functionalities have on this choice.
- Update the **Knowledge** > **My Flagged** and **Self-Service** > **My Knowledge Articles** modules to include the following condition in the **Filter** field, if these modules do not already reflect this change: **Revised by is (dynamic) me**.

If you have customized any of the Knowledge Management Overview dashboard reports, these files are also skipped during plugin activation and must be updated manually.

Check out a published article and create a new version

Create a new version of a knowledge article by checking out the latest published version.

Before you begin

Roles required: knowledge owner, knowledge manager, or knowledge administrator

About this task

You cannot check out a published article unless there is already a checked out version. If a version has been checked out, the **Checkout** button does not appear on the Knowledge form header and you cannot edit the knowledge article. To make changes, you must first publish the knowledge article.

When you check out an article, the default value of **Valid to** field of the article is derived from the **Article Validity** field configured for the knowledge base (see Create a knowledge base). If the **Article Validity** field is blank, the date in the **Valid to** field date is set to January 1, 2100. An article author or editor can select whether to keep or change the default **Valid to** date.

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When you check out an article, attachments from the article's base version are copied into the new article version and relative paths to these attachments are also updated.

Note:
For article versions that were created in the previous releases, the relative paths to the attachments may not be updated. To update them, activate and run the *Fix attachment links on article versions* fix script.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **Published**.
2. Select the desired article from the list.
3. Click **Checkout** in the Knowledge form header.
   The system creates a new version of the knowledge article and displays a message to the user. The article number for the new version remains the same, the version number is increased by 0.01, and the state changes to **Draft**.
4. Make your changes and click **Publish**.
   The new version of the article is added to the Knowledge list and to the **Article Versions** related list on the Knowledge form.

Revert an outdated article to the current state

Use an outdated version of an article to create a new version.

Before you begin
Roles required: knowledge base owner, knowledge_manager, knowledge_admin

About this task
This action is available for earlier published version that have a state of **Outdated** and only when there is no checked out version. If a version has been checked out, the **Make this current** button does not appear on the Knowledge form header.

Procedure

1. Navigate to **Knowledge** > **Articles** > **All**.
2. Open an article in the **Outdated** state.
3. Click **Make this current** in the Knowledge form header.
   The system displays the Knowledge form. The version number increments to the latest version number plus 0.01 and the state changes to **Draft**. For example, if the latest published version of an article is 3.0 and you select the outdated 1.0 version to become the current version, the version number increments to 3.01.

View all versions of an article

View a list of all available versions for a selected knowledge article and then view the selected version in a new tab.

About this task
The list of all available versions for a selected knowledge article is displayed in the **Article Versions** related list on the Knowledge form. Users with read access can see major versions. Users with contribute access can see major and minor versions.

Procedure

1. Navigate to **Knowledge** > **Articles** > **All**.
2. Open the desired article.

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3. Click the **Article Versions** tab to display the related list.
4. Click **Version** to display the desired article version in a new tab.
5. If desired, click the **View Version** related link to see the article view page.

Compare two versions of an article

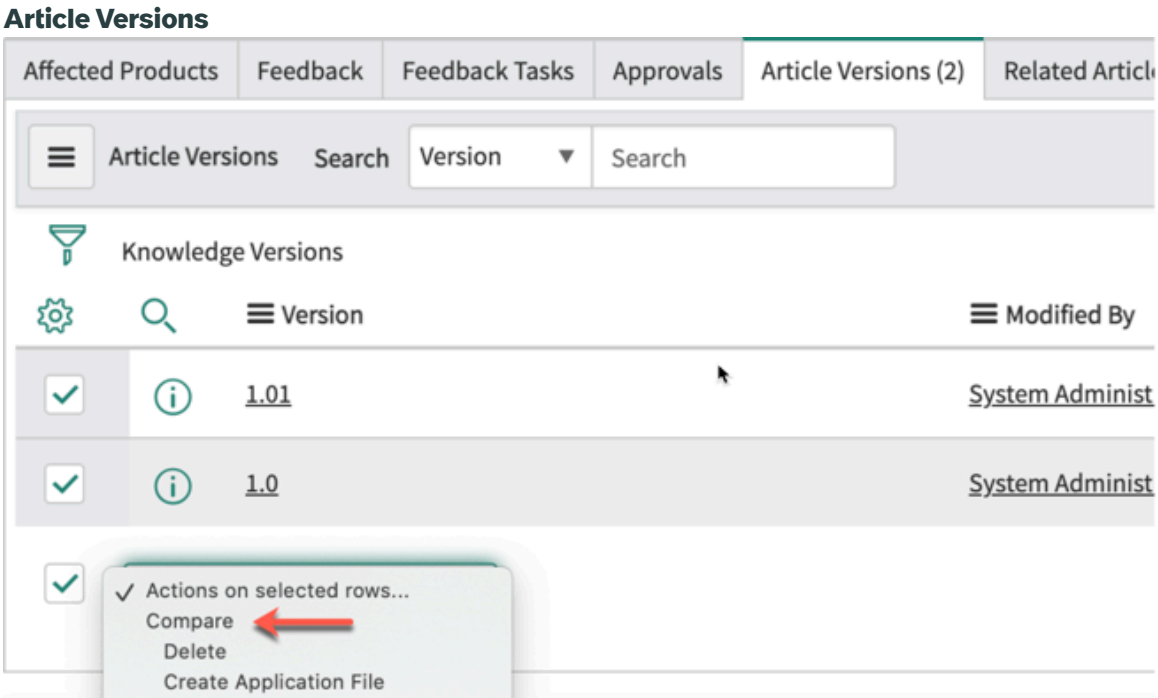
Select and compare two versions of a knowledge article.

Before you begin
Role required: knowledge_manager, knowledge_admin

Note:
For better comparison experience of the knowledge article versions, see Compare knowledge article versions in Agent Workspace.

Procedure

1. Navigate to a **Knowledge** > **Articles** > **All**.
2. Click a knowledge article with multiple versions.
3. In the Article Versions related list, select the check boxes for the two versions of the article to compare.



4. In the Actions on selected rows list, select **Compare** from the list.
The Compare versions page opens and lists the fields (including Article body) for the selected article versions in a side-by-side format. Differences between the two article versions are highlighted.

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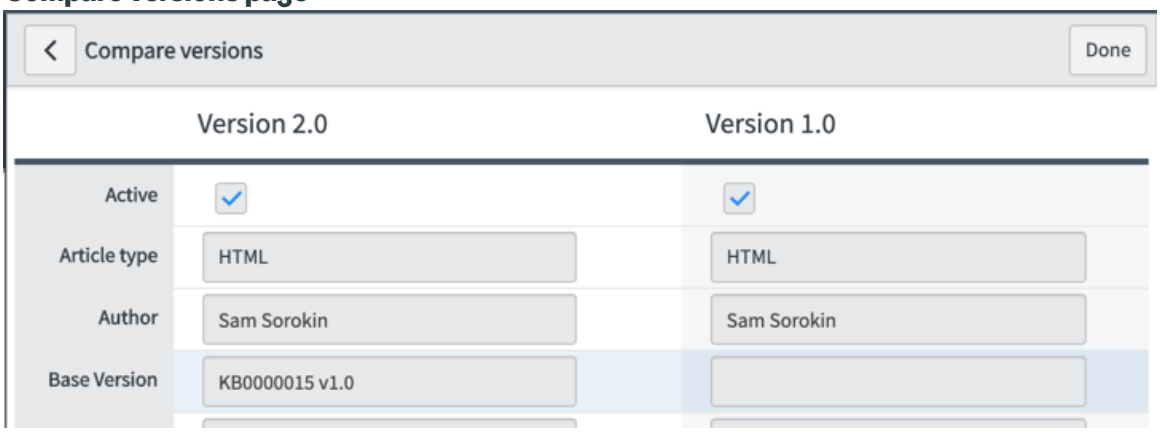
Compare versions page



5. Click **Done** to return to the Knowledge form.

Retire a versioned article

You can retire the latest published version of a knowledge article. Retiring a knowledge article doesn't create a version. It simply marks the article as **Retired**.

Before you begin

Role required: knowledge administrator, knowledge manager, and latest publisher of the versioned knowledge article (not available for kcs_candidate or kcs_contributor)

About this task

You can only retire an article, which has no checked out version. If a version has been checked out, the **Retire** button doesn't appear on the Knowledge form header.

Note:
For the Knowledge - Approval Retire workflow, this happens only when the retire request is approved.

You can still access outdated articles that have been attached to incidents by navigating to the article view page with the sys_id of the article. Outdated articles include a message that an updated article is available.

If versioning is disabled, only the latest version of the article is shown in search results and list views.

Retired knowledge articles can't be searched by external users or customers. To reuse a retired article, create an article with the same content, which is published once approved.

Beginning with the Utah release, you can give a replacement article while retiring a knowledge article. When the retired article is accessed, you will automatically be redirected to the replacement article with a display message `The article KBxxx is retired and has been replaced with the knowledge article KBxxx`. If no replacement article is available, the page displays the message `Knowledge record not found`.

- Article with replacement returns a 301 code.
- Article without any replacement returns a 404 code.
- By default, the *`glide.knowman.enable_article_replacement_on_retire`* system property is set to true to give a replacement article for a retired article. The setup to redirect an article to a replacement article is set by default.

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Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **Published**.
2. Select an article.
3. Click **Retire** in the Knowledge form header.
   The system returns to the Knowledge list. The state of the article changes to **Pending retirement** and the state of previously published versions change to **Outdated**.

> **Note:**
> You can't check out or edit a retired article.

Result
The selected article is retired and can be accessed from **Knowledge** > **Articles** > **Retired**

Disable the article versioning feature

Users with the system administrator role can disable the article versioning feature by setting a property.

Before you begin
Role required: admin

About this task
The **Enable article versioning feature**(glide.knowman.versioning.enabled) property controls the article versioning feature. Setting this property to **false** disables the article versioning feature. Once disabled:

- The **Version** field is removed from the Knowledge form. The **Version** column remains on the Knowledge list and can be removed manually.
- The **Article Versions** related list is removed from the Knowledge form.
- The **Recall**, **Checkout**, and **Make this current** buttons are removed from the Knowledge form.
- Outdated articles are removed from Knowledge list views.
- The version history does not appear on the article view page.

Articles continue to be versioned in the background. Minor versions are incremented until an article is published and then the version number is increased to the next major version.

Users can still access outdated articles that have been attached to incidents. Outdated articles include a message that an updated article is available.

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Properties**.
2. Locate the **Enable article versioning feature** property in the Article Versioning Properties section.
3. Click the check box to disable the property.
4. Click **Save**.

Using knowledge blocks

Use knowledge blocks to simplify knowledge authoring for writers and knowledge consumption for readers.

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Create a knowledge block

Create or modify a knowledge block to define a reusable piece of content that can be inserted into knowledge articles in a knowledge base. The knowledge block is secured by user criteria, which controls what users, groups, roles, companies, locations, or departments can read or not read the content in an article or search, enabling users to more easily view content that is relevant to them.

Before you begin

Activate knowledge blocks

Role required: user must have contributor access to the knowledge base.

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge Blocks** > **Create New**.
2. Click **New** or open a record.
3. Fill in the fields on the form.

Knowledge Block form

Field	Description
Number	This field is automatically set to a knowledge block number.
Knowledge base	Name of the knowledge base. The knowledge blocks feature must be enabled for each knowledge base that you plan to create blocks. See Enable knowledge blocks for each knowledge base.
Category	Name of the knowledge category or subcategory.
Ownership Group	Ownership group for the knowledge block. This field appears when the ownership groups feature is enabled. Knowledge blocks can be used with or without the ownership groups feature. To learn more about ownership groups, including how to enable the feature, see Ownership groups.
Can read	User criteria to apply for read access at the knowledge block level. User criteria set at the knowledge base and knowledge block level controls which users can read or not read block content within an article. To learn more about selecting user criteria for a knowledge block, see Select user criteria for a knowledge block.
Cannot read	User criteria to apply for cannot read access at the knowledge block level. User criteria set at the knowledge base and knowledge block level controls which users can read or not read block content within an article. To learn more about selecting user criteria for a knowledge block, see Select user criteria for a knowledge block.
Valid to	Date that the knowledge block expires. After the valid to date:

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Field	Description
	○ Knowledge article viewer will no longer display expired knowledge block content in the associated knowledge article. ○ Search will no longer return knowledge articles if the keywords are contained in the expired blocks.
Short Description	Description of the knowledge block.
Text	Text of the knowledge block.
Version	This field is automatically set to a version number when the article versioning feature is enabled. Knowledge blocks can be used with or without the article versioning feature. To learn more about article versioning, including how to disable the feature, see Article versioning.
Article type	This field is automatically set to HTML. **Note:** Knowledge blocks are only supported with HTML knowledge articles.
Workflow	This field is automatically set to the publication state of the block, such as Draft, Published, or Retired.
Source task	Not applicable.

4. Click **Save** or **Update** to create or update the block.
5. Click **Publish** to publish the block.

Note:
Any additional steps required to publish the knowledge block, such as approvals, depend on the publishing workflow for the knowledge base. See Knowledge workflows for more information.

What to do next
After the knowledge block is published, you can add the block to an article within the knowledge base.

Select user criteria for a knowledge block

Control which users can read or not read knowledge block content within an article in a knowledge base by setting user criteria at the knowledge base and knowledge block level. As a knowledge contributor, you can apply user criteria at the knowledge block level.

Before you begin
Activate knowledge blocks

Role required: knowledge_admin or admin

Procedure
1. Navigate to **Knowledge** > **Knowledge Blocks** > **All**.
2. Open a knowledge block.

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3. Apply the desired user criteria for the **Can Read** and **Cannot Read** fields.

Name	Description
Can Read	User criteria to apply for read access at the knowledge block level.
Cannot Read	User criteria to apply for cannot read access at the knowledge block level.

Note:

- You can use existing or create new user criteria records. To create a new record, see Create a user criteria record in Knowledge Management.
- If a user meets any **Can Contribute** criteria at the knowledge base level, they can read all knowledge block content, regardless of the **Can read** and **Cannot read** criteria set at the knowledge block level.
- If a user meets any **Cannot read** criteria at the knowledge block level, they cannot read the block content, regardless of the **Can read** criteria set at the knowledge block level.
- If a user has access to knowledge article and doesn't have access to one or more blocks within article then user can still read the content but without specify block content.

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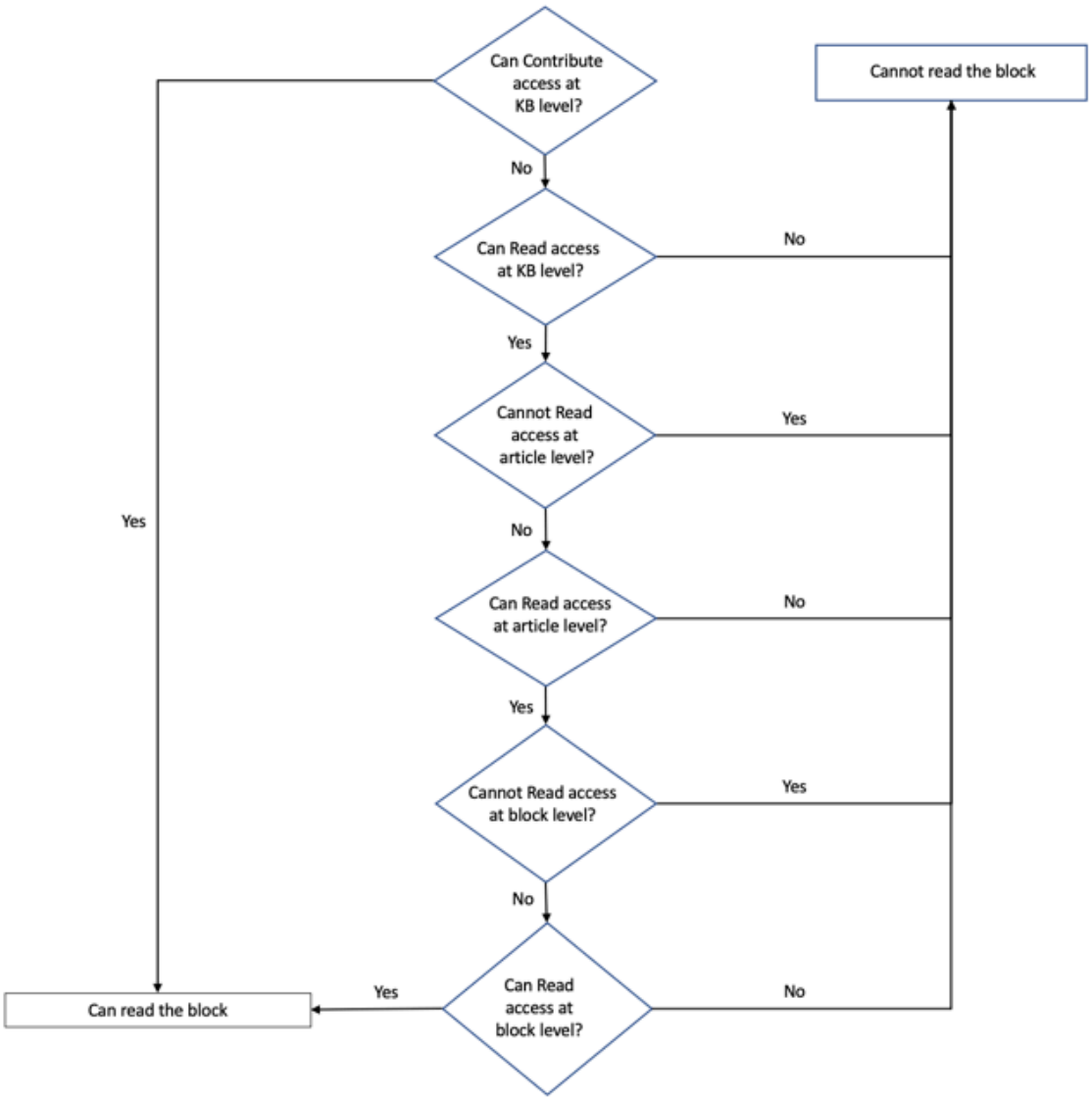

4. Right-click the form header and click **Save**.

What to do next

- To finish and publish the block, see Create a knowledge block.
- To add the block to an article, as well as preview the article by impersonating different users, see Add knowledge blocks to a knowledge article.

Retire a knowledge block

You can retire a published knowledge block so that it's no longer available for users to view or search.

Before you begin

Role required: user must have contributor access to the knowledge base.

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge Blocks** > **Published**.
2. Open the applicable record.

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3. Select **Retire** to retire the knowledge block.

Note:

- Starting from the Zurich release, you can retire the knowledge block attached to an article by setting the (*glide.knowman.allow_retire_block*) system property to true.
- Any additional steps required to retire the knowledge block, such as approvals, depend on the workflow for the knowledge base. See Knowledge workflows for more information.
- A knowledge block can only be deleted if it's not being used in any knowledge article, including any retired article or previous version of an article.

Result

The retired knowledge block is no longer visible in the article.

Add knowledge blocks to a knowledge article

You can insert one or more knowledge blocks into a knowledge article within a knowledge base. Each knowledge block is secured by user criteria, which controls who can read or not read the content in an article.

Before you begin

Activate the Knowledge Management Advanced plugin

Role required: user must have contributor access to the knowledge base.

Procedure

1. Navigate to **All** > **Self-Service** > **My Knowledge Articles**.
2. Click **New** or open a record.
   On clicking **New**, you are provided options to select an article template. The article templates appear when you activate them in the **Knowledge** > **Article templates**.
3. Select an article template.

Note:
You can add or remove knowledge blocks in more than one HTML field of any article template including custom templates.

4. Fill in the fields on the form, as appropriate.
   For more details on creating a knowledge article, see Create a knowledge article from an incident in ITSM Agent Workspace.

Note:
Knowledge blocks are only supported with HTML knowledge articles. Make sure that the **Article type** field is set to **HTML**.

5. In the article body, click where a block needs to be inserted and then click **Add Blocks**.

   If the **Add Blocks** button is not visible, make sure that the knowledge blocks feature is enabled for the knowledge base that the article is in. See Enable knowledge blocks for each knowledge base for more information.

Note:
Blocks can be added to only the text field.

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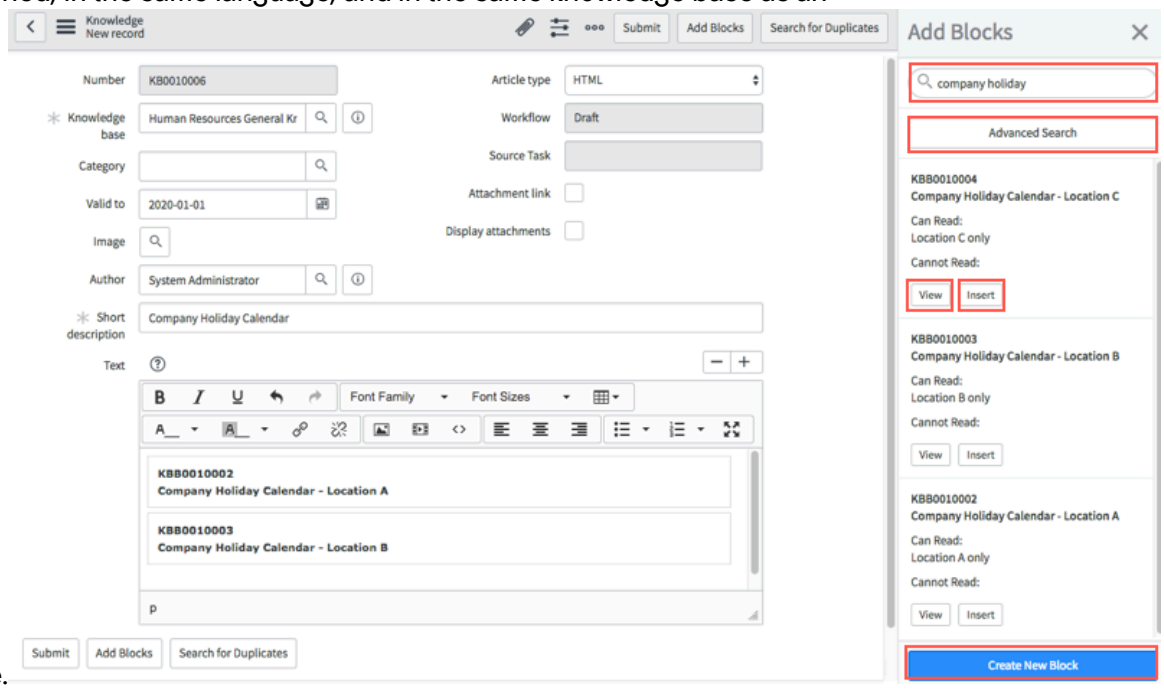
In the **Add Blocks** side panel, you can search for, do an advanced search, view, and insert knowledge blocks into the article. To use condition builder with advanced search, see Condition builder. You can also create blocks directly from the side panel.

- You can configure the number of search results displayed in the **Add Blocks** side panel using the *glide.knowman.add_blocks.search_results* property. By default, the minimum number of search results displayed is 6 and the maximum number of search results displayed is 25. See Knowledge properties for more information.
- If there are knowledge blocks you cannot find, make sure that the blocks are published, in the same language, and in the same knowledge base as an article.



6. **Optional:** Rearrange knowledge block in the article body.

Example

(Optional) The following GIF shows an example of a user moving a knowledge block within an article using a keyboard.

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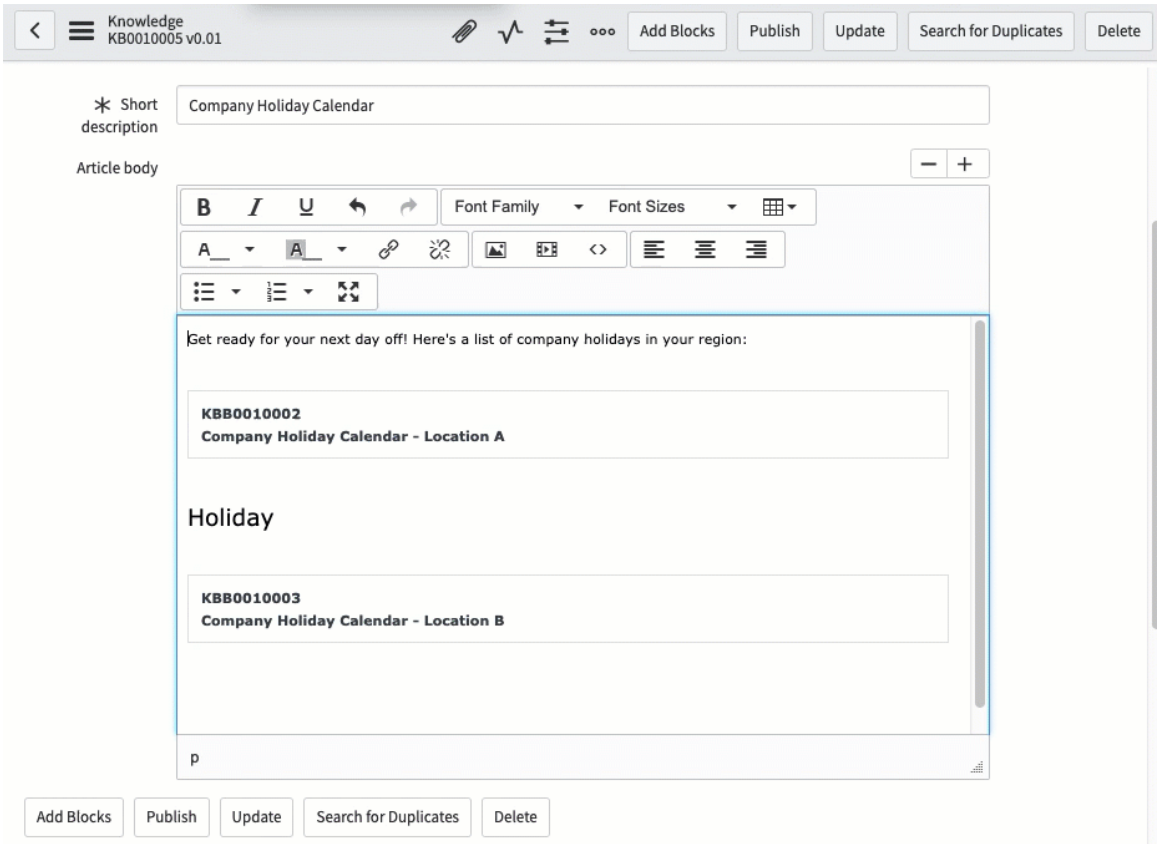

7. Click **Save** or **Update** to create or update the article.

> **Note:**
> You can preview the article with the blocks by user or, if published, date. See Preview a knowledge article with knowledge blocks for more information.

8. Click **Publish** to publish the article.

> **Note:**
> Any additional steps required to publish the knowledge article, such as approvals, depend on the publishing workflow for the knowledge base. See Knowledge workflows for more information.

Preview a knowledge article with knowledge blocks

Preview a knowledge article with knowledge blocks by user or, if published, by date. For an unpublished article, you can preview the article by user by impersonating different users to see how the article displays or hides block content (based on the user criteria set at the knowledge base and knowledge block level). For published articles, you can preview the article by both user and date to see how the article appears in past versions for different users.

Before you begin

Role required: user must have contributor access to the knowledge base.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles**, and open one of the modules, such as **Unpublished** or **Published**.
2. Open the knowledge article with knowledge blocks.
3. In the **Related Links** section, click **Preview Article with Blocks**.

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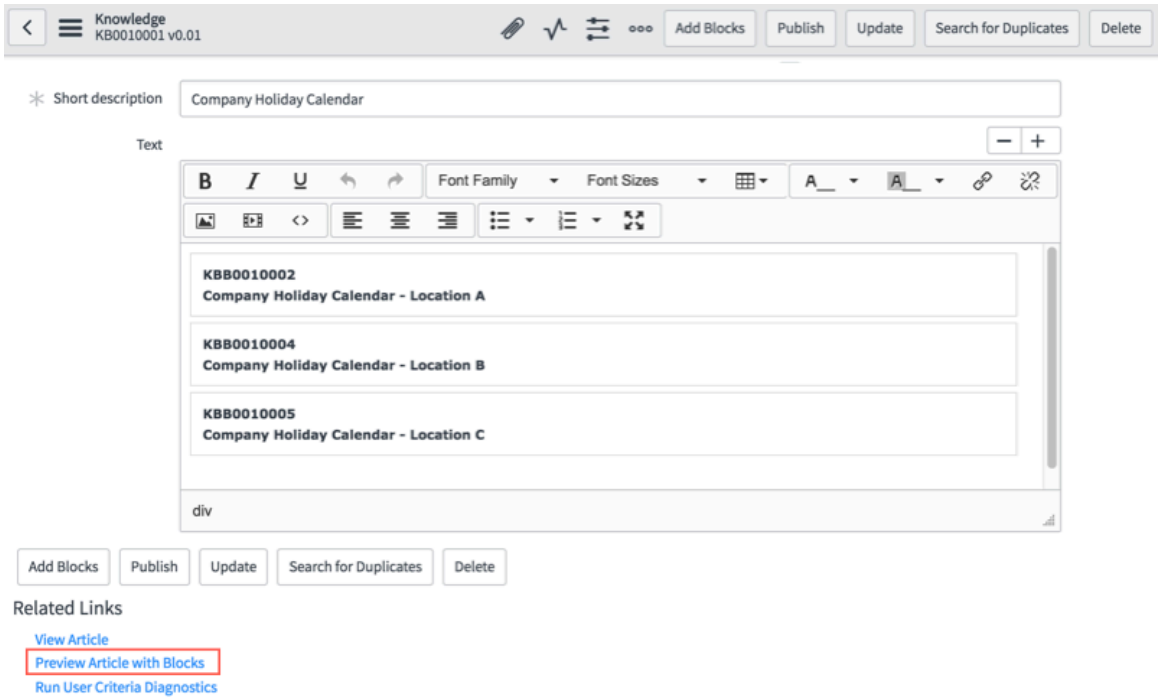

4. Preview the article as one of the following.

Knowledge blocks authoring in Agent Workspace

Reuse content by creating, editing, and publishing knowledge blocks in Agent Workspace.

You can perform the following knowledge blocks-related tasks in Agent Workspace:

- Create a knowledge block for a knowledge base.
- Manage all unpublished and published knowledge blocks authored by you.
- Add knowledge blocks to a knowledge article.

  When adding a knowledge block to a knowledge article, you can also add knowledge blocks to any fields associated with an article template if used for an article.

- Retire a knowledge block not used in any knowledge articles.

View a knowledge block in Agent Workspace

View a knowledge block in Agent Workspace, including the block number, short description, and block content.

Before you begin

You must have read access to the knowledge base that stores the knowledge block you want to view.
Role required: agent_workspace_user and knowledge

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. View knowledge blocks authored by you or by other people.
   - View all blocks by navigating to **Lists** > **Knowledge Blocks** > **All**.
   - View blocks authored by you by navigating to either **Lists** > **Knowledge Blocks** > **Published** or **Lists** > **Knowledge Blocks** > **Unpublished**.

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3. Click the link to the knowledge block that you want to view.
4. **Optional:** View another version of the knowledge block by selecting the version in the Version list.

> **Note:**
> The Version list appears only when the article versioning feature is enabled. For more information, see Article versioning.

Result

The selected version of the knowledge block opens within Agent Workspace. Any earlier version of the knowledge block is indicated as outdated. When viewing an earlier version, click the version number of the knowledge block to view a list of all versions.

Related topics

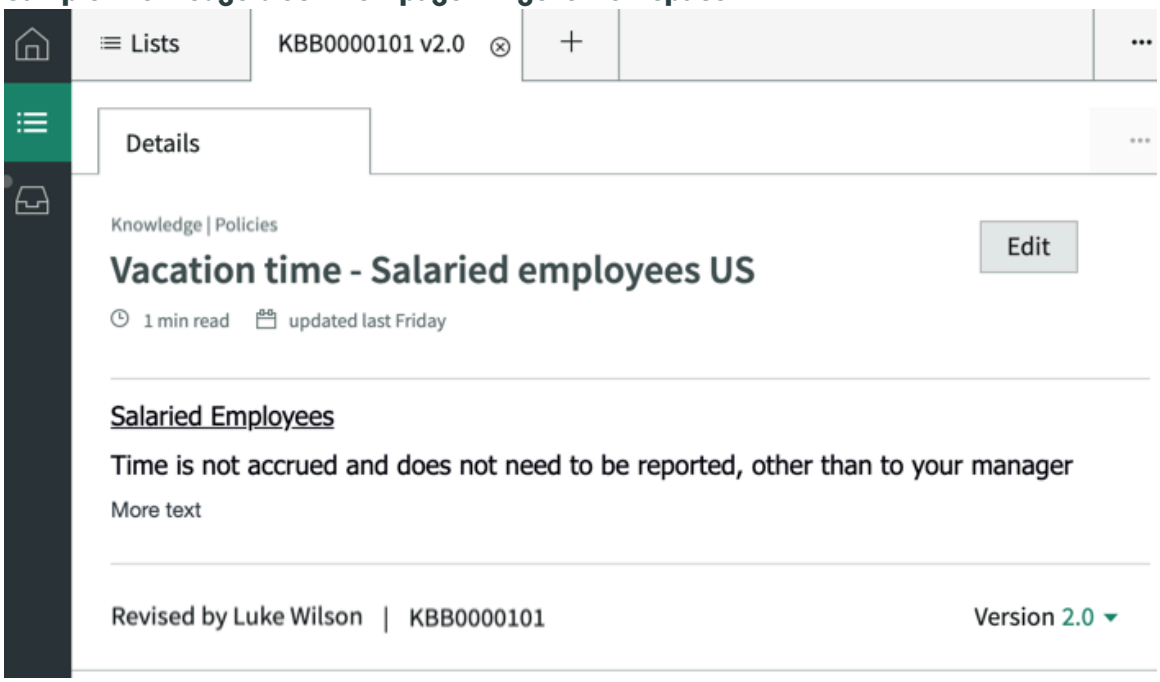
- Knowledge block details displayed in Agent Workspace
- Create a knowledge block in Agent Workspace
- Edit a knowledge block in Agent Workspace
- Publish a knowledge block in Agent Workspace

Knowledge block details displayed in Agent Workspace

View the details of a knowledge block in Agent Workspace.

The knowledge block view page in Agent Workspace provides several details about a displayed block.

Sample knowledge block view page in Agent Workspace



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Article information displayed on the knowledge block view page in Agent Workspace

Details	Description
Knowledge base	Knowledge base that stores the knowledge article and the article category. In the figure, Knowledge is the knowledge base and Policies is the knowledge block category.
Read time	Average time to read the knowledge block, which can help you decide whether you have time to read the block. The read time is calculated based on an average reading speed of 200 words per minute. For blocks in languages such as Chinese, Japanese, and Korean, the read time is calculated based on an average speed of 500 characters per minute. If images are present in an article, the read time is calculated using the following rules: • For the first image add 12 seconds, for the second image add 11 seconds, and so on. • If there are more than 10 images, after the tenth image add 3 seconds for each image.
Last updated time	Last time the knowledge block was updated in number of days for the current week, number of weeks, or number of years.
Knowledge block content	Text and images in the knowledge block.
Authored by	Author of the knowledge block. This field appears only in the first version of a knowledge block.
Revised by	User who revised the knowledge block. This field appears if a knowledge block was later edited.
Knowledge block number	Unique number automatically assigned to the knowledge block. In the figure, KBB0000101 is the block number.
Version	Selected version of the knowledge block. This field appears when the article versioning feature is enabled. In the figure, 2.0 is the selected version of the knowledge block.

Related topics

- View a knowledge block in Agent Workspace
- Create a knowledge block in Agent Workspace
- Edit a knowledge block in Agent Workspace
- Publish a knowledge block in Agent Workspace

Create a knowledge block in Agent Workspace

Create a knowledge block for a knowledge base in Agent Workspace to reuse a piece of content in knowledge articles in that knowledge base.

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Before you begin

- Enable the knowledge blocks feature for the knowledge base where you plan to create blocks. For more information, see Enable knowledge blocks for each knowledge base.
- You must have contribute access to the knowledge base within which you want to create the knowledge block.

Role required: agent_workspace_user and knowledge

About this task

You can also create blocks when accessing an article panel. For more information, see Add a knowledge block to a knowledge article in Agent Workspace.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. **Optional:** Check whether a knowledge block on this subject is already available.
   a. Navigate to **Lists** > **Knowledge Blocks** > **All**.
   b. Set a filter to search for possible matching knowledge blocks.
      - Click a column header. Based on the data type included in the column, in the Filter section, select the filter options or enter the filter conditions you want to apply. For example, for the Workflow column, you can select the following states:
        - Draft
        - Review
        - Scheduled for publish
        - Published
        - Pending retirement
        - Retired
        - Outdated
      - Click the show filter panel icon ( ), and click **Advanced view**. In the Advanced view dialog box, specify conditions in the **All of these conditions must be met** field and click **Update**.
3. Click **New** in a Knowledge Blocks list.
4. On the Knowledge Block form, fill in the fields.

Field	Description
Number	Unique number for identifying the knowledge block. This field is automatically populated.
Knowledge base	Name of the knowledge base to which you are adding the knowledge block.
Category	Name of the knowledge category or subcategory associated with the knowledge base.

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Field	Description
Ownership Group	Ownership group for the knowledge block. This field appears when the ownership groups feature is enabled (see Ownership groups). **Note:** Knowledge blocks can be used without the ownership groups feature.
Can Read	User criteria to apply for read access at the knowledge block level. **Note:** User criteria set at the knowledge base and knowledge block level control which users can read block content within an article. (For more information, see Select user criteria for a knowledge block.)
Cannot Read	User criteria to apply for cannot read access at the knowledge block level. **Note:** User criteria set at the knowledge base and knowledge block level controls which users can read block content within an article. (For more information, see Select user criteria for a knowledge block.)
Valid to	Date that the knowledge block expires. Once the valid to date has passed: ○ The Knowledge article view page no longer displays expired knowledge block content in the associated knowledge article. ○ Knowledge article searches no longer return knowledge articles if the keywords are contained only in the expired blocks.
Short description	Description of the knowledge block.
Article body	Content of the knowledge block.
Version	Version number of the knowledge block. This field is automatically set to a version number when the article versioning feature is enabled. **Note:** Knowledge blocks can be used without the article versioning feature. To learn more about article versioning, including how to disable the feature, see Article versioning.
Article type	Markup language used for formatting the block. This field is automatically set to HTML because

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Field	Description
	Note: knowledge blocks are supported only with HTML knowledge articles.
Workflow	Publication state of the block. This field is automatically set to the publication state of the block, such as Draft, Published, or Retired.

Note: You can ignore the **Source Task** field, which is not used.

5. Click **Save**.
   The knowledge block is saved and appears in the Unpublished list of Knowledge Blocks in Agent Workspace and additional functionality becomes available on the form.
6. **Optional:** Publish the block by clicking **Publish**.

   (Optional) A knowledge block is published depending on the workflow setting of its knowledge base.

   - **Knowledge - Instant Publish**: The knowledge block is immediately published.
   - **Knowledge - Approval Publish**: The knowledge block is published on approval completion.

   When published, your knowledge block appears in the Published and All lists under Knowledge Blocks in Agent Workspace. If the article versioning feature is enabled, the version number of the knowledge block is incremented.

Related topics

Edit a knowledge block in Agent Workspace

Edit a knowledge block in Agent Workspace

Edit knowledge blocks within a knowledge base in Agent Workspace to update the reused content across articles within the knowledge base.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge block you want to edit. By default, the knowledge block doesn't show attached files and it only shows as a link.
Role required: agent_workspace_user and knowledge

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge Blocks** > **All**.
3. Click a knowledge block link.
4. Modify the fields on the Knowledge Block form.

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- For an unpublished knowledge block, the Knowledge Block form opens when you select the article.
- For a published knowledge block, click **Edit** to access the Knowledge Block form.

> **Note:**
> If the article versioning feature is enabled, you can edit only the latest version of a knowledge block. Click **Checkout** after you click **Edit**.

5. Click **Save**.
   The knowledge block is saved and appears in the Unpublished list under Knowledge Blocks. If the article versioning feature is enabled, the version of the knowledge block is incremented by 0.01.
6. **Optional:** Publish the knowledge block by clicking **Publish**.
   The knowledge block is published depending on the workflow setting of its knowledge base.
   - **Knowledge - Instant Publish**: The knowledge block is immediately published.
   - **Knowledge - Approval Publish**: The knowledge block is published on approval completion.

   When published, your knowledge block appears in the Published and All lists under Knowledge Blocks in Agent Workspace. If the article versioning feature is enabled, the version number of the knowledge block is updated to the next whole number (for example, from 2.02 to 3.0).

Publish a knowledge block in Agent Workspace

Publish a knowledge block to make it available to add to knowledge articles.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge block you want to publish.
Role required: agent_workspace_user and knowledge

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge Blocks** > **Unpublished**.
3. Click a knowledge block link.
4. On the Knowledge Block form, click **Publish**.

Result

A knowledge block is published depending on the workflow setting of its knowledge base.

- **Knowledge - Instant Publish**: The knowledge block is immediately published.
- **Knowledge - Approval Publish**: The knowledge block is published on approval completion.

When published, your knowledge block appears in the Published and All lists under Knowledge Blocks in Agent Workspace. If the article versioning feature is enabled, the version of the block is incremented.

Related topics

View a knowledge block in Agent Workspace

Approve a knowledge block in Agent Workspace

Approve a knowledge block that is awaiting your review in Agent Workspace.

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Before you begin
Role required: agent_workspace_user and knowledge

Procedure
1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge Blocks** > **Unpublished**.
3. Click a knowledge block link that is in the **Review** workflow state.
4. Click **Edit**.
5. In the Approvals related list, in the **State** column, click **Requested**.
   The Approval form opens in another tab within Agent Workspace.
6. From the State list, select **Approved**.
7. Click **Save**.

Result
The approved knowledge block is published immediately. If the article versioning feature is enabled, the version number of the knowledge block increments to the next whole number (for example, from 2.02 to 3.0). On the Knowledge Block form, the workflow state changes to **Published**. The new published version of the knowledge block is added to the Block Versions related list on the Knowledge Block form. The version is also available in the All list under Knowledge Blocks in Agent Workspace, go to **Knowledge Blocks** > **All**.

Add a knowledge block to a knowledge article in Agent Workspace

Add a knowledge block to a knowledge article in Agent Workspace.

Before you begin
- Both the knowledge article and the knowledge block must be in the same knowledge base.
- You must have contribute access to the knowledge base.
- Ensure that the knowledge blocks feature is enabled for the knowledge base that the article is in. For more information, see Enable knowledge blocks for each knowledge base.

Role required: agent_workspace_user and knowledge

Procedure
1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge Articles** > **All**.
3. Click an existing article link.
   For more information, see Edit a knowledge article in Agent Workspace.

   Note:
   - Knowledge blocks are supported only with HTML knowledge articles. Make sure that the **Article type** field is set to **HTML**.
   - If a knowledge article uses an article template, you can add knowledge blocks to any fields associated with the article template.

4. In the contextual side panel, click the add blocks icon ( ).
5. Search for the article to which you want to add the knowledge block.
   To use condition builder with advanced search, see Condition builder .
6. Click **Insert** to add the knowledge block to the article.

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If there are no knowledge blocks, click **Create New Block** and follow the procedure to create another block. For more information, see Create a knowledge block in Agent Workspace.

7. Click **Update** to save your changes.

Note:
You can preview the article with the blocks. For more information, see Preview a knowledge article with knowledge blocks in Agent Workspace.

8. Click **Publish** to publish the article.

The knowledge article is published depending on the workflow setting of its knowledge base. For more information, see Publish a knowledge article in Agent Workspace.

Preview a knowledge article with knowledge blocks in Agent Workspace

Preview a knowledge article with knowledge blocks in Agent Workspace.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article.
Role required: agent_workspace_user and knowledge

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge Articles** > **All**.
3. Select the article in which you want to preview a knowledge block and click **Edit**.
4. Click **Preview with Blocks**.
   The article edit page refreshes to show options for previewing a knowledge block.
5. **Optional:** Click **Show Blocks** to highlight the knowledge blocks added to the article.
6. Click **OK**.

Retire a knowledge block in Agent Workspace

Retire a published knowledge block if you no longer want it to be available for users to view or search.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge block you want to retire.
Role required: agent_workspace_user and knowledge

About this task

You can retire knowledge blocks only if they are not used in any knowledge articles.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge Articles** > **Published**.
3. Select the knowledge block you want to retire.
4. Click **Edit**.
5. Click **Retire**.

Result

The knowledge block is retired depending on the workflow setting of its knowledge base.

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- **Knowledge - Instant Retire**: The knowledge block is immediately retired.
- **Knowledge - Approval Retire**: The knowledge block is retired on approval completion.

When retired, your knowledge block no longer appears in the Published list under Knowledge Blocks in Agent Workspace.

Integrating a custom search or knowledge article viewer with knowledge blocks

If you are using a custom search or knowledge article viewer with your application, you can integrate that custom search or viewer with the appropriate knowledge or knowledge blocks API.

Note:
Integration is only necessary if you are using a custom search or knowledge article viewer.

KBPortalServiceImpl - Global

The `KBPortalServiceImpl` API is included with Knowledge Management V3 [com.snc.knowledge3] as a script include. It provides methods to use with knowledge, such as integration with a custom search.

KBPortalServiceImpl - KBPortalServiceImpl()

Instantiates a KBPortalServiceImpl object in a global application.

Parameters

Name	Type	Description
None		

KBPortalServiceImpl - getResultData(Object request)

Returns search results based on keywords from the knowledge article and from relevant knowledge block content that the user has access to read.

If you have activated the knowledge blocks feature and are using a custom search for knowledge with your application, your search may not return relevant articles when keywords are contained in the blocks. To return search results based on keywords from the article and from relevant block content that the user has access to read, you must call the `getResultData()` method inside your custom search.

Parameters

Name	Type	Description
request	Object	JSON object to refine the search.

Returns

Type	Description
Object	Array of search results in JSON format based on keywords from the knowledge article and from relevant knowledge block content that the user has access to read.

Example: Integrating a custom search with knowledge blocks

```
function doKeywordSearch(queryText, count, queryLocation) {
  var results = [];
```

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```
 // To set up the request.
 var request = {
   keyword: queryText,
   language: "",

   // To pass data to filter on different metadata.
   variables: {
     kb_knowledge_base: ['Knowledge'],
     kb_category: '',
     author: ['']
   },

   // Provide the following.
   context: gs.getProperty('glide.knowman.sp.search_context',
'Knowledge Search'),
   resource: 'Knowledge',
   order: "relevancy,true",

   // Provide the pagination variables.
   start: queryLocation,
   end: queryLocation+count,

   attachment: false,

   // Provide any additional metadata you want to include in
your results.
   knowledge_fields: [
     "number",
     "sys_id",
     "published"
   ]
 };

 // To execute the search.
 var response = new KBPortalServiceImpl();
 response.getResultData(request);

 // To send the search results back to the UI or to store
results in your object.
 for (var i = 0; i < response.results.length; i++) {
   result = response.results[i];
   var article = {};
   article.sys_id = result.meta.sys_id.display_value;
   article.number = result.meta.number.display_value;
   article.short_description = article.short_description;
   article.title = result.title;
   article.published = result.meta.published.display_value;
   article.publishedUTC = result.meta.published.display_value;
   article.text = article.text;
   article.score = result.meta.score;
   article.label = article.short_description;
   article.shortDescription = article.short_description;
   results.push(article);
 }
```

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```
  return results;
}
```

KBBlock - Global

The `KBBlock` API is included with knowledge blocks [com.snc.knowledge_blocks] as a script include. It provides methods to use with the knowledge blocks feature, such as integration with a custom knowledge article viewer.

KBBlock - KBBlock()

Instantiates a KBBlock object in a global application.

Parameters

Name	Type	Description
None		

KBBlock - getArticleContent(GlideRecord knowledgeRecord)

Gets knowledge articles with relevant knowledge block content that a user has access to read.

If you have activated the knowledge blocks feature and are using a custom knowledge article viewer with your application, your viewer may not display articles that expand the relevant block content. To expand block content that a user has access to read, you must call the `getArticleContent()` method inside your custom viewer.

Parameters

Name	Type	Description
knowledgeRecord	GlideRecord	GlideRecord of the knowledge article to display.

Returns

Type	Description
String	Knowledge article with relevant knowledge block content that a user has access to read.

Example: Integrating a custom knowledge article viewer with knowledge blocks

```
// This function returns the article text with expanded block
 content.
function getArticleText(kbSysId) {
  var knowledgeRecord = new GlideRecord('kb_knowledge');
  var kbText='';
  if(knowledgeRecord.get(kbSysId)) {
    if(new
 GlidePluginManager().isActive('com.snc.knowledge_blocks')) {
      kbText = new KBBlock();
      kbText.getArticleContent(knowledgeRecord);
    }
    else
      kbText = knowledgeRecord.getValue('text');
    }
  return kbText;
```

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```
}

// This is an example of how to call the function defined above.
var kbText = getArticleText('01a1ca5b6710130038876c3b5685efd3');
```

Use knowledge subscriptions

Use knowledge subscriptions to receive email notifications about new articles and article revisions or comments.

Subscribe to a knowledge base

Subscribe to a knowledge base and receive notifications when articles are added to that knowledge base.

Before you begin

You must activate the Knowledge Management Advanced (com.snc.knowledge_advanced) plugin. For more information, see Configure knowledge subscriptions.

Role required: knowledge

About this task

Users can subscribe to a knowledge base from either the Knowledge Management v3 user interface or the Knowledge Management Service Portal.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Homepage**.
2. Click the **Subscribe** link on the knowledge base tile.
   The link changes to **Subscribed** and includes a check mark.

Result

Receive notifications when articles are added to the subscribed knowledge base.

Unsubscribe from a knowledge base

Unsubscribe from a knowledge base.

Before you begin

Role required: knowledge

About this task

Users can unsubscribe from a knowledge base from either the Knowledge Management v3 user interface or the Knowledge Management Service Portal.

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Note:
If you subscribe to an article and then subscribe to the knowledge base, unsubscribing from the knowledge base also unsubscribes you from the article.

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Homepage**.
2. Point to and click the **Subscribed** link on the knowledge base tile, which toggles to **Unsubscribe**.
   After unsubscribing you from the knowledge base, the link toggles to **Subscribe**.

Subscribe to a knowledge article

Subscribe to a knowledge article within a knowledge base to receive email notifications about new articles and article revisions or comments.

Before you begin
Role required: Check with your admin

About this task
Users can subscribe to a knowledge article from either the Knowledge Management V3 user interface or the Knowledge Management Service Portal.

Note:

- Users who are already subscribed to a knowledge base are also subscribed to the articles within that knowledge base.
- To subscribe to articles from the base service portal (`https://<instance name>/sp?`), you must navigate to the Knowledge Management Service Portal pages (for example, `https://<instance name>/sp?id=kb_home`) from the base service portal.
- To manage the knowledge subscription for knowledge base and knowledge article, see Manage knowledge subscriptions.
- Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Homepage**.
2. Click **Subscribe** at the top of the knowledge article.
   The system shows an information message about the article subscription and the button toggles to **Subscribed**. If the email notification contains an article link, the link points to the Knowledge Management Service Portal. The email notification for a subscribed article includes the knowledge article ID, short description, and link to the article.

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Unsubscribe from a knowledge article

Unsubscribe from a knowledge article.

Before you begin
Role required: knowledge

About this task
Users can unsubscribe from a knowledge article from either the Knowledge Management v3 user interface or the Knowledge Management Service Portal.

Note:
If you are subscribed to a knowledge base and you unsubscribe from an article in that knowledge base, you must also unsubscribe from the parent knowledge base.

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to **All** > **Knowledge** > **Homepage**.
2. Point to and click **Subscribed**, which toggles to **Unsubscribe**.
   If you are subscribed to the knowledge article, this action results in an information message that the article subscription has been removed. If you are also subscribed to the parent knowledge base, proceed to the next step.
3. If you are subscribed to the parent knowledge base, click **Yes** on the Unsubscribe pop-up window.
   This action results in an information message that the knowledge base subscription has been removed.

Manage knowledge subscriptions

Manage knowledge base and knowledge article subscriptions from the Notification Settings page.

Before you begin
Role required: knowledge

About this task
Users can manage knowledge subscriptions from the Knowledge application or from the Knowledge Management Service Portal.

Procedure

1. Navigate to the Notification Settings page.
2. Click the Subscriptions tab.
3. Click **Knowledge Base** or **Knowledge Articles** to see a list of current subscriptions.
4. To unsubscribe from a knowledge base or knowledge article, click **Subscribed**.
   The link toggles to **Unsubscribed**.

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Use translation management

Use translation management to create and manage translation tasks.

Create translation assignments for knowledge articles

Assign knowledge articles to language experts to ensure accurate translations. Identify the language experts and create assignment rules so that translation tasks are automatically assigned to language experts and groups.

Before you begin

Role required: knowledge_admin or admin

About this task

Translation tasks are automatically assigned once the assignment rules are created. Assignment rules are applied only if a task is not already assigned to another user or group.

Procedure

1. Navigate to **All** > **Knowledge** > **Translation Management** > **Translator Mapping**.
2. Click **New** to create a new assignment rule.
3. Enter a name for the assignment rule in the **Name** field.
4. In the **Applies To** tab, choose the task type you want to assign by setting a condition.
   a. Select the **Knowledge Translation Task [kb_translation_task]** table from the **Table** drop-down list.
   b. Set a condition for assigning tasks in the **Conditions** field.
   For example, to assign tasks for translation into English, you would set the condition to**[Translated language][is][English].**
5. In the **Assign To** tab, select the user or group you want to assign the task to.
6. **Optional:** Click the **Script** tab to enter a script to further customize the assignment rule.
7. Click **Submit**.

Result

An email notification is sent to the user or group that has been assigned the task with a link to the translation task and source article.

Auto-create translation tasks

Auto-create translation tasks in specified languages to avoid having to manually create translation tasks after an article is published. The available languages are determined by the language plugins that have been installed on your instance.

Before you begin

Role required: knowledge_admin or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge Bases**.
2. Select an existing knowledge base.
3. Display the languages you have installed by clicking the lock icon to unlock the **Languages** field.
4. Select the languages for which you want to create tasks from the drop-down list.

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5. Select **Auto-create translation tasks**.
6. Click **Submit**.

What to do next

Open a knowledge article and access the Knowledge Translation Tasks related list to view the associated translation tasks.

Bulk Translation for knowledge articles

Perform bulk translations of knowledge articles in multiple languages using the Localization Framework application.

The Bulk Translations feature extends the localization service in Knowledge Management to support customers across geographies by localizing knowledge articles in the language they speak. You can select multiple knowledge articles and translate them into different languages by using the ServiceNow® Localization Framework application. Once the translation process is complete, you can access the translated article from the Knowledge [kb_knowledge] table. You can request translations for up to 200 articles at a time.

Translation workflow

You can define a workflow to determine the actions required to complete a translation. For information, see Workflows in the Localization Framework .

Preferences configuration

Through preferences, define the translations, workflow, and project preferences to request translation for activated languages. For more information, see Configure the Localization Framework preferences .

Artifact configuration

The Knowledge artifact is included in the Artifact Configurations [sn_lf_config] table and is active by default. For more information, see Localization Framework support for Knowledge Base .

Translation validations

Translation validation enables you to review and manage the translation request before submitting knowledge articles for translation. The validations to be executed are:

- The requested language is allowed in the knowledge base.
- Blocks used in the article have translations present in the target language.
- Source articles are not in the retired or outdated state.
- The article's source language is different from the requested language.
- The source article shouldn’t be a translated article.
- The total number of selected articles is less than 200.

Use Bulk Translation for manual translation

Translate knowledge articles into different languages through bulk translations.

Bulk Translation uses the ServiceNow® Localization Framework application, which enhances the translation process of knowledge artifacts through configurable workflows. You can select multiple knowledge articles and the preferred language into which you want to localize your content.

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Request bulk translations for multiple knowledge articles

Request translations for multiple knowledge articles through Bulk Translations to localize them into one or more languages.

Before you begin

Add a custom Localization Framework setting to enable bulk translations.

Role required: Localization requester to request translations

Procedure

1. Navigate to **All** > **Knowledge** > **Articles**.
2. Select the articles you want to translate.
3. Select **Request Translations**.

   Note:
   . Check the validation list to ensure that all articles to be translated have been validated. For more information, see Bulk Translation for knowledge articles.

4. In the **Request Translations** dialog box, select the languages into which you want to translate the articles.
5. Select **Submit**.

Result

Localization tasks are created for the selected items in all the selected languages. A success message with a link to the list of requested items is displayed. Select the link to see the list of requested items.

Translate multiple knowledge articles into different languages

Translate multiple knowledge articles to localize your content into different locales.

Before you begin

- Add a custom Localization Framework setting to enable bulk translations.
- Request bulk translations for multiple knowledge articles.

Role required: Localization fulfiller to fulfill translation request

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge Translations** > **My translation request**.
2. On the Localization Request Items page, select the gear icon ( ) to add the **Localization task** to your task list.
3. Open any localization task.
4. On the Localization Task page, select **Translate** in the form header.
   A two-column comparison UI page displays a **Source Language** column on the left and **Target Language** column on the right. You can set the display as follows:
   - Select **Expand all** to expand all the groups on the comparison UI.
   - Select **Collapse all** to collapse all the groups on the comparison UI.
   - Select **Show groups with missing translations** to see only the groups that have missing translations when the content is translated.

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5. In the comparison UI page, copy the content from **Source Language** column and paste it in **Target Language** column.
6. Repeat the copy and paste process for each listed article.
7. Select **Publish Translation**.
8. In the **Publish Translations** dialog box, select **Publish Translations**.

Result
The selected articles are translated into the selected languages and marked as version 0.01. The articles can be accessed from the Knowledge [kb_knowledge] table.

Use Bulk Translation for Dynamic Translation

Translate knowledge articles into different languages using machine translations.

Dynamic Translation for Bulk Translation translates knowledge articles content in real-time and offers a seamless localization experience to your customer. With the help of language translator, dynamic translation automatically detects the language of the user-entered texts and displays translated text in the comparison UI page.

Translate knowledge articles using Dynamic Translation

Use machine translation to automatically translate knowledge articles into different languages.

Before you begin
Add a custom Localization Framework setting to enable machine translation.

Role required: Localization requester to request translations

About this task
Dynamic Translation uses the ServiceNow® Localization Framework to translate knowledge articles into different locales without any manual intervention.

Procedure
1. Navigate to **All** > **Knowledge** > **Articles**.
2. Select the articles you want translated.
3. Select **Request Translations**.

> **Note:**
> .Check the validation list to ensure that all articles to be translated have been validated. For more information, see Bulk Translation for knowledge articles.

4. In the **Request Translations** dialog box, select the languages into which you want the articles translated.
5. Select **Submit**.
   Dynamic Translation automatically initiates a translation process and creates a translated article.

Result
The selected articles are translated in selected languages and marked as version 0.01. The article can be accessed from the Knowledge [kb_knowledge] table.

Translate a knowledge article from a translation task

Start translating articles once they are published and assigned to you for translation.

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Before you begin

- Activate the Dynamic Translation plugin (com.glide.dynamic_translation).
- Enable the *glide.knowman.translation.enable_translation_task* property. For more information, see Translation management.

Role required: admin, knowledge_admin, or knowledge

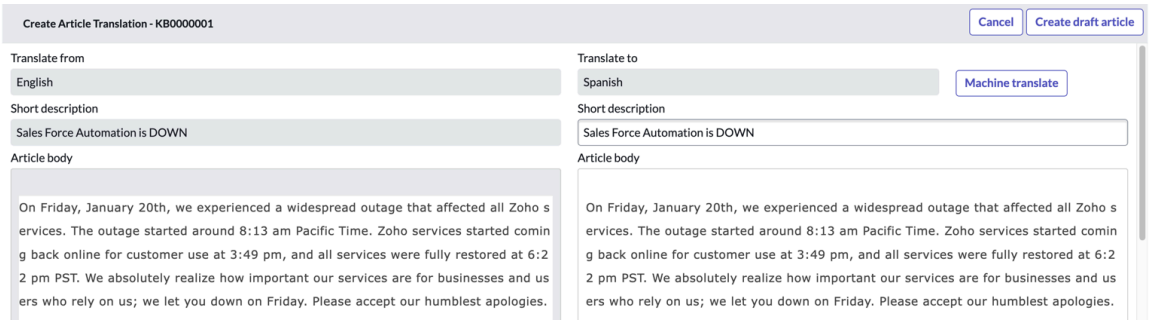
About this task

Note:
This procedure has been superseded by the Localization Framework. For more information see Localization Framework support for Knowledge Base. This information is provided for legacy context.

For information about how administrators configure the translation API, see DynamicTranslation API.

Procedure

1. Navigate to **All** > **Knowledge** > **Translation Management** > **My Assigned Tasks**.
2. In the Knowledge Translation Tasks page, select one of the listed translation tasks assigned to you.
3. Select **Translate**.
   The **Translate from** and **Translate to** panes are side-by-side for easy comparison, as shown in the following figure.



4. Select **Machine translate** to automatically translate to the targeted languages.
5. Select **Create draft article** to create a draft version of the translated article.
   If a translated article is already present for that language, a new draft version overwrites the existing translated content.
6. Select **Publish**.

Note:
By default, the translated version is always created as v1.0 so that the parent version remain same for all the translated versions. For more information, see Translated KB articles always show Parent version 1.0 regardless of version used for translation.

Result

The newly created draft is listed in the **Translated Versions** tab.

Translate knowledge blocks within an article

If a selected article indicates that a knowledge block is missing a translation, you must translate the knowledge block before you can translate the article.

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Before you begin
Role required: translator

Procedure

1. Navigate to **All** > **Knowledge** > **Translation Management** > **My Assigned Tasks**.
2. In the Knowledge Translation Task page, select a translation task and click **Translate**.
   A message stating that the knowledge article contains one or more knowledge blocks that have missing translations is displayed.
3. Click on the link in the message to view the list of blocks that require translation.
4. Click the block that requires translation and click **Translate**.
   The newly translated blocks appears in the **Translated Block Versions** related list.

Related topics

Add knowledge blocks to a knowledge article

Request missing translations for available languages

Manually create translation tasks if an article does not have translation tasks created for all the languages you have configured.

Before you begin

- Role required: none
- Verify that the *glide.knowman.translation.enable_translation_task* property is set to true.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **Published**.
2. Select an article from the list of published articles.
3. Click the **Request translations** related link.
4. Select the languages from the list that are unselected, which indicates they do not have associated translation tasks.
5. Click **Submit**.

Result
The translation tasks for the languages are created and listed in the Knowledge Translation Tasks tab.

Work on a feedback task

You can change the state of a task and resolve or reassign tasks generated by article feedback.

Before you begin
Role required: knowledge

About this task

- If no ownership group is assigned to the article, the feedback task is available to you as the author or reviser of the article.
- If an ownership group is assigned to the article, a feedback task is assigned to you as an ownership group manager. As a manager, you can reassign the task to another group member. All group members see the feedback task in **All Open Tasks**. As a group member, you can reassign the task to yourself to appear in **My Assigned Tasks**.

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Procedure

1. Navigate to **All** > **Knowledge** > **Feedback Management** > **My Assigned Tasks**.
2. Select a feedback task.
3. Review the feedback given by the submitter.
   When a feedback task is generated, the information in the article feedback form is copied to the feedback task form as follows:

Feedback task form field	Information from article feedback form
Reason	The selected reason for the feedback.
Description **Note:** If feedback is negative and the **Details** field is left blank, this field indicates whether the article was not helpful or rated poorly.	Text in the **Details** field.

4. Work on the feedback task.

Track the progress on a feedback task

Monitor open and closed feedback tasks and track the duration of time a feedback task remains in each state.

Before you begin

Role required: Owner of the knowledge base, knowledge_manager, knowledge_admin, or admin

Procedure

1. Navigate to the open or closed tasks you want to track.
2. In the **Knowledge Feedback Task Metrics** related list section, select a feedback task metric to view the start and end time and the duration of the feedback task.

Note:

- If you are a knowledge administrator, you can view the feedback tasks and task metrics of articles in the knowledge bases. If you are a knowledge owner or knowledge manager, you can view feedback tasks and task metrics of all articles in the knowledge bases you own or manage.
- You may need to configure the form to add **Knowledge Feedback Task Metrics** in the related list section. For more information, see Add a related list to a form.
- The feedback task state is unaffected by changes in the article state. Therefore, when the article is retired, the feedback owner or group assigned to the feedback task has to close or resolve the feedback task.

Use Article Quality Index

Use article quality index (AQI) to assess the quality of knowledge articles.

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Create an AQI checklist

Create a checklist of questions that reviewers can use to evaluate the quality of knowledge articles.

Before you begin

Role required: knowledge_admin or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Article Quality Index** > **AQI checklists**, and click **New**.
2. Fill in the following fields:

Field	Description
Checklist	Name for the checklist.
Description	Description for the checklist.

3. Right-click the form header and click **Save**.
4. In the **Checklist Questions** related list, add questions to the checklist.
   Add questions and adjust the weight of the questions until the combined weight of all questions is equal to 100. The weight defines the score that is added to the total AQI review score of the article when the answer for that question is set to **true**. The maximum score that can be applied to an article in an AQI review is 100.

   Note:
   The default AQI pass score is 70. You can change the pass score in the Article Quality Index properties.

   To add a question:

   a. Click **New**.

   b. Fill in the following fields:

Checklist Question form

Field	Description
Question	Text for the question to evaluate articles.
Description	Short description for the question.
Order	Value for the display order of questions in the checklist. The lower the value in the **Order** field, the higher the question displays in the checklist.

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Field	Description
	Note: Before you assign a value for the display order, think about how many questions you would create for the checklist. For example, if you have five questions in a checklist, you can assign the value in increments of 20. This ensures that you have enough values to assign if you add questions to the checklist later.
Weight	A value for the question to score the article quality. This value is added to the AQI score when the answer for the question is set to **true**. **Note:** ▪ The combined weight of all questions cannot exceed 100. ▪ The sum of weights of all questions in a checklist must be equal to 100 to be assigned to a knowledge base.

c. Click **Submit**.

5. After you finish adding questions to the checklist, click **Update** on the AQI Checklist form.

What to do next
After you create a checklist, assign it to a knowledge base.

Assign an AQI checklist to a knowledge base

Before a knowledge reviewer can start performing the AQI review, you must assign an AQI checklist to a knowledge base.

Before you begin
You can only assign a checklist to a knowledge base when the weight of all questions in the checklist is equal to 100. Each knowledge base can have one assigned checklist. However, a checklist can be assigned to more than one knowledge base.
Role required: knowledge_admin or admin

About this task

Procedure
1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge Bases**.
2. Click a knowledge base to which you want to assign a checklist.
3. On the Knowledge Base form, click the search icon in the **Checklist** field and select the AQI checklist to apply.
4. Click **Update**.

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What to do next
After you assign an AQI checklist to a knowledge base, you can start performing AQI reviews.

Remove an AQI checklist from a knowledge base

Before you can edit a checklist that is assigned to a knowledge base, you must remove it from the knowledge base.

Before you begin
A checklist with pending AQI reviews cannot be removed from the knowledge base until all AQI reviews associated with the checklist are complete.
Role required: knowledge_admin or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Administration** > **Knowledge Bases**.
2. Click a knowledge base from which you want to remove a checklist.
3. On the Knowledge Base form, delete the name of the AQI checklist from the **Checklist** field.
4. Click **Update**.

Delete questions from an AQI checklist

Deleting a question in a checklist deletes the text in the question of previously performed AQI reviews that use the checklist. Deleting an AQI question from a checklist will not affect the score of the previously performed AQI reviews. However, the text of the question will not be displayed in the checklist.

Before you begin
You can delete questions from a checklist if the following conditions are met:

- The checklist is not attached to a knowledge base. For more information, see Remove an AQI checklist from a knowledge base.
- There are no AQI reviews using the checklist in progress.

Role required: admin

Procedure

1. Navigate to **All** > **Knowledge** > **Article Quality Index** > **AQI checklists**.
2. Click the AQI checklist from which you want to delete one or more questions.
3. In the Checklist Questions related list, select the check box next to the questions that you want to delete.
4. From the **Actions on Selected Rows** choice list, select **Delete**.
5. In the Confirmation window, click **Delete**.

Perform the Article Quality Index review

Perform the Article Quality Index (AQI) review to evaluate the quality of the article.

Before you begin
The knowledge base must have an assigned AQI checklist.
Role required: knowledge_domain_expert, knowledge_coach, knowledge_admin, or admin

About this task
Configure the *glide.knowman.aqi.article_workflow_states* property to set the article workflow states where you could perform AQI reviews. You can perform several AQI

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reviews for an article. If you perform several AQI reviews for the same version of the article, the latest AQI score appears in the **Latest AQI** field in the article.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** and click **Published**.
2. Click an article link.

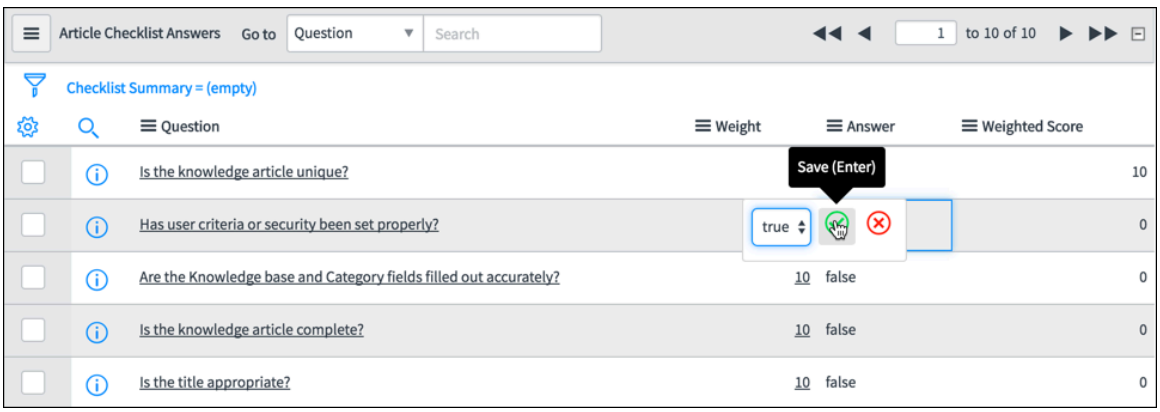
   Note:
   To read the article and perform the AQI review simultaneously, open the article in two separate tabs or window in your browser. You can then read the article from one tab or window and perform the AQI from another tab or window.

3. Perform the AQI review.

4. In the **Article Checklist Answers** related list, read the questions and evaluate which ones are true.

   Double-click the **Answer** cell for each question that is true, select **true**, and select the green check mark.

   Note:
   The associated **Weighted Score** is applied to the AQI score when the answer is set to **true.**



   Note:
   - If you perform several AQI reviews for the same version, the latest AQI score appears in the **Latest AQI** field in the article.
   - If you're using Knowledge Management within the Customer Service Management application, you can automatically make knowledge public by running the *`Make KM Service Portal Pages Public`* fix script after you install the Customer Service Management plugin (com.sn_customerservice).

   Standard Pagination - Displays the search results in multiple pages.

   Infinite Scroll - Displays the search results while scrolling.

5. Perform one of the following actions.

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What to do next

To view all the AQI reviews you completed, navigate to **Knowledge** > **My Completed AQI Checklists**.

View all pending and completed AQI reviews

View checklists of all users to monitor the pending and completed reviews.

Before you begin

Role required: knowledge_admin or admin

Procedure

1. Navigate to **All** > **Knowledge** > **Article Quality Index**
2. Do one of the following:
   - To view all completed AQI checklists, select **All Completed AQI Checklists**.
   - To view all pending AQI checklists, select **All Pending AQI Checklists** .

Delete AQI reviews

Delete an AQI review that was created by mistake or is no longer required.

Before you begin

Roles required:

- To delete an AQI in a submitted state: admin or knowledge admin
- To delete an AQI not in a submitted state: knowledge admin or the reviewer who initiated the AQI

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **My Pending AQI Checklists**.
2. Select all checklist reviews you would like to delete.
3. Click **Delete**.

Managing KCS article states

Manage the readiness of KCS articles and comply with regulated information using KCS article states.

For information about the KCS article states, see KCS v6 Practices Guide.

For information about all the KCS roles, see Knowledge Management roles.

Activation information

Activate the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities) to enable the use of KCS roles (kcs_contributor, kcs_publisher, and kcs_candidate) and metadata fields for the KCS article state (governance and confidence). For more information, see Activate Knowledge Management KCS Capabilities.

Note:
If you are not an admin and has either kcs_contributor or kcs_candidate roles, you cannot retire an article.

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Article confidence

The confidence state of an article indicates where the article is in its life cycle. Only users with the knowledge_coach, knowledge_admin, kcs_contributor or kcs_publisher role can modify the value of the **Confidence** field.

For articles existing before the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities) was activated, the **Confidence** field is automatically set to **None**.

If an article is created after the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities) is activated, the **Confidence** field is automatically set based on the workflow state of the article.

Article workflow states and confidence values

Workflow state	Confidence field value
Draft, Review, or Scheduled for publish	Work in Progress
Published	• Validated: For articles published by users with the knowledge_coach, kcs_contributor, or kcs_publisher role. • Not Validated: For articles published by users with a role other than knowledge_coach, kcs_contributor, or kcs_publisher.
Pending retirement or Outdated	Same as in the Published workflow state.
Retired	Archived

Article governance

The governance state of an article indicates which users can manage articles specific to a regulatory requirement, either experience based or compliance based. Users with contribute access to a knowledge article can modify the value of the **Governance** field.

Related topics

Create a knowledge article from an incident in ITSM Agent Workspace

Create a knowledge article in Agent Workspace

Knowledge article creation from an incident

Enable users to quickly and easily reuse information from an incident in a knowledge article.

Perform the following steps to enable creating a knowledge article from an incident. You can create a knowledge article from an incident using Incident KCS Article template. For more information, see Create a knowledge article from an incident using an article template.

Create field mapping from an incident to a knowledge article

Copy information from an incident into a knowledge article by creating custom mapping between the Incident table and the KCS article table.

Before you begin

Role required: admin

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- You must activate the Knowledge Advanced plugin (com.snc.knowledge_advanced).
- You must activate the KCS Article template.
  1. Navigate to **Knowledge** > **Administration** > **Article Templates**.
  2. Set the **Active** field to **true** for the KCS Article template.

Procedure

1. In the filter navigator, type `csm_table_map.list`.
2. Click **New**.
3. In the **Mapping Name** field, enter `Incident KCS Article`.
4. In the **Source Table** field, enter `Incident`.
5. In the **Target Table** field, enter `KCS Article`.
6. Right-click the form header and **Save**.
7. In the **Basic Field Mapping** related list, click **New**.
8. Create mappings for the following fields.

Source Field	Target Field
Sys ID	Source Task
Short description	Short description
Resolution notes	Resolution

Note:
You can create field mappings for more fields, as required.

- In the **Source** field, select the field in the source Incident table that contains the information to be copied to the field in the article template target table.
- In the **Target** field, select the field in the article template target table to which you need information copied to from the field in the source Incident table.

9. To customize when and how the **Knowledge** check box is displayed, click the **Condition** tab.
10. To map fields using advanced scripts, select the **Advanced Field Mapping** check box.
11. On the **Advanced field Mapping** tab, paste in the following code.

```
(function (source,target) {
    // Get the first comments from incident and use it as Issue
 description for article
    var notes = source.comments.getJournalEntry(-1);
    var entries = notes.split("\n\n");
    var comment = "";
    if(entries[entries.length-2]){
        comment = entries[entries.length-2];
        var part = comment.toString().indexOf(")");
        if(part != -1){
comment =
 comment.toString().substring(part+2).replaceAll("\r\n","<br/>
");
    }
    }if(comment)
```

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```
        target.kb_issue = comment;
})(source,target);
```

The first comment on an incident is mapped to the **Issue Description** field in the knowledge article.

Note:
If the same source or target field is configured in both the basic and advanced field mappings, the advanced field mapping overrides the basic field mapping.

If the fields configured in the basic and advanced field mapping are different, the field configurations in the advanced field mapping are appended to the field configurations in the basic field mapping.

Add a property to enable creating knowledge article from incidents

Add a property, which is required to allow users to create a knowledge article from an incident.

Before you begin
Role required: admin

Procedure

1. In the Filter navigator, enter `sys_properties.list`.
2. Click **New**.
3. Fill in the following fields.

System Property form

Field	Description
Name	enable_kcs_incident
Description	Enable Knowledge Centered Services (KCS) for Incident Management.
Type	true|false
Value	true

4. Click **Submit**.

Create a UI action to enable creating knowledge articles from incidents

Create a UI action to add the Knowledge check box to the Incident form.

Before you begin
Role required: admin

Procedure

1. Navigate to **System UI** > **UI Actions**.
2. Click **New**.
3. Fill in the following fields.

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UI Action form

Field	Description
Name	Create Knowledge
Table	Incident
Action name	create_knowledge

4. Select the **Client** check box.
5. Select the **List v3 Compatible** check box.
6. Select the **Form button** check box.
7. In the **Onclick** field, enter `createKnowledgeClient()`.
8. In the **Condition** field, enter `gs.getProperty("enable_kcs_incident") == 'true' && new global.CSMTableMapUtil (current).findMapByName("incident_kcs_article") && new global.KBKnowledge().canCreate()`.
9. In the **Script** field, enter the following code.

```
function createKnowledgeClient() {
    if (g_form.modified) {
        alert(new GwtMessage().getMessage('You have unsaved
 changes. Please save them to continue.'));
    }else{
        //Call the UI Action again but skip the 'onclick'
 function
        gsftSubmit(null, g_form.getFormElement(),
 'create_knowledge');
//MUST call the 'Action name' set in this UI Action
    }
}

//Code that runs without 'onclick'
//Ensure call to server-side function with no browser errors
if (typeof window == 'undefined')
    CreateKnowledgeServer();

function CreateKnowledgeServer(){
    current.update();

    var map = new global.CSMTableMapUtil (current);
    map.findMapByName("incident_kcs_article");
    var targetURL = map.getTargetURL();
        if(targetURL)
        action.setRedirectURL(targetURL[0]);
}
```

Knowledge content migration from v2 to v3

To use the new functionality available in knowledge v3 with legacy articles, you must migrate these articles out of the default knowledge base.

To migrate knowledge content, move articles out of the default knowledge base by changing the **Knowledge Base** value for each article. The state of the article remains unchanged when

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moving articles. After selecting a new knowledge base, assign a category to each article using the category structure defined in the new knowledge base.

After you migrate a knowledge article, the legacy feedback functionality is automatically replaced with the new knowledge feedback mechanisms. Legacy feedback is copied to the Live Feed Message [live_message] table to ensure previously submitted feedback is available for knowledge v3 articles.

Creating and maintaining articles

Share your ideas and experience by creating a knowledge article. Review and provide feedback on knowledge articles, and resolve issues yourselves rather than contacting customer service or an internal helpdesk.

Create a knowledge article

Knowledge contributors can create and edit knowledge articles within a knowledge base to share information across your organization.

Before you begin

To view an article template, you must activate the article templates feature and enable the desired templates.

Role required: knowledge, knowledge_manager, knowledge_admin, knowledge_coach, knowledge_domain_expert, knowledge_group_member, admin. You must have contribute access to at least one active knowledge base.

About this task

Users with at least one role can create and edit knowledge articles. These users are known as knowledge contributors. Users without any role can read articles and submit feedback, but can't create or edit articles.
Some knowledge bases may allow only certain users to contribute. For example, a member of the IT department can create knowledge articles in the IT knowledge base, such as desktop support information or articles describing company IT processes.

Procedure

1. There are three ways of creating knowledge articles.
   - Navigate to **Self-Service** > **Knowledge** and select the Create an Article icon.
   - Navigate to **Knowledge** > **Articles** > **Create New**.
   - From the Knowledge Management homepage, select the more icon (···) and then select **Create Article**.
2. On the Create new article page, select a knowledge base.
   The list of article templates to select in the next step is filtered according to the article templates available for the selected knowledge base.

   Note:

   On the Create new article page, you can select to **Switch to older version of this page** or **Switch to updated version of this page (recommended)**.

3. Select an article template.
4. Select **Next**.
   The Knowledge form is displayed based on the article template selected.
5. On the Knowledge form, fill in the fields.

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Knowledge form

Field	Description
Number	Number of the article. This field is automatically set to a number. For more information, see Duplicate knowledge article numbers.
Knowledge Base	The knowledge base selected for this article. **Note:** An article can only be associated with one knowledge base. You can change the knowledge base, but only if the selected article template is available in the knowledge base.
Category	The category for this article. Select a **Knowledge Base** before you can select a category. Articles without a category appear on the knowledge homepage in the (empty) category.
Ownership Group	The ownership group for this knowledge article. An ownership group is a group of members and a manager who are responsible for approvals, ensuring article quality, and feedback tasks. Ownership groups can publish, edit, and retire knowledge articles that they're associated with. **Note:** If no ownership group is assigned, the article automatically goes to the knowledge administrator and knowledge manager for approval.
Language	Language in which you're creating the article. The list is populated based on the languages enabled for the selected knowledge base.
Schedule publish date	Date in future when the article is published automatically. If approvals are enabled, the approval process must be completed before this date.
Valid to	The date this knowledge article expires. Articles don't appear in search results after the **Valid to** date or if the **Valid to** date is empty. The default value of the **Valid to** field is derived from the **Article Validity** field configured for the knowledge base (see Create a knowledge base). The **Valid to** date starts from the date that the article was created until the number of days specified in the **Article Validity** field. If the **Article Validity** field is empty, the default date in the **Valid to** field for the knowledge article is set to January 1, 2100. An article author or editor can select whether to keep or change the default **Valid to** date. For more information, see Validity of a knowledge article. On the first day of each month, the application sends an email notification to a list of authorized recipients to remind them about articles that are expire in the next month. The recipient can then extend the **Valid to** date to continue using the article. For more information, see Managing email notifications in Knowledge Management.

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Field	Description
	Note: If the system date format or user preferences is set to use `yy` year format, you might face issues when the **Valid to** date is set to the default date. Contact your administrator or modify the user preferences to use a date format with the `yyyy` year format. For more information, see Global date and time field format and Personalize the system date format topics.
Confidence	Maturity of an article based on its completeness and reusability.
Version	Version of the article. This field appears only when the article versioning feature is enabled. For more information, see Article versioning.
Parent	Number of the article that represents the base language article. This setting keeps translations of the same article related to each other. Consider choosing the same language consistently for the parent article. This field appears only when the I18N:Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) is activated. For more information, see I18N - Knowledge internationalization. **Note:** The **Parent** field contains the first version of the parent article only. This field is used by the translation management feature to maintain the relationship between the source article and its translations.
Article type	The type of article, either HTML or wiki. **Note:** This field is only visible in the standard template.
Workflow	[Read-Only] The publication state of the article, such as **Draft**, **In Review**, or **Published**. When inserting a new article from an existing article, the state of the new article is reset to **Draft**.
Source	The task this knowledge article was created in response to, if any. This field is set automatically when you create the knowledge article from a task record.
Attachment link	Option for downloading an attached file automatically when a user accesses the article, instead of opening the article view. Add one or more attachments to the article to use this option. **Note:** You may attach multiple files, but most web browsers permit users to download only the first one. To ensure download of all the files, bundle them into an archive, such as with WinZip, and attach the archive. The Attachment link option applies to articles accessed from search links only. Articles accessed as links within other knowledge articles won't replicate this behavior.
Display attachments	Option for displaying attachments to users viewing this knowledge article. Attachments appear below the article text. Add one or more attachments to the article to use this option.
Governance	An attribute of an article that enables you to control sensitive, critical, or regulated information. Not all articles have the same requirement for compliance reviews. Some articles are based on the collective experience of

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Field	Description
	the people who use the articles (experience-based). Other articles have policy or legal information that require tight control (compliance-based).
Short description	The title of the article. This title appears when browsing and searching for a knowledge article, and at the top of the article. You can enter up to 100 characters in this field. **Note:** If contextual search is enabled, the knowledge articles similar to the entered short description text appear in the Knowledge results section.
Article body	Content for the article. A preview of the content appears when browsing and searching for a knowledge article. Use the editing functions in the HTML editor to create content. For more information, see Editing functions for knowledge articles in the HTML editor.
Meta	Tags for optimizing search from external search engines. Separate multiple entries by commas. You may need to configure the form to add this field. For more information, see Configuring the form layout. **Note:** If AI Search is enabled for the Knowledge Management Service Portal, the tags you add to the **Meta** field aren't indexed. To fine-tune AI Search results, your administrator can configure result improvement rules. For more information, see AI Search in Service Portal.

Note:
The **Confidence** and **Governance** fields appear when the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities) is activated. For more information, see Managing KCS article states.

6. To preview the article select the **View Article** link in the Related Links section located below the form.

Note:

Viewing the article through this link is only to facilitate a preview of the edited article and, does not add to the actual view count of the article on the document site.

7. **Optional:** To search for similar articles, enter the text in the **Related Search** field or continue with the default text in the Knowledge results section.
If the Knowledge results section isn't displayed on the Knowledge form, an administrator can configure the form layout to add the **Contextual Search Results** field to the form.

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- To find knowledge articles that have high text similarity with the entered search text, choose **Similar Articles (ML)**.

  Note:
  This option is available only when the Predictive Intelligence feature is enabled and your administrator has trained the similarity solution for Knowledge Management to find related articles. For more information, see Train the similarity solution for Knowledge Management to find related articles.

- To find knowledge articles that match the entered search text, choose **Search Articles**.

8. **Optional:** To view the entire article in a pop-up window, select the link to the article title.
9. Select **Submit** to create the article.
10. **Optional:** Select **Search for Duplicates** for any redundant content in existing articles.
11. **Optional:** Select the link in the **For SEO suggestions on this article, click here** message, if available, to review suggestions for improving your article.
    Suggestions are provided to help you improve the search engine optimization and accessibility of your article, such as removing multiple **Heading 1** or `<H1>` tags. Suggestions are provided for the heading 1 `<h1>`, anchor `<a>`, and image `<img>` tags.
12. **Optional:** Either add to or modify the article details or publish the article.
    - Add to or modify the article details.

      (Optional) For more information, see Edit a knowledge article.

    - Publish the article by selecting **Publish**.

      A knowledge article is published depending on the workflow setting of its knowledge base:

      - **Knowledge - Instant Publish**: The knowledge article is immediately published unless it's scheduled to be published at a later date.
      - **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it's scheduled to be published at a later date.

        Note:
        With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. An administrator can override this behavior by disabling the *`glide.knowman.ownership_group.enable_self_approval`* property. For more information, see Ownership groups.

      For more information, see Schedule a knowledge article for publishing.

      If an article is visible to a guest user, a message appears that reads `This article may be visible to unauthenticated users after it is published. Do you still want to proceed?`

      When published, the knowledge article appears in the Published and All lists. To view the Published list, navigate to **Knowledge** > **Articles** > **Published**. To view the All list, navigate to **Knowledge** > **Articles** > **All**.

      If the article versioning feature is enabled, the version number of the knowledge article increments to the next whole number (for example, from 2.02 to 3.0). For more information, see Knowledge article version numbers.

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What to do next

After saving the article record, you can add tags to organize the article.
After you create and publish a knowledge article, you can perform the following actions related to the article:

- Request translations for the knowledge article. For more information, see Request missing translations for available languages.
- Retire the knowledge article. Select **Retire** to enable the retirement workflow. For more information, see Retire a knowledge article.
- Translate the knowledge article directly from the knowledge article. For more information, see Translate a knowledge article from a translation task.
- Delete the published knowledge article. Select **Delete**. If the **Delete** button isn't displayed, select the more actions icon ( ), and then select **Delete**.

> **Note:**
> Only users with the admin role can delete a published knowledge article.

Related topics

Map related articles

Predictive Intelligence for Knowledge Management

Edit a knowledge article

Edit knowledge articles within a knowledge base to update information shared across your organization.

Before you begin

Role required: knowledge

About this task

Users with at least one role can edit knowledge. These users are known as knowledge contributors. Users without any role can read articles and submit feedback, but cannot edit articles.

However, knowledge managers can configure User Criteria to restrict access to certain knowledge bases. For example, only members of the IT department can create or edit knowledge articles in the IT knowledge base, such as desktop support information or articles describing company IT processes.

> **Note:**
>
> - If the article versioning feature is enabled, the author cannot edit the article if it is already checked out by the contributor. If the feature is disabled, any users with contribute access to an article can edit the draft version of the article. An administrator can disable the article versioning feature by setting the *glide.knowman.versioning.enabled* property (from the **System Property** [sys_properties] table) to **false**.
> - If an ownership group is associated with a knowledge article, the author or reviser of the article can't contribute to the article after the article is published. An administrator can override this behavior by enabling the *glide.knowman.ownership_group.override* property. For more information, see Ownership groups.
> - If the *glide.knowman.translation.enable_translation_task* property is enabled, you can't modify the knowledge base of existing articles.

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Procedure

1. Navigate to **All** > **Knowledge** > **Articles**.
2. Select an article from the **Published** or **Unpublished** category.
3. On the Knowledge form, click **Edit**.

   Note:
   If the knowledge article was created using Microsoft Word, you can edit the article only in Microsoft Word. In this case, select **Open in Word** to open the article in Word Online. For more information, see Edit a knowledge article in Microsoft Word.

   If you want to edit the article using the HTML editor, you can unlink the article from Word. For more information, see Unlink knowledge articles from linked Microsoft Word documents.

4. If the article versioning feature is enabled, click **Checkout** for a published knowledge article. You can only edit the latest version of a knowledge article.
5. Click **Update**.
   When you edit a knowledge article, a default value appears in the **Valid to** field. You can select whether to keep or change the default **Valid to** date.

   Note:
   If the article versioning feature is enabled, the default value of the **Valid to** date in the updated article version is automatically set based on the following criteria:

   - If the **Article Validity** field in the knowledge base associated with the article is blank, the **Valid to** date value from the earlier version of the article is retained.
   - If the **Article Validity** field in the knowledge base associated with the article is not blank, the **Valid to** date is automatically updated to start from the date the article was updated until the number of days specified in the **Article Validity** field (Article updated date + article validity).

   If you move a knowledge article to another knowledge base, the default value of the **Valid to** date in the updated article is automatically set based on the following criteria:

   - If the **Article Validity** field in the selected knowledge base is blank, the earlier **Valid to** date value is retained for the knowledge article.
   - If the **Article Validity** field in the selected knowledge base isn't blank, the **Valid to** date is automatically updated to start from the date the article was updated until the number of days specified in the **Article Validity** field (Article updated date + article validity).

   If the dictionary value of the **Valid to** field is modified, this dictionary value overrides the default value of the **Valid to** field calculated according to the **Article Validity** field. For more information, see Validity of a knowledge article.

   The article is saved. If the article versioning feature is enabled, the version of the knowledge article is incremented by 0.01. For more information, see Knowledge article version numbers
6. **Optional:** Select the link in the **For SEO suggestions on this article, click here** message, if available, to review suggestions for improving your article.
   Suggestions are provided to help you improve the search engine optimization and accessibility of your article, such as removing multiple **Heading 1** or `<H1>` tags. Suggestions are provided for the heading 1 `<h1>`, anchor `<a>`, and image `<img>` tags.
7. **Optional:** Publish the article by clicking **Publish**.
   The knowledge article is published depending on the workflow setting of its knowledge base:

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- **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
- **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

Note:

- With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. An administrator can override this behavior by disabling the *glide.knowman.ownership_group.enable_self_approval* property. For more information, see Ownership groups
- If an article is visible to a guest user, a message appears that reads `This article may be visible to unauthenticated users after it is published. Do you still want to proceed?`

For more information, see Schedule a knowledge article for publishing.

When published, the knowledge article appears in the Published and All lists. To view the Published list, navigate to **Knowledge** > **Articles** > **Published**. To view the All list, navigate to **Knowledge** > **Articles** > **All**.

If the article versioning feature is enabled, the version number of the knowledge article increments to the next whole number (for example, from 2.02 to 3.0). For more information, see Knowledge article version numbers.

Related topics

Article versioning changes

Editing functions for knowledge articles in the HTML editor

Improve the readability and usefulness of knowledge articles by formatting the article text using the HTML editor.

The HTML editor available in knowledge articles uses the built-in TinyMCE editor. The text formatting is preserved when the content is displayed on a portal.

The HTML toolbar within the HTML editor contains an array of icons that enable you to edit and format the body text of your knowledge article. You can also use the HTML Editor to add images, links, audio, and video to the knowledge article.

Note:
Your administrator can configure the HTML toolbar within the HTML editor. For more information, see Customize TinyMCE attributes.

You can perform the following functions using the HTML editor:

- Spell check as you type in the Article body section of a knowledge article.

  The HTML editor automatically checks spelling as you type and underlines spelling and grammar mistakes in red.

- View the style applied to the selected text and the word count from the bottom pane of the HTML editor.
- Apply formatting.
- Paste without formatting.

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- Insert tables and modify cells, rows and columns of a table.
- Include HTML content.
- Insert or edit a code snippet.
- Insert a basic table of contents at the cursor's current position.
- Find and replace text.
- Identify and resolve accessibility related issues in a knowledge article using the Accessibility checker in the toolbar.
- Revert changes that you have made during the current session of content editing.

Managing HTML content in knowledge articles

You can manage HTML content in knowledge articles by using the HTML editor.

You can perform the following functions for HTML content in knowledge articles:

- Insert a hyperlink by using the insert/edit link icon ( ) available on the HTML toolbar. For more information, see Link to a website in HTML fields.
- Insert an image by using the insert/edit image icon ( ) available on the HTML toolbar. For more information, see Embed images in HTML fields.
- Embed a video from the video library, an attachment, or URL by using the insert/edit video icon ( ) available on the HTML toolbar. You can also add videos to the video library. For more information, see Embed videos in HTML fields.
- Copy content from external sources and paste them as simple text into the editor. For more information, see Paste content into the HTML editor.
- View and edit the HTML source code by using the source code icon ( ) available on the HTML toolbar. For more information, see Extended functions.

  Note:
  To insert or edit a code snippet, see Format a code snippet automatically in knowledge articles.

- Expand the HTML field to use the full form view for easier editing by using the fullscreen icon ( ). For more information, see Extended functions.

Formatting options for knowledge articles

You can apply formatting to a knowledge article using the HTML editor.

You can use the options on the HTML toolbar to apply the following formatting in knowledge article text:

- Change the font or font size of knowledge articles.
- Format text as bold, italicized, underlined, or strikethrough.
- Change the text color and text background color.
- Create bulleted and numbered lists.
- Change paragraph indentation.
- Apply styles to text.
- Auto-format content copied from Microsoft Word to match the format of the article.

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- Create collapsible sections in an article to show or hide the content.
- Insert bookmarks to the article content that can link to specific parts of the text with an ID.
- Identify and resolve accessibility related issues in a knowledge article using the Accessibility checker in the toolbar.

For more information, see Formatting icons for HTML fields.

Paste content without formatting into the knowledge article

Paste content into the body of a knowledge article without copying the content formatting.

Before you begin

Open the knowledge article in which you want to use the HTML editor.

About this task

You can also use the HTML editor when creating or editing a knowledge article using the Knowledge Management application in the ServiceNow AI Platform interface or in Agent Workspace. To create or edit a knowledge article in the ServiceNow AI Platform interface, see Create a knowledge article or Edit a knowledge article. To create or edit a knowledge article in Agent Workspace, see Create a knowledge article in Agent Workspace or Edit a knowledge article in Agent Workspace.

Procedure

1. Copy your text from a content source.
2. Click the paste as text icon ( ) on the HTML toolbar.
3. In the Article body section, place your cursor at the point where you want to paste the content, right-click, and select **Paste** from the context menu.

Adding tables to knowledge articles

You can insert tables and modify the cells, rows, and columns of a table in a knowledge article.

You can add tables to your knowledge articles by clicking the table icon ( ) on the HTML toolbar and selecting your desired table options. For example, you can adjust the height and width of rows and column, the spacing between cell text and cell borders, and change the colors of cells.

For more information, see Add a table to the HTML field.

Insert an image in a knowledge article

Insert an image in a knowledge article using the HTML editor.

Before you begin

Role required: user with contribute access

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **All**.
2. Select a knowledge article.
3. On the knowledge article form, in the **Article body** field, place the cursor where you want to insert an image.
4. On the HTML editor toolbar, select the Insert/edit image icon ( ).
5. On the Insert/Edit Image dialog box, select the Upload icon ( ).

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6. Select an image.
7. Select **Open**.
8. Select **Save**.

Result
The image is included in the knowledge article.

Format a code snippet automatically in knowledge articles

Add syntax highlighting to a code snippet in knowledge articles using the HTML editor.

Before you begin
Open the knowledge article in which you want to use the HTML editor.

Role required: knowledge

About this task
You can also use the HTML editor when creating or editing a knowledge article using the Knowledge Management application in the ServiceNow AI Platform interface or in Agent Workspace. To create or edit a knowledge article in the ServiceNow AI Platform interface, see Create a knowledge article or Edit a knowledge article. To create or edit a knowledge article in Agent Workspace, see Create a knowledge article in Agent Workspace or Edit a knowledge article in Agent Workspace.

Procedure
1. In the Article body section, place the cursor where you want to insert the code snippet.
2. Click the insert/edit code sample icon ({;}) on the HTML toolbar.
3. In the Insert/Edit code sample dialog box, select a markup or programming language from the Language list.
4. In the text box after the Language list, enter your code.
   Alternatively, you can copy the code from an external source and paste it.
5. Click **Ok**.
6. **Optional:** Edit the code by clicking the code snippet, and then clicking the insert/edit code sample icon ({;}).

Insert a table of contents in knowledge articles

Insert a hierarchical table of contents (toc) based on the headings in your knowledge article.

Before you begin
Open the knowledge article in which you want to use the HTML editor.

Role required: none

About this task
You can also use the HTML editor when creating or editing a knowledge article using the Knowledge Management application in the ServiceNow AI Platform interface or in Agent Workspace. To create or edit a knowledge article in the ServiceNow AI Platform interface, see Create a knowledge article or Edit a knowledge article. To create or edit a knowledge article in Agent Workspace, see Create a knowledge article in Agent Workspace or Edit a knowledge article in Agent Workspace.

You can generate a table of contents only if your article uses heading levels from Heading 1 to Heading 3 and is a standard article.

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Note:
Use Format select to set heading levels in the article. You can also configure the HTML toolbar using TinyMCE attributes.
For more information, see Customize TinyMCE attributes.

Procedure

1. In the Article body section, place the cursor where you want to insert the table of contents.
2. Click the table of contents icon ( ) on the HTML toolbar.
   If you do not see the table of contents icon on the toolbar, add it using steps available in Customize TinyMCE attributes.
3. **Optional:** Update an existing table of contents by selecting it and then clicking the update icon ( ) on the HTML toolbar.

Result
The HTML editor searches for the headings in your content including their levels (such as Heading 2 or Heading 3). It then automatically generates a table of contents that contains links to the heading levels from Heading 1 to Heading 3 only. The links to heading levels are indented to show the heading hierarchy.

Find and replace text in knowledge articles

Make global changes to the content of a knowledge article by finding and replacing specific text using the HTML editor.

Before you begin
Open the knowledge article in which you want to use the HTML editor.

About this task
You can also use the HTML editor when creating or editing a knowledge article using the Knowledge Management application in the ServiceNow AI Platform interface or in Agent Workspace. To create or edit a knowledge article in the ServiceNow AI Platform interface, see Create a knowledge article or Edit a knowledge article. To create or edit a knowledge article in Agent Workspace, see Create a knowledge article in Agent Workspace or Edit a knowledge article in Agent Workspace.

Procedure

1. In the Article body section, place the cursor anywhere.
2. Click the find and replace icon ( ) on the HTML toolbar.
3. In the Find and Replace dialog box, in the **Find** field, enter the search term you want to find.
4. Enter replacement text for the search term in the **Replace with** field.
   If you want to delete repeated occurrences of the search text, leave the **Replace with** field blank.
5. **Optional:** Refine the scope of the search.
   - To limit the search to text that exactly matches the case of the search term, select the **Match case** check box.
   - To limit the search to text that matches one or more complete words only, select the **Whole words** check box.

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6. Find or replace the search term.

Result
When no more occurrences of the term can be found or if the search term is not found at all in the content, a message appears indicating that the specified string wasn't found.

Accessibility checker in the toolbar

Accessibility checker in the toolbar enables you to identify and resolve accessibility related issues in a Knowledge article.

Before you begin
Open the Knowledge article in which you want to use the Accessibility checker.

Role required: user with contribute access

Procedure
1. Navigate to **All** > **Knowledge** > **Articles** > **All**.
2. Select a Knowledge article.
3. Select the **Accessibility checker** icon in the toolbar of the article body.
4. View accessibility-related issues in the **Accessibility Checker** window along with suggestions for resolution of each issue.
5. Select **Repair** to implement the suggestion, or **Ignore**.
   If there are no accessibility issues in the article, then the **Accessibility Checker** window displays a success message:

```
No accessibility issues detected
```

Undo or redo typing actions or formatting while authoring knowledge articles

Quickly revert typing actions or formatting that you made during the current session of editing a knowledge article using the HTML editor.

Before you begin
Open the knowledge article in which you want to use the HTML editor.

About this task
You can also use the HTML editor when creating or editing a knowledge article using the Knowledge Management application in the ServiceNow AI Platform interface or in Agent Workspace. To create or edit a knowledge article in the ServiceNow AI Platform interface, see Create a knowledge article or Edit a knowledge article. To create or edit a knowledge article in Agent Workspace, see Create a knowledge article in Agent Workspace or Edit a knowledge article in Agent Workspace.

Procedure
1. Place the cursor in the Article body section.
2. Undo or redo a typing action or format change.

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- To undo the previous change, click the undo icon ( ).
- To redo a change that has been undone, click the redo icon ( ).

Note:

The undo ( ) and redo ( ) icons are available based on the number of actions that are saved to be undone or certain actions that can't be undone.

Map related articles

Discover similar information across articles on a topic while viewing an article. You can manually map related articles or have the application automatically present related articles using machine learning (ML) algorithms.

Before you begin

Role required: knowledge
To edit the article, you must have knowledge contributor access for the associated Knowledge Base.

About this task

If you have manually mapped related articles when editing an article, those articles are listed in the Related Articles section on the knowledge article view page before the related articles that are predicted thorough the Knowledge Management similarity solution.

Note:

An administrator can train the solution definition for Knowledge Management within the Predictive Intelligence feature to find related articles. For more information, see Train the similarity solution for Knowledge Management to find related articles.

This task provides steps to manually map related articles when editing an article.

Procedure

1. On the ServiceNow AI Platform, open the knowledge article for which you want to map related articles.
2. On the Knowledge form, click the Related Articles related list.
3. Click **Edit**.
4. On the Edit Members form, move the desired articles from the available articles in the **Collection** column to the **Related Articles List** column.
5. Click the up or down icon to arrange the articles in the order in which you want them to appear in the Related Articles section on the article view page, and then click **Save**.

Note:

Knowledge administrators can configure the number of articles shown in the Related Articles section using the instance options.

Related topics

Edit a knowledge article

Train the similarity solution for Knowledge Management to find related articles

Configure knowledge related articles widget instance options

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Map catalog items related to an article

Manually map catalog items related to a knowledge article to enable employees to request the related product or service.

Before you begin

Role required: knowledge
To edit the article, you must have knowledge contributor access for the associated Knowledge Base.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **All**.
2. Open the knowledge article for which you want to map related catalog items.
3. On the Knowledge form, click the Related Catalog Items related list.
4. Click **Edit**.
5. On the Edit Members form, move the desired catalog items from the available catalog items in the **Collection** column to the **Related Catalog Items List** column.
6. Click the up or down icon to arrange the articles in the order in which you want them to appear in the Related Items section on the article view page, and then click **Save**.

> **Note:**
> Knowledge administrators can configure the number of catalog items shown in the Related Items section using the instance options.

Related topics

Edit a knowledge article

Service Catalog items

Configure related catalog item widget instance options

Schedule a knowledge article for publishing

Set a specific time and day for a knowledge article to be published automatically.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article you want to schedule for publishing.
Ensure that the system administrator verifies the following settings:

- Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated. For more information, see Activate the Knowledge Management Advanced plugin.
- The article versioning feature is enabled. For more information, see Article versioning.

Role required: knowledge

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** and click **Unpublished**.
2. Select an article link.
3. In the **Scheduled publish date** field, click the select date and time icon.

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You may need to configure the knowledge block form to include the **Scheduled publish date** field. Click the form context menu icon ( ) and navigate to **Configure** > **Form Layout**. Use slushbucket to add the Scheduled publish date field.

Important:
You must set the **Scheduled publish date** at least 24 hours from the current date. To publish the article earlier than 24 hours, click **Publish article** available in the form.

4. Select any future date from the calendar.
5. In the **Time** field, enter a time in the format hh:mm:ss.
6. Select the save (enter) icon .
7. Select **Publish** to enable the publishing workflow.
   The article is available in the All list. Go to **Knowledge** > **Articles** > **All**.

Tip:
If you want to cancel an article's scheduled publication and move the article back to the Draft state, click **Recall**.

Result

The knowledge article is published on the scheduled publish date depending on the following workflow settings of its knowledge base:

- If the knowledge base workflow is set to **Knowledge - Instant Publish**, the knowledge article is automatically published on the scheduled publish date. The **Workflow** field on the Knowledge form of the article is updated to **Scheduled for publish**.
- If the knowledge base workflow is set to **Knowledge - Approval Publish**, the knowledge article is published on approval completion. The **Workflow** field on the Knowledge form of the article is updated to **Review**.

  The approval completion affects the scheduled publishing as follows:

  - If the approvals are completed before the scheduled publish date, the **Workflow** field on the Knowledge form of the article is updated to **Scheduled for publish** and the article is published on the scheduled publish date.
  - If the approvals are completed after the scheduled publish date, the article is published immediately on the approval completion.

Related topics

Edit a knowledge article

Recall an article that is being reviewed

Recall an article that is being reviewed to make additional changes.

About this task

If ownership groups is not enabled, only the author of the article, knowledge administrators, or system administrators can recall the article.

If ownership groups is enabled, the author of the article, the ownership group manager, ownership group members, knowledge administrators, or system administrators can recall an article.

Recalling an article in the **Review** state results in a minor version increment.

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When a revised article is in **Review** state, only the corresponding versions reviser can recall the article to make additional changes.

Procedure

1. Navigate to **Knowledge** > **Articles** > **All**.
2. Open an article in the **Review** state.
3. Click **Recall** in the Knowledge form header.
   The system returns the state of the article to **Draft**, increments the version number by 0.01, and displays a message to the user.

Approve an article that is being reviewed

Approve an article that is being reviewed and create a new published version.

Before you begin
Role required: Owner and knowledge manager

About this task
When an article is in the **Review** state, only those users who are included in the **Approvals** related list can modify the article.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **Unpublished**.
2. Open an article in the **Review** state and review the text.
3. In the **Approvals** related list, click **Requested** in the **State** column to display the Approval form for the article.
4. Click **Approve**.

Result
The system displays the Knowledge form. The version number of the article increments to the next whole number (for example, from 2.02 to 3.0) and the state changes to **Published**. The new published version of the article is added to the Knowledge list and to the **Article Versions** related list on the Knowledge form.

Retire a knowledge article

Initiate the retirement workflow to retire a knowledge article. Knowledge base owners and managers can view articles after they are retired but cannot search for retired articles on the Knowledge homepage and portal.

A knowledge article has an associated retirement workflow, similar to the publishing workflow. This allows administrators to configure these workflows, defining an approval and review process for retiring knowledge if appropriate.

When editing an article, click **Retire** to launch the retirement workflow associated with that article. Only knowledge administrator, knowledge manager, and the latest publisher of the versioned knowledge article (not available for kcs_candidate or kcs_contributor) can retire a knowledge article. For more information, see Retire a versioned article. If the article requires approval prior to retirement, the article goes to a pending approval state, and the workflow either finishes upon approval or cancels if rejected by a required approver. The article number associated with the retired article is not available for reuse. For information on the status of a knowledge article see Knowledge article states.

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Note:

- Only administrators and knowledge administrators can view the retired knowledge articles. To reuse a retired article, administrators and knowledge administrators can republish the article. For more information, see Republish a retired article.
- An article and its translations have a parent-child relationship. Retiring a parent article does not automatically retire all its translated child articles.

Beginning with the San Diego release, you can provide a replacement article while retiring a knowledge article. When the retired article is accessed, the user will automatically be redirected to the replacement article with a display message `The article KBxxx is retired and has been replaced with the knowledge article KBxxx`. If no replacement article is available, the page displays the message `Knowledge record not found`. The retire with replacement feature is not supported on classic workspace. By default, the *`glide.knowman.enable_article_replacement_on_retire`* system property is set to `true` for new users, to provide a replacement article for a retired article. Existing and upgraded users must enable this property (set it to true manually), to able to view and use the feature.

Note:

- Article with replacement returns a 301 code.
- Article without any replacement returns a 404 code.
- The retire action on classic workspace will just retire the article and not provide a replacement irrespective of the setting of *`glide.knowman.enable_article_replacement_on_retire`*.

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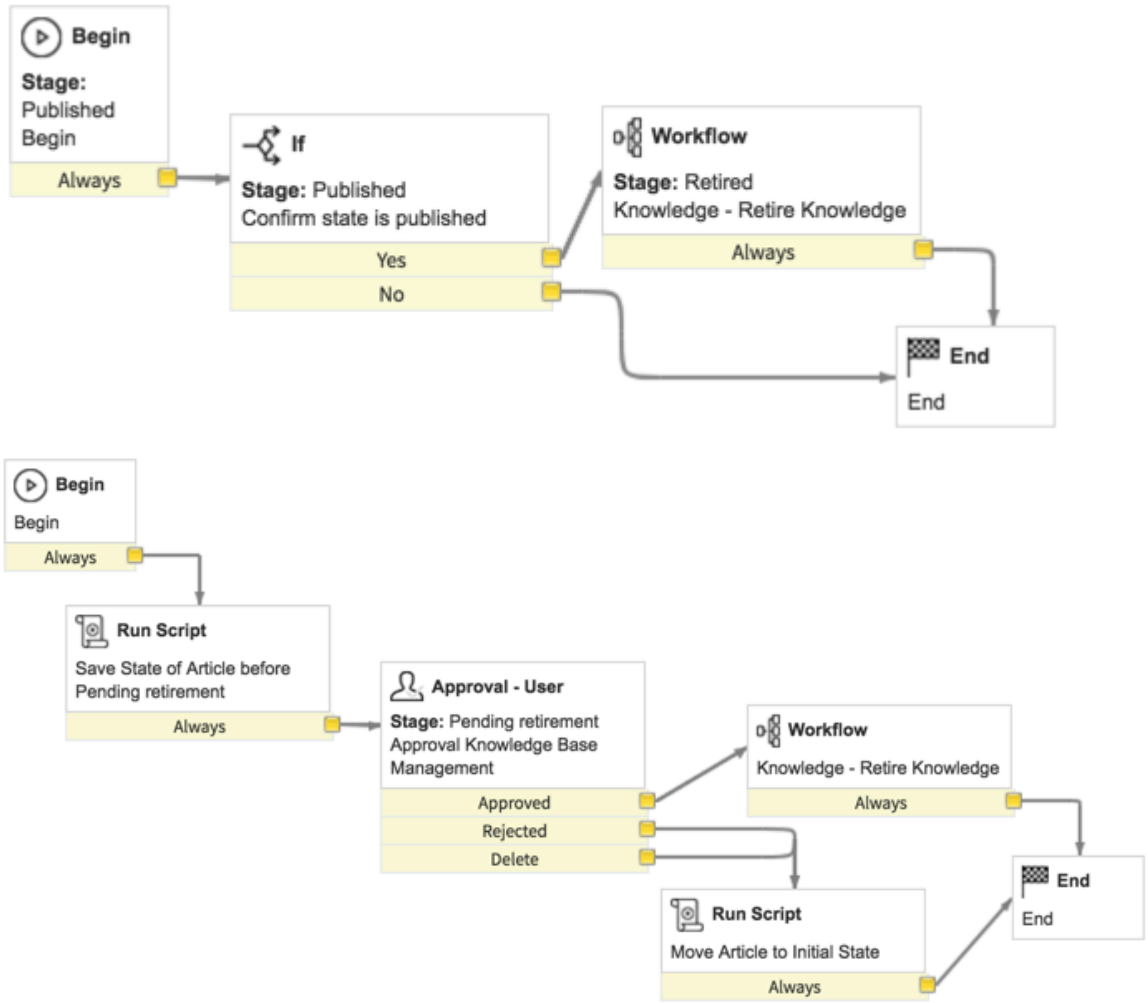
Instant retire and Approval retire workflows



Republish a retired article

Instantly republish a retired article.

Before you begin

You must activate the Knowledge Management Advanced (com.snc.knowledge_advanced) plugin.

Role required: admin or knowledge admin

Note:
You need a scoped admin role to republish a retired article in the Scoped knowledge bases.

About this task

There may be cases where you will need to republish a retired article. For example, an admin may want to temporarily retire an article when its information doesn't currently apply, but will at a later date. An administrator or knowledge administrator who can view retired articles can instantly republish these without having to go through an approval workflow.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **Retired**.
2. Select a retired article and click **Republish**.

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Result
The article is instantly published as the previous last published version.

Move a knowledge article

You can move articles between knowledge bases.

Before you begin
Role required: User must have contributor access to the knowledge base.

Note:

- When versioning is enabled, and you move an article from one knowledge base to another, the latest version of an article is moved to the new knowledge base. However, the previous versions of the article remain in the old knowledge base. It is recommended to retire the article from the old knowledge base. For more information, see Retire a knowledge article.
- Although you can move an article from one knowledge base to another consider creating an article in new knowledge base.

Procedure

1. Edit a knowledge article.
2. Change the **Knowledge Base** field value.
   After moving an article, the Apply Default Values dialog box prompts you to populate certain fields in the article with default values from the new knowledge base. If the new knowledge base has no default values, the dialog box does not appear.
3. Click **OK** to overwrite fields with the default values, or **Cancel** to leave all fields unchanged.

   A knowledge manager can define default values for articles in knowledge bases you manage using the **Set default knowledge field values** field on the Knowledge Base form.
4. Click **Update**.

Comment on a knowledge article

Comment on a knowledge article or reply to a comment.

Before you begin
You must activate the Knowledge Management V3 plugin (com.snc.knowledge3).

Role required: User with Can Read access. Unauthenticated users and users with only the snc_external role can't add or view attachments for comments.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Procedure

1. Navigate to the Knowledge Management Service Portal.
2. Click the article you want to comment or reply to a comment on.

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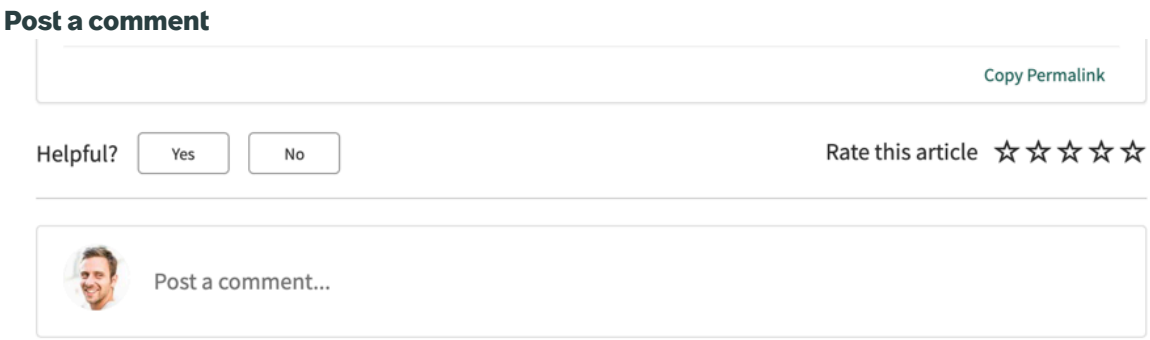
3. Select **Post a comment**.
   If you want to reply to an existing comment, select **Reply**



4. Enter your comment or reply and add links, images, and attachments as required.

> **Note:**
> Attachments to comments posted in the Knowledge Management Service Portal are not displayed in the Live Feed. If attachments to comments are posted in Live Feed, they are displayed in the Knowledge Management Service Portal.
>
> If antivirus protection is enabled, all attachments are automatically scanned for viruses once the comment is posted. Attachments are only displayed once the scan is finished and successful.
>
> If you are the author of the comment, you can delete it. All comments and replies underneath are automatically deleted.

5. Click **Submit**.

> **Note:**
> When the Use Live Feed for Knowledge Feedback property is enabled, you can only view comments in the Live Feed. By default, it is set to inactive.
>
> Comments posted in Live Feed before upgrading to release version New York are not shown hierarchically in the Knowledge Management Service Portal. Comments posted in Live Feed after upgrading to release version New York are shown hierarchically in the Knowledge Service Portal.

The following table illustrates how comments and replies to comments are displayed depending on where you are viewing them.

Display of comments and replies to comments

Viewing from	HTML formatting	Hierarchy	Attachments
Knowledge Management Service Portal	Yes	Yes	Yes
Live Feed	No	Yes	Yes
Knowledge Management v3	No	No	No

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Create knowledge from incident or problem

Create a knowledge article, so the next time the issue comes up the resolution is easy to find.

Before you begin

Role required: knowledge

About this task

To create a knowledge article from an incident, see Create a knowledge article from an incident.

To create a knowledge article from problem, see Create a known error article.

Depending on the value of the *glide.knowman.submission.workflow* property, knowledge created from an incident or problem may require additional approval. When this property is true, a submission record is created instead of a knowledge article. A user with the knowledge role must approve the submission to create a knowledge article.

Procedure

1. Open a resolved incident or problem.
2. Select the **Knowledge** check box on the form.
   You may need to configure the form to include the **Languages** field. Click the form context menu icon ( ) and navigate to **Configure** > **Form layout**. Use slushbucket to add the Languages field.
3. Close the incident or problem.
   A new draft knowledge article is created.
4. If additional approval is required, navigate to **Knowledge** > **Articles** > **Open Submissions**.
5. Select a submission record.
6. Review the submission to ensure the content and settings are correct.
7. Click **Create Article**.
   A new draft knowledge article is created. Articles created this way are added to the knowledge base specified in the property *glide.knowman.task_kb*.

Create an article version by importing a Word document

Import a Word document to a knowledge article to create a new version.

Before you begin

- Ensure that the Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is installed.
- You can only upload new versions to articles that are in **Draft** or **Published** state.
- You cannot upload new versions to articles that are created using an article template or if the article type is **Wiki**.

Role required: admin

Procedure

1. Navigate to **All** > **Knowledge** > **Articles**.
2. Click an article.
3. Click the **Upload New Version** related link.

Note:
Any text written in TinyMCE is overwritten once the file is imported.

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4. Add the file you want to import.
5. **Optional:** Select the **Copy Attachments** check box to copy all attachments to the knowledge article.

   Note:
   If the article is published, the attachments are added to a new article version. If the article is in draft, the attachments are added to the existing knowledge article. The draft article does not appear in the knowledge base (KB) for users until it is reviewed and published.

6. Click **Import**.
   A draft version is created and sent to approvers to approve or reject. Once the article is approved, it is displayed in the **Article Versions** related list.

Using human readable URLs for the Knowledge article page

Human readable URLs include more readable keywords to the URL structure.

Human readable URLs are short and simple web addresses that use relevant keywords from the knowledge article page that are easier to understand. Users have a better idea of what they will find when they access the link.

The benefits of using human readable URLs rather than technical URLs include:

- Improves the readability of the URL to make it easier for a human to understand
- Improves search engine optimization (SEO) rankings and the click-through rate

Enable Human Readable URLs for the Knowledge Article View page

Update a human readable URL structure in the Knowledge Article View page to improve search ranking and click-through rates.

Before you begin
Role required: admin, sp_admin

About this task
If you are upgrading from a release earlier than the Zurich release, you must enable the Human Readable URLs feature for the Knowledge Article View page. Beginning with the Zurich release, this feature is enabled by default.

Note:
To disable the Human Readable URLs feature, change the *`glide.service_portal.enable_human_readable_urls`* system property value to false.

Procedure

1. Navigate to **All** > **Service Portal** > **Pages**.
2. On the Pages form, search for the ID `kb_article_view` and select it.
3. In the information message on the Page form indicating that you have to change the current application to edit the record, select the word **here**.
4. On the Knowledge Article View form, in the **Human readable url structure** field enter the `%short_descr` variable.

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Note:
You can also create a variable to add information from various data sources. For more information, see Add human readable keywords to page URLs.

5. Select **Update**.

Result
The *%short_descr* variable is added to the URL structure and will enable simpler, non-technical words in the URL.

Example: Knowledge Article View page with human readable keywords in the URL

The following sample URL shows the keywords from the Knowledge article KB0000007. The URL considers *en* as the preferred language and displays the Knowledge article content in the English language.

```
https://<instance>.com/kb/en/faq/what-is-a-cookie?id=kb_article_
view&sysparm_article=KB0000007
```

This article URL contains the field variables, and keywords in the following table.

Field variables in the URL structure

Field	Variable	Keywords
Category	%category	`faq`
Short description	%short_descr	`What is a cookie?`

Select a knowledge article category

Knowledge articles within a knowledge base are grouped by category. These groups can help you define the knowledge base taxonomy, and can help users find articles within that knowledge base.

Before you begin
Role required:

About this task
As a knowledge contributor, when editing a knowledge article you can select categories using the Category picker, and add or edit categories if enabled for the knowledge base.

Procedure

1. Click the reference lookup icon beside the **Category** field.
2. Select an existing category, or click the add category icon (+) to add a new category.
   After you select a category, you can click the pen icon to rename that category. Press the enter key or click outside the selected category to save the change.

   Note:
   Clicking **Cancel** while selecting a category cancels selecting a new category, but does not revert any changes you make to the categories such as renaming or adding new categories.

3. Fill in the fields on the form, as appropriate.

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4. **Optional:** Select or add a subcategory.
5. Click **OK**.

Associate a knowledge article with a taxonomy category

Associate a knowledge article with a taxonomy topics to create a uniform classification structure across different kinds of content.

Before you begin

You must have contribute access to the knowledge base that contains the knowledge article.

Role required: knowledge

About this task

The taxonomy feature enables you to link an article to one or more topics from multiple taxonomies. It helps you maintain a unified content categorization across content types such as catalog items, knowledge articles, and community posts. For more information, see Unified taxonomy for Employee Center

Note:
You can associate only articles in the Draft, Review, or Published state.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles**.
2. On the article page, click the article you want to associate to a taxonomy topic.
3. In the Assigned Topics related list, click **Add**.

   Note:
   As an admin, you may need to configure the form to include the Connected Content → Knowledge in the related list. Click the form context menu icon and navigate to **Configure** > **Related Lists**. Using slushbucket, add the Connected Content → Knowledge.

4. Select a Taxonomy category from the list in the topic picker dialog box.

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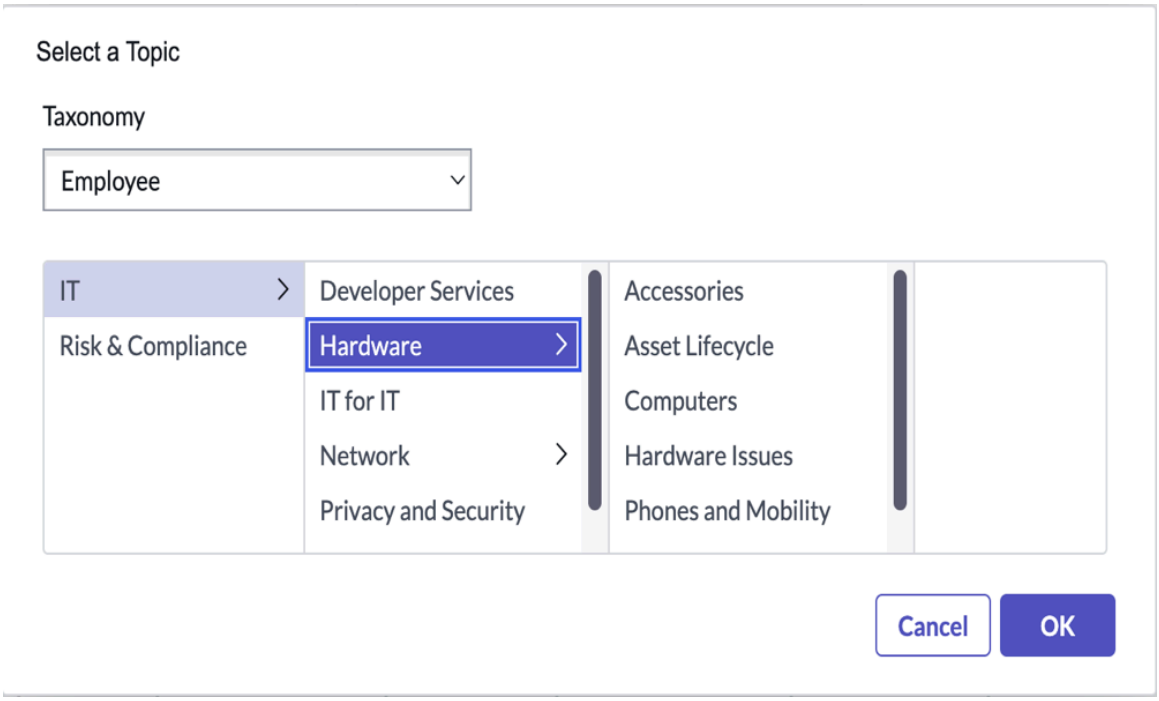

5. Select a topic from a topic picker list and click **OK**.

Result
The selected article is associated with a taxonomy category for better content browsing.

Authoring a knowledge article in Agent Workspace

Complete your job efficiently by creating, editing, and publishing knowledge articles in Agent Workspace.

Knowledge Management features specific to agents and authors are available in Workspace. Perform any knowledge administration-related tasks such as creating a knowledge base, managing access to knowledge articles, enabling an article template, and so on using the ServiceNow AI Platform interface.

You can perform the following Knowledge-related tasks in Workspace:

- Create a knowledge article using a default or custom article template.
- Manage all unpublished and published knowledge articles authored by you.
- Address feedback tasks assigned to you.
- Compare two knowledge article versions.
- Request translations for published untranslated knowledge articles.
- Complete translation tasks assigned to you.
- Map related articles and related catalog items to a knowledge article.
- Add affected products to a knowledge article.
- Use Agent assist to avoid creating knowledge articles with duplicate content.

The authoring experience for knowledge articles in Workspace is similar to the one in ServiceNow AI Platform with the following exceptions:

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- Knowledge blocks can't be created or associated with knowledge articles. However, you can view articles containing knowledge blocks.
- Knowledge articles of type Wiki aren't supported.
- Knowledge article categories can't be created.

Activation Information

The Knowledge list in Workspace is available with the activation of the Agent Workspace plugin (com.glide.core-ui-components). When you install and activate the Agent Workspace plugin, the sn-component-workspace-knowledge plugin for using Knowledge Management in Workspace is also installed and activated.

Related topics

View a knowledge article in Agent Workspace

Create a knowledge article in Agent Workspace

Edit a knowledge article in Agent Workspace

Schedule a knowledge article for publishing in Agent Workspace

Work on a feedback task in Agent Workspace

Compare knowledge article versions in Agent Workspace

Request translations for missing languages in Agent Workspace

View a knowledge article in Agent Workspace

View a knowledge article in Agent Workspace, including the article number, short description, and article content.

Before you begin
You must have read access to the knowledge article.
Role required: agent_workspace_user

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. View knowledge articles authored by you or by other people.
   - View all articles by navigating to **Lists** > **Knowledge** > **All Articles**.
   - View articles authored by you by navigating to either **Lists** > **Knowledge** > **My Articles - Published** or **Lists** > **Knowledge** > **My Articles - Unpublished**.
3. Click the link to the knowledge article that you want to view.
4. **Optional:** View the knowledge article in another language by selecting a language in the Language list.

   Note:
   The Language list is populated based on the available translated versions of the article.

5. **Optional:** Copy the link to the knowledge article to your clipboard by clicking the more actions icon (···) and then clicking **Copy link**.
6. **Optional:** Download the article as a Microsoft Word document to your computer by selecting the more actions icon (···) and then selecting **Download as Word**.

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Note:
This option appears only when the article was originally created using Microsoft Word and the administrator has enabled the *sn_km_word.glide.knowman.enable_document_download* property.

7. **Optional:** View another version of the knowledge article by selecting the version of the knowledge article in the Version list.

Note:
The Version list appears only when the article versioning feature is enabled.

Result

The selected version of the article opens in a knowledge article view page displayed in another tab within Agent Workspace. The tab name includes the knowledge article number and its version number.

Related topics

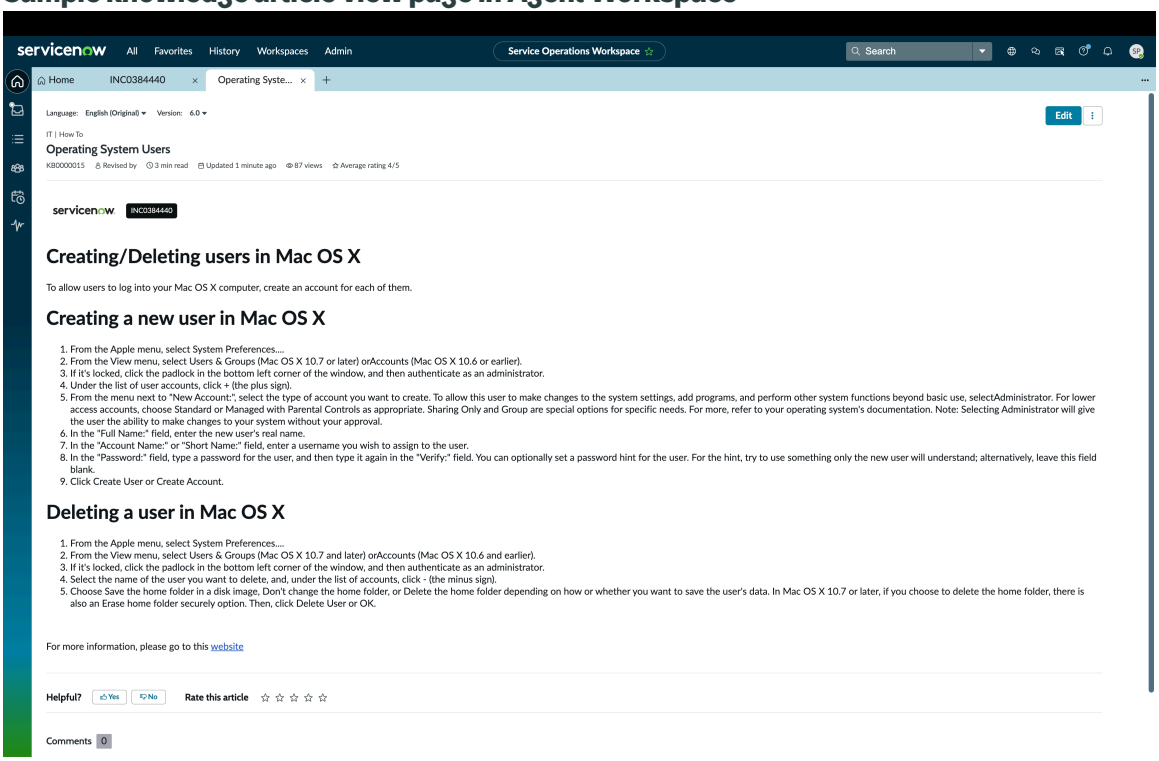
- Viewing knowledge article details in Agent Workspace
- Managing access to knowledge bases and knowledge articles
- Provide feedback for a knowledge article in Agent Workspace
- Edit a knowledge article in Agent Workspace

Viewing knowledge article details in Agent Workspace

View the details of a knowledge article in Agent Workspace.

The knowledge article view page in Agent Workspace provides several details about a displayed article.

Sample knowledge article view page in Agent Workspace



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Article information displayed on the knowledge article view page in Agent Workspace

Details	Description
Knowledge base	Knowledge base that stores the knowledge article and the article category. In the figure, IT is the knowledge base and Announcements is the knowledge article category.
Read time	Average time to read the knowledge article, which can help you can decide whether you have time to read the article. The read time is calculated based on an average reading speed of 200 words per minute. For articles in languages such as Chinese, Japanese, and Korean, the read time is calculated based on an average speed of 500 characters per minute. If images are present in an article, the read time is calculated using the following rules: • For the first image add 12 seconds, for the second image add 11 seconds, and so on. • If there are more than 10 images, after the tenth image add 3 seconds for each image.
Last updated time	Last time the knowledge article was updated in number of days for the current week, number of weeks, or number of years.
Number of views	Number of times the knowledge article was viewed in the past number of days set by your system administrator in the *glide.knowman.view_age.days* property. For more information on this property, see Knowledge portal properties.
Average rating	Result of the weighted average rating of the knowledge article based on numeric 1 through 5 ratings. The average rating is carried on the next version of the article.
Knowledge article content	Text and images of the knowledge article.
Authored by	Author of the knowledge article. This field appears only in the first version of a knowledge article.
Revised by	User who revised the article. This field appears if a knowledge article was later edited.
Article number	Unique number automatically assigned to the knowledge article. In the figure, KB0010090 is the article number.
Version	Selected version of the knowledge article. This field appears when the article versioning feature is enabled. In the figure, 1.01 is the selected version of the article.
Language	Language of the selected article. This field appears if the translations of the knowledge article in other languages are available.
Attachments	List of article attachments. This field appears if the knowledge administrator has enabled it to be displayed on the knowledge article view page.

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Related topics

- View a knowledge article in Agent Workspace
- Create a knowledge article in Agent Workspace
- Edit a knowledge article in Agent Workspace
- Publish a knowledge article in Agent Workspace

Provide feedback for a knowledge article in Agent Workspace

Provide feedback on a knowledge article by rating the article, marking the article as helpful or not helpful, and posting and replying to comments for the article in Agent Workspace.

Before you begin

You must have read access to the knowledge article.

Role required: agent_workspace_user

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **All articles**.
3. Click the link to the knowledge article that you want to view.
4. Provide feedback for the article.

Related topics

- View a knowledge article in Agent Workspace
- Work on a feedback task in Agent Workspace

Create a knowledge article in Agent Workspace

Create a knowledge article in Agent Workspace to share information across your organization.

Before you begin

You must have contribute access to the knowledge base within which you want to create the knowledge article.
Role required: agent_workspace_user

About this task

You can also create a knowledge article when adding a knowledge block. For more information, see Add a knowledge block to a knowledge article in Agent Workspace.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. **Optional:** Check whether a knowledge article on this subject is already available by going to **Lists** > **Knowledge** > **All Articles** and setting a filter to search for possible matching articles.
3. Click **New**.
4. Create the knowledge article by either selecting an article template or using the default template.

Option	Description
Selected article template	Select an article template to create a knowl edge article using defined fields and values.

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Option	Description
	In the Create Article dialog box: **a.** From the Knowledge Base list, select a knowledge base. **b.** From the Article Template list, select the de sired article template. **Note:** The Article Template list is populated based on the article templates config ured for the selected knowledge base. **c.** Select **Create Article**. The Create Article dialog box is available if the article versioning and the Knowledge Arti cle Templates features are enabled. For more information, see Article versioning and Knowl edge article templates.
Default Standard template	Create a knowledge article using the default Standard template.

5. On the form, fill in the fields.

Note:
If you're using an article template, the available fields will vary.

Knowledge form

Field	Description
Knowledge base	Knowledge base in which the knowledge article is stored. You can associate a knowledge article with one knowledge base only. If you're using an article template, you can modify this value only if the template is available in the other knowledge base.
Category	Category for the knowledge article. This value helps users find the article within a selected category. You can select only categories available within the selected knowledge base. Articles without a category appear in the (empty) category.
Ownership Group	Ownership group for the knowledge article. An ownership group consists of a group of members and a manager who are responsible for approvals and feedback tasks. Ownership groups can publish, edit, and retire knowledge articles that they're associated with. **Note:** This field is available only if the *glide.knowman.ownership_group.enabled* property is enabled. If no ownership group is assigned and approvals are required to publish a knowledge article, it's automatically submitted for approval to the knowledge administrator and knowledge manager. For more information, see Ownership groups.

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Field	Description
Version	Automatically generated article version number. This number is incremented when changes are made to a published article. **Note:** This field is available if the article versioning feature has been enabled.
Workflow	Publishing workflow state of the knowledge article, such as **Draft**, **In Review**, or **Published**. For a new article, the workflow state is set to **Draft**.
Language	The language in which you're creating the knowledge article. The list is populated based on the languages enabled for the selected knowledge base. This field appears only when the I18N:Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) is activated. For more information, see I18N - Knowledge internationalization.
Short description	Title of the knowledge article. This title appears when browsing and searching for knowledge article, and at the top of the article. You can enter up to 100 characters in this field. **Note:** Knowledge articles similar to the short description text will appear in Agent assist.
Article body	Content for the knowledge article. Use the editing functions in the HTML editor to create content. For more information, see Editing functions for knowledge articles in the HTML editor.
Source Task	Task this knowledge article was created from. This field is set automatically when you create the knowledge article from a task, such as an incident or a customer service case, or from a submission record.
Scheduled publish date	Future date when the knowledge article will be published automatically. For more information, see Schedule a knowledge article for publishing in Agent Workspace.
Valid to	The date this knowledge article expires. Articles don't appear in search results after the **Valid to** date or if the **Valid to** date is empty. The default value of the **Valid to** field is derived from the **Article Validity** field configured for the knowledge base (see Create a knowledge base). The **Valid to** date starts from the date that the article was created until the number of days specified in the **Article Validity** field. If the **Article Validity** field is empty, the default date in the **Valid to** field for the knowledge article is set to January 1, 2100. An article author or editor can select whether to keep or change the default **Valid to** date. For more information, see Validity of a knowledge article. On the first day of each month, the application sends an email notification to a list of authorized recipients to remind them about articles that are expire in the next month. The recipient can then extend the **Valid to** date to continue using the article. For more information, see Managing email notifications in Knowledge Management.

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Field	Description
	Note: If the system date format or user preferences is set to use `yy` year format, you might face issues when the **Valid to** date is set to the default date. Contact your administrator or modify the user preferences to use a date format with the `yyyy` year format. For more information, see Global date and time field format and Personalize the system date format topics.
Confidence	Maturity of an article based on its completeness and reusability.
Article type	Type of the article, which is automatically set to HTML. This field is available in the Standard template only. **Note:** The Wiki article type isn't supported in Agent Workspace.
Display attachments	Option to display attachments in the knowledge article. If the article has attachments, they're listed below the text of a knowledge article on the knowledge article view page.
Attachment link	Option to automatically download an attached article when a user accesses it instead of opening the article. The Attachment link option applies to articles accessed from search links only. **Note:** Although you may attach multiple files, most web browsers permit users to download only the first attachment. To ensure download of all the files, bundle them into an archive and attach the archive. Articles accessed as links within other knowledge articles will not replicate this behavior.
Governance	An attribute of an article that enables you to control sensitive, critical, or regulated information. Not all articles have the same requirement for compliance reviews. Some articles are based on the collective experience of the people who use the articles (experience-based). Other articles have policy or legal information that require tight control (compliance-based).
Issue	Brief description about an issue. **Note:** This field is available in the KCS Article template only.
Environment	Details of the environment in place when the issue occurred. **Note:** This field is available in the KCS Article template only.
Cause	The cause of the issue. **Note:** This field is available in the KCS Article template only.
Resolution	Method used to resolve the issue.

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Field	Description
	Note: This field is available in the KCS Article template only.
Question	Text to display as a question. **Note:** This field is available in the FAQ template only.
Answer	Text to display as an answer to an included question. **Note:** This field is available in the FAQ template only.
Introduction	Introduction to the topic. **Note:** This field is available in the How To and What Is templates only.
Instructions	Instructions for a how-to topic. **Note:** This field is available in the How To template only.
Explanation	Explanation of a what-is topic. **Note:** This field is available in the What Is template only.

Note:
The **Confidence** and **Governance** fields appear when the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities) is activated. For more information, see Managing the KCS article state.

6. **Optional:** Research for content related to knowledge article you're authoring using Agent assist.

   a. In the contextual side panel, select the agent assist icon ( ).
   The search results in Agent assist display default content based on the text-based search.

   b. Click the select a search resource icon ( ), and then select a search resource.
   For example, to view knowledge articles, select **Knowledge Articles**.

   c. **Optional:** In the search results, you can click a resource item, such as a knowledge article, to view its content in Agent assist.

   Tip:
   For better readability, you can resize the contextual side panel for Agent assist. For a full view of the selected resource item content, select **Full View**. The resource item content opens in another tab within the Agent Workspace.

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7. **Optional:** Check whether your content matches the content in an existing article.

   a. Enter your search text in the text box available in Agent assist or retain the default text, which is the short description of the knowledge article.

   b. Select the lookup icon ( ).

   c. Select a search resource by clicking the Select a search resource icon ( ).

   - To find knowledge articles that have high text similarity with the entered search text, choose **Similar Articles (ML)**.

     Note:
     This option is available only when the Predictive Intelligence feature is enabled and your administrator has trained the similarity solution for Knowledge Management. For more information, see Train the similarity solution for Knowledge Management to find related articles.

   - To find knowledge articles that match the entered search text, choose **Knowledge Articles**.

8. **Optional:** Attach a file with supporting information by clicking the attachments icon ( ) in the contextual side panel and selecting the file.
9. **Optional:** Add a knowledge block.
   For more information, see Add a knowledge block to a knowledge article in Agent Workspace.
10. Click **Save**.
    The article is saved and appears in the My Articles - Unpublished list and additional functionality becomes available on the form.
11. **Optional:** Either add to or modify the article details or publish the article.
    - Add to or modify the article details.

      (Optional) For more information, see Edit a knowledge article in Agent Workspace.

    - Publish the article by clicking **Publish**.

      A knowledge article is published depending on the workflow setting of its knowledge base:

      - **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
      - **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

        Note:
        With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. An administrator can override this behavior by disabling the `glide.knowman.ownership_group.enable_self_approval` property. For more information, see Ownership groups.

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For more information, see Schedule a knowledge article for publishing in Agent Workspace.

When published, your knowledge article appears in the My Articles - Published and All Articles lists. If the article versioning feature is enabled, the version number of the knowledge article is updated. For more information, see Knowledge article version numbers.

What to do next

After you create and publish a knowledge article, you can perform the following actions related to the article:

- Request translations for the knowledge article. For more information, see Request translations for missing languages in Agent Workspace.
- Retire the knowledge article. Click **Retire** to enable the retirement workflow. For more information, see Retire a knowledge article.
- Translate the knowledge article directly from the knowledge article. For more information, see Translate a knowledge article in Agent Workspace.
- Delete the published knowledge article. Click **Delete**. If the **Delete** button isn't displayed, click the more actions icon (...), and then click **Delete**.

Note:
Only users with the admin role can delete a published knowledge article.

Related topics

View a knowledge article in Agent Workspace

Edit a knowledge article in Agent Workspace

Work on a feedback task in Agent Workspace

Provide feedback for a knowledge article in Agent Workspace

Managing access to knowledge bases and knowledge articles

Knowledge workflows

Knowledge article templates

Using Agent Assist in Agent Workspace

Create knowledge from incident or problem

Publish a knowledge article in Agent Workspace

Publish a knowledge article to make it available to users.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article you want to publish.
Role required: agent_workspace_user

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **My Articles - Unpublished**.
3. Click a knowledge article link.
4. On the Knowledge form, click **Publish**.

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Result

A knowledge article is published depending on the workflow setting of its knowledge base:

- **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
- **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

Note:
With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. An administrator can override this behavior by disabling the *glide.knowman.ownership_group.enable_self_approval* property. For more information, see Ownership groups.

For more information, see Schedule a knowledge article for publishing in Agent Workspace.

When published, your knowledge article appears in the My Articles - Published and All Articles lists. If the article versioning feature is enabled, the version of the article is incremented based on the version number pattern.

Related topics

Create a knowledge article in Agent Workspace

Edit a knowledge article in Agent Workspace

Knowledge workflows

Edit a knowledge article in Agent Workspace

Edit knowledge articles within a knowledge base in Agent Workspace to update information shared across your organization.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article you want to edit.

Note:

- If the article versioning feature is enabled, only the knowledge administrator, knowledge managers, and author can edit the checked-out version of an article. If the feature is disabled, any users with contribute access to an article can edit the draft version of the article. An administrator can disable the article versioning feature by setting the *glide.knowman.versioning.enabled* property (from the **System Property** [sys_properties] table) to **false**.
- If an ownership group is associated with a knowledge article, the author or reviser of the article can't contribute to the article after the article is published. An administrator can override this behavior by enabling the *glide.knowman.ownership_group.override* property. For more information, see Ownership groups.
- If the *glide.knowman.translation.enable_translation_task* property is enabled, you can’t modify the knowledge base of existing articles.

Role required: agent_workspace_user

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Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **All Articles**.
3. Click a knowledge article link.
4. On the Knowledge form, click **Edit**.

Note:
If the knowledge article was created using Microsoft Word, you can edit the article only in Microsoft Word. In this case, select **Open in Word** to open the article in Word Online. For more information, see Edit a knowledge article in Microsoft Word.

If you want to edit the article using the HTML editor, you can unlink the article from Word. For more information, see Unlink knowledge articles from linked Microsoft Word documents.

5. If the article versioning feature is enabled, click **Checkout** for a published knowledge article. You can only edit the latest version of a knowledge article.
6. Access the relevant related lists to modify the information.

Knowledge form related lists

Related list	Description
Details	Knowledge article content and its metadata. **Note:** If the article versioning feature is enabled, the default value of the **Valid to** date in the updated article version is automatically set based on the following criteria: ○ If the **Article Validity** field in the knowledge base associated with the article is empty, the **Valid to** date value from the earlier version of the article is retained. ○ If the **Article Validity** field in the knowledge base associated with the article isn't empty, the **Valid to** date is automatically updated to start from the date the article was updated until the number of days specified in the **Article Validity** field (Article updated date + article validity). If you move a knowledge article to another knowledge base, the default value of the **Valid to** date in the updated article is automatically set based on the following criteria: ○ If the **Article Validity** field in the selected knowledge base is empty, the earlier **Valid to** date value is retained for the knowledge article. ○ If the **Article Validity** field in the selected knowledge base isn't empty, the **Valid to** date is automatically updated to start from the date the article was updated until the number of days specified in the **Article Validity** field (Article updated date + article validity). If the dictionary value of the **Valid to** field is modified, this dictionary value overrides the default value of the **Valid to** field calculated according to the **Article Validity** field. For more information, see Validity of a knowledge article.

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Related list	Description
Feedback	Feedback received on the published versions of the article. To view more details about the feedback, in the **Comments** column, select a link for the desired version of an article.
Feedback Tasks	Details about the feedback task created for a knowledge article version.
Approvals	Approval history of the knowledge article.
Article Versions	Version history of the knowledge article.
Translated Versions	Translated versions of the knowledge article. This related list appears only when the translation management feature is enabled. To translate a knowledge article, select **New**. The **New** button on this related list appears when the *glide.knowman.translation.enable_translation_task* property is inactive.
Translation Tasks	Tasks submitted for translating the article. This related list appears when the Translation Management feature and the *glide.knowman.translation.enable_translation_task* property to enable creation of translation tasks are enabled. For more information, see Knowledge Management properties.
Related Articles	Related articles mapped to the knowledge article. For more information, see Map a related article in Agent Workspace.
Related Catalog Items	Related catalog items mapped to the knowledge article. For more information, see Map a related item in Agent Workspace.
Affected Products	Products mapped to the knowledge article. For more information, see Add an affected product to a knowledge article in Agent Workspace.

7. **Optional:** Research for content related to knowledge article you're authoring using Agent assist.

   a. In the contextual side panel, select the agent assist icon ( ).
   The search results in Agent assist display default content based on the text-based search.

   b. Click the select a search resource icon ( ), and then select a search resource.
   For example, to view knowledge articles, select **Knowledge Articles**.

   c. **Optional:** In the search results, you can click a resource item, such as a knowledge article, to view its content in Agent assist.

   Tip:
   For better readability, you can resize the contextual side panel for Agent assist. For a full view of the selected resource item content, select **Full View**. The resource item content opens in another tab within the Agent Workspace.

8. **Optional:** Check whether your content matches the content in an existing article.

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a. Enter your search text in the text box available in Agent assist or retain the default text, which is the short description of the knowledge article.

b. Select the lookup icon ( ).

c. Select a search resource by clicking the Select a search resource icon ( ).

- To find knowledge articles that have high text similarity with the entered search text, choose **Similar Articles (ML)**.

  Note:
  This option is available only when the Predictive Intelligence feature is enabled and your administrator has trained the similarity solution for Knowledge Management to find related articles. For more information, see Train the similarity solution for Knowledge Management to find related articles.

- To find knowledge articles that match the entered search text, choose **Knowledge Articles**.

9. **Optional:** Work with attachments.
   - Attach a file with supporting information by clicking the attachments icon ( ) in the contextual side panel and selecting the file.
   - Download, remove, or rename an existing attachment by clicking the menu icon ( ) displayed for the attachment.
10. Click **Save**.
    The article is saved and appears in the My Articles - Unpublished list. If the article versioning feature is enabled, the version of the knowledge article is incremented by 0.01. For more information, see Knowledge article version numbers.
11. **Optional:** Publish the article by clicking **Publish**.
    The knowledge article is published depending on the workflow setting of its knowledge base:
    - **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
    - **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

      Note:
      With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. An administrator can override this behavior by disabling the `glide.knowman.ownership_group.enable_self_approval` property. For more information, see Ownership groups.

    For more information, see Schedule a knowledge article for publishing in Agent Workspace.

    When published, the knowledge article appears in the My Articles - Published and All Articles lists. If the article versioning feature is enabled, the version number of the knowledge article increments to the next whole number (for example, from 2.02 to 3.0). For more information, see Knowledge article version numbers.

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Related topics

- Create a knowledge article in Agent Workspace
- View a knowledge article in Agent Workspace
- Using Agent Assist in Agent Workspace
- Create knowledge from incident or problem

Map a related article in Agent Workspace

Discover similar information across articles on a topic while viewing a knowledge article. You can manually map related articles or have the application automatically present related articles using machine learning (ML) algorithms.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article for which you want to add related articles.
Role required: agent_workspace_user

About this task

If you have manually mapped related articles when editing an article in Agent Workspace, those articles are listed in the Related Articles section on the knowledge article view page in the Knowledge Management Service Portal before the related articles that are predicted thorough the Knowledge Management similarity solution.

Note:
An administrator can train the solution definition for Knowledge Management within the Predictive Intelligence feature to find related articles. For more information, see Train the similarity solution for Knowledge Management to find related articles.

This task provides steps to manually map related articles when editing an article in Agent Workspace. You can also manually map related articles when editing an article from the Knowledge Management application in the ServiceNow AI Platform interface. For more information, see Map related articles.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **All Articles**.
3. Click the link to the knowledge article for which you want to map related articles.
4. In the Related Articles related list, click **New**.
5. On the Related Articles form, fill in the fields.

Related Articles form

Field	Description
Active	Option to enable the mapping to the related knowledge article.
Related knowledge article	Knowledge article that contains related information. You can click the search for record icon (), to access the list of available knowledge articles.
Knowledge article	Number of the knowledge article for which you are adding the related knowledge article.

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Field	Description
Order	Order in which you want the article to appear in the Related Articles section on the Knowledge Management article view page. A lower value means that a knowledge article has the greater priority to appear in the Related Articles section. The default value is 100.

6. Click **Save**.

Result
The mapped articles are available in the Related Articles section on the Knowledge Management article view page in the Knowledge Management Service Portal. See Knowledge Management Service Portal article view page features.

Note:
Because system administrators can configure the number of knowledge articles shown in the Related Articles section, not all mapped related articles might appear in the Related Articles section. For more information, see Configure knowledge related articles widget instance options.

Related topics

Edit a knowledge article in Agent Workspace

Map a related item in Agent Workspace

Manually map catalog items related to a knowledge article in Agent Workspace to enable employees to request the related catalog item.

Before you begin
You must have contribute access to the knowledge base that stores the knowledge article for which you want to add related articles.
Role required: agent_workspace_user

About this task
This task provides steps to map related catalog items when editing an article in Agent Workspace. You can also map related catalog items when editing an article from the Knowledge Management application in the ServiceNow AI Platform interface. For more information, see Map catalog items related to an article.

Procedure
1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **Published** for a published article or **Lists** > **Knowledge** > **Unpublished** for an unpublished article.
3. Click the link to the knowledge article for which you want to map a related item.
4. On the Knowledge form, click the Related Catalog Items related list.
5. Click **New**.
6. On the Related Catalog Items form, fill in the fields.

Related Items form

Field	Description
Active	Option to enable the mapping to the related catalog item.

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Field	Description
Catalog item	Catalog item related to the knowledge article. You can click the search for record icon (🔍) to access a list of available catalog items.
Knowledge article	Number of the knowledge article for which you are adding the related catalog item.
Order	Order in which you want the catalog item to appear in the Related Items section on the Knowledge Management article view page. A lower value means that a catalog item has the greater priority to appear in the Related Items section. The default value is 100.

7. Click **Save**.

Result
The mapped catalog items are listed in the Related Items section on the Knowledge Management article view page in Knowledge Management Service Portal.

Note:
Because system administrators can configure the number of catalog items shown in the Related Items section, not all mapped related catalog items might appear in the Related Items section. For more information, see Configure related catalog item widget instance options.

Related topics

Edit a knowledge article in Agent Workspace

Service Catalog items

Add an affected product to a knowledge article in Agent Workspace

Add affected products to a knowledge article to view the products associated with the knowledge article

Before you begin
The Knowledge Product Entitlements plugin (com.snc.kb_product_entitlements) must be activated to use the Knowledge Product Entitlements application. Installing this plugin adds the Affected Products related list to the Knowledge form. For more information, see Knowledge product entitlements.

You must have contribute access to the knowledge base that stores the knowledge article for which you want to add affected products.

Role required: agent_workspace_user

About this task
This task provides steps to add affected products to a knowledge article in Agent Workspace. You can also add affected products to a knowledge article using the Knowledge Management application in the ServiceNow AI Platform interface. For more information, see Add a related product to a knowledge base or knowledge article.

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Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **All Articles**.
3. Click the link to the knowledge article for which you want to add a related product.
4. On the Knowledge form, in the Affected Products related list, click **New**.
5. On the Knowledge Related to Products form, in the **Configuration item** field, click the search for record icon ( ).
6. In the Configuration item dialog box, click the related product.
7. Click **Save**.

Related topics

Edit a knowledge article in Agent Workspace

Schedule a knowledge article for publishing in Agent Workspace

Set a specific time and day for a knowledge article to be published in Agent Workspace automatically.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article you want to schedule for publishing.
Ensure that the system administrator verifies the following settings:

- Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated. For more information, see Activate the Knowledge Management Advanced plugin.
- The article versioning feature is enabled. For more information, see Article versioning.

Note:
You can also schedule a knowledge article for publishing from the Knowledge Management application in the ServiceNow AI Platform interface. For more information, see Schedule a knowledge article for publishing.

Role required: agent_workspace_user

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **My Articles - Unpublished Articles**.
3. Click an article link.
4. In the **Scheduled publish date** field, click the show calendar icon ( ).
5. Select any future date in the calendar.
6. In the **Select Time** field, enter a time in the format hh:mm:ss.
7. Click **OK**.
8. Click **Publish** to enable the publishing workflow.

Tip:
If you want to cancel an article's scheduled publication and move the article back to the Draft state, click **Recall**.

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Result

The knowledge article is published on the scheduled publish date depending on the following workflow settings of its knowledge base:

- If the knowledge base workflow is set to **Knowledge - Instant Publish**, the knowledge article is automatically published on the scheduled publish date. The **Workflow** field on the Knowledge form of the article is updated to **Scheduled for publish**.
- If the knowledge base workflow is set to **Knowledge - Approval Publish**, the knowledge article is published on approval completion. The **Workflow** field on the Knowledge form of the article is updated to **Review**.

  The approval completion affects the scheduled publishing as follows:

  - If the approvals are completed before the scheduled publish date, the **Workflow** field on the Knowledge form of the article is updated to **Scheduled for publish** and the article is published on the scheduled publish date.
  - If the approvals are completed after the scheduled publish date, the article is published immediately on the approval completion.

Related topics

Edit a knowledge article in Agent Workspace

Knowledge workflows

Work on a feedback task in Agent Workspace

Start working on a feedback task, request clarifications, and resolve or close the feedback task in Agent Workspace. You can view all feedback tasks assigned to you or your ownership group.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article you want to work on.
Role required: agent_workspace_user

About this task

A feedback task is created based on the following types of feedback sources.

Source	Description
User feedback	Knowledge article was marked as not helpful or given low ratings.
Internal feedback	Knowledge article was flagged.
Knowledge gap	Knowledge gap feedback task was created for one or more tasks using the Knowledge Demand Insights feature.
Knowledge gap - manual	Knowledge gap feedback task was created manually from a task, such as a customer service case or an incident.
Unsuccessful search	Knowledge gap feedback task was created from the Unsuccessful Searches report in the Self-Service Analytics for Customer Service dashboard.
Other	Feedback for a knowledge article from other sources.

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Source	Description
	Note: When you upgrade your instance, for any existing records that don't have any feedback task type set or don't match with supported types, the feedback task type is automatically set to **Other**.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Click **Lists** > **Knowledge** > **My Tasks - Feedback**.
3. Click the link to a feedback task number.
4. On the Knowledge Feedback Task form, review the feedback given by the submitter.
5. Work on the feedback task.
6. **Optional:** In the Compose section, enter comments, which all viewers can see, or work notes, which only internal users can see.
7. **Optional:** Track the time spent on each state for a feedback task by clicking the **Knowledge Feedback Task Metrics** tab and then clicking a link to the state in the **Value** column.
8. Click **Save**.

Result
The feedback task is updated.

Related topics

View a knowledge article in Agent Workspace

Create a knowledge article from a feedback task in Agent Workspace

When working on a knowledge article feedback task, if the current knowledge article doesn't address the issue, you can create another knowledge article from within the task. A feedback task is created for a knowledge article when the article is flagged, marked as not helpful, or rated low, or a knowledge gap feedback task is created on a topic.

Before you begin
You must have contribute access to the knowledge base that stores the knowledge article.
Role required: agent_workspace_user

About this task
A feedback task is created in the following ways:

- When a user provides a feedback for the knowledge article. For more information, see Provide feedback for a knowledge article in Agent Workspace.
- When knowledge gap feedback tasks are created on a topic from a demand insights dashboard. For more information, see Analyze knowledge gaps from a demand insights dashboard and create knowledge gap feedback tasks.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to your tasks list.

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- For feedback tasks created through knowledge gaps or if a knowledge article was marked as not helpful or rated low, go to **Knowledge** > **My Tasks - Feedback**.
- For tasks created when an article was flagged, go to **Knowledge** > **My Tasks - Flagged**.

3. In the **Number** column, click the link to a feedback task assigned to you or your ownership group.
4. Click **Create Article**.
5. Create the knowledge article by either selecting an article template or using the default template.

Option	Description
Selected article template	Select an article template to create a knowl edge article using defined fields and values. In the Create Article dialog box: **a.** From the Knowledge Base list, select a knowledge base. **b.** From the Article Template list, select the de sired article template. **Note:** The Article Template list is populated based on the article templates config ured for the selected knowledge base. **c.** Select **Create Article**. The Create Article dialog box is available if the article versioning and the Knowledge Arti cle Templates features are enabled. For more information, see Article versioning and Knowl edge article templates.
Default Standard template	Create a knowledge article using the default Standard template.

6. On the form, fill in the fields.

Note:
If you're using an article template, the available fields will vary.

Knowledge form

Field	Description
Knowledge base	Knowledge base in which the knowledge article is stored. You can associate a knowledge article with one knowledge base only. If you're using an article template, you can modify this value only if the template is available in the other knowledge base.
Category	Category for the knowledge article. This value helps users find the article within a selected category. You can select only categories available within the selected knowledge base. Articles without a category appear in the (empty) category.

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Field	Description
Ownership Group	Ownership group for the knowledge article. An ownership group consists of a group of members and a manager who are responsible for approvals and feedback tasks. Ownership groups can publish, edit, and retire knowledge articles that they're associated with. **Note:** This field is available only if the *glide.knowman.ownership_group.enabled* property is enabled. If no ownership group is assigned and approvals are required to publish a knowledge article, it's automatically submitted for approval to the knowledge administrator and knowledge manager. For more information, see Ownership groups.
Version	Automatically generated article version number. This number is incremented when changes are made to a published article. **Note:** This field is available if the article versioning feature has been enabled.
Workflow	Publishing workflow state of the knowledge article, such as **Draft**, **In Review**, or **Published**. For a new article, the workflow state is set to **Draft**.
Language	The language in which you're creating the knowledge article. The list is populated based on the languages enabled for the selected knowledge base. This field appears only when the I18N:Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) is activated. For more information, see I18N - Knowledge internationalization.
Short description	Title of the knowledge article. This title appears when browsing and searching for knowledge article, and at the top of the article. You can enter up to 100 characters in this field. **Note:** Knowledge articles similar to the short description text will appear in Agent assist.
Article body	Content for the knowledge article. Use the editing functions in the HTML editor to create content. For more information, see Editing functions for knowledge articles in the HTML editor.
Source Task	Task this knowledge article was created from. This field is set automatically when you create the knowledge article from a task, such as an incident or a customer service case, or from a submission record.
Scheduled publish date	Future date when the knowledge article will be published automatically. For more information, see Schedule a knowledge article for publishing in Agent Workspace.
Valid to	The date this knowledge article expires. Articles don't appear in search results after the **Valid to** date or if the **Valid to** date is empty. The default value of the **Valid to** field is derived from the **Article Validity** field configured for the knowledge base (see Create a knowledge base). The **Valid to** date starts from the date that the article was created until the number of

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Field	Description
	days specified in the **Article Validity** field. If the **Article Validity** field is empty, the default date in the **Valid to** field for the knowledge article is set to January 1, 2100. An article author or editor can select whether to keep or change the default **Valid to** date. For more information, see Validity of a knowledge article. On the first day of each month, the application sends an email notification to a list of authorized recipients to remind them about articles that are expire in the next month. The recipient can then extend the **Valid to** date to continue using the article. For more information, see Managing email notifications in Knowledge Management. **Note:** If the system date format or user preferences is set to use `yy` year format, you might face issues when the **Valid to** date is set to the default date. Contact your administrator or modify the user preferences to use a date format with the `yyyy` year format. For more information, see Global date and time field format and Personalize the system date format topics.
Confidence	Maturity of an article based on its completeness and reusability.
Article type	Type of the article, which is automatically set to HTML. This field is available in the Standard template only. **Note:** The Wiki article type isn't supported in Agent Workspace.
Display attachments	Option to display attachments in the knowledge article. If the article has attachments, they're listed below the text of a knowledge article on the knowledge article view page.
Attachment link	Option to automatically download an attached article when a user accesses it instead of opening the article. The Attachment link option applies to articles accessed from search links only. **Note:** Although you may attach multiple files, most web browsers permit users to download only the first attachment. To ensure download of all the files, bundle them into an archive and attach the archive. Articles accessed as links within other knowledge articles will not replicate this behavior.
Governance	An attribute of an article that enables you to control sensitive, critical, or regulated information. Not all articles have the same requirement for compliance reviews. Some articles are based on the collective experience of the people who use the articles (experience-based). Other articles have policy or legal information that require tight control (compliance-based).
Issue	Brief description about an issue. **Note:** This field is available in the KCS Article template only.
Environment	Details of the environment in place when the issue occurred.

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Field	Description
	Note: This field is available in the KCS Article template only.
Cause	The cause of the issue. **Note:** This field is available in the KCS Article template only.
Resolution	Method used to resolve the issue. **Note:** This field is available in the KCS Article template only.
Question	Text to display as a question. **Note:** This field is available in the FAQ template only.
Answer	Text to display as an answer to an included question. **Note:** This field is available in the FAQ template only.
Introduction	Introduction to the topic. **Note:** This field is available in the How To and What Is templates only.
Instructions	Instructions for a how-to topic. **Note:** This field is available in the How To template only.
Explanation	Explanation of a what-is topic. **Note:** This field is available in the What Is template only.

Note:
The **Confidence** and **Governance** fields appear when the Knowledge Management KCS Capabilities plugin (com.snc.knowledge_kcs_capabilities) is activated. For more information, see Managing the KCS article state.

7. **Optional:** Research for content related to knowledge article you're authoring using Agent assist.

   a. In the contextual side panel, select the agent assist icon ( ).
   The search results in Agent assist display default content based on the text-based search.

   b. Click the select a search resource icon ( ), and then select a search resource.

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For example, to view knowledge articles, select **Knowledge Articles**.

c. **Optional:** In the search results, you can click a resource item, such as a knowledge article, to view its content in Agent assist.

> **Tip:**
> For better readability, you can resize the contextual side panel for Agent assist. For a full view of the selected resource item content, select **Full View**. The resource item content opens in another tab within the Agent Workspace.

8. **Optional:** Check whether your content matches the content in an existing article.

a. Enter your search text in the text box available in Agent assist or retain the default text, which is the short description of the knowledge article.

b. Select the lookup icon ( ).

c. Select a search resource by clicking the Select a search resource icon ( ).

- To find knowledge articles that have high text similarity with the entered search text, choose **Similar Articles (ML)**.

> **Note:**
> This option is available only when the Predictive Intelligence feature is enabled and your administrator has trained the similarity solution for Knowledge Management. For more information, see Train the similarity solution for Knowledge Management to find related articles.

- To find knowledge articles that match the entered search text, choose **Knowledge Articles**.

9. Click **Save**.
The article is saved and appears in the My Articles - Unpublished list and additional functionality becomes available on the form.

10. **Optional:** Either add to or modify the article details or publish the article.

- Add to or modify the article details.

  (Optional) For more information, see Edit a knowledge article in Agent Workspace.

- Publish the article by clicking **Publish**.

  A knowledge article is published depending on the workflow setting of its knowledge base:

  - **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
  - **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

> **Note:**
> With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. An administrator can override this behavior by disabling the *glide.knowman.ownership_group.enable_self_approval* property. For more information, see Ownership groups.

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For more information, see Schedule a knowledge article for publishing in Agent Workspace.

When published, your knowledge article appears in the My Articles - Published and All Articles lists. If the article versioning feature is enabled, the version number of the knowledge article is updated. For more information, see Knowledge article version numbers.

What to do next

After you create and publish a knowledge article, you can perform the following actions related to the article:

- Request translations for the knowledge article. For more information, see Request translations for missing languages in Agent Workspace.
- Retire the knowledge article. Click **Retire** to enable the retirement workflow. For more information, see Retire a knowledge article.
- Translate the knowledge article directly from the knowledge article. For more information, see Translate a knowledge article in Agent Workspace.
- Delete the published knowledge article. Click **Delete**. If the **Delete** button isn't displayed, click the more actions icon ( ), and then click **Delete**.

Note:
Only users with the admin role can delete a published knowledge article.

Related topics

View a knowledge article in Agent Workspace

Finding solutions by using Agent assist

Edit a knowledge article from a feedback task in Agent Workspace

When working on a knowledge article task, you can edit the knowledge article from within the task. A feedback task is created for a knowledge article when the article is flagged, marked as not helpful, or rated low, or a knowledge gap feedback task is created on a topic.

Before you begin

Role required: You must have contribute access to the knowledge base that stores the knowledge article.

Note:
If the article versioning feature is enabled, only the knowledge administrator, knowledge managers, and author can edit the checked-out version of an article. If the feature is disabled, any users with contribute access to an article can edit the draft version of the article. An administrator can disable the article versioning feature by setting the *glide.knowman.versioning.enabled* property (from the **System Property** [sys_properties] table) to **false**.

Role required: agent_workspace_user

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to your tasks list.
   - For feedback tasks created through knowledge gaps or if a knowledge article was marked as not helpful or rated low, go to **Knowledge** > **My Tasks - Feedback**.
   - For tasks created when an article was flagged, go to **Knowledge** > **My Tasks - Flagged**.

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3. In the **Number** column, click the link to a feedback task assigned to you or your ownership group.
4. Click **Edit Article**.
5. If the article versioning feature is enabled, click **Checkout** for a published knowledge article. You can only edit the latest version of a knowledge article.
6. Access the relevant related lists to modify the information.

Knowledge form related lists

Related list	Description
Details	Knowledge article content and its metadata. **Note:** If the article versioning feature is enabled, the default value of the **Valid to** date in the updated article version is automatically set based on the following criteria: ○ If the **Article Validity** field in the knowledge base associated with the article is empty, the **Valid to** date value from the earlier version of the article is retained. ○ If the **Article Validity** field in the knowledge base associated with the article isn't empty, the **Valid to** date is automatically updated to start from the date the article was updated until the number of days specified in the **Article Validity** field (Article updated date + article validity). If you move a knowledge article to another knowledge base, the default value of the **Valid to** date in the updated article is automatically set based on the following criteria: ○ If the **Article Validity** field in the selected knowledge base is empty, the earlier **Valid to** date value is retained for the knowledge article. ○ If the **Article Validity** field in the selected knowledge base isn't empty, the **Valid to** date is automatically updated to start from the date the article was updated until the number of days specified in the **Article Validity** field (Article updated date + article validity). If the dictionary value of the **Valid to** field is modified, this dictionary value overrides the default value of the **Valid to** field calculated according to the **Article Validity** field. For more information, see Validity of a knowledge article.
Feedback	Feedback received on the published versions of the article. To view more details about the feedback, in the **Comments** column, select a link for the desired version of an article.
Feedback Tasks	Details about the feedback task created for a knowledge article version.
Approvals	Approval history of the knowledge article.
Article Versions	Version history of the knowledge article.
Translated Versions	Translated versions of the knowledge article. This related list appears only when the translation management feature is enabled. To translate a knowledge article, select

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Related list	Description
	New. The **New** button on this related list appears when the *glide.knowman.translation.enable_translation_task* property is inactive.
Translation Tasks	Tasks submitted for translating the article. This related list appears when the Translation Management feature and the *glide.knowman.translation.enable_translation_task* property to enable creation of translation tasks are enabled. For more information, see Knowledge Management properties.
Related Articles	Related articles mapped to the knowledge article. For more information, see Map a related article in Agent Workspace.
Related Catalog Items	Related catalog items mapped to the knowledge article. For more information, see Map a related item in Agent Workspace.
Affected Products	Products mapped to the knowledge article. For more information, see Add an affected product to a knowledge article in Agent Workspace.

7. **Optional:** Research for content related to knowledge article you're authoring using Agent assist.

   a. In the contextual side panel, select the agent assist icon ( ).
   The search results in Agent assist display default content based on the text-based search.

   b. Click the select a search resource icon ( ), and then select a search resource.
   For example, to view knowledge articles, select **Knowledge Articles**.

   c. **Optional:** In the search results, you can click a resource item, such as a knowledge article, to view its content in Agent assist.

   Tip:
   For better readability, you can resize the contextual side panel for Agent assist. For a full view of the selected resource item content, select **Full View**. The resource item content opens in another tab within the Agent Workspace.

8. **Optional:** Check whether your content matches the content in an existing article.

   a. Enter your search text in the text box available in Agent assist or retain the default text, which is the short description of the knowledge article.

   b. Select the lookup icon ( ).

   c. Select a search resource by clicking the Select a search resource icon ( ).

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- To find knowledge articles that have high text similarity with the entered search text, choose **Similar Articles (ML)**.

  Note:
  This option is available only when the Predictive Intelligence feature is enabled and your administrator has trained the similarity solution for Knowledge Management to find related articles. For more information, see Train the similarity solution for Knowledge Management to find related articles.

- To find knowledge articles that match the entered search text, choose **Knowledge Articles**.

9. Click **Save**.
   The article is saved and appears in the My Articles - Unpublished list. If the article versioning feature is enabled, the version of the knowledge article is incremented by 0.01. For more information, see Knowledge article version numbers.
10. **Optional:** Publish the article by clicking **Publish**.
    The knowledge article is published depending on the workflow setting of its knowledge base:
    - **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
    - **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

      Note:
      With an ownership group associated with a knowledge article, ownership group members can approve self-authored articles for publication. An administrator can override this behavior by disabling the *glide.knowman.ownership_group.enable_self_approval* property. For more information, see Ownership groups.

    For more information, see Schedule a knowledge article for publishing in Agent Workspace.

    When published, the knowledge article appears in the My Articles - Published and All Articles lists. If the article versioning feature is enabled, the version number of the knowledge article increments to the next whole number (for example, from 2.02 to 3.0). For more information, see Knowledge article version numbers.

Related topics

Work on a feedback task in Agent Workspace

Create a knowledge article from a feedback task in Agent Workspace

View a knowledge article in Agent Workspace

Provide feedback for a knowledge article in Agent Workspace

Using Agent Assist in Agent Workspace

Compare knowledge article versions in Agent Workspace

Select and compare two versions of a knowledge article in Agent Workspace to view the differences between them.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article.
Role required: agent_workspace_user

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Note:
For comparison of the knowledge article versions in the Next Experience UI, see Compare two versions of an article.

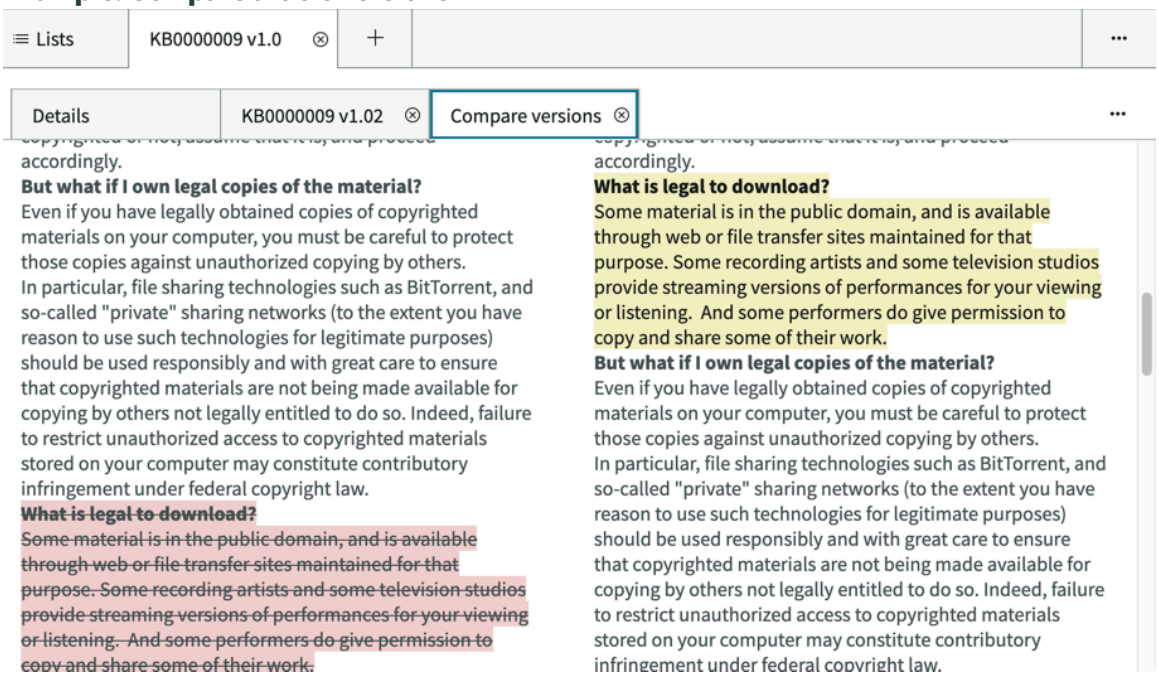
Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Click **Lists** > **Knowledge** > **All Articles**.
3. Click the link to a knowledge article for which you want to compare two versions.
4. Click **Edit** to open the Knowledge article form.
5. In the Article Versions related list, select the two versions of the article to compare.
6. Click **Compare**.

Result

The **Compare versions** tab opens within Agent Workspace and lists the fields for the selected versions in a side-by-side format. Any differences between the two versions are highlighted as shown in the following example image.

Example: Compare article versions



Related topics

Article versioning

Recall an article that is being reviewed in Agent Workspace

Recall an article that is being reviewed to stop the approval process.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article you want to recall.
Ensure that the article versioning feature is enabled. For more information, see Article versioning.

Role required: agent_workspace_user

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About this task

The author of a knowledge article, knowledge administrators, and system administrators can recall the article. If an ownership group is assigned to a knowledge article, the ownership group manager and ownership group members can also recall the knowledge article.

If a version of a knowledge article is in the **Review** workflow state, you can recall only the corresponding version to make additional changes. Recalling the article results in a minor version increment.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **All Articles**.
3. Click the link to the article in **Review** workflow state that you want to recall.
4. On the Knowledge form, click **Recall**.

Result

The article opens in edit mode and the workflow state of the article is changed to **Draft**. The version number of the article increments by 0.01.

Related topics

Edit a knowledge article in Agent Workspace

Knowledge workflows

Approve a knowledge article in Agent Workspace

Approve a knowledge article that is awaiting your review in Agent Workspace.

Before you begin

Role required: agent_workspace_user

About this task

If the article versioning feature is enabled, only users who are assigned as approvers can modify a knowledge article that is in the **Review** state. If you are not an approver but need to modify the article, consider recalling the article. For more information, see Recall an article that is being reviewed in Agent Workspace.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Go to **Lists** > **Knowledge** > **My Articles - Unpublished**.
3. Click an article link in **Review** workflow state.
4. Click **Edit**.
5. In the Approvals related list, in the **State** column, click **Requested**.
   The Approval form opens in another tab within Agent Workspace.
6. From the State list, select **Approved**.
7. Click **Save**.
   The approved knowledge article is published immediately or on the scheduled publish date, if the article is scheduled for publishing. If the article versioning feature is enabled, the version number of the knowledge article increments to the next whole number (for example, from 2.02 to 3.0). On the Knowledge form of the article, the workflow state changes to **Published**.

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The new published version of the article is added to the Article Versions related list on the Knowledge form. The version is also available in the All Articles list in Agent Workspace, go to **Knowledge** > **All Articles**.

Related topics

View a knowledge article in Agent Workspace

Request translations for missing languages in Agent Workspace

Request to translate a published knowledge article in available languages by creating a translation task in Agent Workspace.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article. Ensure that the system administrator verifies the following settings:

- Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated.
- I18N: Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) is activated.

> **Note:**
> The 18N: Internationalization plugin (com.glide.i18n) activates the I18N: Knowledge Management Internationalization Plugin v2 plugin.

- The *glide.knowman.translation.enable_translation_task* property is set to `true` in the ServiceNow AI Platform interface. For more information, see Knowledge Management properties.

Role required: agent_workspace_user

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Click **Lists** > **Knowledge** > **All Articles**.
3. Click the link to a knowledge article for which you want to create a translation task.
4. On the Knowledge form, click **Edit**.
5. Click **Request translations**.
6. In the Request translation dialog box, select one or more available languages in the Select languages list.
   If a language appears grayed out, a translation is already in progress or has been completed for that language. Some languages might not be available if the system administrator has configured only specific languages for the knowledge base in which the article is contained.
7. Click **Submit**.

Result

The translation task is created for the article in the selected languages and assigned to a group or user based on assignment rules, if configured.

Related topics

Create translation assignments for knowledge articles

Translate a knowledge article from a translation task in Agent Workspace

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Translate a knowledge article in Agent Workspace

Translate published knowledge articles to make them available in other languages.

Before you begin

You must have contribute access to the knowledge base that stores the knowledge article.
Ensure that the system administrator verifies the following settings:

- Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated.
- I18N: Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) is activated.

  Note:
  The 18N: Internationalization plugin (com.glide.i18n) activates the I18N: Knowledge Management Internationalization Plugin v2 plugin.

- The *glide.knowman.translation.enable_translation_task* property is set to `true` in the ServiceNow AI Platform interface. For more information, see Knowledge Management properties.

  Note:
  When the *glide.knowman.translation.enable_translation_task* property is set to `false`, translate the knowledge article by clicking **New** in the Translated version related list of a Knowledge form. The Knowledge form that is displayed to translate the article is based on the article template of the source knowledge article. You can enter your translation content in the Knowledge form. For more information about the Knowledge form, see Create a knowledge article in Agent Workspace.

Role required: agent_workspace_user

About this task

If you have contribute access to a knowledge article, you can translate a knowledge article directly from the knowledge form.
If your system administrator has configured languages for the knowledge base, you can translate into those languages only. For more information, see Create a knowledge base.

Note:
The translation management feature isn't available for knowledge blocks in Agent Workspace.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Click **Lists** > **Knowledge** > **All Articles**.
3. In the **Number** column, click the link to a knowledge article that you want to translate.
4. Click **Edit**.
5. Click **Translate**.

   Note:
   The **Translate** button is not available if the *glide.knowman.translation.enable_translation_task* property is disabled, translations of the knowledge article are available in all available languages, or a translation task has already been created for all the available languages.

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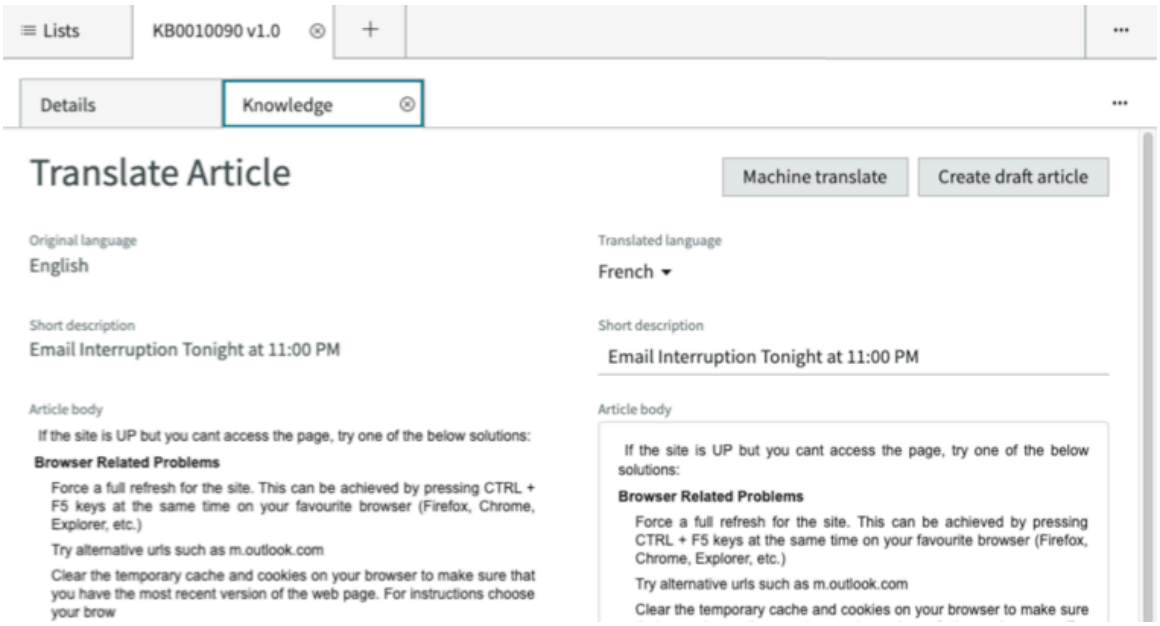
The Original language and Translated language sections appear side by side for easy viewing, as shown in the following figure. The text in the Translated language section still appears in the original language content.



6. Provide the translation in the Translated language section.
   - If dynamic translation is enabled, click **Machine translate** to automatically replace the draft content in the Translated language section with machine-translated content in the targeted language.

     Note:
     A default translator configuration should be available. For configuring the translation API, see Dynamic translation.

     When you click **Machine translate**, any draft content in the Translated language section is automatically replaced with the machine-translated content.

   - If dynamic translation is not available, replace the draft content in the Translated language section with your translated text.
7. Click **Create draft article** to create a draft version of the translated article.
8. Click **Publish**.

Result

When the translated version of the knowledge article is published, a new knowledge number is assigned to the translated version. The translated version is available in the All Articles list in Agent Workspace. Also, the Translated Versions related list on the Knowledge form of the original and translated knowledge article is updated with all the translated versions.

Related topics

Request translations for missing languages in Agent Workspace

Translation management

Translate a knowledge article from a translation task in Agent Workspace

Translate a published knowledge article for which you have been assigned a translation task.

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Before you begin

You must have contribute access to the knowledge base that stores the knowledge article. Ensure that the system administrator verifies the following settings:

- Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated.
- I18N: Knowledge Management Internationalization Plugin v2 plugin (com.glideapp.knowledge.i18n2) is activated.

  Note:
  The 18N: Internationalization plugin (com.glide.i18n) activates the I18N: Knowledge Management Internationalization Plugin v2 plugin.

- The *glide.knowman.translation.enable_translation_task* property is set to `true` in the ServiceNow AI Platform interface. For more information, see Knowledge Management properties.

Role required: agent_workspace_user

About this task

A translation task is created for a knowledge article when a request for translation is submitted or its knowledge base is configured to automatically create translation tasks. For more information, see Request translations for missing languages in Agent Workspace and Create a knowledge base.

Note:
The translation management feature isn't available for knowledge blocks in Agent Workspace.

Procedure

1. Navigate to **All** > **Agent Workspace** > **Agent Workspace Home**.
2. Click **Lists** > **Knowledge** > **My Tasks - Translation**.
3. In the **Number** column, click the link to a translation task.
4. Click **Translate**.

   Note:
   The **Translate** button is not available if the *glide.knowman.translation.enable_translation_task* property is disabled, translations of the knowledge article are available in all available languages, or a translation task has already been created for all the available languages.

   The Original language and Translated language sections appear side by side for easy viewing, as shown in the following figure. By default, the Translated language section includes the original language content.

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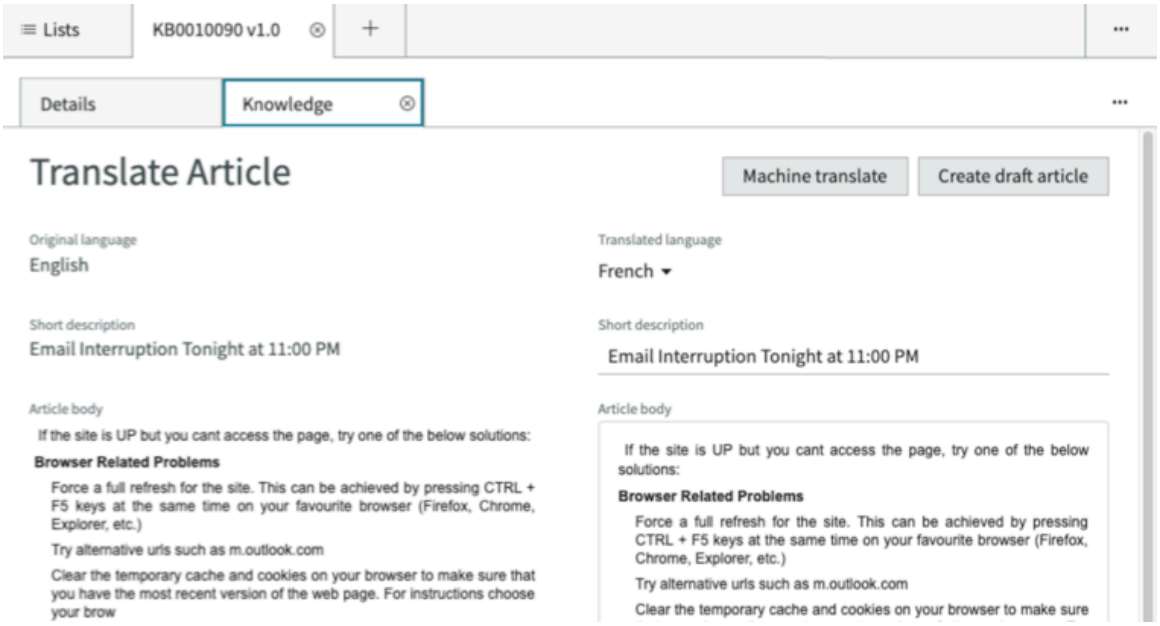

5. Provide the translation in the Translated language section.
   - If dynamic translation is enabled, click **Machine translate** to automatically replace the draft content in the Translated language section with machine-translated content in the targeted language.

     Note:
     A default translator configuration should be available. For configuring the translation API, see Dynamic translation.

     When you click **Machine translate**, any draft content in the Translated language section is automatically replaced with the machine-translated content.

   - If dynamic translation is not available, replace the draft content in the Translated language section with your translated text.
6. Click **Create draft article** to create a draft version of the translated article.
7. Click **Publish**.

Result

When the translated version of the knowledge article is published, a new knowledge number is assigned to the translated version. The translated version is available in the All Articles list in Agent Workspace. Also, the Translated Versions related list on the Knowledge form of the original and translated knowledge article is updated with all the translated versions.

Related topics

Request translations for missing languages in Agent Workspace

Translation management

Authoring a knowledge article in Microsoft Word

Author and access knowledge articles in Microsoft Word by deploying the Knowledge Management - Add-in for Microsoft Word.

User with contribute access to a knowledge base can open, create, edit, publish, and search for knowledge articles from within the Knowledge Management pane in Microsoft Word. A user

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with read access to a knowledge base can view the article in Microsoft Word. The Knowledge Management - Add-in for Microsoft Word is available in the online version of Microsoft Word only.

The Knowledge Management - Add-in for Microsoft Word works with applications that are integrated with the online version of Microsoft Word such as Microsoft SharePoint and Microsoft OneDrive.

Consider the following points when using the Knowledge Management - Add-in for Microsoft Word to maintain knowledge articles:

- The URL is automatically generated for Word documents created in Microsoft SharePoint and Microsoft OneDrive with business accounts only.

  For other applications, account types and custom SharePoint URLs, you must manually enter the URL in the **Document URL** field on the Knowledge form in Microsoft Word. For more information, see Create a knowledge article in Microsoft Word.

- The conversion time of a knowledge article from a Microsoft Word document depends on the document size.
- Headers and footers corresponding to pages in the Microsoft Word document appear as is in the knowledge article. You can remove headers and footers in the Microsoft word document before creating or updating the knowledge article.

Note:
As an admin, you must create a Restricted Caller Access Privileges record for the Microsoft Word add-in to publish a knowledge article content in scoped knowledge bases. For more information, see Restricted caller access privilege settings.

Activation information

Activate the Knowledge Management - Add-in for Microsoft Word plugin (com.snc.knowledge.ms_word) to access knowledge articles from within the Microsoft Word online application. For more information, see Activate Knowledge Management - Add-in for Microsoft Word.

Related topics

View a knowledge article in Microsoft Word

Create a knowledge article in Microsoft Word

Edit a knowledge article in Microsoft Word

Publish a knowledge article in Microsoft Word

Configure Knowledge Management - Add-in for Microsoft Word

Log in to your ServiceNow instance for authoring knowledge articles in Microsoft Word

Author and collaborate on knowledge articles in Microsoft Word by logging in to your ServiceNow instance from the Word Online application.

Before you begin

You must have contribute access to the knowledge base within which you want to create the knowledge article.
The system administrator and Office 365 administrator have configured the Knowledge Management - Add-in for Microsoft Word. (For more information, see Configure Knowledge Management - Add-in for Microsoft Word.)

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About this task

You need to authenticate with your ServiceNow instance credentials for accessing and creating knowledge articles using Microsoft Word. You might also need to re-authenticate if your session has expired.

Procedure

1. Sign in to your Office 365 account.
2. From the Microsoft 365 app launcher, select the icon to launch the Microsoft Word app. For more information, see Use the Office 365 app launcher.
3. In the New section, click **New blank document**, or open any existing Microsoft Word document.
4. On the Home tab, click the Knowledge icon ( ).
5. In the Knowledge Management pane of the Word document, click **Log in to ServiceNow**. The ServiceNow login page opens in a separate tab of your browser.
6. On the ServiceNow login page, enter your ServiceNow credentials.

Result

After successful authentication, the ServiceNow instance browser tab closes and you are redirected to the Microsoft Word browser tab. On the Microsoft Word document, the Knowledge Management pane displays the welcome screen.

View a knowledge article in Microsoft Word

View a knowledge article in Microsoft Word, including the article number, short description, and article content.

Before you begin

- Ensure that the administrator has configured the Knowledge Management - Add-in for Microsoft Word. (For more information, see Configure Knowledge Management - Add-in for Microsoft Word.)
- You must have logged in to your ServiceNow instance from the Word Online application. For more information, see Log in to your ServiceNow instance for authoring knowledge articles in Microsoft Word.
- You must have read access to the knowledge article.
- You must have signed in to your Office 365 account.

Procedure

1. From the Microsoft 365 app launcher, select the icon to launch the Microsoft Word app. For more information, see Use the Office 365 app launcher.
2. In the New section, click **New blank document**, or open any existing Microsoft Word document.
3. On the Home tab of the Word document, click the Knowledge icon ( ).
4. Access the article in the Knowledge Management pane of the Word document.

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- In the Knowledge Management pane, in the **Search** box, enter the knowledge article number or description.
- In the Knowledge Management pane, click a knowledge base to view a list of knowledge articles within the knowledge base. All knowledge bases and associated knowledge articles for which you have contribute or read access appear in the Knowledge Management pane

5. In the Knowledge Management pane, click the link to the knowledge article that you want to view.

Tip:
To go back to the previous view in the Knowledge Management pane, click the left caret icon ( ). To go back to the landing screen, click the home icon ( ).

Result
If a knowledge article was created from the Knowledge Management application in the ServiceNow AI Platform interface, the article content appears in the Document pane and the article details appear in the Knowledge Management pane of the Microsoft Word document.

If a knowledge article was created using another Word document, the document opens in a new browser tab with the content in the Document pane and the article details in the Knowledge Management pane of that document.

Note:
If the article uses a template, the article opens in the ServiceNow AI Platform interface in a new browser tab. You can't edit articles with templates in Microsoft Word.

The following article details appear in the Knowledge Management pane.

Knowledge form

Field	Description
Number	Automatically generated knowledge article number.
Knowledge base	Knowledge base in which the knowledge article is stored. You can associate a knowledge article with one knowledge base only.
Category	Category for the knowledge article. This value helps users find the article within a selected category. You can select only categories available within the selected knowledge base. Articles without a category appear in the (empty) category.
Ownership Group	Ownership group for the knowledge article. An ownership group consists of a group of members and a manager who are responsible for approvals and feedback tasks. Ownership groups can publish, edit, and retire knowledge articles that they are associated with. **Note:** This field is available only if the *glide.knowman.ownership_group.enabled* property is enabled. If no ownership group is assigned and approvals are required to publish a knowledge article, it is automatically submitted for approval to the knowledge administrator and knowledge manager. For more information, see Ownership groups.
Workflow	Publishing workflow state of the knowledge article, such as **Draft**, **In Review**, or **Published**. For a new article, the workflow state is set to **Draft**.

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Knowledge form (continued)

Field	Description
Short description	Title of the knowledge article. This title appears when browsing and searching for knowledge article, and at the top of the article. You can enter up to 100 characters in this field.
Document URL	URL of the article for accessing the online version in Microsoft Word. The URL is automatically generated for Word documents created in Microsoft SharePoint and Microsoft OneDrive with business accounts only. For other applications and account types, you must manually enter the URL in the **Document URL** field. **Note:** Avoid copy-pasting the browser URL, because it might not always work. Depending on the collaboration tool for your Word document use the URL generated specifically for sharing with other users. When manually entering the URL: • For Microsoft SharePoint, use the URL generated by the Word Online application for specific users you want to have access to the document. • For Box, use the Box Shared Link. For more information, see Creating Shared Links.
Version	Automatically generated article version number. This number is incremented when changes are made to a published article. **Note:** This field is available if the article versioning feature has been enabled.
Valid to	The date this knowledge article expires. Articles do not appear in search results after the **Valid to** date or if the **Valid to** date is blank. The default value of the **Valid to** field is derived from the **Article Validity** field configured for the knowledge base (see Create a knowledge base). The **Valid to** date starts from the date the article was created until the number of days specified in the **Article Validity** field. If the **Article Validity** field is blank, the default date in the **Valid to** field for the knowledge article is set to January 1, 2100. An article author or editor can select whether to keep or change the default **Valid to** date. On the first day of each month, the application sends an email notification to a list of authorized recipients to remind them about articles that are about to expire in the next month. The recipient can then extend the **Valid to** date to continue using the article. For more information, see Managing email notifications in Knowledge Management.

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Knowledge form (continued)

Field	Description
	Note: If the system date format or user preferences are set to use the `yy` year format, you might face issues when the **Valid to** date is set to the default date. Contact your system administrator or modify the user preferences to use a date format with the `yyyy` year format. For more information, see Global date and time field format and Personalize the system date format topics.
Scheduled publish date	Future date when the knowledge article will be published automatically. For more information, see Schedule a knowledge article for publishing in Microsoft Word.

Related topics

Create a knowledge article in Microsoft Word

Edit a knowledge article in Microsoft Word

Create a knowledge article in Microsoft Word

Create a knowledge article in Microsoft Word to author and collaborate on content using Word.

Before you begin

- Ensure that the administrator has configured the Knowledge Management - Add-in for Microsoft Word. (For more information, see Configure Knowledge Management - Add-in for Microsoft Word.)
- You must have logged in to your ServiceNow instance from the Word Online application. For more information, see Log in to your ServiceNow instance for authoring knowledge articles in Microsoft Word.
- You must have contribute access to the knowledge base within which you want to create the knowledge article.
- You must have signed in to your Office 365 account.

Procedure

1. From the Microsoft 365 app launcher, select the icon to launch the Microsoft Word app from your Office 365 account and open a Word document.
   For more information, see Use the Office 365 app launcher.
2. In the New section, click **New blank document**, or open any existing Microsoft Word document.
3. On the Home tab of the Word document, click the Knowledge icon ( ).
4. In the Knowledge Management pane of the Word document, click **Create Article**.
5. On the Knowledge form, fill in the fields.

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Knowledge form

Field	Description
Number	Automatically generated knowledge article number.
Knowledge base	Knowledge base in which the knowledge article is stored. You can associate a knowledge article with one knowledge base only.
Category	Category for the knowledge article. This value helps users find the article within a selected category. You can select only categories available within the selected knowledge base. Articles without a category appear in the (empty) category.
Ownership Group	Ownership group for the knowledge article. An ownership group consists of a group of members and a manager who are responsible for approvals and feedback tasks. Ownership groups can publish, edit, and retire knowledge articles that they are associated with. **Note:** This field is available only if the *glide.knowman.ownership_group.enabled* property is enabled. If no ownership group is assigned and approvals are required to publish a knowledge article, it is automatically submitted for approval to the knowledge administrator and knowledge manager. For more information, see Ownership groups.
Workflow	Publishing workflow state of the knowledge article, such as **Draft**, **In Review**, or **Published**. For a new article, the workflow state is set to **Draft**.
Short description	Title of the knowledge article. This title appears when browsing and searching for knowledge article, and at the top of the article. You can enter up to 100 characters in this field.
Document URL	URL of the article for accessing the online version in Microsoft Word. The URL is automatically generated for Word documents created in Microsoft SharePoint and Microsoft OneDrive with business accounts only. For other applications and account types, you must manually enter the URL in the **Document URL** field. **Note:** Avoid copy-pasting the browser URL, because it might not always work. Depending on the collaboration tool for your Word document use the URL generated specifically for sharing with other users. When manually entering the URL: ○ For Microsoft SharePoint, use the URL generated by the Word Online application for specific users you want to have access to the document. ○ For Box, use the Box Shared Link. For more information, see Creating Shared Links.
Version	Automatically generated article version number. This number is incremented when changes are made to a published article.

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Field	Description
	Note: This field is available if the article versioning feature has been enabled.
Valid to	The date this knowledge article expires. Articles do not appear in search results after the **Valid to** date or if the **Valid to** date is blank. The default value of the **Valid to** field is derived from the **Article Validity** field configured for the knowledge base (see Create a knowledge base). The **Valid to** date starts from the date the article was created until the number of days specified in the **Article Validity** field. If the **Article Validity** field is blank, the default date in the **Valid to** field for the knowledge article is set to January 1, 2100. An article author or editor can select whether to keep or change the default **Valid to** date. On the first day of each month, the application sends an email notification to a list of authorized recipients to remind them about articles that are about to expire in the next month. The recipient can then extend the **Valid to** date to continue using the article. For more information, see Managing email notifications in Knowledge Management. **Note:** If the system date format or user preferences are set to use the `yy` year format, you might face issues when the **Valid to** date is set to the default date. Contact your system administrator or modify the user preferences to use a date format with the `yyyy` year format. For more information, see Global date and time field format and Personalize the system date format topics.
Scheduled publish date	Future date when the knowledge article will be published automatically. For more information, see Schedule a knowledge article for publishing in Microsoft Word.

6. In the Document pane of the Word document, enter the article content.
7. In the Knowledge Management pane of the Word document, click **Submit**.
8. **Optional:** Publish the article by clicking **Publish**.

   (Optional) A knowledge article is published depending on the workflow setting of its knowledge base:

   - **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
   - **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

   For more information, see Schedule a knowledge article for publishing in Microsoft Word.

   If the article versioning feature is enabled, the version number of the knowledge article is updated. For more information, see Knowledge article version numbers.

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What to do next

You can share the document URL so that users can co-author the document. For more information, see Document collaboration and co-authoring.

Edit a knowledge article in Microsoft Word

Use Microsoft Word to edit a knowledge article originally created in Microsoft Word.

Before you begin

- Ensure that the administrator has configured the Knowledge Management - Add-in for Microsoft Word. (For more information, see Configure Knowledge Management - Add-in for Microsoft Word.)
- You must have logged in to your ServiceNow instance from the Word Online application. For more information, see Log in to your ServiceNow instance for authoring knowledge articles in Microsoft Word.
- You must have contribute access to the knowledge article.
- You must have signed in to your Office 365 account.

About this task

Note:
You can't edit a knowledge article that uses an article template in Word.

Procedure

1. From the Microsoft 365 app launcher, select the icon to launch the Microsoft Word app. For more information, see Use the Office 365 app launcher.
2. In the New section, click **New blank document**, or open any existing Microsoft Word document.
3. On the Home tab of the Word document, click the Knowledge icon ( ).
4. Access the article in the Knowledge Management pane of the Word document.
   - In the Knowledge Management pane, in the **Search** box, enter the knowledge article number or description.
   - In the Knowledge Management pane, click a knowledge base to view a list of knowledge articles within the knowledge base. All knowledge bases and associated knowledge articles for which you have contribute or read access appear in the Knowledge Management pane. However, you can edit knowledge articles for which you have contribute access.
5. In the Knowledge Management pane, click the link to the knowledge article that you want to edit.
6. If the Document pane of the Word document contains any content, retain or replace the content.
   - To overwrite the existing content in the Word document with content from the article you selected, click **Replace**.
   - To keep the existing content in the Word document, click **Retain**.

   Note:
   When you save the article, the Word document content will replace the article content.
7. If the article versioning feature is enabled, click **Checkout** for a published knowledge article. You can edit only the latest version of a knowledge article.

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8. Edit the content of the article in Microsoft Word.
   - Edit the article content online using Microsoft Word in your browser.
   - Edit the article content using the Word Desktop app on your computer. In this case, after you complete editing the desktop version of the article content, you must return to the online version in your browser to save the article content in your ServiceNow instance.

   Tip:
   If multiple people with contribute access to the knowledge article need to co-author the same document, you can share the document URL. For more information, see Document collaboration and co-authoring.

9. In the Knowledge Management pane, click **Save**.
10. **Optional:** Publish the article by clicking **Publish** in the Knowledge Management pane.
    The knowledge article is published depending on the workflow setting of its knowledge base.
    - **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
    - **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

    For more information, see Schedule a knowledge article for publishing in Microsoft Word.

    If the article versioning feature is enabled, the version number of the knowledge article increments to the next whole number (for example, from 2.02 to 3.0). For more information, see Knowledge article version numbers.

Unlink knowledge articles from linked Microsoft Word documents

Unlink a knowledge article from a linked Microsoft Word document to edit the article directly from the Knowledge form in the ServiceNow AI Platform.

Before you begin
Ensure that the article was created using the Knowledge Management - Add-in for Microsoft Word.
Role required: admin

About this task
If a knowledge article is created using the Knowledge Management - Add-in for Microsoft Word, you can edit the article using only the linked Word document in the Word Online application. However, if you delete or move the linked Word document, the URL to the Word document and article is broken. Therefore, you will no longer be able to edit the article using the linked Word document. To continue editing such articles:

- Manually enter the new document URL for the Word document in the **Document URL** field on the Knowledge form in Microsoft Word. For more information about the field, see Create a knowledge article in Microsoft Word.
- Unlink the article from its linked Word document by following the steps in this procedure.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles**.
2. Select an article from the **Published** or **Unpublished** category.

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3. On the Knowledge form, click the **Unlink from Word** related link.

> **Important:**
>
> When you unlink an article from Microsoft Word, it may affect the HTML formatting in the editor. This formatting change can impact how knowledge articles appear and function during editing and display.

Publish a knowledge article in Microsoft Word

Use the Word Online application to publish a knowledge article originally created in Microsoft Word to make it available to users.

Before you begin

- Ensure that the administrator has configured the Knowledge Management - Add-in for Microsoft Word. (For more information, see Configure Knowledge Management - Add-in for Microsoft Word.)
- You must have logged in to your ServiceNow instance from the Word Online application. For more information, see Log in to your ServiceNow instance for authoring knowledge articles in Microsoft Word.
- You must have contribute access to the knowledge base within which you want to publish the knowledge article.
- You must have signed in to your Office 365 account.

Procedure

1. From the Microsoft 365 app launcher, select the icon to launch the Microsoft Word app. For more information, see Use the Office 365 app launcher.
2. In the New section, click **New blank document**, or open any existing Microsoft Word document.
3. On the Home tab of the Word document, click the Knowledge icon ( ).
4. Access the article in the Knowledge Management pane of the Word document.
   - In the Knowledge Management pane, in the **Search** box, enter the knowledge article number or description.
   - In the Knowledge Management pane, click the knowledge base to view a list of knowledge articles within the knowledge base.
5. In the Knowledge Management pane, click the link to the knowledge article that you want to publish.
6. On the Knowledge form, click **Publish**.

Result

A knowledge article is published depending on the workflow setting of its knowledge base:

- **Knowledge - Instant Publish**: The knowledge article is immediately published unless it is scheduled to be published at a later date.
- **Knowledge - Approval Publish**: The knowledge article is published on approval completion unless it is scheduled to be published at a later date.

For more information, see Schedule a knowledge article for publishing in Microsoft Word.

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If the article versioning feature is enabled, the version of the article is incremented based on the version number pattern.

Schedule a knowledge article for publishing in Microsoft Word

Set a specific time and day for the draft version of a knowledge article created in Microsoft Word to be published automatically.

Before you begin

- You must have contribute access to the knowledge base that stores the knowledge article you want to schedule for publishing.
- You must have logged in to your ServiceNow instance from the Word Online application. For more information, see Log in to your ServiceNow instance for authoring knowledge articles in Microsoft Word.
- You must have signed in to your Office 365 account.

Ensure that the system administrator verifies the following settings:

- Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated. For more information, see Activate the Knowledge Management Advanced plugin.
- The article versioning feature is enabled. For more information, see Article versioning.
- The Knowledge Management - Add-in for Microsoft Word is enabled. (For more information, see Configure Knowledge Management - Add-in for Microsoft Word.)

Procedure

1. From the Microsoft 365 app launcher, select the icon to launch the Microsoft Word app. For more information, see Use the Office 365 app launcher.
2. In the New section, click **New blank document**, or open any existing Microsoft Word document.
3. On the Home tab of the Word document, click the Knowledge icon ( ).
4. In the Knowledge Management pane of the Word document, in the **Search** box, enter the knowledge article short description.
5. Click the link to the knowledge article in the Draft state that you want to schedule for publishing.

   Note:
   The knowledge article must have been originally created using Microsoft Word.

6. In the **Scheduled publish date** field, click the show calendar icon .
7. Select any future date from the calendar.
8. In the **Select Time** field, enter a time in the format hh:mm:ss.
9. Click **OK**.
10. Click **Publish** to enable the publishing workflow.

    Tip:
    If you want to cancel an article's scheduled publication and move the article back to the Draft state, click **Recall**.

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Result

If approvals are disabled, the state of the knowledge article is changed to **Scheduled for Publish** and the article is automatically published on the scheduled publish date.

If approvals are enabled, the state of the knowledge article is changed to Review. If the article is approved, the state of the article is changed to Scheduled for Publish. If the article was approved after the scheduled publish date, the article is published immediately.

The version number of the knowledge article increments based on the publishing workflow. For more information, see Knowledge article version numbers.

Related topics

Knowledge workflows

Approve an article that is being reviewed

Recall an article that is being reviewed in Microsoft Word

Recall a knowledge article that is being reviewed and created using Microsoft Word to stop the approval process.

Before you begin

- You must have contribute access to the knowledge base that stores the knowledge article you want to recall.
- You must have logged in to your ServiceNow instance from the Word Online application. For more information, see Log in to your ServiceNow instance for authoring knowledge articles in Microsoft Word.
- You must have signed in to your Office 365 account.

Ensure that the system administrator verifies the following settings:

- Knowledge Management Advanced plugin (com.snc.knowledge_advanced) is activated. For more information, see Activate the Knowledge Management Advanced plugin.
- The article versioning feature is enabled. For more information, see Article versioning.
- The Knowledge Management - Add-in for Microsoft Word is enabled. (For more information, see Configure Knowledge Management - Add-in for Microsoft Word.)

About this task

The author of a knowledge article, knowledge administrators, and system administrators can recall an article. If an ownership group is assigned to a knowledge article, the ownership group manager and ownership group members can also recall the knowledge article.
If a version of a knowledge article is in the Review state, you can recall only the corresponding version to make additional changes. Recalling the article results in a minor version increment.

Procedure

1. From the Microsoft 365 app launcher, select the icon to launch the Microsoft Word app. For more information, see Use the Office 365 app launcher.
2. In the New section, click **New blank document**, or open any existing Microsoft Word document.
3. On the Home tab of the Word document, click the Knowledge icon ( ).
4. In the Knowledge Management pane of the Word document, in the **Search** box, enter the knowledge article title or description.

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5. Click the link to the article in Review state that you want to recall.
6. On the Knowledge form, click **Recall**.

Result

The article opens in edit mode and the state of the article is changed to Draft. The version number of the article increments by 0.01.

Create a knowledge article from a customer service case

Reuse information from a customer service case by creating knowledge articles from cases.

Before you begin

Your administrator must enable creation of articles from customer service cases.

Role required: sn_customerservice_agent or knowledge

Procedure

1. Navigate to **Customer Service** > **Cases** > **All**.
2. Select a case from which you want to create a knowledge article.
3. Click **Create Knowledge**.
   The relevant fields are automatically copied from the case to the record that opens.
4. In the **Knowledge base** field, enter the name of the knowledge base in which you want this article to display.
5. Click **Submit**.

Provide feedback on knowledge articles

You can view and contribute to feedback on knowledge articles.

Feedback options

You can submit feedback for knowledge articles in these ways:

- Flag an article as incorrect or inappropriate.
- Provide a rating value for the article.
- Mark an article as helpful or not helpful.
- View comments, add a new comment, or reply to existing comments.

Users can view comments directly on the article. Knowledge managers can view the other types of feedback by navigating to **Knowledge** > **Feedback**.

Note:
To know more about Knowledge article view properties and rating options that appear with articles, see Knowledge article view properties.

Administrators and knowledge managers can disable some feedback options using fields on the Knowledge Base form. Administrators can configure feedback options using properties.

Flagging articles

You can flag an article for incorrect or inappropriate content. Click **Flag Article** in the article header to open a new window, allowing you to enter suggested changes.

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- Flagged comments do not appear on the Article View page. Users with the admin, knowledge_admin, and knowledge_manager roles can access flagged articles by navigating to **All** > **Knowledge** > **Articles** > **All Flagged**. Users with the knowledge role can access their flagged articles by navigating to **All** > **Knowledge** > **Feedback Management** > **My Flagged**.
- If disabled, the author of the article and users with the admin, knowledge_admin, and knowledge_manager roles can see all flagged comments. Other users can see only their own flagged comments.

Note:

- You cannot disable flagging for an article until you have disabled the flagging for all feedback comments for that article.
- If Disable Suggesting is checked at the Knowledge Base level, the **Flag Article** button does not appear for any knowledge article

Flagged comments are stored in the Knowledge Feedback (kb_feedback) table but not the Live Feed Messages (live_message) table.

Rating articles

The five stars below the article title allow you to indicate the article's effectiveness on a scale of 1 to 5.

Note:
If the **Disable rating** is checked at the Knowledge Base level, the Rating Article button does not appear for any knowledge article.

Marking articles

The question Helpful? at the bottom of the article allows you to indicate the usefulness of the article with a simple **Yes** or **No** answer. The **Yes** and **No** options are always available on the knowledge article view page even when you had selected an option earlier.

Note:
If the **Disable Mark as helpful** is checked at the Knowledge Base level, the Marking Article button does not appear for any knowledge article.

Comments

Knowledge comments at the bottom of the article use Live Feed to enable a conversation around a knowledge article. For example, you can post replies to comments, add attachments, or Like comments. The *glide.knowman.use_live_feed* property controls the display of knowledge article comments. If enabled, the system uses Live Feed to manage and display feedback on knowledge articles.

Note:
Unauthenticated users and users with only the snc_external role can't add or view attachments for comments.

Related topics

Automating feedback management to improve content

Request a knowledge base

Create a knowledge article from an incident in ITSM Agent Workspace

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Knowledge Management reference

Reference topics provide additional information that you can use to configure and administer Knowledge Management.

Domain separation and Knowledge Management

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

Support level: Standard

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

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

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

Overview

Domain separation works differently at different access levels of an application. In Knowledge Management, data, requester, and fulfiller access to knowledge bases are domain separated.

How domain separation works in Knowledge Management

In Knowledge Management, the following rules apply:

Data: At the data level of domain separation, data visibility is separated from one domain to another. Knowledge bases, user criteria, articles, categories, article feedback, article versions, article templates, and external sources are domain separated in the base system.

> **Note:**
> The data in one domain cannot be seen in any other domain. For example, if you create a Knowledge Management article in a domain A using an article template which is not in domain A, the article will not be visible in domain A. Similarly, if you create a Knowledge Management article in the global domain using a template that is not in global, the article might not be visible in all the domains.

Requester: Requester activities are supported within tenant domains. Users can search; view; comment; and rate articles of their domain, any child domain, and global domains, if feedback is enabled and the knowledge base settings grant them read access to articles.

- Users in the global domain can access articles in all the domains if read access is granted at knowledge base and/or article level.
- Users in the parent domain can access articles in that domain, global, and all its child domains if read access is granted at knowledge base and/or article level.
- Users in the child domain can access articles in that domain and the global domain if read access is granted at knowledge base and/or article level.

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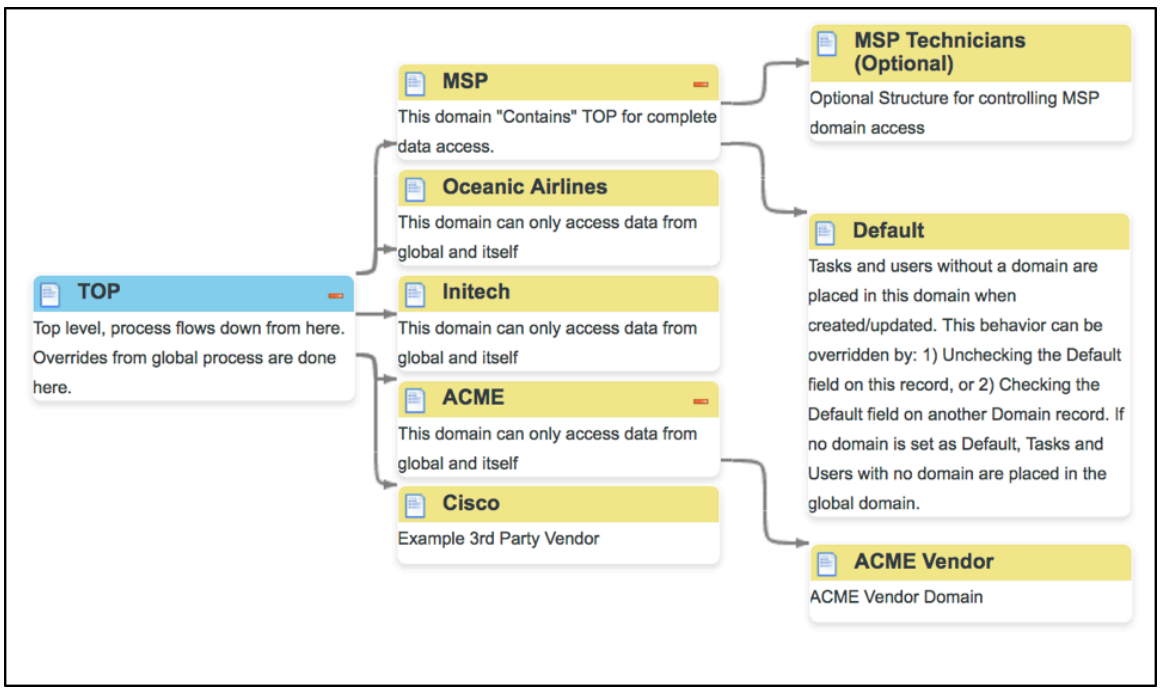
Fulfiller: The application can be used by the Fulfiller within the tenant domains as a tenant domain-owned application. Users are allowed to author articles in knowledge bases of their domain, any child domain, and the global domain if the knowledge base has user criteria set up to grant contribute access.

- Articles are automatically saved to the user's current domain when the article is created.
- If the `glide.knowman.allow_edit_global_articles` system property is enabled, users from a domain other than the global domain can check out and edit global articles. Otherwise, system administrators and users from a domain other than the global domain cannot check out global articles and are shown a warning message to that effect. Depending on their access, users can change their domain to the global domain to check out and edit the global articles.
- Domains of versioned articles will be maintained as per the latest article version's domain. This includes updating the domain for kb_version, kb_knowledge, kb_feedback, and sys_attachment tables.
- If domains contain another domain: If Domain A contains Domain B, users with access to Domain A can author articles in Domain B by toggling the domain scope. To learn more about toggling domain scope, see Visibility domains and Contains domains.

See Managing access to knowledge bases and knowledge articles to learn how to control contribute and read access to knowledge bases and knowledge articles.

Use cases

This image demonstrates a basic domain hierarchy that is available in the base system.



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Requester use cases

User domain	Knowledge base domain	Read user criteria domain	Article domain	Result
Global	Global	Global	Global	Can view, comment, rate articles.
	Parent domain (TOP)	Parent domain (TOP)	Parent domain (TOP)	
	Child domain (TOP/ACME	Child domain (TOP/ACME	Child domain (TOP/ACME	
	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	
Parent domain (TOP)	Global	Global	Global	
	Parent domain (TOP)	Parent domain (TOP)	Parent domain (TOP)	
	Child domain (TOP/ACME	Child domain (TOP/ACME	Child domain (TOP/ACME	
	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	
Child domain (TOP/ACME)	Global	Global	Global	Can view, comment, rate articles.
	Parent domain (TOP)	Parent domain (TOP)	Parent domain (TOP)	
	Child domain (TOP/ACME	Child domain (TOP/ACME	Child domain (TOP/ACME	
	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	

Fulfiller use cases

User domain	Knowledge base domain	Contribute user criteria domain	Article domain	Result
Global	Global	Global	Global	Can author, update, view, comment, rate articles.
	Parent domain (TOP)	Parent domain (TOP)	Parent domain (TOP)	
	Child domain (TOP/ACME	Child domain (TOP/ACME	Child domain (TOP/ACME	
	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	
Parent domain (TOP)	Global	Global	Global	
	Parent domain (TOP)	Parent domain (TOP)	Parent domain (TOP)	
	Child domain (TOP/ACME	Child domain (TOP/ACME	Child domain (TOP/ACME	

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User domain	Knowledge base domain	Contribute user criteria domain	Article domain	Result
	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	
Child domain (TOP/ACME)	Global	Global	Global	Can author, update, view, comment, rate articles.
	Parent domain (TOP)	Parent domain (TOP)	Parent domain (TOP)	
	Child domain (TOP/ACME	Child domain (TOP/ACME	Child domain (TOP/ACME	
	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	MSP domain (TOP/MSP)	

Known Issues

- The following AQI tables are not domain separated:
  - AQI Checklist [kb_quality_checklist]
  - Checklist Question [kb_checklist_question]
  - Article Checklist Answer [kb_article_checklist_answer]

  Note:
  The Article Checklist Answer table does not contain the Order field. The application shows the list in a random order.

- Comment provided by a user on an article is stored in article's domain instead of user domain.

Related topics

Domain separation for service providers

Additional plugins for Knowledge Management

After Knowledge Management is activated, you can activate additional plugins that provide access to various additional Knowledge Management features.

You must have the admin role to activate these additional plugins. For details, see Activate a plugin.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Plugin	Description
Knowledge Management Core (com.glideapp.knowledge)	Installs the core Knowledge Management items used to allow other Knowledge-related plugins to work, such as Knowledge V3, Knowledge Advanced, and Knowledge Service Portal. This plugin is activated by default.

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Plugin	Description
Knowledge Management Advanced Installer (com.snc.knowledge_advanced.installer)	Installs the Knowledge Management Advanced plugin. Activating/upgrading to this plugin validates the knowledge articles and knowledge bases to make sure that the Knowledge Advanced plugin can be successfully installed. If validation fails, check the Plugin Activation logs and follow instructions given to fix any errors. Once you fix all the issues, re-run this plugin.
Knowledge Management Advanced (com.snc.knowledge_advanced)	Adds advanced features to Knowledge Management such as version control and subscriptions. This plugin requires that all knowledge bases are version Knowledge V3. Use the Knowledge Management Advanced Installer plugin to activate this plugin.
Predictive Intelligence for Knowledge Management (com.snc.knowledge_ml)	Provides various Knowledge Management capabilities driven by machine-learning solutions. For example, capabilities such as similar articles and knowledge demand insights. Activation of this plugin on production instances may require a separate license. Contact ServiceNow for details. **Note:** When you install and activate the Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml), the Predictive Intelligence for Contextual Search plugin (com.snc.contextual_search_ml) is also activated.
Performance Analytics - Content Pack - Knowledge Management (com.snc.pa.knowledge_v2)	Enables the Performance Analytics content pack for the Analytics and Reporting Knowledge Management Solution. Activation of this plugin on production instances might require a separate Performance Analytics license. Contact ServiceNow for details.
Knowledge Management V3 (com.snc.knowledge3)	Enables support for Knowledge Management V3. Activate this plugin when you upgrade from Eureka or earlier versions.
I18N: Knowledge Management Internationalization Plugin v2 (com.glideapp.knowledge.i18n2)	Helps create and maintain translations of an article in various languages in a way that is easy to manage translations while authoring as well as viewing articles. Activating internationalization plugins for any of the available languages automatically activates this plugin.
Knowledge Document (com.snc.knowledge_document)	Adds knowledge-based functionalities to the Managed Documents plugin. You can create a knowledge article from a document or update a knowledge document to a newer revision.
Knowledge Management - External Content Integration (com.snc.knowledge.external_integrations)	Adds external content search capabilities to the Knowledge Management application. Once configured, this feature creates a copy of the external content on ServiceNow as knowledge articles, and then indexes the articles through Zing Search. You must have appropriate reuse and copy privileges before you configure an external source to be searchable using this feature.

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Plugin	Description
Knowledge Management Wiki Support (com.glideapp.knowledge2.wiki)	Enables support to save Knowledge articles in wiki type field instead of html type field.
Knowledge Management KCS Capabilities (com.snc.knowledge_kcs_capabilities)	Enables the use of KCS roles (kcs_contributor, kcs_publisher, and kcs_candidate) and use the metadata fields for the KCS article state (governance and confidence).
Knowledge Management - Add-in for Microsoft Word (com.snc.knowledge.ms_word)	Enables authoring content in Microsoft Word and publishing it as a knowledge article using a Word add-in.
Knowledge Blocks (com.snc.knowledge_blocks)	Enables you to create re-usable content blocks that can be included in existing knowledge articles. This feature is capable to display only pieces of an article to specific users.
Knowledge Overview (com.sn_knowledge_overview)	Enables you to generate reports to provide an overview of knowledge base and article data.

Components installed with Knowledge Management Core

Several types of components are installed with activation of the Knowledge Management Core plugin (com.glideapp.knowledge) including user roles and tables.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available.

Roles installed

Role	Description	Contains roles
Knowledge [knowledge]	Users with the knowledge role can contribute to the default knowledge base and access the Knowledge application menu. The knowledge role is a fulfiller role and not a requester role.	None.
Knowledge administrator [knowledge_admin]	Knowledge administrator can create new knowledge bases and manage all knowledge bases.	Knowledge administrator contains the knowledge role.
Knowledge manager [knowledge_manager]	Knowledge managers perform administrative functions for knowledge bases they manage such as defining categories, pinning important articles, and approving changes to articles. Users selected as managers of a knowledge base receive this role automatically.	Knowledge manager contains the knowledge administrator role.

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Tables installed

Table	Description
CSM Table Map [csm_table_map]	Stores information about the mapping source and target table. For example, while creating a knowledge article from a customer service case, the source table would be customer service case [sn_customerservice_case] and the target table would be Knowledge [kb_knowledge].
CSM Field Map [csm_field_map]	Stores information about the fields that are mapped from the source table to the target table in a given table map (CSM Table Map). For example, when creating a knowledge article from a customer service case [sn_customerservice_case], the source field value would be case.short description and the target field value would be knowledge.short description.
Related Articles [kb_2_kb]	Stores information about related knowledge articles.
Related Catalog Items [kb_2_sc]	Stores information about related catalog items.
Knowledge Category [kb_category]	Stores the category of a knowledge article.
Knowledge Feedback Task [kb_feedback_task]	Stores information about the feedback task on a knowledge article.
Knowledge Feedback [kb_feedback]	Stores information about flagged comments on a knowledge article.
Knowledge Keyword [kb_keyword]	Stores information about keywords associated with the featured knowledge articles on the homepage of the Knowledge Management Service Portal.
Knowledge Base [kb_knowledge_base]	Stores information about knowledge bases that store knowledge articles.
Knowledge keyword [kb_knowledge_keyword]	Stores information related to mapping between knowledge articles and keywords.
Knowledge [kb_knowledge]	Stores knowledge articles organized by knowledge base and category, as well as featured content and popular articles.
Who Can Contribute To Knowledge Base [kb_uc_can_contribute_mtom]	Stores information about who can read and write to a knowledge base.

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Table	Description
Who Can Read Knowledge Base [kb_uc_can_read_mtom]	Stores information about who can read a knowledge base.
Who Cannot Contribute To Knowledge Base [kb_uc_cannot_contribute_mtom]	Stores information about who cannot read and write to a knowledge base.
Who Cannot Read Knowledge Base [kb_uc_cannot_read_mtom]	Stores information about who cannot read a knowledge base.
Knowledge Use [kb_use]	Stores information about the number of times articles are viewed and the number of times knowledge articles are used in an incident, problem, or case.
Knowledge Related to Products [m2m_kb_ci]	Stores information about the products related to knowledge articles.
Knowledge Comment Likes [m2m_kb_feedback_likes]	Stores information about users who like a comment in knowledge feedback.
Knowledge Applied to Tasks [m2m_kb_task]	Stores information about articles attached to tasks (incident, case, or problem).

Components installed with knowledge blocks

Several types of components are installed with activation of the knowledge blocks plugin, including tables.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available for this feature.

Tables installed

Table	Description
Knowledge Block [kb_knowledge_block]	Knowledge blocks table. **Note:** This table extends the Knowledge [kb_knowledge] table.
KB Knowledge to Block [m2m_kb_knowledge_to_block]	KB knowledge to block table.
KB Knowledge to Block History	KB knowledge to block history table.

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Table	Description
[m2m_kb_to_block_history]	

For further information on table administration and how to manage data, see Table administration.

Knowledge Management roles

Certain roles are required to use Knowledge Management functionality.

Note:
The user criteria determine the access to knowledge articles. For more information, see Managing access to knowledge bases and knowledge articles.

The kcs_candidate, kcs_contributor, and kcs_publisher roles also include the knowledge role. For more information about these KCS-related roles, see KCS v6 Practices Guide.

Knowledge [knowledge]

Users with the knowledge role can contribute to the default knowledge base and access the Knowledge application menu. The knowledge role is a fulfiller role and not a requester role. Requesters can view, comment, and give feedback to the knowledge articles. However, a requester cannot create or edit articles.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Knowledge manager [knowledge_manager]

Knowledge managers perform administrative functions for the knowledge bases they manage defining categories, pinning important articles, and approving changes to articles. Users selected as managers of a knowledge base receive this role automatically. Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

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Special considerations

None.

Knowledge administrator [knowledge_admin]

Knowledge administrator can perform all the administrative tasks associated with maintaining the Knowledge Management system. User selected as a knowledge admin can make changes to all the knowledge bases except the scoped knowledge base. Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Knowledge coach [knowledge_coach]

Knowledge coaches can perform Article Quality Index (AQI) surveys on articles, write, edit and review knowledge articles, and coach the team on best practices. Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Knowledge domain expert [knowledge_domain_expert]

Knowledge domain experts perform AQI surveys on articles and can write, edit and review knowledge management articles. A knowledge domain expert keeps track of the health of knowledge base. Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

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None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Administrator [admin]

Administrators can configure knowledge workflows, set knowledge properties, and manage knowledge forms and dashboards.

Contains Roles

List of roles contained within the role.

- sn_templated_snip.template_snippet_admin
- sn_employee.admin
- taxonomy_admin
- sn_ace.ace_user

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Knowledge group manager [knowledge_group_manager]

Knowledge group managers can add or remove members in ownership groups managed by them. They cannot change the manager assigned in their groups. The manager can only be reassigned by the knowledge administrator. Knowledge group managers are assigned feedback tasks by default. They can reassign tasks to another group member, or group members can assign a feedback task to themselves. Knowledge_group_member role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

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Special considerations

None.

Knowledge group member [knowledge_group_member]

Knowledge group members are part of an ownership group that can be associated to knowledge articles. They can approve knowledge articles, assign feedback tasks to themselves and work on them as well as edit any knowledge articles that their ownership group is assigned to. Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

KCS candidate [kcs_candidate]

Knowledge-Centered Service (KCS) candidates understand the basics of Knowledge-Centered Service (KCS). Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

KCS contributor [kcs_contributor]

Knowledge-Centered Service (KCS) contributors can create or validate knowledge articles in their product areas without being reviewed by a knowledge coach. They may also author and approve articles for broad audience visibility. Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

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Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

KCS publisher [kcs_publisher]

Knowledge-Centered Service (KCS) publishers are authors who are well versed in KCS standards and create more external-facing articles. Knowledge role comes as a subordinate role.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Knowledge Management properties

As an administrator, you can configure the look and functionality of many knowledge base features with Knowledge Management properties.

You can access Knowledge Management properties by navigating to **Knowledge** > **Administration** > **Properties**.

Knowledge portal properties

Knowledge portal properties control the look and functionality of the legacy portal page. This portal page lists recent knowledge articles and their publishing dates, organized by topic.

Property	Description
Number of columns on Knowledge portal pages (*glide.knowman.columns*)	Set the number of columns topics on the knowledge po **Note:** This property applies o Knowledge Manageme This property is not sup Knowledge Manageme
Maximum number of articles per content block on the home page (*glide.knowman.content_block_limit*)	Enter the maximum number display in the Most Useful a sections of the knowledge h

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Property	Description
	Note: This property applies o Knowledge Managemer This property is not sup Knowledge Managemer
Omit empty Knowledge topics and categories (*glide.knowman.show_only_populated*)	Select the check box to disp sections only if there are art topic. Clear the check box t sections, even those with n articles. **Note:** This property does not New category. This property applies o default knowledge base legacy knowledge porta Management v3 articles a topic. Therefore, this p applies only to Knowled This property is not sup Knowledge Managemer
Show Knowledge section descriptions (*glide.knowman.show_descriptions*)	Select the check box to disp descriptions in the knowled enter these descriptions: 1. Edit an existing knowledg 2. Right-click the Topic field Show Choice List. 3. Open the record for the to enter the description into Clear the check box to omit descriptions from the knowl **Note:** This property applies o Knowledge Managemer This property is not sup Knowledge Managemer
Number of Knowledge Base items to preview in a section (*glide.knowman.section_limit*)	Set the maximum number o topic for the knowledge port articles shown depends on section sort field property se

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Property	Description
	Note: This property applies o Knowledge Managemer This property is not sup Knowledge Managemer
Knowledge section sort field (*glide.knowman.section_sort*)	Select the default order for a each topic section on the kn • Published: uses the date • View count: uses the num articles have been viewe period specified in the Nu used when summing artic property (applicable only Management v2.) • Alphabetically: uses the fi article title (Short descript **Note:** This property applies o Knowledge Managemer This property is not sup Knowledge Managemer
Knowledge Base section sort direction (*glide.knowman.section_sort_direction*)	Select the order, ascending in which articles are listed w section on the knowledge p used for sorting is set in the section sort field property. **Note:** This property applies o Knowledge Managemer This property is not sup Knowledge Managemer
Show unpublished articles in Knowledge Base portal and topic lists (*glide.knowman.show_unpublished*)	Select the check box to allo unpublished articles in the k portal and knowledge searc the subsequent List of roles designated which users can in various unpublished state selected, users with approp access unpublished articles modules of the Knowledge B
List of roles (comma separated) that can see articles in the Review workflow state in the Knowledge portal and Topic list (*glide.knowman.section.view_roles.review*)	Enter role names exactly as in **User Administration** > **Ro** unpublished articles in Know portal and topic lists is selec with these roles see articles workflow state in the knowle

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Property	Description
	topic list that appears when title on the portal, and in kn results.
List of roles (comma separated) that can see articles in the Draft workflow state in the Knowledge portal and Topic list (*glide.knowman.section.view_roles.draft*)	Enter role names exactly as in **User Administration** > **Ro** unpublished articles in Kno portal and topic lists is sele these roles see articles in th state in the knowledge porta that appears when they clic the portal, and in knowledge
Define roles that can view articles in other/custom workflow states (*glide.knowman.section.view_roles.stagesAndRoles*)	Enter role names exactly as in **User Administration** > **Ro** unpublished articles in Kno portal and topic lists is sele the custom field and role as `state:[roles];`. The us roles see articles in the cust state on the knowledge port The property is not applicab knowledge articles. Only us knowledge_admin role can articles.
The number of articles that are asynchronously loaded when scrolling down in the new search results page (*glide.knowman.search.articles_per_page*)	Enter the number of articles during a search. **Note:** This property applies o Knowledge Managemer This property is not sup Knowledge Managemer
Show only Knowledge topic titles on portal page (no article links) (*glide.knowman.home_titlesonly*)	Select the check box to omi from the knowledge portal a topic names. Users can clic see the list of related article **Note:** This property applies o Knowledge Managemer This property is not sup Knowledge Managemer
Number of days (integer, default 30) used when summing article views (*glide.knowman.view_age.days*)	Enter a number of days to c calculating view count. The field in the Knowledge form periodically to reflect the vie on this property. For exampl 60, the view count is the tot views in the past 60 days. E ServiceNow consider all vie date.

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Property	Description
	Note: If you edit this property, Knowledge Use schedu the changes immediate the Count Knowledge U job runs daily and upda counts on the knowledg view the scheduled job, **System Scheduler** > **Sc Scheduled Jobs**. New customers as of the Pa will not have access to the V property and Count Knowle job. Existing customers prio release can continue to use scheduled job. If you set the property value • The Count Knowledge sch not run. • The View count of an artic a rolling count, the existin gets incremented for ever **Note:** Beginning Vancouver re *glide.knowman.vi* and Count Knowledge s job is deprecated. So, s *glide.knowman.vi* to zero and do not use i
Automatically place cursor in Knowledge portal search box (*glide.knowman.portal_search_focus*)	Select the check box to have place the cursor in the searc user opens the knowledge p check box to have users clic field before entering a searc **Note:** This property applies on Knowledge Managemen This property is not sup Knowledge Managemen
Session level cache in "Most useful article" (*glide.knowman.use_session_cache_for_most_useful_articles*)	Set the property to True to e level cache in 'Most useful A widget. • Type: true | false • Default value: true • Location: System Properti

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Property	Description
Enable SEO for selected portal for article view page. (*glide.knowman.serviceportal.seo_portals*)	Value contains a comma-se of service portal record sys_ indexing of knowledge artic on the portals mentioned in blocked by the noindex met portals. If at least one portal suggestions display when u edit knowledge articles. • Type: string • Default value: none • Location: System Properti **Note:** If the property value is e indexing is enabled for
Comma-separated list of service portal record sys_ids (*glide.knowman.serviceportal.use_numbered_url.portals*)	Configure the property value sys_id of any portal so that a in portal widgets (for examp Useful, Featured, Most viewe related article) and search re sysparm_number paramete sys_kb_id parameter. • Type: string • Default value: None • Location: System Properti **Note:** If there are multiple por their sys_ids by comma
View article as another user (*glide.knowman.enable_view_as_user*)	Set the property to `true` to an article as another authori • Type: true | false • Default value: false • Location: System Properti
(*glide.knowman.serviceportal.seo_user_agent*)	This property contains the b patterns, which are used to whether the user-agent is a bot. • Type: string • Default value: None • Location: System Properti

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Knowledge search properties

Knowledge search properties give you control over the search options available to users and the presentation of search results.

Note:
Knowledge search properties is only applicable to Zing search. To configure AI search implementation, see Configuring AI Search.

Property	Description
Knowledge search result order (*glide.knowman.order.search*)	Select the order for displaying search results: • **Number of Views**: orders search results based **of days used when summing article views** pro • **Relevancy**: orders search results based on co to the search term. • **Last Modified**: orders search results based on date. This property is applicable for search within the I Management application and not the ServiceNow global search.
Search method to find Knowledge articles from a task or directly in the Knowledge Base (*glide.knowman.search.operator*)	Select the search approach to use when the sea multiple words. • **OR query**: returns articles that contain at least search term. • **AND then OR query**: first searches for articles words in the search term (an AND query). If no found, an OR query is performed.
Show author in knowledge search results (*glide.knowman.search.show_author*)	Select the check box to include the author of eac knowledge search results. If the article versioning feature is enabled, article number less than or equal to 1.0 display **Authore** articles with a version number greater than 1.0 di **<name>**.
Show last modified date and time in knowledge search results (*glide.knowman.search.show_last_modified*)	Select the check box to show the date and time a edited in knowledge search results.
Show publish date in knowledge search results (*glide.knowman.search.show_published*)	Select the check box to show the date article was knowledge search results.
Show category in knowledge search results (*glide.knowman.search.show_category*)	Select the check box to show the category bread article in knowledge search results.
Show number of views in knowledge search results (*glide.knowman.search.show_view_count*)	Select the check box to include the number of tir was viewed in knowledge search results.
How to display attachments in Knowledge Search Results (*glide.knowman.search.attachment*)	Select the behavior of how the attachments are s search results:

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Property	Description
	• **Do not show attachment** • **Show only link for attachment** (default) • **Show attachment with text snippet** For best performance, select **Do not show attac** **only link for attachment**. **Note:** Starting with the San Diego release, **Show o** **attachment** is activated by default. For existi prior to the San Diego release, the default se **attachment with text snippet**.
Show relevancy in knowledge search results (*glide.knowman.search.show_relevancy*)	Select the check box to show how relevant each based on the search string. **Relevancy** value is only shown when knowledge order property is set to **Relevancy**.
Show number of knowledge blocks in the knowledge block search results when creating or updating a knowledge article (*glide.knowman.add_blocks.search_results*	Define how many search results can be displaye knowledge block is searched for. By default, the 6 and the maximum is 25.
Enable instant search results for knowledge (*glide.knowman.search.instant_results*)	Select the check box to enable instant search fo The default value is set to **No**.
Show Knowledge Base name in Knowledge search results (*glide.knowman.search.show_knowledgebase*)	Select the check box to display the knowledge b knowledge article belongs. For example, **IT**.
Show average rating from knowledge search results (*glide.knowman.search.show_rating*)	Select the check box to display the average star knowledge base articles. This property is applicable to the search results articles that appear on the Knowledge Managem search results page and service portal widgets s Featured Articles and Knowledge Most Viewed A information, see Using search in Knowledge Mar Portal and Configure the home page widget insta
Show article number in knowledge search results (*glide.knowman.search.show_article_number*)	Select the check box to display the article numbe in the search result. If the article versioning feature is enabled, the ar the version number are displayed for each article result.
Specify default language for searching articles (*glide.knowman.search.default_language*)	Set the property to the default language for searc • Type: String • Default value: user-specified • Location: System Properties

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Property	Description
	Note: If the *glide.knowman.enable_multi_lan* property is set to **True**, then the multi-langua capability overrides the default language se
Enable multi-language search (*glide.knowman.enable_multi_language_search*)	Set the property to **True** to enable search for mul simultaneously. • Type: true | false • Default value: false • Location: System Properties **Note:** If this property is set to **True**, it overrides the the *glide.knowman.search.defaul* property.
Disable Knowledge blocks feature (*glide.knowman.blocks.enable*)	Allows you to disable Knowledge blocks feature • Type: true | false • Default value: true • Location: System Properties **Note:** If the property is set to **True** and **Enable Bloc** selected: • You can create new blocks in the Knowled • You can add blocks to an article in the Kno If the property is set to **False**: • You cannot create new blocks. • You cannot add blocks to new or existing a • **Enable Blocks** field is inactive on the Know form. • Any existing articles with block content wil show the content.

Knowledge article view properties

Article view properties give you control over the meta data and rating options that appear with articles. They also enable you to grant access to individual feedback options based on user role.

Property	Description
Show tasks to which an article has been recently attached (*glide.knowman.recent_tasks.display*)	Select the check box to have article view include a list of tasks associated with the article. The list associated tasks appears on the Most Recent Ta

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Property	Description
	widget on the article view page. The widget appe only when a task is attached to the article and th property is set to **Yes**. Knowledge articles can be attached to a task by clicking the **Attach to Task** after searching from a form.
Number of attached tasks to display when viewing an article (*glide.knowman.recent_tasks*)	Specify the maximum number of tasks to list in a view.
Show article rating section, which may optionally include yes/no rating, star rating, and flagging options (*glide.knowman.show_rating_options*)	Select the check box to display the rating option users with specific roles. Clear this check box to the rating section for all users, regardless of role. The **Feedback** field is always displayed for all us
List of roles (comma separated) that can see an article's rating section, which may optionally include yes/no rating, star rating, and flagging option (*glide.knowman.show_rating_options.roles*)	Enter role names exactly as they appear in **User Administration** > **Roles**. If **Show article rating se** is selected, users with the roles listed here see th no rating, star rating, and flagging options, accor related property settings. Be sure to include all roles that should be permit see any of these rating options. Separate proper enable you to identify specific roles for each opti separately. All roles in those properties must also listed here.
Show the "Was this article helpful?" yes/no rating option. (*glide.knowman.show_yn_rating*)	Select the check box to display the "Was this arti helpful?" rating to users with roles set in the asso property. This appears only if the **Show article ra section** property is selected.
List of roles (comma separated) that can see yes/no "Was this article helpful?" rating option. (*glide.knowman.show_yn_rating.roles*)	Enter role names exactly as they appear in **User Administration** > **Roles**. If both **Show article rati section** and **Show the "Was this article helpful?** properties are selected, users with the roles liste see the "Was this article helpful?" rating in article All roles listed here must also be listed in the **Lis roles that can see an article's rating section** pro
Show "Create Incident" link (*glide.knowman.create_incident_link.display*)	Select the **Yes** check box to display the **Create In** link.
URL used for the "Create Incident" link (*glide.knowman.create_incident_link*)	Enter the URL for the page where users can crea an incident only if the **Show "Create Incident" li** property is selected. To find the URL, open the appropriate page, then click the header bar and choose **Copy URL**. High the URL that appears and use the browser's copy paste feature to place it into this property field.
Show five-star rating option (*glide.knowman.show_star_rating*)	Select the check box to display the five-star ratin users with roles set in the associated property. T appears only if the **Show article rating section** p is selected.

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Property	Description
	This property is applicable to the knowledge article view page in the Knowledge Management Service Portal. For more information, see Knowle Management Service Portal article view page fea
List of roles (comma separated) that can see five-star rating option (*glide.knowman.show_star_rating.roles*)	Enter role names exactly as they appear in **User Administration** > **Roles**. If both **Show article rati section** and **Show five-star rating option** proper are selected, users with the roles listed here see five-star rating option in article view. All roles listed here must also be listed in the **Lis roles that can see an article's rating section** pro
Show "Flag Article" option to identify incomplete/inaccurate articles (*glide.knowman.show_flag*)	Select the check box to display the flag article op to users with roles set in the associated property appears only if the **Show article rating section** p is selected.
List of roles (comma separated) that can flag incomplete/inaccurate articles (*glide.knowman.show_flag.roles*)	Enter role names exactly as they appear in **User Administration** > **Roles**. If both the **Show article section** and **Show "Flag Article" option** properti selected, users with the roles listed here see the article option in article view. All roles listed here must also be listed in the **Lis roles that can see an article's rating section** pro
Show user comments on knowledge articles (*glide.knowman.show_user_feedback*)	Select one of the options: **When article loads** or **When user clicks link to show comments**, for the roles defined in *glide.knowman.show_user_feedback.* to be able to view the user comments. If you sele **Never**, none of the roles will be able to see the comments.
List of roles (comma separated) that can see user comments on an article (*glide.knowman.show_user_feedback.roles*)	Enter role names exactly as they appear in **User Administration** > **Roles**. If the **Show user comm knowledge articles** property is selected, users w roles listed here can add and view user commen article view.
Maximum number of user comments displayed on a knowledge article (*glide.knowman.feedback.display_threshold*)	Set the maximum number of user comments to d If no value is set, all comments are displayed. Th property does not apply to Live Feed comments article view page.
Use Live Feed for Knowledge feedback (*glide.knowman.use_live_feed*)	Set the property to **True** to use Live Feed to man and display feedback on knowledge articles. • Type: true|false • Default value: false • Location: System Properties

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Property	Description
Determines the maximum number of knowledge article feedbacks that user can post per day (*glide.knowman.max_comments_per_user_daily*).	Enter the value to define the maximum feedback day. • Type: integer • Default value: • Location: System Properties **Note:** If no value is defined, then no restrictions ar applied to the number of feedbacks.

Knowledge homepage properties

Knowledge homepage properties control the featured content on the knowledge homepage.

Table title

Property	Description
Display or hide the count of articles and questions in the Knowledge Homepage (*glide.knowman.show_number_on_homepage*)	Select to display or hide the count of knowledge articles and questions on the Knowledge homepage.
Default keyword for getting pinned articles (*glide.knowman.default_keyword*)	Enter a default keyword for pinned articles. Articles pinned with the specified keyword appear in the Featured Content section of the knowledge homepage.
Display or hide the count of articles and questions in the category and child categories (*glide.knowman.show_number_on_categories*)	Select to display the count of articles and questions within each category, including subcategories, when browsing or searching knowledge bases.
Show Knowledge Home page when user has access to only one Knowledge Base (*glide.knowman.show_home_if_one_kb*)	Select to display the Knowledge homepage when the current user has access to only one knowledge base.

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Table title (continued)

Property	Description
Default header title for the pinned articles section on knowledge home pages (*glide.knowman.default_pinned_section_header_title*)	Enter a title for the Featured Content section of the knowledge homepage.

Other knowledge properties

Other knowledge properties let you control general knowledge management features.

Property	Description
When attaching an article to an incident, copy the content into this field (*glide.knowman.attach.fields*)	When a user searches knowled or change) and clicks the **Attac** article number and content into field is generally a journal field Use dot walking to copy the art does not exist, that field is igno If the property has no value, co
Displays a read-only article view page when articles are viewed from contextual search (*glide.knowman.contextual_search.show_read_only_article*)	Displays a read-only article vie contextual search. • Type: true|false • Default value: true **Note:** The *glide.knowman.cont* property is activated by de and set its value to **true** to the contextual search. For
Knowledge Management logo to display if running out of the ServiceNow frames (*glide.knowman.frameless_logo*)	Click the reference lookup tool knowledge pages that are used example, the logo image select System site that includes know image stored in the database t **Note:** This property applies only supported on Knowledge v
Hide the 'Import' functionality (button and drag-n-drop) for all users (*glide.knowman.import.hide_import_functionality*)	Select **Yes** to hide the **Import A** If you have not yet migrated to you can configure the visibility importing articles to knowledge

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Property	Description
Show publish check box on the knowledge import pop-up (*glide.knowman.import.show_publish_checkbox*)	Select **No** to remove the **Publis** article cannot be published as
Use submission workflow (*glide.knowman.submission.workflow*)	Select the **Yes** check box to us standard knowledge workflow. knowledge from an incident or record instead of a draft article follows a specific workflow.
The sys_id of the knowledge base when creating knowledge from task records (*glide.knowman.task_kb*)	Enter the sys_id of the knowled tasks in.
Before displaying the text of the article in search results or the article view, check field-level ACLs on appropriate field: kb_knowledge.text (HTML article) or kb_knowledge.wiki (wiki text article) (*glide.knowman.text.check_can_read*)	Select this check box if users m the Knowledge [kb_knowledge results.
Defines the number of results to be considered when building the search filters (*glide.knowman.search.facet_depth*)	Define maximum number of kn for populating search filters. • Type: string • Default value: 300 • Location: System Properties
Send notification to approvers and authors in article approval workflow (*glide.knowman.enable_approval_notification*)	Select this check box to send a enabled.
Allow articles in the global domain to be checked out or edited by users in another domain (*glide.knowman.allow_edit_global_articles*)	Enter the value as `true` to ena from a domain other than the g • Type: true | false • Default value: true • Location: System Properties
When showing a list of articles through the Knowledge portal (using the kb_list UI Page), remove articles the user cannot see before building the list (*glide.knowman.list.filter*)	Enter the value as `true` to ena building the articles list in the k • Type: true | false • Default value: false • Location: System Properties If you have large number of arti `true` will negatively impact pe
Create translation task when an article is published (*glide.knowman.translation.enable_translation_task*)	Enter the value as `true` to ena • Type: true | false • Default value: false • Location: System Properties **Note:** When you enable this prop existing articles.

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Property	Description
Deny access to a knowledge base when either Can Read or Can Contribute user criteria list for the knowledge base isn't specified (*glide.knowman.block_access_with_no_user_criteria*)	Enter the value as `true` to den Contribute or Can Read user cr • Type: true | false • Default value: true • Location: System Properties
Override contribute access based on Can Read and Cannot Read user criteria at article level (*glide.knowman.apply_article_read_criteria*)	Enter the value as `true` to ove on Can Read and Cannot Read • Type: true | false • Default value: false • Location: System Properties
Send email notifications on the first day of each month for articles expiring in the next month (*glide.knowman.enable_article_expiry_notification*)	Enter the value as `true` to sen articles expiring next month on depends on the ownership gro information, see Knowledge su • Type: true | false • Default value: false • Location: System Properties
Determines whether to apply ACLs on the search results (*glide.knowman.search.apply_acls*)	Enter the value as `true` to app results. • Type: true | false • Default value: true • Location: System Properties **Note:** If the *glide.knowman.* base without any articles p Knowledge Field Facet wh see Configure filter facet w
Comma separated list of all domains of office365 online sites, in which the Knowledge management Word add-in will be available (*sn_km_word.glide.knowman.word.xframe*)	Enter a list of all the parent dom which Knowledge Managemen multiple entries, separate the d • Type: string • Default value: None • Location: System Properties
Download the original Word document from the article view page in a portal and Workspace. Enabling the	Enter the value as `true` to dow knowledge article view page in

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Property	Description
property might affect the search relevancy of the article (*sn_km_word.glide.knowman.enable_document_download*)	• Type: true | false • Default value: false • Location: System Properties
Determines the duration required to capture the metrics (Article Views, Portal page views, and Portal searches). *glide.knowman.usage_metrics_duration*	Enter the value to change the d • Type: integer • Default value: 60 • Location: System Properties
Translate a knowledge article from a translation task (*glide.knowman.translation.enable_translation_task*)	Enter the value as `true` to ena • Type: true|false • Default value: true
Default language for searching Knowledge Articles (*glide.knowman.search.default_language*)	Enables you to set the default l logged-in language. • Type: string • Default value: None • Location: System Properties Following are the two characte • en - English US • fr - Francais • es - Español • it - Italiano • de - Deutsch To enable search for different la **Knowledge** > **Administration** > select the check box. **Note:** If the *glide.knowman.* inactive, you can search on can search for multiple lan
Provides replacement article for a retired article (*glide.knowman.enable_article_replacement_on_retire*)	Enables you to provide a replac default, the property value is se • Type: true | false • Default value: true • Location: System Properties
Retire the knowledge block attached to an article (*glide.knowman.allow_retire_block*)	Enter the value as `true` to reti

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Property	Description
	• Type: true | false • Default value: true • Location: System Properties **Note:** If you set the (*glide.kn* as true and if: • An article is associated `There are article want to retire th` • No article is associated `Are you sure you`
Determines the recommended document size (*glide.knowman.import.max_document_size*)	Enables you to set the recomm document. By default, the valu • Type: integer • Default value: 30 • Location: System Properties

Article versioning properties

The knowledge administrator can set knowledge properties that enable users to edit specific fields on published articles without creating new versions.

The article versioning feature requires the Knowledge Management Advanced plugin (com.snc.knowledge_advanced). For more information, see Activate the Knowledge Management Advanced plugin and Article versioning.

Property	Description
Enable article versioning feature (*glide.knowman.versioning.enabled*)	Select the check box to enable the article versioning feature. • Type: true | false • Default value: true • Location: **Knowledge** > **Administration** > **Properties**
Enable minor edits to a published article without creating a new version (*glide.knowman.versioning.enable_minor_edits*)	Select the check box to enable minor edits to published articles and associated attachments without creating a new version. • Type: true | false • Default value: false

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Property	Description
	• Location: **Knowledge** > **Administration** > **Properties** **Note:** To perform the minor edits to the published articles, the user must be the knowledge base owner or the knowledge administrator or the knowledge base manager.
A comma-separated list of fields that can be edited on published articles without creating a new version (*glide.knowman.versioning.minor_edit_fields*)	Enter the fields in a comma-separated list that can be edited on published articles without creating a new version. • Type: String • Default value: valid_to • Location: **Knowledge** > **Administration** > **Properties** You can also enter the property value `attachments` to add or remove any attachments associated with a knowledge article without checking out the article.

Knowledge subscription properties

The knowledge administrator can set configuration properties that enable users to subscribe to knowledge bases and knowledge articles.

Property	Description
Enable subscribe feature for KM (*glide.knowman.enable_km_subscription*)	Select the check box to enable the Knowledge subscription feature. • Type: true | false • Default value: true • Location: **Knowledge** > **Administration** > **Properties**

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Property	Description
List of roles (comma-separated) who can have subscription feature (*glide.knowman.enable_km_subscription.roles*)	Enter the roles in a comma-separated list that can use the Knowledge subscription feature. • Type: String • Default value: knowledge • Location: **Knowledge** > **Administration** > **Properties**
List of workflow states (comma-separated) that can have subscription feature (*glide.knowman.enable_km_subscription.workflow_state*)	Enter the workflow states for knowledge articles in a comma-separated list that users can subscribe to. • Type: String • Default value: draft,review,published • Location: **Knowledge** > **Administration** > **Properties**

Article quality index properties

The knowledge administrator can set the pass score for AQI reviews using the knowledge properties page.

Properties for Article Quality Index

Property	Description
Pass score for AQI reviews (*glide.knowman.aqi_pass_score*)	Set the pass score for AQI reviews. • Type: Integer • Default value: 70 • Range of values possible: 1-100
List of article workflow states to perform AQI reviews (*glide.knowman.aqi.article_workflow_states*)	Enter the article workflow states, in a comma-separated list, where users can perform AQI reviews. • Type: String • Default value: draft,review,published

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External Content Integration Properties

Administrators can configure the properties to add allowed content types and change the UI label for the external content integration feature.

Properties for External Content Integration

Property	Description
Maximum limit for total size of external content in Knowledge Management (in GB) (*sn_km_intg.glide.knowman.external.max_content_size*) **Note:** This is a read-only field.	• Type: Integer • Default value: 2
Maximum size of an external article including its attachments (in MB) (*sn_km_intg.glide.knowman.external.max_article_size*) **Note:** This is a read-only field.	• Type: Integer • Default value: 8
An editable, comma-separated list of allowed content types to be processed from the source system (*sn_km_intg.glide.knowman.external.allow_content_types*)	• Type: Comma s • Default value:ap msword,applica officedocumen vnd.ms-excel,a officedocumen vnd.ms-powerp officedocumen pdf,text/plain,te • Other possible audio/mpeg
List of content types not allowed to be processed from the source system (*sn_km_intg.glide.knowman.external.reject_content_types*) **Note:** This property is read-only and takes precedence over allowed content types.	• Type: Comma-s • Default value: a apple-diskimag executable
UI Label for indicating external articles in Search Results and Article View Pages (*sn_km_intg.glide.knowman.external.ui_label_for_external_content*)	• Type: String • Default value: E

Actionable Knowledge Feedback Properties

The Knowledge administrator can set configuration properties that would create actionable feedback tasks.

Properties for Actionable Knowledge Feedback

Property	Description
Create actionable feedback task when an article is flagged.	Select the check box to enable

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Properties for Actionable Knowledge Feedback (continued)

Property	Description
(*glide.knowman.feedback.enable_actionable_feedback_for_flag*)	actionable feedback task generation when an article is flagged for incorrect or inappropriate content. • Type: true|false • Default value: true • Location: **Knowledge** > **Administration** > **Properties**
Create actionable feedback task when an article is marked as not helpful (*glide.knowman.feedback.enable_actionable_feedback_for_helpful*)	Select the check box to enable actionable feedback task generation when an article is marked as not helpful. • Type: true|false • Default value: false • Location: **Knowledge** > **Administration** > **Properties**
Create actionable feedback task when an article is rated at or lower than this value. 0 or no value indicates that actionable feedback tasks are not enabled for Rating type feedback (*glide.knowman.feedback.enable_actionable_feedback_for_rating*)	An actionable feedback task is created when an article is rated at or lower than this value. The article is rated on a scale of 1-5. • Type: Integer • Default value: none

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Properties for Actionable Knowledge Feedback (continued)

Property	Description
	• Location: **Knowledge** > **Administration** > **Properties**
Create actionable feedback task only when feedback details are provided for the negative feedback (*glide.knowman.feedback.enable_explicit_feedback*)	Select the check box to enable actionable feedback task generation for the negative feedback. • Type: true|false • Default value: false • Location: **Knowledge** > **Administration** > **Properties** **Note:** Set the property to **True** to deactivate feedback task generation if: • The feedback dialog box is close or cancel • Other option is chosen and no reason provided

Group ownership properties

The knowledge administrator can set group ownership properties that enable the use of ownership groups for knowledge articles and decide who can edit and approve a published knowledge article.

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Property	Description
Enable ownership group for Knowledge articles (*glide.knowman.ownership_group.enabled*)	Select the check box to enable associating ownership groups with knowledge articles. **Note:** Once you have set this property to **true**, try not to change it to **false**. Before setting this property back to **false**, manually reassign all knowledge articles associated with any ownership group, close all article approvals sent to ownership groups, and resolve all open feedback tasks assigned to ownership groups. • Type: true | false • Default value: false • Location: **Knowledge** > **Administration** > **Properties**
Retain contribute access for author or reviser of knowledge article linked to ownership group (*glide.knowman.ownership_group.override*)	Select the check box to enable the author and reviser of a knowledge article to retain contribute access to the article even when an ownership group is associated with the article.

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Property	Description
	• Type: true | false • Default value: false • Location: **Knowledge** > **Administration** > **Properties**
Allow approval of self-authored article as ownership group member (*glide.knowman.ownership_group.allow_self_approval*)	Select the check box to allow ownership group members to approve self-authored articles for publication. • Type: true | false • Default value: true • Location: **Knowledge** > **Administration** > **Properties**

Quick start tests for Knowledge Management

Validate that Knowledge Management still works after you make any configuration change, such as apply an upgrade or develop an application. Copy and customize these quick start tests to pass when using your instance-specific data.

Knowledge Management quick start tests require activating the Knowledge Management Core plugin (com.glideapp.knowledge), the Knowledge Management Advanced Installer plugin (com.snc.knowledge_advanced.installer), the Knowledge Blocks plugin (com.snc.knowledge_blocks), and the Customer Service Management Demo Data plugin (com.snc.customerservice.demo).

KM: Knowledge Management test suite

Test	Description	Release version
KM : Create KCS Template Article with Approval Publish workflow	Verify the creation of a KCS template article with approval publish workflow. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Madrid
KM: Create MultiVersioned standard Article with approval publish workflow	Verify the creation of a multi-versioned standard article with approval publish workflow.	Madrid

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KM: Knowledge Management test suite (continued)

Test	Description	Release version
	Note: Requires the Knowledge Management Advanced Installer plugin.	
KM: Article level subscription	Verify that users can subscribe to a knowledge article. **Note:** Requires the Knowledge Management Advanced Installer plugin.	New York
KM: User criteria covering canRead and canContribute for KnowledgeBase and canRead at Article level	Verify the creation of canRead and canContribute user criteria for knowledge base and canRead user criteria for article. **Note:** Requires the Knowledge Management Core plugin.	Madrid
KM: Create a KCS article from a case	Verify the creation of a KCS article from a case. **Note:** Requires the Knowledge Management Advanced Installer and Customer Service Management Demo Data plugins.	Madrid
KM: Knowledge Base Level Subscriptions	Verify that users can subscribe to a Knowledge Base. **Note:** Requires the Knowledge Management Advanced Installer plugin.	New York
KM: AQI	Verify the creation, assignment, and review of an AQI checklist.	New York

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KM: Knowledge Management test suite (continued)

Test	Description	Release version
	Note: Requires the Knowledge Management Advanced Installer plugin.	
KM: Requestor performs search, view the article, provide feedback (Helpful No with Feedback Task)	Verify the search request, review, provision of feedback as not helpful, and creation of a feedback task for an article on the Knowledge Management Service Portal. **Note:** Requires the Knowledge Management Advanced Installer plugin.	New York
KM: Create and edit an article from Feedback Task form	Confirm the availability of the **Create Article** and **Edit Article** buttons on a Knowledge Feedback Task form. **Note:** Requires the Knowledge Management Advanced Installer plugin.	New York
KM: Search for pinned articles and checking the highest click rank	Verify the search request and that the click rank value of a pinned article was added to the Knowledge Searches (ts_query_kb) table. **Note:** Requires the Knowledge Management Advanced Installer plugin.	New York
KM: Create an Ownership Group and check edit permissions and subscriptions	Verify the assignment of an article to an ownership group, that all members of the ownership group are subscribed to the article, and have permission to edit.	New York

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KM: Knowledge Management test suite (continued)

Test	Description	Release version
	Note: Requires the Knowledge Management Advanced Installer plugin.	
KM: Create, search for, and view knowledge articles with knowledge blocks	Verify the creation of a knowledge block and its addition to a knowledge article. Also, verify that the knowledge block content is searchable. **Note:** Requires the Knowledge Blocks plugin.	Orlando
KM: Validate the Knowledge - Approval Retire workflow	Verify the success of Knowledge - Approval Retire workflow by retiring a published knowledge article. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Orlando
KM: Validate feedback task assignment to the ownership group manager	Verify the assignment of a feedback task to the ownership group manager of a knowledge article. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Orlando
KM: Validate that the article template selector includes knowledge bases and article templates	Verify that the article template selector includes all knowledge bases with contribute access and article templates applicable to each knowledge base. **Note:** Requires Knowledge Management Advanced Installer.	Orlando
KM: Validate the Knowledge - Approval Publish workflow	Verify the success of a Knowledge - Approval	Orlando

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KM: Knowledge Management test suite (continued)

Test	Description	Release version
	Publish workflow by recalling, rejecting, and then approving a knowledge article through the approval process. **Note:** Requires the Knowledge Management Advanced Installer plugin.	
KM: Make an outdated version of an article the latest version	Verify that an outdated version of a knowledge article is made the latest version. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Orlando
KM: Validate that the mapped related articles appear in the Related articles widget	Verify that the related articles mapped to a knowledge article appear in the Related articles widget on the knowledge article view page. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Orlando
KM: Validate that the mapped related catalog items appear in the Related items widget	Verify that the related catalog items mapped to a knowledge article appear in the Related items widget on the knowledge article view page. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Orlando
KM: Validate that a versioned article is created, published, checked out, and retired	Verify the success of UI actions on a versioned knowledge article by creating, publishing, updating, and retiring the knowledge article in Agent Workspace.	Quebec

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KM: Knowledge Management test suite (continued)

Test	Description	Release version
	Note: Requires the Knowledge Management Advanced Installer plugin.	
KM: Verify the scheduled publish feature for knowledge articles	Verify the scheduled publish feature for knowledge articles by creating an article in approval publish workflow, putting it for scheduled for publish and observing the change in workflow state from the**Scheduled for publish** state to the **Published** state. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Quebec
KM: Validate the Knowledge - Approval Publish workflow in Agent Workspace	Verify the success of a Knowledge - Approval Publish workflow by recalling and then approving a knowledge article through the approval process in Agent Workspace. **Note:** Requires the Knowledge Management Advanced Installer plugin.	Quebec

Related topics

Quick start tests

Understanding access to the Knowledge knowledge base

User criteria are available to manage access to the Knowledge knowledge base.

The Knowledge knowledge base is provided as a demo example in the Knowledge Management application. Starting from the Paris release, user criteria were added to the Knowledge knowledge base to enable you to control access for guest (unauthenticated) users:

- Any User user criteria in Can Read, which enables any user to read articles in the Knowledge knowledge base.
- Guest User in Cannot Read, which prevents guest or unauthenticated users from reading articles in the Knowledge knowledge base.

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Note:
If you are on a release version prior to the Paris release, see Configure access to knowledge bases for unauthenticated users for information about managing access without any user criteria.

Although you can continue to use the Knowledge knowledge base consider creating your own knowledge base to store, share, and manage content. You can configure access to your knowledge bases through user criteria. For more information, see Create a knowledge base.

Knowledge workflows

The publishing and retirement processes for a knowledge article are controlled by workflows defined for the knowledge base that the article belongs to.

You can assign different workflows to each Knowledge Base .

You can use one of the default workflows, or create your own workflows to define custom publishing and retirement processes for different types of knowledge.

For the workflows that require approval, you can configure which users can approve or reject by editing the *`getApprovers()`* function in the *`KBWorkflow`* script include.

Existing users of Knowledge Management upgrading to Zurich will have access to both workflows and flows in the Knowledge Base form. However, they will be able to use either workflows or flows for a knowledge base, with Workflow being the default option.

Cross selection between flow and workflow for publish and retire is not possible.

You cannot delete the approval records for knowledge flows. You can only approve or reject the records.

Default knowledge workflows

Workflow	Description
Knowledge - Approval Publish	Requests approval from a manager of the knowledge base. Articles in approval are In Review state before moving to Published state once approved or to Scheduled for publish if set to publish later. If the manager rejects the request, the workflow is canceled and the article remains in Draft state. If ownership groups is enabled, email notifications with a link to the article are sent to the ownership group members for approval. If ownership groups is not enabled, email notifications with a link to the article are sent to knowledge base managers for approval. A notification is also sent to authors or revisers of articles to inform them that their article has been approved or rejected. To turn on approval email notifications, set the *`glide.knowman.enable_approval_notification`* property to `true`.

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Default knowledge workflows (continued)

Workflow	Description
	Note: Only the active user receives the notifications.
Knowledge - Approval Retire	Requests approval from a manager of the knowledge base before moving the article to the retired state. The workflow is canceled and the article remains in the published state if any manager rejects the request. If ownership groups is enabled, email notifications with a link to the article are sent to the ownership group members for approval. If ownership groups is not enabled, email notifications with a link to the article are sent to knowledge base managers for approval.
Knowledge - Instant Publish	Immediately publishes a draft article without requiring an approval, or publishes on the scheduled publish date if set to publish later.
Knowledge - Instant Retire	Immediately retires a published article without requiring an approval.
Knowledge - Publish Knowledge	A subflow that moves the knowledge article to the published state. You can use this subflow when defining your own workflow.
Knowledge - Retire Knowledge	A subflow that moves the knowledge article to the retired state. You can use this subflow when defining your own workflow.

Note:

- Only administrators and knowledge administrators can view the retired knowledge articles. To reuse a retired article, administrators and knowledge administrators can republish the article. For more information, see Republish a retired article.
- An article and its translations have a parent-child relationship. Retiring a parent article does not automatically retire all its translated child articles.

Email notifications for approval workflows

You can send email notifications for approval workflows.

- Notify approvers about knowledge articles submitted for their approvals.
- Notify authors about the approval status of their knowledge articles.

To send email notifications for approval workflows, enable the **Send notification to approvers and authors in article approval workflow** property (*glide.knowman.enable_approval_notification*). Beginning with New York, the property is enabled by default. Existing customers on release versions prior to New York can enable this property to send email notifications. Disable any custom notifications for article approvals before enabling this property. If the

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glide.knowman.enable_approval_notification property is not available, an administrator can create the property and set its value to `true`. For more information, see Knowledge Management properties.

Related topics

- Knowledge article states
- Approve an article that is being reviewed
- Retire a versioned article

Knowledge flows

The publishing and retirement processes for a knowledge article are controlled by flows defined for the knowledge base that the article belongs to.

Beginning with Zurich, Knowledge Flow is available to all new users of Knowledge Management.

The **Publish flow** and **Retire flow** fields are mandatory in the Knowledge Base form.

You can use the Out-of-Box (OOB) flows, or create your own to define custom publishing and retirement processes for different types of knowledge. For more information see, https://www.servicenow.com/docs/bundle/vancouver-build-workflows/page/administer/flow-designer/concept/flow-designer.html

For the flows that require approval, you can configure which users can approve or reject by editing the *getApprovers()* function in the *KBWorkflow* script include.

You cannot delete the approval records for knowledge flows. You can only approve or reject the records.

Default knowledge flows

Flow	Description
Knowledge - Approval Publish	Requests approval from a manager of the knowledge base. Articles in approval are In Review state before moving to Published state once approved or to Scheduled for publish if set to publish later. If the manager rejects the request, the flow is canceled and the article remains in Draft state. If ownership groups is enabled, email notifications with a link to the article are sent to the ownership group members for approval. If ownership groups is not enabled, email notifications with a link to the article are sent to knowledge base managers for approval. A notification is also sent to authors or revisers of articles to inform them that their article has been approved or rejected. To turn on approval email notifications, set the *glide.knowman.enable_approval_notification* property to `true`.

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Default knowledge flows (continued)

Flow	Description
	Note: Only the active user receives the notifications.
Knowledge - Approval Retire	Requests approval from a manager of the knowledge base before moving the article to the retired state. The flow is canceled and the article remains in the published state if any manager rejects the request. If ownership groups is enabled, email notifications with a link to the article are sent to the ownership group members for approval. If ownership groups is not enabled, email notifications with a link to the article are sent to knowledge base managers for approval.
Knowledge - Instant Publish	Immediately publishes a draft article without requiring an approval, or publishes on the scheduled publish date if set to publish later.
Knowledge - Instant Retire	Immediately retires a published article without requiring an approval.
Knowledge - Publish Knowledge	Action for publishing an article.
Knowledge - Retire Knowledge	Action for retiring an article.

Note:

- Only administrators and knowledge administrators can view the retired knowledge articles. To reuse a retired article, administrators and knowledge administrators can republish the article. For more information, see Republish a retired article.
- An article and its translations have a parent-child relationship. Retiring a parent article does not automatically retire all its translated child articles.

Email notifications for approval flows

You can send email notifications for approval flows.

- Notify approvers about knowledge articles submitted for their approvals.
- Notify authors about the approval status of their knowledge articles.

To send email notifications for approval flows, enable the **Send notification to approvers and authors in article approval flow** property (*glide.knowman.enable_approval_notification*). The property is enabled by default. If the *glide.knowman.enable_approval_notification* property is not available, an administrator can create the property and set its value to `true`. For more information, see Knowledge Management properties.

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Knowledge Management Service Portal properties

Knowledge Management Service Portal properties determine how information is displayed on the Knowledge portal. You must have the admin role to set configuration properties.

The following system properties are set to direct users to the Knowledge Management Service Portal homepage, and to specify the URL suffix for the homepage.

Property	Description
sn_km_portal.glide.knowman.serviceportal.enable_redirect	Directs users to the desired Knowledge homepage. • Type: true|false • Default value: false Set to **true** to redirect users navigating to v2 or v3 pages to the Knowledge Management Service Portal homepage. **Note:** This property is not honored for the following use cases: • Contextual search in the Incident form • Connect • Global search
sn_km_portal.glide.knowman.serviceportal.portal_url	The URL suffix for the Knowledge Management Service Portal. The default is **kb**.

The Knowledge Management Service Portal supports the Knowledge Management V3 properties. Configuring widget instance options on the portal pages can override these properties.

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Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Knowledge Management v3 homepage and Knowledge Management Service Portal comparison

A comparison of the features available on the Knowledge Management v3 homepage and the Knowledge Management Service Portal.

Note:

Starting with the Washington DC release, the Knowledge Management v3 homepage (com.snc.knowledge3) is being prepared for deprecation in the future Y release. It is replaced by the Knowledge Management Service Portal (com.snc.knowledge_serviceportal), which is active by default for customers on Madrid and later releases. For more information about the new experience, see Knowledge Management Service Portal homepage features.

Page		Component	V3 Homepage	Knowledge Management Service Portal
Home page		Create an article	Y	Y
		Import an article	Y	N
		Knowledge bases	Y	Y
		Featured content	Y	Y
		Most useful	Y	Y
		Most viewed	Y	Y
		Language selection menu	Y	N
		Search text box	Y	Y
Search results page		Create an article	Y	N
		Import an article	Y	N
		Search box with language selection	Y	Y
	Sort by	Relevancy	Y	Y
		Last updated (newest)	Y	Y
		Views	Y	Y
		Alphabetical	N	Y
	Filter by	Knowledge bases	Y	Y

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Page		Component	V3 Homepage	Knowledge Management Service Portal
		Categories	Y	Y
		Authors	Y	Y
		Tags	N	Y
		Resource	N	Y
		Rating	N	Y
		View count	N	Y
	Article meta data	Authored by	Y	Y
		Article number	Y	Y
		Last modified	Y	Y
		Category	Y	Y
		Number of views	Y	Y
		Star rating	Y	Y
		Relevancy rank	Y	Y
		Tags	Y	N
		Attachments	Y	Y
Article view page		Back button	Y	N
		Create Favorite icon	Y	N
		Navigation hierarchy path	Y	Y
		Article meta data • Article number • Article version • Authored by • Last modified • Number of views • Star rating	Y	Y
		Subscribe option	Y	Y
		Flag article option	Y	Y
		Create incident option	Y	Y
		Edit option	Y	Y
		Article language selection option	Y	Y

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Page		Component	V3 Homepage	Knowledge Management Service Portal
		Helpful yes/no option	Y	Y
		Star rating	Y	Y
		Text box for comments	Y	Y
		Live feed comment	Y	N
		Copy permalink	Y	Y
		Most Recent Tasks widget	N	Y
		Affected Products widget	N	Y
		Most Viewed widget	N	Y
		Most Useful widget	N	Y

The *sn_km_portal.glide.knowman.serviceportal.enable_redirect* property is not honored for the following use cases:

- Contextual search in the Incident form
- Connect

Related topics

Import a Word document to a knowledge base

Import a Word document to a knowledge base using Knowledge Management v3

SEO for canonical URLs and localized versions of knowledge articles

Improve the searchability of knowledge articles by adding tags for canonical URLs and *hreflang* tags for translated knowledge articles.

You can add the default tags for canonical URLs and *hreflang* tags by selecting the **Use SEO script** check box on the Knowledge Article View [kb_article_view] page record. For more information, see Enable SEO for canonical URLs and localized versions of a portal page.

When the **Use SEO script** option is selected:

- The canonical URLs for a knowledge article are added to the knowledge article view page.

  Example canonical URL: `https://<instance name>.servicenow-com/csp?id=kb_article_view&sysparm_article=<article number>`

- The *hreflang* tags for the translated versions of a knowledge article are added to the knowledge article view page.

  Example URL with an *hreflang* tag: `<link rel="alternate" href="https://<instance name>.servicenow-com/csp/fr?`

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```
id=kb_article_view&sysparm_article=<article number>"
hreflang="fr"/>
```

Note:
A self-referencing *hreflang* URL is also added for the language of current knowledge article.

For example, an English knowledge article is viewed by visiting a URL with the following format:

```
https://<instance name>.servicenow-com/csp/?
id=kb_article_view&sys_kb_id=<sys_id>
```

In addition to the *hreflang* tags added for translations, the English language self-referencing *hreflang* tag is added:

```
<link rel="alternate" href="https://
<instance name>.servicenow-com/csp/?
id=kb_article_view&sys_kb_id=<sys_id>" hreflang="en"/>
```

Script includes for canonical URLs and hreflang tags

By default, the knowledge article view page uses the *SPSEOHeaderTagsArticleViewSNC* script include to add the SEO tags for canonical URLs and *hreflang* tags.

The following table describes the script includes for adding canonical URLs and *hreflang* tags to Service Portal pages, including the knowledge article view page.

Script includes for canonical URLs and hreflang tags

Script include	Description
SPSEOHeaderTagsSNC	Includes the default implementation for the canonical URLs and *hreflang* tags for Service Portal pages. This script include is read-only. For more information, see Enable SEO for canonical URLs and localized versions of a portal page.
SPSEOHeaderTags	Facilitates overriding the default implementation in the *SPSEOHeaderTagsSNC* script include for Service Portal pages. The *SPSEOHeaderTags* script include extends the #*SPSEOHeaderTagsSNC* script include.
#SPSEOHeaderTagsArticleViewSNC	Overrides the *generateHrefLangArray* and *generateCanonicalURL* functions for the knowledge article view page configured in the *SPSEOHeaderTags* script include. The *SPSEOHeaderTagsArticleViewSNC* script include is read-only and extends the #*SPSEOHeaderTags* script include.

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Script includes for canonical URLs and hreflang tags (continued)

Script include	Description
SPSEOHeaderTagsArticleView	Facilitates overriding the default implementation in the *SPSEOHeaderTagsArticleViewSNC* script include for the knowledge article view page. The *SPSEOHeaderTagsArticleView* extends the *SPSEOHeaderTagsArticleViewSNC* script include.

As an administrator, you can add canonical URLs, *hreflang* tags, and any custom headers for knowledge articles by updating the *SPSEOHeaderTagsArticleView* script include. For more information, see Configure custom SEO tags for canonical URLs and localized knowledge articles.

Article versioning changes

Article versioning introduces new actions that allow knowledge users to create and revise versions of existing articles. It also introduces new fields and related lists to the Knowledge form, new columns to the Knowledge list, and updates to Knowledge dashboard reports.

New user actions

As part of creating article versions, users can:

- Check out a published article and create another version by clicking **Checkout** on the Knowledge form.

  Note:
  Only the author, knowledge base owner, and users with the knowledge_admin role can edit an article in the Draft state.

- Recall an article that is being reviewed or scheduled for publish by clicking **Recall** on the Knowledge form.
- Select a previously published article in the Outdated state and make it the current published version by clicking **Make this current**in the Knowledge form header.

Note:
To edit a published article without having to create a new version, make sure the *glide.knowman.versioning.enable_minor_edits* property is enabled.

Changes to the Knowledge list

The article versioning feature adds the following to the Knowledge list:

- The **Version** column displays the article version number. The Knowledge list displays multiple versions of an article.
- The **Workflow** column includes the new **Outdated** state.

Changes to the Knowledge form

The article versioning feature adds the following to the Knowledge form:

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- The **Version** field displays the article version number.
- The **Display number** field displays a combination of the article number and the version number. For example, KB0010004 v1.02. All references to a knowledge article use this display number.
- The **Base Version** field displays the knowledge article number and version on which the current article is based.
- The **Revised By** field displays the name of the user who checked out a published article and created a new version.
- The **Article Versions** related list displays a list of all versions for an article. From this list,you can:
  - Click the **Version** to view a specific version of an article.
  - Click the **View Article** related link to see the article page view.

Note:
If necessary, configure the form to display the fields and the related list.

Changes to Knowledge modules

The article versioning feature introduces the following Knowledge module changes:

- **My Knowledge Articles**
  - For a knowledge user, this module includes records for the articles authored by the user as well as records for each article revised by the user.
  - For a knowledge reviser, this module includes records for the articles published by the user as well as records for each article revised by the user.
- **My Flagged**
  - For a knowledge user, this module includes records for each revision made to articles authored by the user.
  - For a knowledge reviser, this module includes records for each article revised by the user.

Note:
Users that have customized these modules do not see these changes.

Changes to Knowledge Management dashboard reports

The Knowledge Management Overview dashboard reports have been updated to include article versioning-related changes when the Knowledge Management Advanced plugin is activated.

- Articles Flagged in the Last 30 Days
- Articles Marked Not Useful in the Last 30 Days
- Articles Used per Month
- Knowledge use
- Knowledge view
- Knowledge updated in past 30 days
- Knowledge flagged in past 30 days
- Knowledge by Workflow state
- Knowledge created by Author
- Knowledge created in past 30 days

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- New Knowledge Articles Created in the Last 30 Days
- Knowledge Ratings for past 30 days

Versioning information available in the Knowledge Management Service Portal

Knowledge search results show the article number and the version number for each article.

Note:

To display the article version number next to the article number in the search results, enable the *glide.knowman.search.show_article_number* property in the Knowledge Search Properties section of the Knowledge Management Properties page.

If you are accessing an article from the base system or knowledge service portals using the URL to a KB article, you must also include the article version number in the URL. For example, to access the KB0000005 knowledge article, instead of using the `https://<instance name>/sp?id=kb_article&sys_id=KB0000005` as the URL, you must use `https://<instance name>/sp?id=kb_article&sys_id=KB0000005%20V1.0` to view the article.

The article view page shows a version history section for articles that have been updated. This section includes the version numbers, date updated, and the name of the author or reviser.

- Click **Latest version** or the version number and current state to expand the version history section.
- Click the version number to open that particular version of the article.
- When viewing an outdated article, a message informs the user that a newer updated version is available. The message includes a link to the latest version.

Feedback on article versions

With the article versioning feature, users can view and contribute to feedback on the current versions of knowledge articles.

For more information about feedback options, see Knowledge feedback.

Feedback option	How this option works with article versioning
Rating an article	The average rating for an article is carried over to the checked out version. The average rating calculation updates and displays on the current version of the article.
Marking an article as helpful	The helpfulness percentage of a previous version of an article is also considered for a new version when displayed in the helpfulness column on the homepage.
Comments	The Comments section at the bottom of an article displays comments from previous versions unless Live Feed is enabled. Live Feed only shows comments for the current version.

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(continued)

Feedback option	How this option works with article versioning
Flagging an article	Checking out an article or setting a previous version to the current version resets the flagged value to false.
View count	The view count is carried over to the checked out article. Any view of a version of an article increments the view count of all the subsequent published versions. Views to a newer version of an article do not affect the view count of previous versions. When a draft article is published, the total view count shows sum of previous published article view count and its own standalone view count.
Use count	The use count is carried over to the checked out article. Any use of a version of an article increments the use count of all subsequent versions. Any use of a newer version of an article does not affect the use count of previous versions.

Knowledge article version numbers

Knowledge article version numbers follow a specific pattern. Increments to the version number depend on the revision type.

Article version numbers follow this pattern: <major release number.minor release number>.

The type of revision being made to an article determines the increment. A minor revision increments the version number by 0.01. A major revision, such as publishing an article, increments the version to the next whole number, for example, from version 2.02 to 3.0.

The following example illustrates the life cycle of a versioned article and the changes to the version number.

User action	Article state	Version number
Knowledge author creates a new article	Draft	0.01
Knowledge author makes a change and updates the article.	Draft	0.01
Knowledge author submits the article for review.	Review	0.02
Knowledge author recalls the article to make another change.	Draft	0.03
Knowledge article submits the article for review	Review	0.04
Approver rejects the article and requests a change.	Draft	0.05

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User action	Article state	Version number
Knowledge author makes the change and submits the article for review.	Review	0.06
Approver approves the article	Scheduled for publish	0.07
Article is published	Published	1.0
Knowledge author checks out the published article.	Draft	1.01
Knowledge author submits the article for review.	Review	1.02
Approver approves the article	Scheduled for publish	1.03
Article is published When the version 2.0 article is published, the state of the version 1.0 article changes to **Outdated**.	Published	2.0

Any change to the state of an article results in a version increment, except to and from the **Pending retirement**, **Retired**, and **Outdated** states.

Note:
To know more about minor version edits, see Article versioning changes.

Knowledge article version information

Users can view version information for a knowledge article from the Knowledge view page.

The knowledge article number and the version number appear at the top of the article, just below the title. Clicking the version number expands the version history section, which includes a list of the available article versions. User roles determine what is included in this list:

- Users with read access to a knowledge base can see the latest published version and previous major versions.
- Users with read and contribute access to a knowledge base can see the latest published version, previous major versions, and any draft or review versions.

You can view any of the previous versions of an article by clicking the version number in the list. When you view a previous version, a message at the top of the article indicates that an updated version is available.

At the bottom of a knowledge article, you can see additional information about an article, including the name of the author or revisor and the date that the article was last modified.

Validity of a knowledge article

Knowledge article validity is the date a knowledge article expires. Articles do not appear in search results after the **Valid to** date or if the **Valid to** date is blank.

Decide when to expire a knowledge article by using the **Valid to** field in the Knowledge form. The Knowledge form is available when creating or editing a knowledge article.

When you create or edit a knowledge article, a default value appears in the **Valid to** field. As an article author or editor, you can select whether to keep or change the default **Valid to** date.

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Note:
If the system date format or user preferences is set to use `yy` year format, you might face issues when the **Valid to** date is set to the default date. Contact your system administrator or modify the user preferences to use a date format with the `yyyy` year format. For more information, see Global date and time field format and Personalize the system date format topics.

Default article validity when creating a knowledge article

The default value of the **Valid to** field is derived from the **Article Validity** field configured for the knowledge base (see Create a knowledge base). The **Valid to** date starts from the date the article was created until the number of days specified in the **Article Validity** field. If the **Article Validity** field is blank, the default date in the **Valid to** field for the knowledge article is set to January 1, 2100.

Default article validity when editing a knowledge article

If the article versioning feature is enabled, the default value of the **Valid to** date in the updated article version is automatically set as described in the following table.

Valid to date in the updated article version

Article Validity value in the associated knowledge base	Valid to default value	Notes
Blank	Earlier version **Valid to** date value	If the **Article Validity** field in the knowledge base associated with the article is blank, the **Valid to** date value from the earlier version of the article is retained.
Is not blank	Article updated date + article validity	If the **Article Validity** field in the knowledge base associated with the article is not blank, the **Valid to** date is automatically updated to start from the date the article was updated until the number of days specified in the **Article Validity** field.

If you move a knowledge article to another knowledge base, the default value of the **Valid to** date in the updated article is automatically set as described in the following table.

Valid to date when moving a knowledge article to another knowledge base

Article Validity value in the updated knowledge base	Valid to default value	Notes
Blank	Earlier **Valid to** date value	If the **Article Validity** field in the selected knowledge base is blank, the earlier **Valid to** date value is retained for the knowledge article.
Is not blank	Article updated	If the **Article Validity** field in the selected knowledge base isn't blank, the **Valid to** date is automatically updated to start from the

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Valid to date when moving a knowledge article to another knowledge base (continued)

Article Validity value in the updated knowledge base	Valid to default value	Notes
	date + article validity	date the article was updated until the number of days specified in the **Article Validity** field.

Note:
If the dictionary value of the **Valid to** field is modified, this dictionary value overrides the default value of the **Valid to** field calculated according to the **Article Validity** field.

Email notifications for expiring knowledge articles

On the first day of each month, the application sends an email notification to a list of authorized recipients to remind them about articles that are about to expire in the next month. The recipient can then extend the **Valid to** date to continue using the article. For more information, see Managing email notifications in Knowledge Management.

Knowledge article states

Knowledge article versions can be in one of several states as it progresses through the creation cycle.

Note:
You need to activate the Knowledge Management Advanced plugin (com.snc.knowledge_advanced) and set the *glide.knowman.versioning.enabled* system property to `true`. For more information, Activate the Knowledge Management Advanced plugin and Article versioning properties.

State	Description
Draft	The article is in the process of being created. **Note:** A versioned knowledge article in the **Draft** state can be modified only by the author or reviser with the contribute access to the knowledge base, owner of a knowledge base, users with the admin and knowledge_admin role, and ownership group members, if ownership group is added to the article.
Review	The draft version of the article is sent to reviewers to approve or reject.
Scheduled for publish	The draft version of a knowledge article is scheduled for publishing on a future date.
Published	The article is approved and published. When the state of an article changes to **Published**,

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State	Description
	the state of any previous published versions of that article changes to **Outdated**. **Note:** After a knowledge article with an ownership group is approved, only the owner of a knowledge base and ownership group members have contribute access to the article.
Pending retirement	The published article is selected for retirement, pending approval.
Retired	The published article is retired. Retired knowledge articles cannot be searched for by external users or customers. To reuse a retired article, create a new article with the same content, which is published once approved.
Outdated	A more recent version of the article has been published. End users can read published articles as well as the outdated versions.

Related topics

Knowledge access controls

Knowledge subscription email notification templates

The knowledge subscription feature uses email notification templates to send subscription notifications to knowledge users.

Email template	Subscription type
KM Subscription: Article published	Knowledge base
KM Subscription: Article revised in KB	Knowledge base
KM Subscription: Article checked out	Knowledge article
KM Subscription: Article revised	Knowledge article
KM Subscription: Article commented	Knowledge article

Users with the admin or knowledge_admin role can customize these email notification templates. To locate the template, navigate to **System Notifications** > **Email** > **Notifications**. For more information about customizing a template, see Create an email notification.

Subscription notifications include a link at the bottom of the email to the user's Notification Preferences page.

Analytics and Reporting Solutions for Knowledge Management

The following topics provide information on Platform Analytics Solutions and Demand Insights dashboards for Knowledge Management.

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Knowledge Management Platform Analytics Solutions

Platform Analytics Solutions contain preconfigured dashboards. These dashboards contain actionable data visualizations that help you improve your business processes and practices.

Platform Analytics Solutions

Platform Analytics data visualizations use Performance Analytics indicator data to show you data over time, helping you analyze your business processes and identify areas of improvement. With Platform Analytics Solutions, you can get value from Performance Analytics for your application with minimal setup. You can always create your own objects as well.

To enable the solution for Knowledge Management, an admin can navigate to **Performance Analytics** > **Guided Setup**. Click **Get Started** then scroll to the section for Knowledge Management. The guided setup takes you through the entire setup and configuration process.

Note:
You must Activate the Knowledge Management Advanced plugin.

Domain separation and 'Run As' user

In some solutions, System Administrator is the **Run As** user for data collection jobs in the Platform Analytics Solutions. In other solutions, the **Run As** user for data collection jobs is left blank. Verify that the **Run As** user exists on the instance, and that this user has the appropriate level of access. An inappropriate **Run As** user can cause errors or limit the data that is collected. This setting only has an effect if domain separation is enabled.

New and deprecated versions of this solution

In London , this Solution was replaced with a new version, `com.snc.pa.knowledge_v2`. If you activated an earlier version of the Solution and then upgraded your instance, you still have and can still use the earlier Solution. You can also activate the newer version without losing data from existing indicators and breakdowns. If you activate the newer version, run a historical data collection job to populate any new indicators and breakdowns.

Add Self-Service Analytics to Knowledge Management dashboards

If you have Self-Service Analytics activated on an instance, you can add Self-Service analytics widgets to your Performance Analytics dashboards or a Service Portal. To obtain a ready-made set of indicators and breakdowns, activate the Self-Service Analytics PA (*`com.snc.pa.self_service_analytics`*) plugin. Find the Self-Service indicators through the Performance Analytics Admin Console, then create widgets and add them to your dashboard or portal. Also activate the [SSA] Self-Service Analytics data collection job.

Related topics

Activate your Performance Analytics subscription

Knowledge Management dashboard

The Knowledge Management dashboard helps knowledge content owners and managers to determine the usage and quality of their knowledge content. It helps confirm that the proper processes and procedures are being followed for content creation.

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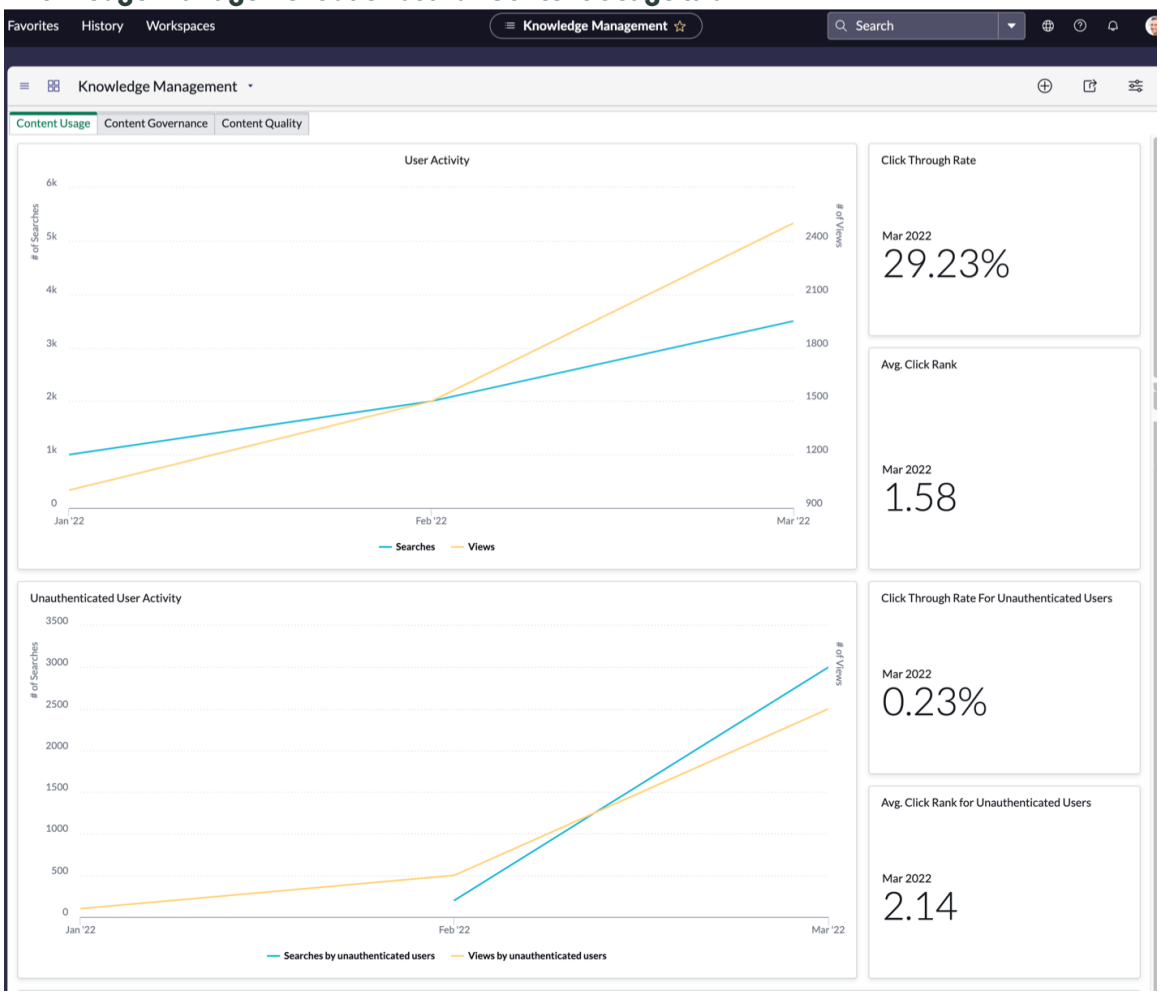
Note:

- This documentation refers to the Performance Analytics Content Pack for Knowledge Management v2, introduced in London. It doesn't refer to the older, deprecated version.
- To enable the solution for Knowledge Management, an admin can navigate to **Performance Analytics** > **Guided Setup**. Select Get Started then scroll to the section for Knowledge Management. The guided setup takes you through the entire setup and configuration process.
- To access the Knowledge Management dashboard, navigate to **All** > **Self-Service** > **Dashboard**. In the **Search dashboard** field, search for the Knowledge Management dashboard.

Knowledge Management dashboard- Content Usage tab



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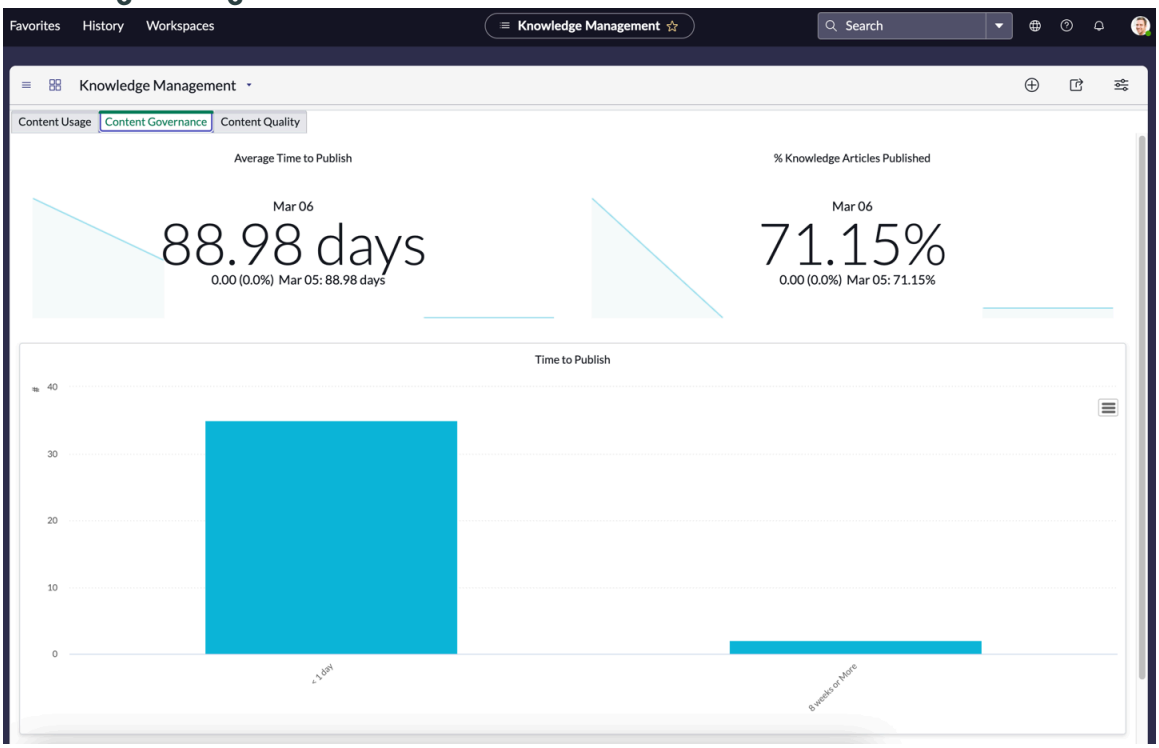
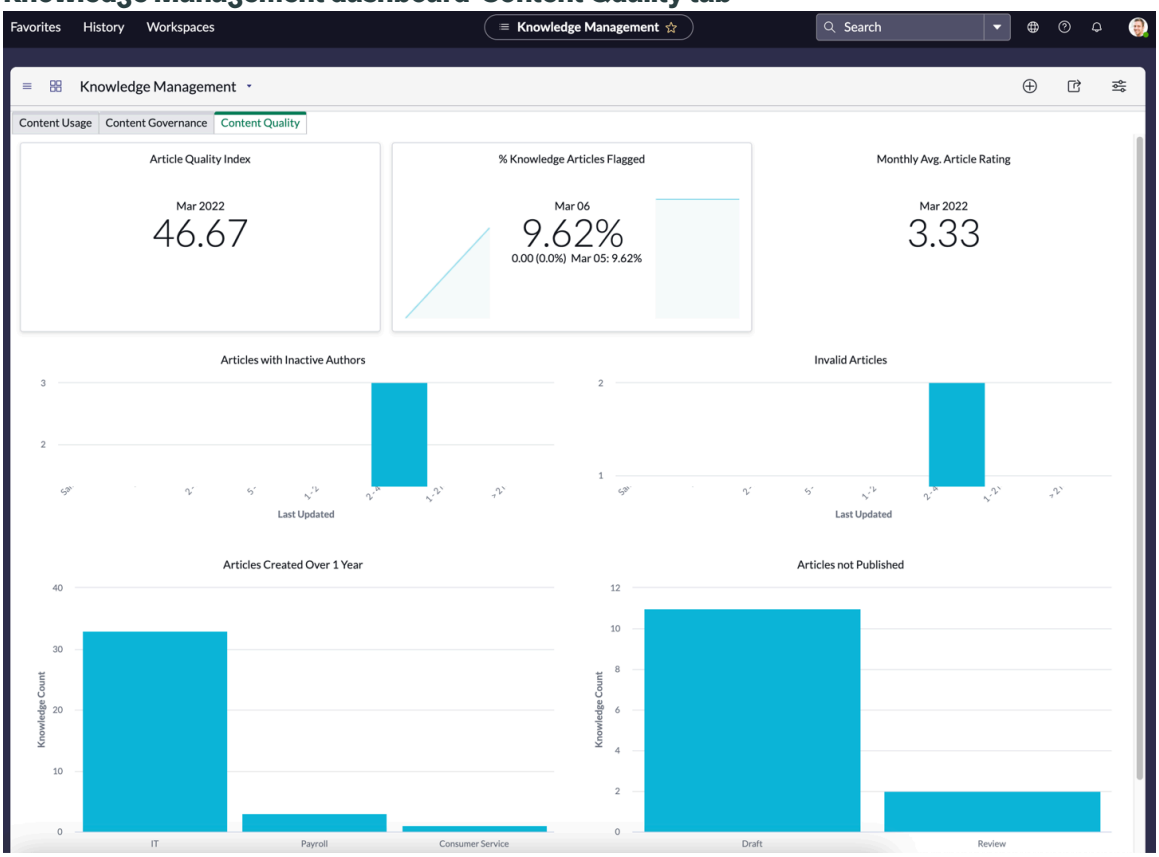
Knowledge Management dashboard - Content Governance tab



Knowledge Management dashboard-Content Quality tab



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End users and roles

End user and goal	Required role	Benefits
Knowledge Manager: must identify areas of concern and direct resources optimally.	knowledge_manager	Can review the velocity of content publication and see what content customers are searching for, to direct the efforts of content owners more efficiently.
Knowledge Administrator: needs clear visibility into the usage and quality of knowledge content.	knowledge_admin	Can plan and direct content creation.
Content creator: must see the usage of content they own and areas for improvement	pa_viewer	Can see what content in their subject area that customers are looking for.

CSM Knowledge Management dashboard indicators

The CSM Knowledge Management dashboard provides three views, into content usage, content governance, and content quality.

The Knowledge Management dashboard presents the following key performance indicators:

% of Knowledge Articles Published

A daily calculation using the formula `[[Number of knowledge articles published]] / [[Number of knowledge articles active]]`

Monthly Average Article Rating

A monthly calculation of the sum of all article ratings for the month divided by the number of knowledge articles rated for the month.

Average select Rank

A monthly calculation using the formula `[[Sum of knowledge search ranks]] / Number of knowledge searches with rank]]`

Select Through Rate

A monthly calculation using the formula `Number of knowledge searches with rank]] / [[Number of knowledge searches]]`

Average Time to Publish

The average time to publish is recalculated daily, as a number of days. The goal of the indicator is for scores to minimize.

Number of Active Users Who Performed Searches- Monthly

The number of authenticated users who performed at least one search of the knowledge base in the preceding month. The goal is for the number to maximize.

Number of Active Users Who Viewed Articles- Monthly

The number of authenticated users who viewed at least one knowledge article in the preceding month. The goal is for the number to maximize.

Number of Knowledge Searches with Rank- Monthly

The number of knowledge searches in a month where the Highest select Rank has a value higher than zero. The goal is for the number to maximize.

Number of Knowledge Searches- Monthly

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The number of knowledge searches in a month. The goal is for the number to maximize.

Number of Knowledge Articles Rated- Monthly

The number of knowledge feedback records created in a month, excluding records where the Rating field is empty. The goal is for the number to maximize.

Number of Knowledge Articles Published

A daily count of the total number of knowledge articles that have entered the Published state. The goal is for the number to maximize.

Number of Knowledge Articles Active

A daily count of the number of active knowledge articles with up-to-date workflows. The goal is for the number to maximize.

Sum of Knowledge Article Rating- Monthly

The monthly sum of all knowledge article ratings. This indicator is used only to calculate the average monthly article rating.

Sum of Knowledge Search Ranks- Monthly

The sum of feedback rankings of knowledge searches made in a month, excluding empty Highest select Rank values. The goal is for the number to maximize.

Average select Rank for Unauthenticated Users

A monthly calculation of the average select rank for the unauthenticated user activity. The score is calculated according to the formula `[[Sum of Knowledge Search Ranks by Unauthenticated Users- Monthly]]/[[Number of Knowledge Searches by Unauthenticated user with Rank- Monthly]]`. A lower value is better.

Select Through Rate for Unauthenticated Users

A monthly calculation of the percentage of select through rate for the unauthenticated user activity. The score is calculated according to the formula `[[Number of Knowledge Searches by Unauthenticated user with Rank- Monthly]]/[[Number of Knowledge Searches by Unauthenticated user- Monthly]] * 100`. A higher value is better.

Number of Knowledge Searches by Unauthenticated Users- Monthly

A monthly count of the knowledge searches by unauthenticated users.

Number of Article Views by Unauthenticated Users- Monthly

A monthly count of the knowledge articles viewed by unauthenticated users.

Sum of Knowledge Search Ranks by Unauthenticated Users- Monthly

A monthly sum of the knowledge search ranks for the unauthenticated user activity.

Number of Knowledge Searches with Rank for Unauthenticated Users- Monthly

A monthly count of the knowledge searches with select rank for the unauthenticated user activity.

Breakdowns

The following breakdowns apply to the indicators on the dashboard:

- Time to Publish Groups
- Knowledge Base
- Knowledge Category

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Data visualizations

The dashboards include the following visualizations:

Title	Type	Description
Articles with Inactive Authors	Column	Active = true and Author.Active = False
Invalid Articles	Column	Active = true and Workflow is one of Draft, Review, Published, or Pending Retirement and Valid to is before today and latest = true
Articles Created Over 1 Year	Column	Active = true and Created = before 1 year ago
Articles not Published	Column	Active = true and Workflow is Draft or Review

Related topics

Dashboards

Knowledge Management Overview dashboard

The Knowledge Management Overview dashboard provides an overview of various usage metrics associated with knowledge articles. You can view and track knowledge usage and views and direct the efforts of content owners more efficiently.

Note:

If you're upgrading from a previous release, you must activate the Knowledge Overview (com.sn_knowledge_overview) plugin to enable the Knowledge Management Overview dashboard. You must also update the navigation path. For more information, see Update the navigation path for the Knowledge Management Overview dashboard.

Enable the responsive dashboard to optimize analytics by setting the *glide.cms.enable.responsive_grid_layout* system property to true.

To access the Knowledge Management Overview dashboard, navigate to **All** > **Self-Service** > **Dashboards**. Search for the Knowledge Management Overview dashboard. The dashboard by default opens with the **Article Lifecycle** tab displayed.

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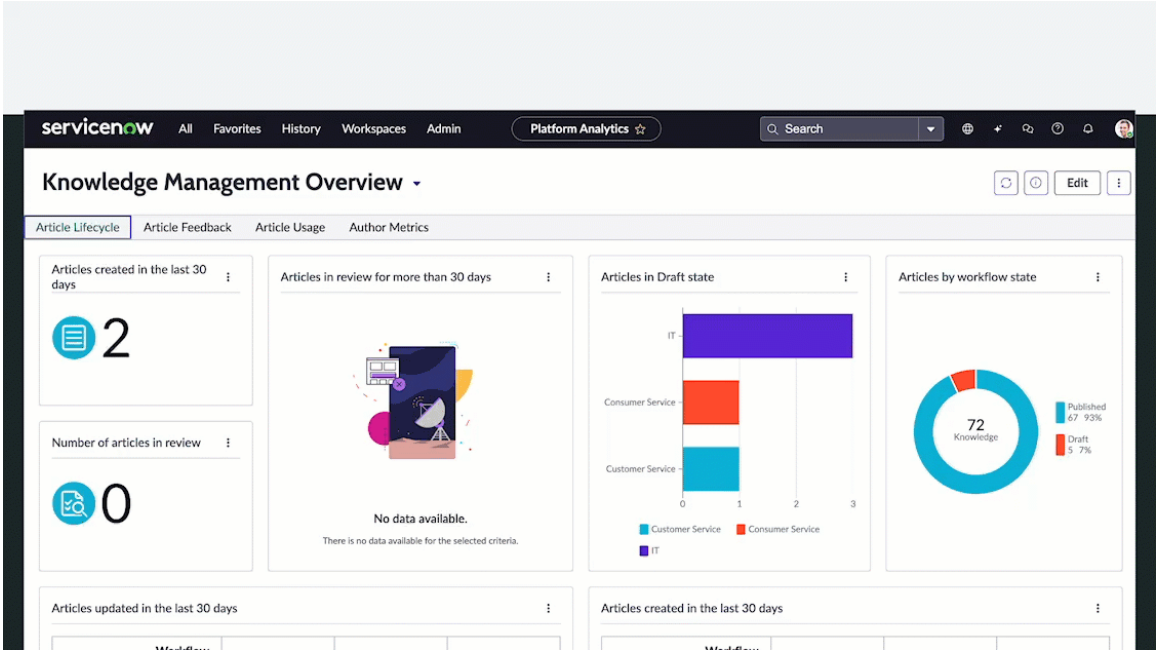
Knowledge Management Overview dashboard



End user and roles

End user and goal	Required role	Benefits
Knowledge Manager: Identify areas of concern and direct resources optimally.	knowledge_manager	Can review the velocity of content publication and see what content customers are searching for.
Knowledge Administrator: Has clear visibility into the usage and quality of knowledge content.	knowledge_admin	Can plan and direct content creation.

Reports

The Knowledge Management Overview dashboard includes various reports.

Title	Type	Description
Article life cycle		
Articles created in the last 30 days	Single score (42)	Total number of articles created in the last 30 days.
Number of articles in review	Single score (42)	The total number of articles in review state.
Articles by workflow state	Pie	Displays articles by their workflow state.

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Title	Type	Description
Articles in review for more than 30 days	Horizontal bar ( )	Shows the articles that have been in the review state for more than 30 days.
Articles created in the last 30 days	Pivot table ( )	Shows the articles created in the last 30 days and the knowledge bases and workflows associated with the articles.
Articles updated in the last 30 days	Pivot table ( )	Shows the articles updated in the last 30 days and the knowledge bases and workflows associated with the articles.
Articles expiring in the next 90 days	Pivot table ( )	Shows the articles expiring in the next 90 days and the Shows the articles.
Articles in Draft state	Horizontal bar ( )	Shows the articles in the draft state.
Article Feedback		
Articles flagged in the last 30 days	Single score ( )	Total number of articles flagged in the last 30 days.
Articles marked Not Helpful in the last 30 days	Single score ( )	The total number of articles marked as not helpful in the last 30 days.
Comments added in the last 30 days	Single score ( )	Total number of articles that have received comments in the last 30 days.
Article ratings in the last 30 days	Pivot table ( )	Displays the ratings for articles that are in different workflow states. It also shows the average rating of articles from different knowledge bases.
Average article rating	Single score ( )	Shows the average rating of articles that have been rated.
Article Usage		
Knowledge use	Vertical bar ( )	Shows the count of articles used as attachments.
Article views	Vertical bar ( )	Shows the count of articles viewed by the knowledge base.
Knowledge use trended by month	Line ( )	Shows the count of articles used as attachments trended by month.
Article view count trend by month	Line ( )	Shows the count of viewed articles trended by month.
Author Metrics		

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Title	Type	Description
Monthly knowledge usage by author	Trend ( )	Shows the count of articles used as attachments trended by month with respect to the author.
Monthly knowledge views by author	Trend ( )	Shows the count of viewed articles trended by month per author.
Articles created by author	Trend ( )	Shows articles created according to knowledge author trended by month.

Update the navigation path for the Knowledge Management Overview dashboard

Update the navigation path to access the Knowledge Management Overview dashboard.

Before you begin

- Activate the knowledge overview (com.sn_knowledge_overview) plugin.
- If you are upgrading from a previous release, you must update the knowledge overview entry in the Modules (sys_app_module) table.

Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Modules**.
2. On the Modules page, in the **Title** field, enter `overview`.
3. In the **Application menu** field, enter `knowledge`.
4. Open the **Overview** module.
5. In the Module Overview page, click **Link Type**.
6. In the **Link type** field, select **URL (from Arguments)** from the list.
7. In the **Arguments** field, enter `now/platform-analytics-workspace/dashboards/params/edit/false/sys-id/5d5e18458731fd51a2522b5a4309cacc`.
8. Select **Update**.

Result

The navigation path for the Knowledge Management dashboard is updated to **All** > **Knowledge** > **Administration** > **Overview**.

Pareto chart for Knowledge Demand Insights

The Pareto chart for Knowledge Demand Insights enables you to visualize candidate knowledge gaps and prioritize the order in which knowledge gaps should be resolved.

The following information is available in the Pareto chart for Knowledge Demand Insights:

- The left Y axis is the count of tasks with no or insufficient knowledge coverage.
- The right Y axis is the cumulative percentage of the total number of tasks evaluated.
- Each bar represents a collections of similar tasks that don't have good knowledge coverage. The bars are arranged in a descending order such that the collection with most number of tasks appears in the left. This order enables you to resolve the largest collection first. When you point to a bar, you view the number of tasks included within the bar and the cumulative percentage.

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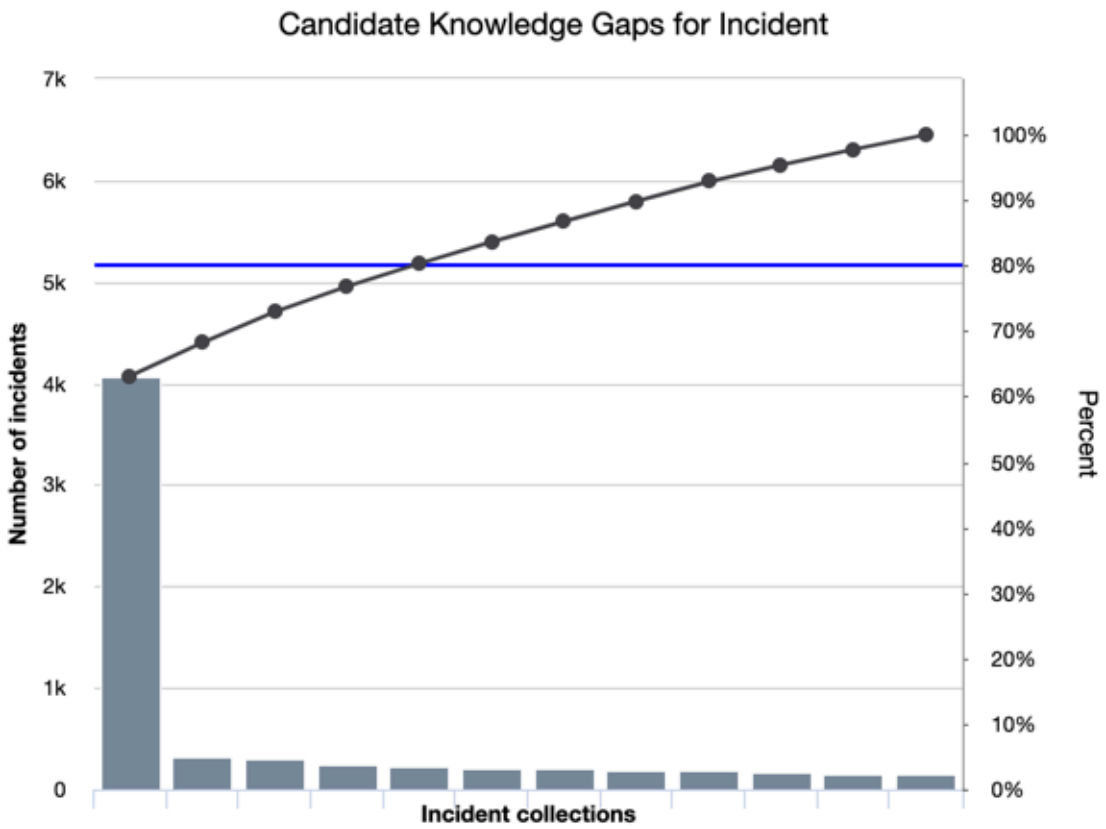
- The line graph shows the cumulative percentage of tasks that are included in each collection.
- The blue line indicates the 80% of total number of tasks that have no or insufficient knowledge coverage. The intersection of the blue line and the line graph indicates the minimum number of collections that need to be resolved so that 80% of tasks can be covered.

Example: Pareto chart for demand insights

The following figure displays a Pareto chart for identifying candidate knowledge gaps for incidents.



Related topics

Demand Insights for Cases dashboard

Demand Insights for Incidents dashboard

Demand Insights for HR Cases dashboard

Knowledge demand insights

Demand Insights for Cases dashboard

The Demand Insights for Cases dashboard enables you as a customer service case manager to identify which cases have no or insufficient knowledge coverage. You can then create feedback tasks for knowledge gaps to deflect such cases.

The Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml) includes the Demand Insights for Cases dashboard. For more information, see Predictive Intelligence for Knowledge Management and Additional plugins for Knowledge Management. The navigation path for viewing this dashboard is **All** > **Platform Analytics** > **Library** > **Dashboards**. Using the search field, look for the dashboard.

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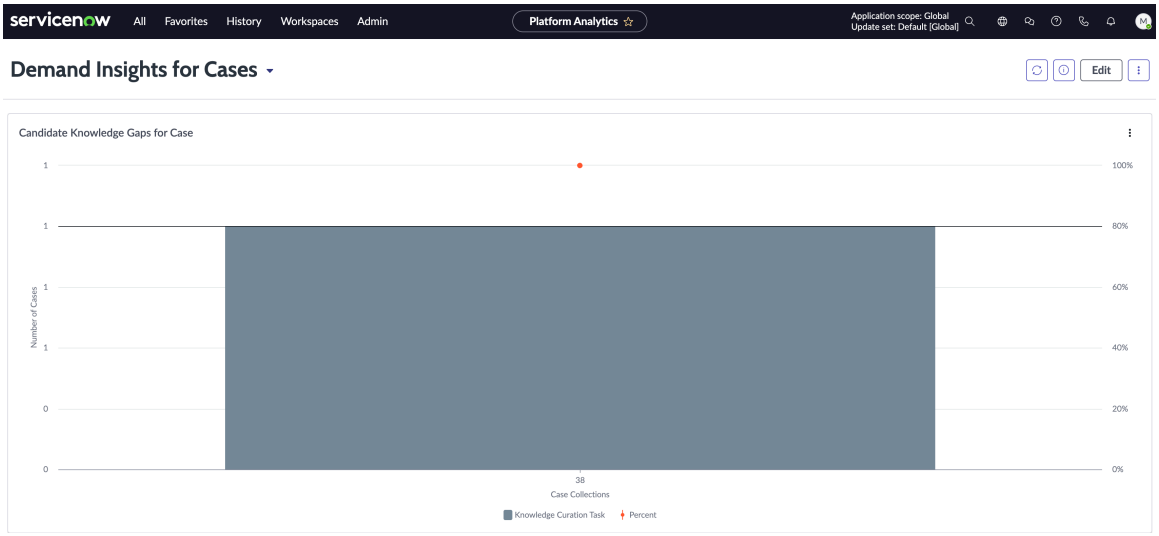

End user and roles

End user and goal	Required roles
Customer service case manager: Needs to identify which cases don't have good knowledge coverage.	sn_km_ml.knowledge_curation_user and sn_customerservice_manager

Reports

Title	Type	Description
Candidate Knowledge Gaps for Case	Pareto Chart	Displays data from the Knowledge Curation Task [kb_curation_task_cluster] table with the following conditions: Curation configuration = sn_customerservice_case AND Solution.Active = true

Related topics

- Pareto chart for Knowledge Demand Insights
- Knowledge demand insights

Demand Insights for Incidents dashboard

The Demand Insights for Incidents dashboard enables you as an incident manager to identify which incidents have no or insufficient knowledge coverage. You can then create feedback tasks for knowledge gaps to deflect such incidents.

The Predictive Intelligence for Knowledge Management plugin (com.snc.knowledge_ml) includes the Demand Insights for Incidents dashboard. For more information, see Predictive Intelligence for Knowledge Management and Additional plugins for Knowledge Management.

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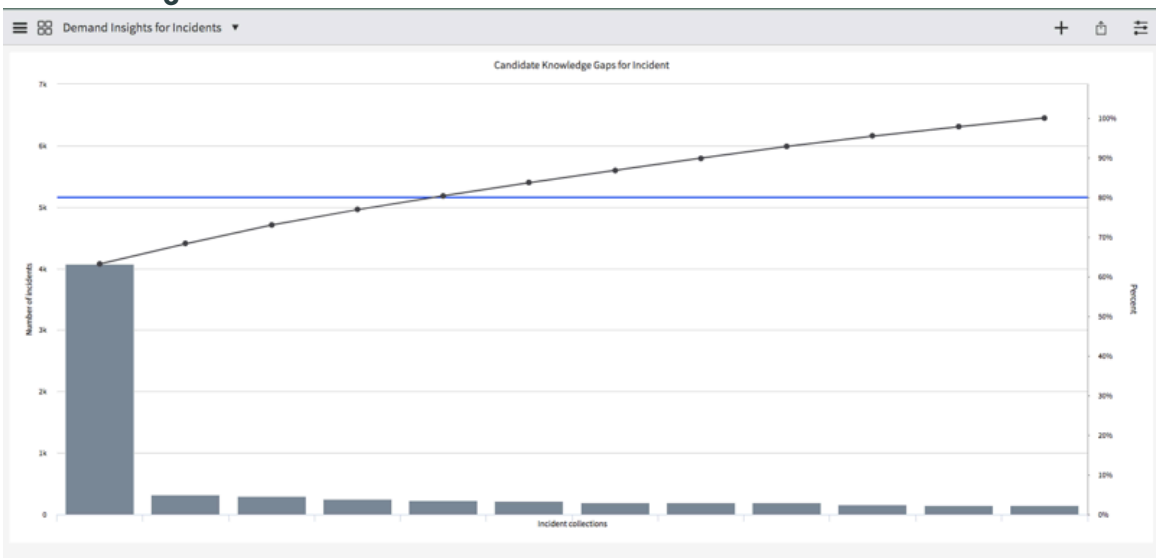
Demand Insights for Incidents dashboard



End user and roles

End user and goal	Required role
Incident manager: Needs to identify which incidents don't have good knowledge coverage.	sn_km_ml.knowledge_curation_user and incident_manager

Reports

Title	Type	Description
Candidate Knowledge Gaps for Incident	Pareto Chart	Displays data from the Knowledge Curation Task [kb_curation_task_cluster] table with the following conditions: Curation configuration = incident AND Solution.Active = true

Related topics

- Pareto chart for Knowledge Demand Insights
- Knowledge demand insights

Demand Insights for HR Cases dashboard

The Demand Insights for HR cases dashboard enables you as an HR agent to identify which HR cases have no or insufficient knowledge coverage. You can then create feedback tasks for knowledge gaps to deflect such HR cases.

Note:
For Demand Insights for HR cases dashboard, activate the Human Resources Scoped App: Core plugin [com.sn_hr_core] and Predictive Intelligence for Knowledge Management plugin [com.snc.knowledge_ml].

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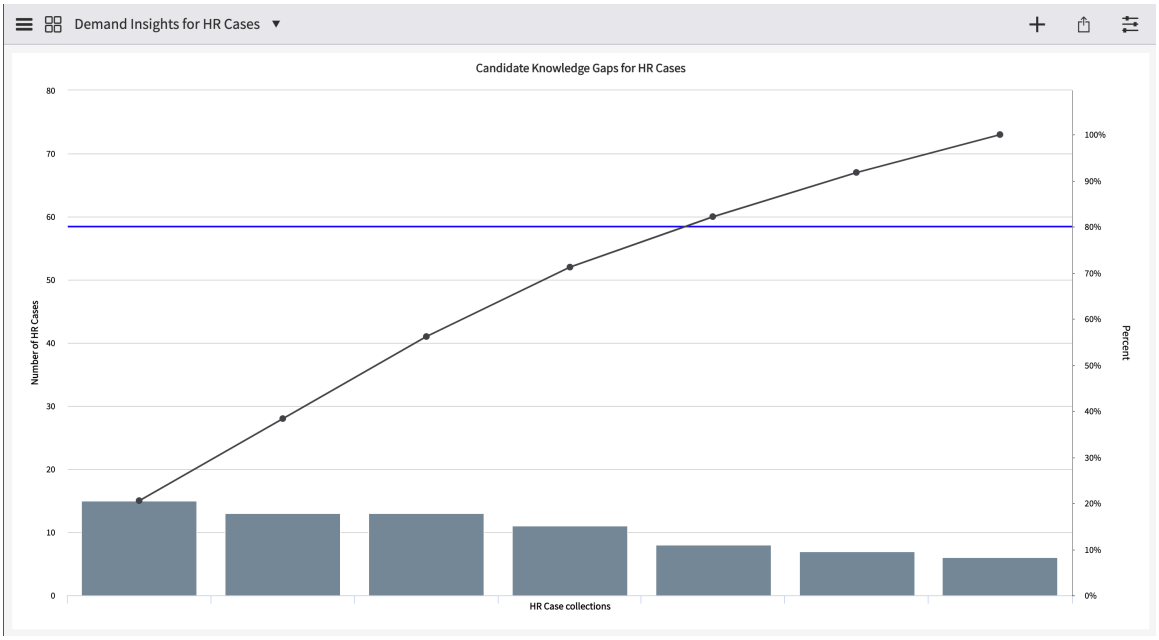
Demand Insights for HR Cases dashboard



End user and roles

End user and goal	Required role
HR agent: Needs to identify which HR cases don't have good knowledge coverage.	sn_km_ml.knowledge_curation_user and sn_hr_core.admin

Reports

Title	Type	Description
Candidate Knowledge Gaps for HR cases	Pareto Chart	Candidate Knowledge Gaps for HR cases.

Knowledge Center

The ServiceNow® Knowledge Center (KC) is designed to simplify the discovery and oversight of the organizational knowledge.

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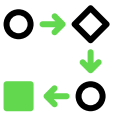
Get started

Explore	Configure	Use
Learn about features in Knowledge Center helpful in managing your knowledge base.	Configure Knowledge Center and related features.	 Use Knowledge Center and related features.

Troubleshoot and get help

- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Related topics

Exploring Knowledge Center

Exploring Knowledge Center

The Knowledge Center Knowledge Center helps in the effective management of knowledge articles by using an intuitive interface. Beyond traditional knowledge bases, the Knowledge Center provides actionable insights and identifies gaps so that your content stays relevant and accurate.

Benefits

- Knowledge Center Article editor provides a range of formatting tools to help you edit and format the content of knowledge articles, including text, images, and media.
- Insights Dashboard- Track top actions, duplicates, and optimization opportunities.
- Gap Analysis- Identify missing topics and improve coverage.
- Article optimization- Generate and edit articles with Now Assist. Turn a text prompt into an article, helping you overcome writer's block and speed up the article writing process.

Why use Knowledge Center

- Monitor the performance of your knowledge ecosystem.
- Enhance article quality through AI-driven recommendations.
- Close gaps and keep your content aligned with audience needs.

Knowledge Center Home Page

Knowledge Center is a plugin within Knowledge Management that helps in the effective management of knowledge articles by using an intuitive interface.

UI features

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Following are the features supported by the Knowledge Center plugin. Some features are only accessible if you have the appropriate role access and meet the necessary criteria to view them.

UI Features and capabilities

Section	Features	Conditions
Search	Find knowledge material by title or text in the body. It lets you quickly access the relevant information, reducing time spent searching.	When the AI Search feature is active, searches are performed using AI. If it's not enabled, contextual search is used instead.
Insights	Discover areas of improvement in the knowledge base through potential knowledge gaps, potential duplicates, and article optimization. It helps you improve the content quality and helps for a complete, accurate knowledge base.	This feature works only if the Now Assist Skills are enabled for your role.
Requires Attention	The Requires Attention section helps you manage and update critical articles and tasks, ensuring content accuracy and timeliness. It includes features like My Approvals, My Feedback Task, and My Article Checklist, and highlights flagged articles and those expiring soon assigned to the logged in user.	User can access features assigned to their role.
Quick View	Navigate quickly to knowledge bases and filter articles by most viewed, most useful, or featured. It speeds up access to popular and high-value content.	User can access features assigned to their role.
Knowledge Features	The Knowledge features section provides a guide to workflows and supporting processes for knowledge management. It helps you understand and maintain a robust knowledge ecosystem.	User can access features assigned to their role.
Actions	The Actions panel provides options to create articles, blocks, or manage groups, helping you organize knowledge and maintain group ownership effectively.	Now Assist feature should be enabled for your role. You can use Now Assist for creating or updating articles. For more information, see
Configurations	The Configurations section provides references to tools and settings that support knowledge management and system optimization. Use these options to configure assistance, manage properties, and improve article quality.	User can access features assigned to their role.
Knowledge Resources	The Knowledge Resources section offers links to learning materials and community platforms. Use these resources to build your skills, connect with peers, and find product documentation.	User can access features assigned to their role.

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Knowledge Center article editor

The Knowledge Center article editor has editing tools that help in formatting knowledge article content such as text, images, and media.

The toolbar within the article editor contains an array of icons that enable you to edit and format the text content of your knowledge article. You can also use the editor to add images, links, audio, and video to the knowledge article.

You can perform the following functions using the article editor:

- Review and edit knowledge article record metadata such as short description (title), knowledge base, and valid to date.
- Preview the article layout on different screen views such as desktop, mobile, and tablets.
- Toggle component outlines, undo, or redo changes and clear the content.
- Drag blocks of columns, text, images, and video into the editing area and format them using settings.
- Use inline text formatting tools such as bold, alignment, font, color, headings, links, and lists to enhance content presentation.
- Use Now Assist for AI-powered content creation and editing, including open prompt commands for text manipulation.
- Use article templates for layout/sections and form templates for default content.

Knowledge Center Article Optimization

Article Optimization is an automated system designed to improve the quality and health of knowledge articles, providing actionable feedback to authors and managers.

The Article Optimization tool scans your knowledge articles and provides instant, actionable feedback. This feature enables you to quickly address issues, resulting in high-quality content that is more accessible and easily discoverable. By streamlining improvements, the tool helps verify that your articles meet accessibility and searchability standards, saving time and enhancing the user experience.

Note:
Your administrator or manager can configure the Article Optimization features to enable and customize a range of operations. For more information, see Configuring custom script based Article Optimization scans.

The Article Optimization tool performs the following operations:

- Scheduled jobs run various scans on articles, such as checking for proper heading tags, missing image alt attributes (for accessibility), and title relevance (for search engine optimization).
- Findings from these scans are presented as cards in the user interface, offering suggestions like adding alt text or updating titles.
- Both script-based and AI-powered scans are supported. AI scans come with suggestions for improvement.
- Authors can fix, ignore, or review findings directly from the UI. Some fixes (changing heading tags, and so on) can be batch-applied.
- Managers can see aggregated findings on the home page (for example, number of flagged articles, types of issues, and so on), while authors can see findings at the individual article level.

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Potential knowledge gaps

Potential knowledge gaps represent areas where you frequently encounter issues but lack supporting articles. Managing these gaps promotes better coverage and improved user experience.

The Knowledge Center identifies gaps based on case or incident trends and their reporting patterns. These gaps highlight missing or insufficient knowledge articles that need attention.

Note:
The Knowledge Gap also known as Potential gaps feature is supported currently in CSM and ITSM products.

Types of views

- All Knowledge Gaps: Displays a complete list of gaps across the organization.
- Top five Gap Views: Shows information of the top five gaps from the incident and cases.

Benefits

Addressing gaps helps reduce repeated incidents, improves self-service, and promotes a comprehensive knowledge base.

Available knowledge actions

- **Unmark as gap**: Remove invalid gaps discovered and remove the issues and all its tasks from the list.
- **Mark as resolved**: Close gaps after creating or updating articles.
- **Report a gap**: Create feedback task for the articles where you believe that a gap exists. Once the article is created, the gap can't be reported again.
- **Create an article**: Draft new content to address the gap.

Related topics

Configure Now Assist Skills for potential gaps

Configuring Knowledge Center

For using the Knowledge Center, the admin must enable system properties and configure the features that enable agents to use its generative AI skills within their application workspace.

The first step in configuring the Knowledge Center involves enabling the following system properties:

- `sn_km_center.glide.knowman.ece.enable`
- `sn_km_center.glide.knowman.enable`
- `sn_km_center.glide.knowman.redirect.enable`

For more information, see Enable system properties for Knowledge Center

Configure how agents use Knowledge Center to generate, edit, and optimize knowledge articles. Refer the following:

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- Configuring custom script based Article Optimization scans
- Activate Article Optimization skill
- Configuring Article Optimization skill and prompts

Related topics

Configure Now Assist Skills for potential gaps

Configure and activate the Now Assist Identify duplicate articles skill

Configure skill for Now Assist context menu

Enable system properties for Knowledge Center

To use the Knowledge Center plugin, you must enable the system properties before you configure the space.

Before you begin

The default system properties settings for Knowledge Center:

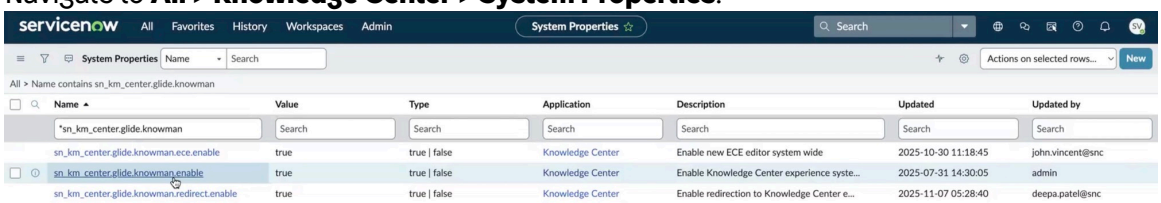
- **For new users:** All the properties are enabled (set to **true**) by default, encouraging immediate use of the new system.
- **For existing users:** All the properties are disabled (set to **false**) by default to avoid disrupting current workflows or customizations. Existing users must manually enable the properties to access KC and its features.

Supporting releases: Knowledge Center and its features are available to the users in Yokohama Patch 11 (YP11) and Zurich Patch (ZP4) releases.

Role required: admin

Procedure

1. Navigate to **All** > **Knowledge Center** > **System Properties**.



2. Enable the following system properties by setting the parameter to **true**.

Configuring Article Optimization jobs

Article Optimization jobs are used to define a schedule to run scans along with their conditional settings, if any. Each job will have one or more scans associated with it.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge Center** > **Lists** > **Article Optimization** > **Jobs**.
2. Select **New**.

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a. If you want to clone and modify an existing job, go to the *sysauto_kb_assist_job* table.

b. Open a record and select **Insert and stay** to copy the scan.

c. **Rename** the copied scan.

3. Fill out the record form as follows:

a. Set the **Query table** field to **Knowledge** (or another table used to store knowledge articles).

b. Define the filter criteria for the job in the **Query conditions** field.

4. Define the schedule of the job in the **Run** field and refine it using the **Time Zone** and the **Time** fields (to stagger job run times and avoid performance issues).

5. **Save** the record.

6. Add or delete scans on the job from the **Related Article Assist Scans** related list.

Result
The article optimization job is configured.

Configuring custom script based Article Optimization scans

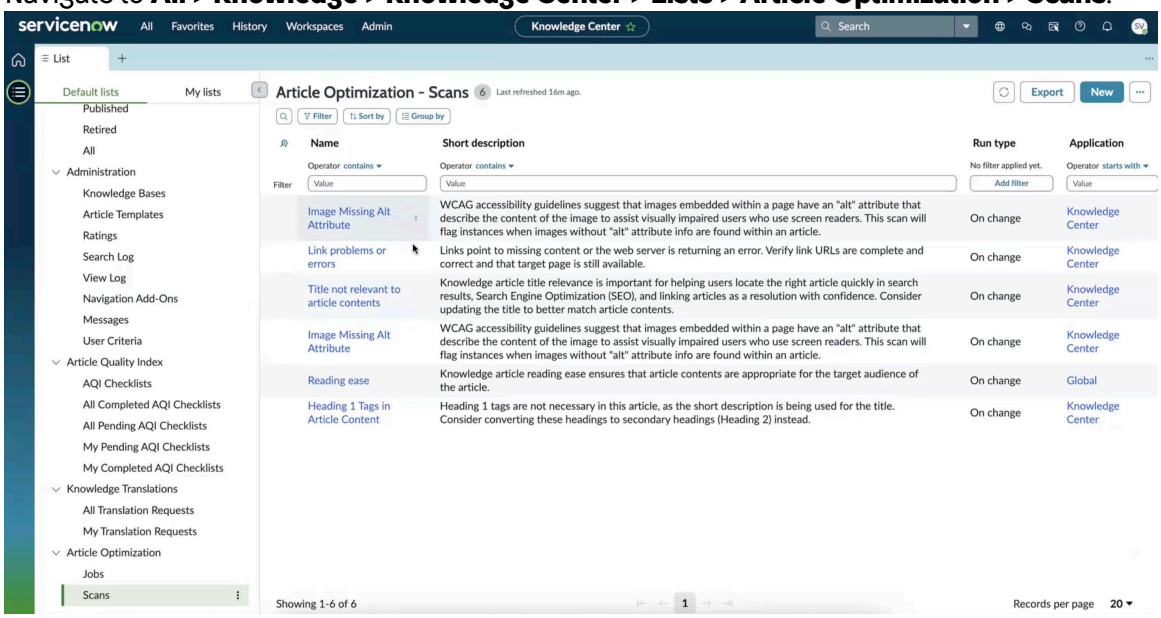
The Out-of-Box (OOB) Knowledge Center settings provide default configurations for article optimization scans. However, users can configure new scans for article optimization.

Before you begin
Role required: admin

About this task
Configure Article Optimization scans for articles in the Knowledge Center. Two types of Article Optimization scans are available in the Knowledge Center. One is a script-based scan and the other is a AI-based scan. If you are subscribed to Now Assist, you can configure both the scan types. If you are not subscribed to Now Assist, you can configure only the script-based scans, and Article Optimization runs only the script-based scans.

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge Center** > **Lists** > **Article Optimization** > **Scans**.



2. Select **New**.

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a. If you want to clone and modify an existing scan, go to the *kb_assist_scan_definition* table.

b. Open a record and select **Insert and stay** to copy the scan.

c. **Rename** the copied scan.

3. Fill out the record form as follows:

a. Set the **Run type** field to:

- **On change:** If you want the scan to run each time an article is saved.

  Note:
  the scan must still be associated with a job in order to run but the job schedule will not control when this scan runs.

- **Always:**If you want the scan to run based on the schedule set up in the associated job.

b. Set the **Execution type** to **Script Based**.

4. Type the script code in the **Script** field.

Note:
Using a copy of an existing scan can come in handy as this specific format has to be used for processing the results.

5. **Save** the record.

Result
The Article Optimization scan is custom configured.

What to do next
To run the scan, you must add the configured scan to a job. For more information see, Configuring Article Optimization jobs

Related topics

Configure custom AI-based Article Optimization scans

Configuring Article Optimization skill and prompts

Activate Article Optimization skill

Using Knowledge Center

Learn how to manage and enhance your knowledge base using the powerful tools and workflows available in Knowledge Center.

Using Knowledge Center goes beyond viewing dashboards as it involves tasks that keep your knowledge ecosystem accurate, complete, and user-friendly. This section explains how you interact with the system to maintain content health and an effective technical support system.

Key Tasks

- **Resolve Issues:** Address knowledge gaps and duplicates highlighted in Insights.
- **Optimize Articles:** Edit, retire, or delete outdated content to maintain relevance.

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- **Create New Content:** Draft articles for missing topics identified through gap analysis.
- **Respond to Feedback:** Review user feedback and implement improvements.

UI feature and uses

Following is the list of features and how they can be useful to you.

Search

Find knowledge material by title or text. Search is equipped with the Now Assist feature, providing more guided and relevant results.

Note:
When the AI Search feature is active, searches are performed using AI. If it's not enabled, contextual search is used instead.

Insights

Discover areas of improvement in the knowledge base through Potential gaps, Potential duplicates, and Article optimization.

- Potential gaps
- Potential duplicates
- Article optimization

Note:
This feature works only if the Now Assist Skill is enabled for your role. See Configure skills with custom prompts for knowledge article templates.

Requires Attention

This feature highlights items that need immediate review or action to maintain content accuracy and compliance. Following are the filters of this feature:

- **Articles Expiring in 90 Days:** Review and update articles scheduled to expire soon to promote relevance and accuracy.
- **My Flagged Items:** Address flagged content for corrections or improvements.
- **My Feedback Tasks:** Resolve feedback requests promptly to maintain content quality.

Quick View

Quickly navigate to knowledge bases and view articles filtered by criteria such as most viewed, most useful, and featured.

Knowledge Features

The Knowledge features section offers a comprehensive guide to various knowledge management workflows and supporting processes. It enables you to explore features that help maintain a robust and efficient knowledge base.

Actions

The Actions Panel helps you organize knowledge effectively by creating articles, adding reusable content blocks, and managing ownership groups.

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- **Create an Article**: Use a template to share detailed information and troubleshooting steps.
- **Add Knowledge Blocks**: Knowledge blocks are reusable pieces of content secured by user criteria. Add them to knowledge articles to maintain consistency and reduce duplication.
- **Manage Groups**: Control ownership by editing existing groups or creating one so that the group users have access and responsibility.

For more information, see the following links:

- Configure Now Assist Skills for potential gaps
- Configure and activate the Now Assist Identify duplicate articles skill
- Configure skill for Now Assist context menu

Related topics

Generate a Knowledge article from the Now Assist panel

Search knowledge article

Use the search function to find articles you want to work on and then filter and sort your results as needed.

Before you begin
Role required: admin

About this task
Searching for knowledge articles is essential because users often struggle to find accurate information quickly. Without a reliable search, they waste time and risk using outdated content. A strong search experience helps in faster resolution and improves productivity.

Note:
When AI Search feature is active, search uses AI for results. If not enabled then contextual search is used.

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge center**.
   You can also access Knowledge Center through **Workspaces** > **Knowledge center**
2. In the **Search** bar, enter the name of the topic you want to find articles about.
3. You can see the detailed results by selecting **View all Knowledge**.
   The detailed results are displayed in a card format.
4. You can also see the detailed results in the list view by selecting **Go to list view**

Result
The detailed results are displayed in a list format.

Check Knowledge Center insights

Learn how to access detailed views for gaps, duplicates, or article optimization from the Insights section in the Knowledge Center.

Before you begin
Role required: admin

About this task
Knowledge Center Insights provide visibility into the health of your knowledge base. Without actionable insights, teams may overlook issues that impact content quality. Insights highlight

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optimization needs, duplicates, and gaps, enabling informed decisions and proactive maintenance.

The Insights section provides quick links to key actions such as managing gaps, duplicates, and article optimization. Selecting these links takes you to the respective detailed view for further actions.

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge center**.
   You can also access Knowledge center through **Workspaces** > **Knowledge center**
2. In the **Insights** section, under **Top knowledge actions** select the action item you want to manage:
   - Select **Article Optimization** to open the optimization window to edit, view, retire, or delete articles.
   - Select **Incident Gap** to open the knowledge gaps window to review or resolve gaps.
   - Select **Duplicates** to open the duplicate articles window to manage duplicate content.

   Note:
   The number of items displayed under Knowledge Actions depends on the categories that you have access to. If you have access to all three categories (Duplicates, Gaps, and Article Optimization), six actions appear, with two actions from each category. When access is limited to any two categories, six actions are still shown, but three actions come from each category. If you have access to only one category, all six actions are displayed from that single category. This approach helps in consistency in the total number of actions while adapting to your permissions.
3. Select the item to navigate to its detailed view.

Result
You're redirected to the relevant detailed view for managing the selected case.

Related topics

Generate and edit articles using the Now Assist from Knowledge Center article editor

Configure Now Assist Skills for potential gaps

Configure and activate the Now Assist Identify duplicate articles skill

Manage potential knowledge gaps

Learn how to review and resolve potential knowledge gaps in the Knowledge Center.

Before you begin
Role required: admin.

Suggested reading: Configure Now Assist Skills for potential gaps

About this task
Potential gaps also known as Knowledge gaps represent missing documentation for recurring issues. If it's unresolved, these gaps lead to repeated incidents and higher support costs. Addressing gaps promotes comprehensive coverage, reduces ticket volume, and enhances self-service adoption.

Note:
Currently, the Potential Gap feature is supported only in CSM and ITSM products.

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Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge center**.
   You can also access Knowledge center through **Workspaces** > **Knowledge center**
2. In the **Insights** section, under **Potential gaps**, select **View more** to view the gaps list.
3. Select a view:
   - **View all gaps** Review the full list of gaps.
   - **View top gaps** Review only the highest-priority gap groups.
4. Select the gaps that you want to manage and choose one of the following actions:
   - Select **Unmark as gap** to clear related incidents or cases tasks when the article meets completeness criteria.
   - Select **Mark as Resolved** to close the incident or cases after creating or updating an article.
   - Select **Create an Article** to draft a knowledge article to address the gap.
   - Select **Report Knowledge Gap** to create a feedback task for incidents or cases.

     Note:
     When you report a gap, a feedback task is created for the article, and consequently, you can't create that article again.

5. Confirm your action if prompted.

Result
The selected gap is updated or resolved, improving knowledge coverage and reducing repeated incidents.

Related topics

Potential knowledge gaps

Identify and resolve duplicate articles

Learn how to find and manage duplicate knowledge articles in the Knowledge Center.

Before you begin
Role required: admin

About this task
Duplicate articles can confuse readers and reduce search accuracy. Use this task to identify duplicates and take corrective actions to maintain content quality.

Note:
The **Potential Duplicate** card on the dashboard displays a trend analysis of the number of duplicate topics for the current year. The card will not display detailed information if the scheduled job runs are fewer than four.

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge center**.
   You can also access Knowledge center through **Workspaces** > **Knowledge center**
2. In the **Insights** section, under **Potential Duplicates**, select **View all** to view the duplicate articles list.
3. Select the duplicate articles that you want to unmark as duplicate.

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4. Select **Unmark as Duplicate** to remove the duplicate tag if the article is valid.
5. Confirm your action if prompted.

Result
The duplicate articles are resolved, improving content accuracy and reducing redundancy.

Address items that requires attention

Learn how to review and manage items that need your attention, such as expiring articles, flagged content, and feedback tasks.

About this task
The **Requires Attention** section helps you quickly identify and act on items that need review. This section includes articles nearing expiration, flagged content, and feedback tasks assigned to you.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Knowledge** > **Requires Attention**.
2. Review the sections under **Requires Attention**, and select the feature that suits your interest from the following list:
   - Select **My Approvals** to view articles that are assigned to you for your approval.
   - Select **My Pending Group Requests** to view if a request is opened by a logged-in user is not completed or closed.
   - Select **My Feedback Tasks** to view feedback tasks assigned to you.
   - Select **My Article Checklist** to view the article checklist. Here the logged-in user should be a reviewer, and state shouldn't be already submitted.
   - Select **My Flagged** to view the articles that you flagged for review.
   - Select **Articles expiring in 90 days** to view the articles that are assigned to the logged-in user that expire soon.
   - Select **My Translation Requests** to view that any translation requests assigned to the logged-in user and are open
3. Select **View all** to see the complete list of items.
4. Open an item link, like from the list of **My Feedback Tasks**, to view details and select desired action on the items.

Result
You can track and resolve to pending tasks efficiently from the **Requires Attention** section.

Related topics

Generate and edit articles using the Now Assist from Knowledge Center article editor

The Knowledge Center (KC) article editor delivers an intuitive experience for creating and managing content. Featuring blocks, responsive previews, and AI-powered assistance, it simplifies article design while verifying accessibility and search engine optimization compliance. Backward compatibility with existing templates guarantees a smooth transition for authors and administrators.

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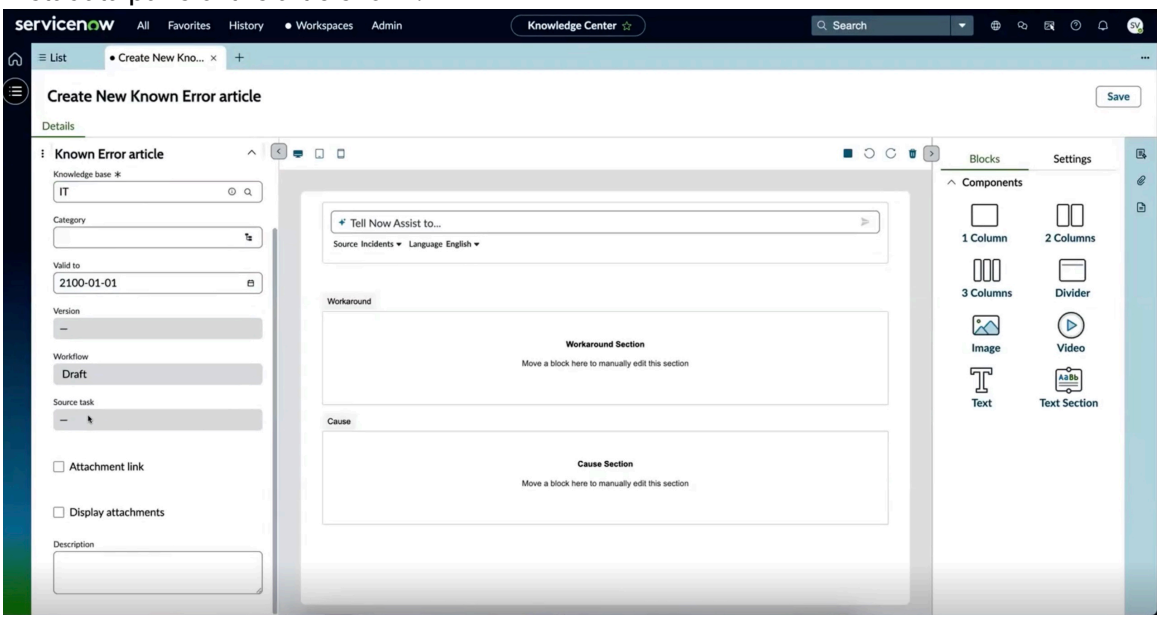
Before you begin
Role required: agent

About this task
Generate and edit knowledge articles in the Knowledge Center from a task using AI-powered editing blocks and formatting tools. The article editor supports all existing article templates, including custom templates, with no migration needed. You can create an article or edit an existing one.

Procedure
1. Navigate to **All** > **Knowledge** > **Knowledge Center** > **Lists**.
2. Select the type of article from the **List** menu (Unpublished, Published, Retired, and so on).
3. Select **New** to create an article.
4. Select the knowledge base and the article template in the **Create new article** window.
5. Preview the article template and select **Next**.
6. Start by entering the **Knowledge base**, **Short description** (title), and other details in the metadata pane of the article form.



7. As you create the article in the main article editor space, drag **Components**, such as columns and text section, into the article area from the **Blocks** pane.

> **Note:**
> Collapse and expand the article area using the arrows for better visibility.

8. Use the block-level controls in the toolbar to preview articles for aspect ratios, toggle component outlines, delete, redo, or undo blocks.
9. Edit blocks using the block **Settings** to fine-tune margins and alignment.
10. Select and format inline text such as headings, lists, fonts, and hyperlinks, with the floating formatting toolbar.

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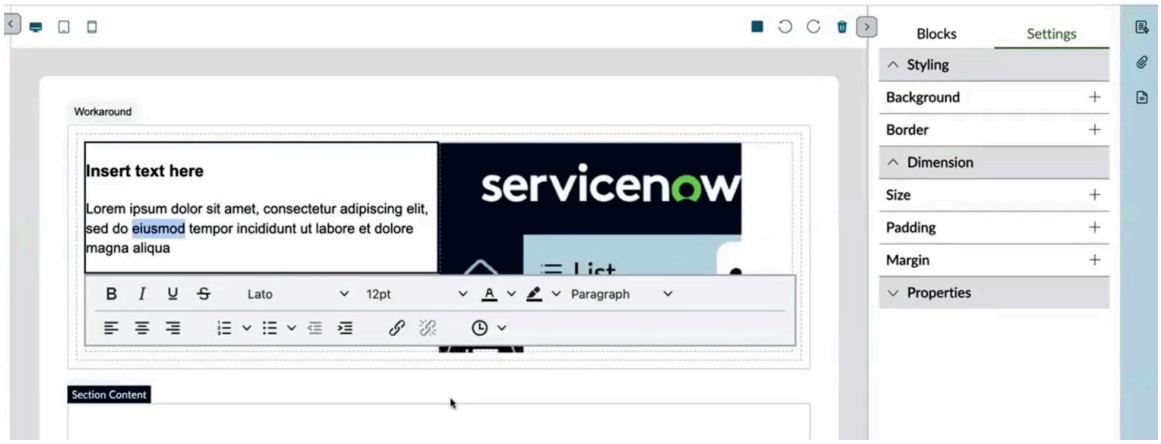

11. Upload images and resize, rotate, or flip using the image-editing tools.
12. Use the Now Assist article assistant to modify content with open prompt commands for summarizing, expanding and, formatting paragraphs.
13. Select **Save** to save the draft of the article.

Related topics

Configure skill for Now Assist context menu

Generate and edit articles using Now Assist in the Knowledge Center article editor

View article optimization analysis

Learn how to navigate to Article optimization in Knowledge Center.

Before you begin
Role required: admin

About this task
Article optimization safeguards content relevance and accuracy. Outdated or poorly structured articles compromise usability and can result in operational errors. Regular optimization maintains quality standards, supports compliance, and strengthens the accuracy of the knowledge base.

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge center**.
   You can also access Knowledge center through **Workspace** > **Knowledge center**.
2. In the **Insights** section, under **Article optimization**, select **View top issues**.
   In the new tab, you see a list of all flagged articles with their detected issues.
3. Select the knowledge article that you want to view.
4. In the **Article Optimization** pane, you can review the detected issues by using following actions:
   - Select **Ignore** to ignore this suggestion.
   - Select **Review** to review the article and update it.
5. Select **Checkout**, to create another version of this article.
6. After you create an article, you can **Save** and **Publish** the article.
   You can ignore suggestions, apply recommended updates, or create an article. Save and publish the article so that it meets quality and optimization standards.

Result
The selected gap is updated or resolved, improving knowledge coverage.

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Review and optimize articles using Article Optimization

The Knowledge Center Article Optimization feature provides automated, actionable feedback to improve content quality, accessibility, and search engine optimization, with configurable scans to identify and fix issues.

Before you begin

Role required: agent

About this task

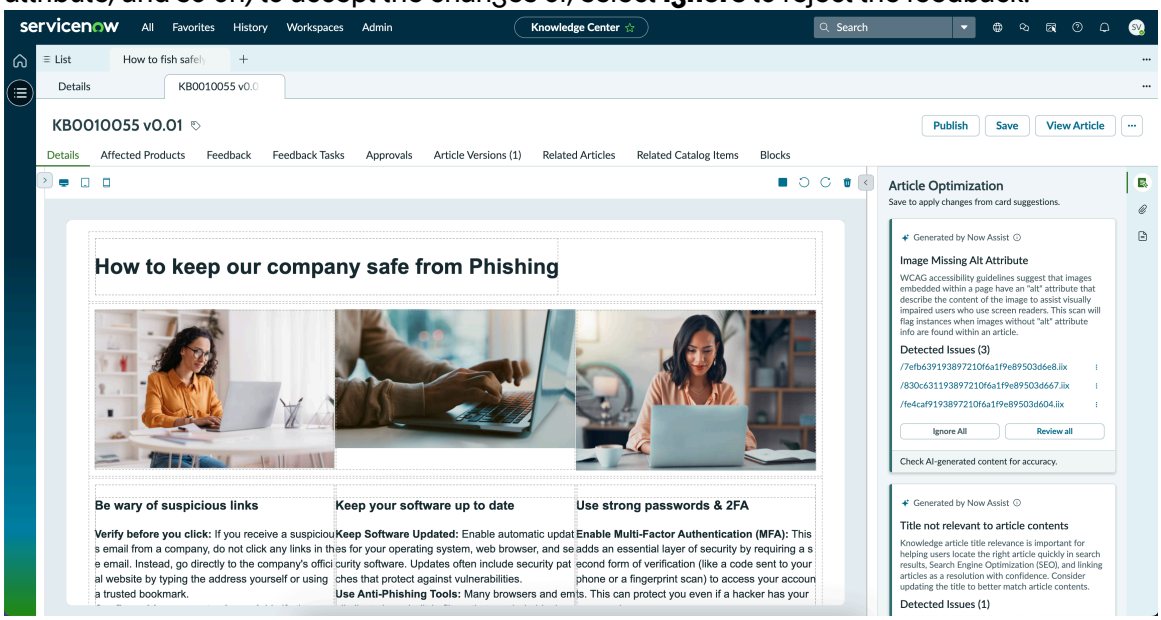
Review and optimize knowledge articles in the Knowledge Center (KC) by running quality scans of all the articles. Default settings come with default scan configurations, but you can also customize scan jobs. For more on creating an Article Optimization job, see Configuring Article Optimization jobs.

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge Center** > **Lists**.
2. Select the type of article from the **List** menu (Unpublished, Published, Retired, and so on).
3. Select an existing article from the article list.
4. Select **Edit** to open the article in the **Article Editor** window.
5. Select the **Article Optimization** icon to view the list of issues identified in the article, along with the suggestions to fix them.

> **Important:**
> Two types of article optimization scans are available. One is a script-based scan and the other is a Now Assist based scan. If you're subscribed to Now Assist, article optimization feature runs both the scans. If you aren't subscribed to Now Assist, then article optimization runs only the script-based scan.

6. Review each of the feedback cards and select the suggested action (such as Review, Add alt attribute, and so on) to accept the changes or, select **Ignore** to reject the feedback.



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7. Select **Save** to save the changes made to the article.

Note:

- Selecting suggested action opens the description for the issue. Only Now Assist subscribers can see these suggestions.
- Select **Update** to implement the solution in the relevant section. If you aren't subscribed to Now Assist, you can manually rectify the identified issue and **Update** the card.

Now Assist in Knowledge Management

Use ServiceNow Now Assist in Knowledge Management to generate a new knowledge article for a case or incident via the Now Assist panel, classic environment, or the respective configurable workspace. Agents can use these articles to propose quicker resolutions to customers.

Get started

Explore	Configure	Use
Learn about the generative AI skills available in Now Assist in Knowledge Management.	Activate Now Assist in Knowledge Management and configure the generative AI skills .	Generate new articles with Now Assist in Knowledge Management.

Troubleshoot and get help

- Knowledge Management community forum
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

AI limitations

This application uses artificial intelligence (AI) and machine learning, which are rapidly evolving fields of study that generate predictions based on patterns in data. As a result, this application may not always produce accurate, complete, or appropriate information. Furthermore, there is no guarantee that this application has been fully trained or tested for your use case. To mitigate these issues, it is your responsibility to test and evaluate your use of this application for accuracy, harm, and appropriateness for your use case, employ human oversight of output, and refrain from relying solely on AI-generated outputs for decision-making purposes. This is especially important if you choose to deploy this application in areas with consequential impacts such as healthcare, finance, legal, employment, security, or infrastructure. You agree to abide by ServiceNow's AI Acceptable Use Policy, which may be updated by ServiceNow.

Data processing

This application requires data to be transferred from ServiceNow customers' individual instances to a centralized ServiceNow environment, which may be located in a different data center region from the one where your instance is, and potentially to a third-party cloud provider, such as Microsoft Azure. This data is handled per ServiceNow's internal policies and procedures, including our policies available through our CORE Compliance Portal.

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Data collection

ServiceNow collects and uses the inputs, outputs, and edits to outputs of this application to develop and improve ServiceNow technologies including ServiceNow models and AI products. Customers can opt out of future data collection at any time, as described in the Now Assist Opt-Out page.

Exploring Now Assist in Knowledge Management

Use the Now Assist in Knowledge Management application to help agents generate a new knowledge article for a case or incident via the Now Assist panel, classic environment, and configurable workspace.

https://player.vimeo.com/video/1009282001?h=fc84a7cd87&badge=0&autopause=0&player_id=0&app_id=58479

The video above shows how an agent can generate a knowledge article with Now Assist from similar incidents in IT Service Management.

Now Assist in Knowledge Management Overview

Once activated and configured, Now Assist in Knowledge Management makes the following generative AI capabilities available to an agent:

- Agents can generate articles from the Now Assist panel.
- Agents can generate articles from their respective configurable workspace.
- Agents can also edit and publish articles in the knowledge base.

Now Assist in Knowledge Management Skills

The Now Assist in Knowledge Management application includes KB generation skills that enable agents to generate knowledge articles when working on a case or incident. Agents can document the resolutions employing various generative AI features enabled within Knowledge Management and relay them to customers, providing quick resolutions to their queries and issues.

Now Assist panel

Agents can use the Now Assist panel available in their workspace. This conversational interface enables agents to generate a new knowledge article related to a case or incident. For more information about the Now Assist panel, see Now Assist panel.

Related topics

- Generate a knowledge article from the CSM Configurable Workspace and classic environment with Now Assist
- Generate a knowledge article from the Service Operations Workspace for ITSM and classic environment by using Now Assist
- Generate a knowledge article from HR Agent Workspace with Now Assist for HRSD
- Generate a Knowledge article from the classic environment with Now Assist

Configuring Now Assist in Knowledge Management

If you have the admin role, you can configure the Now Assist in the Knowledge Management application, enabling agents to use its generative AI skills within their application workspace and the classic environment.

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Configuration overview

Configure how agents use generative AI capabilities to generate new knowledge articles.

Configuring the KB generation skill

Configure the KB generation skill that agents can use to draft a knowledge article with Now Assist.

Before you begin

Before configuring the KB generation skill, the following applications and their respective plugins must be installed.

- The latest Now Assist in Knowledge Management and Knowledge Capabilities in UI Builder store apps must be installed prior to the following configuration steps.
- For ServiceNow Store installation steps, see Install a ServiceNow Store application.

> **Note:**
> You can access knowledge articles created with TinyMCE by enabling KB generation skill, see Configuring the KB generation skill. To use articles created with custom instructions, please activate the knowledge content recommendation skill, see Edit an article using the Now Assist context menu.

Role required: admin

Procedure

1. Navigate to **All** > **Now Assist Admin** > **Now Assist Skills**.
2. Select the application that you want to configure the KB generation skills for.
3. Select the Knowledge feature from the features drop-down.
4. Select **Activate skill** on the feature card.
5. Review the values in the Choose input window, then select **Save and Continue**.
   Review the read-only fields for more information.
   - **Input Table**: The record type used for KB generation. For example, the value is **case** for Now Assist for CSM.
   - **Input Fields**: The fields from which information is gathered to draft the Knowledge article. Based on the Input Table, the Input Fields can be configured. Together, they serve as an input to Now LLM Service from the case or incident where the article is created.
   - **Default Knowledge Base for Now Assist panel**: The Knowledge Base in which the Now Assist panel generates the article.

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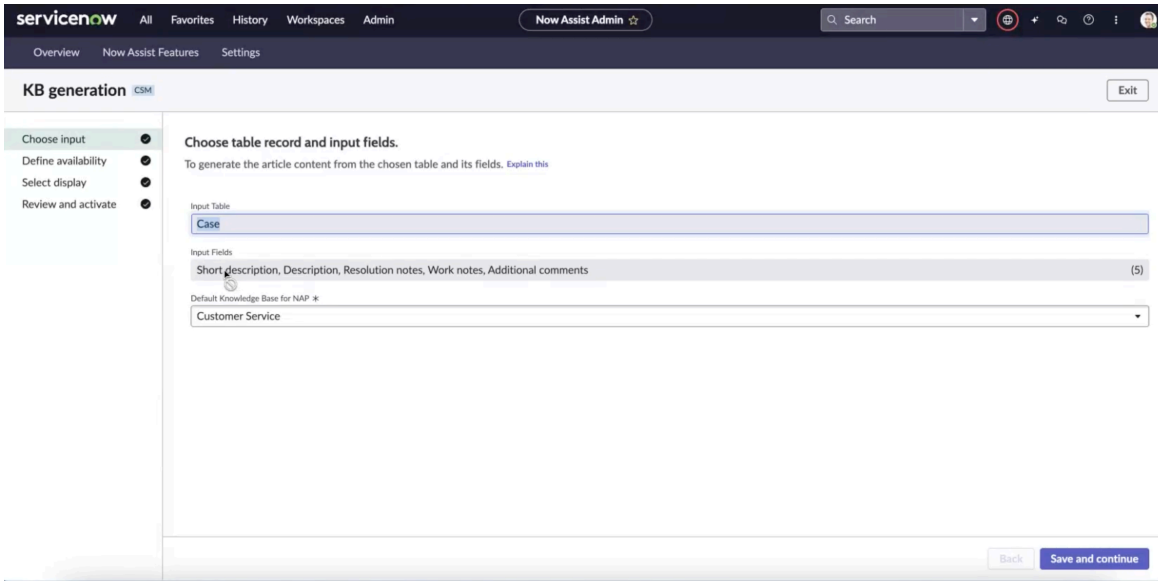
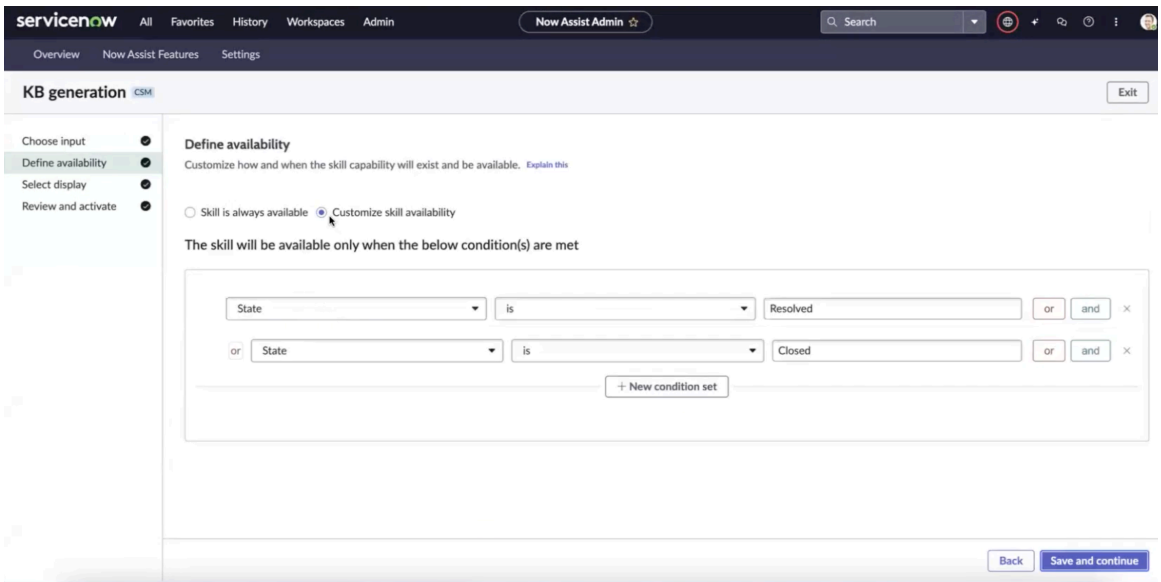


6. Configure whether the KB generation skill should always be available or available based on a set of conditions.



7. Select where you want to display the KB generation skill. You can select In-product, Now Assist panel, or both.
   - **In-product**: When selected, Now Assist skills are displayed on forms and workspaces. Select the arrow next to the toggle switch to define the roles that can use this skill in-product.
   - **Now Assist panel**: When selected, Now Assist skills are available in the Now Assist panel. Select the arrow next to the toggle switch to define roles that can use this skill in the Now Assist panel.

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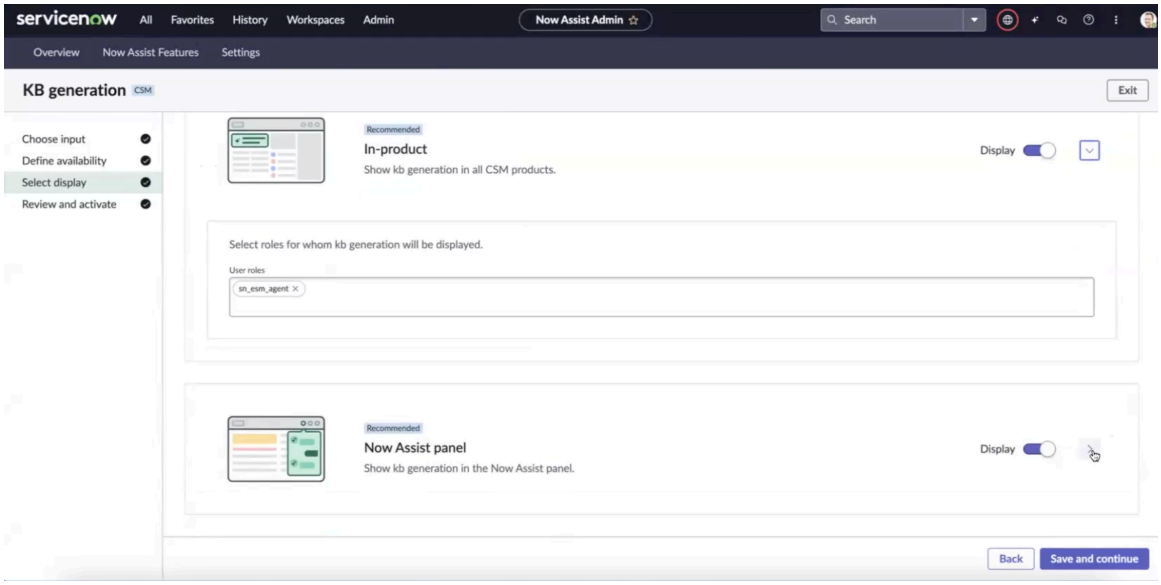

8. Select **Save and continue** to go to the next step.
9. Review your choices and select **Activate** to complete the configuration.

Result
Your skill is configured.

Related topics

- Skill inputs and triggers for Now Assist for IT Service Management (ITSM)
- Skill inputs and triggers for Now Assist for HRSD
- Skill inputs for Now Assist for Field Service Management (FSM)

Configure skill for Now Assist context menu

Configure the knowledge content recommendation skill so that the agents can use the Now Assist context menu to expand or shorten a knowledge article in TinyMCE. With the new content editor available in the Knowledge Center, agents can create and edit knowledge articles using custom instructions.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Now Assist Admin** > **Now Assist Features** > **Platform**.
2. Select **View details** on the Knowledge feature card and navigate to Active skills.

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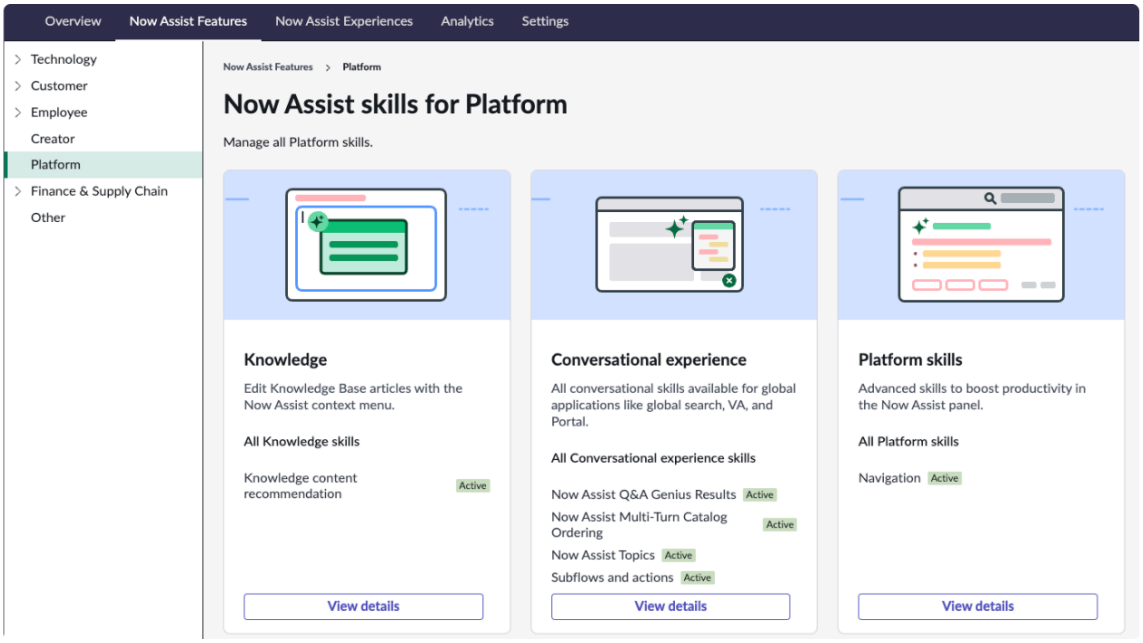
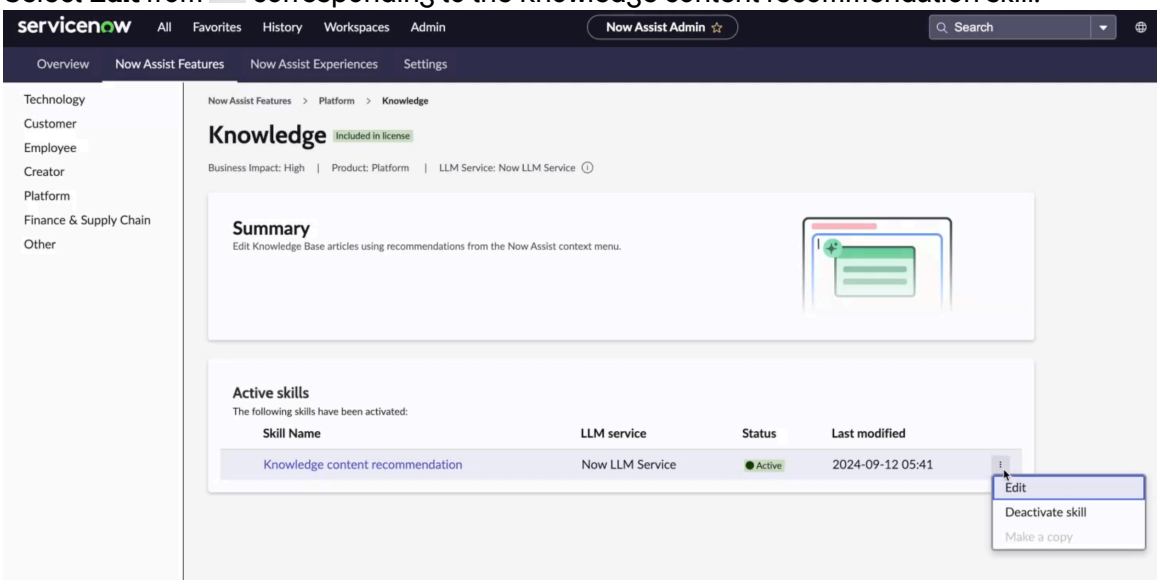


3. Select **Edit** from ⋮ corresponding to the Knowledge content recommendation skill.



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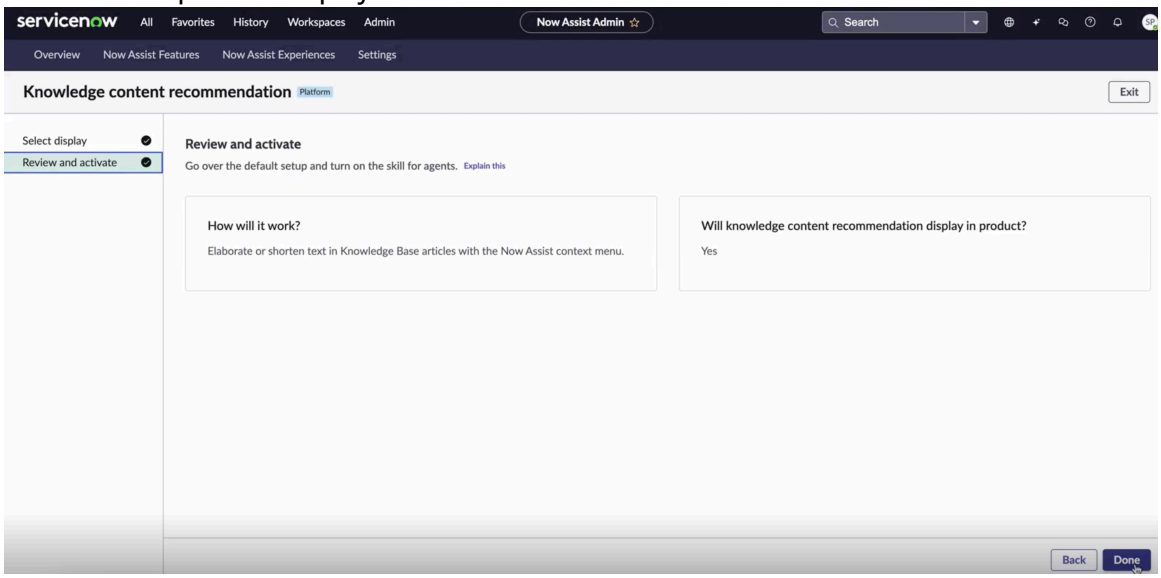
4. Enable the In-product display and select **Done** to activate the skill.



Related topics

Edit an article using the Now Assist context menu

Generate and edit articles using Now Assist in the Knowledge Center article editor

Configure and activate the Now Assist Identify duplicate articles skill

Configure the Knowledge content management skill to enable admins and managers to activate the Now Assist Identify duplicate articles skill.

Before you begin

Role required: knowledge_admin and knowledge_manager

About this task

This skill enables admins and managers to identify and review duplicate content.

Procedure

1. Navigate to **All** > **Admin Center** > **Now Assist Admin** > **Now Assist Skills** > **Platform**.
2. In the Now Assist Skills for Platform list view, scroll down to the Identify duplicate articles skill.
3. Navigate to the skill configuration page by selecting **Activate**.
4. In the Choose input section, select **Switch scope** and specify the following fields.

Field	Description
Table name	The table on which the skill is configured. This is a read-only field with a default value.
Fields	Select the fields that will be used to identify duplicate articles. These fields can be configured in both OOB and custom templates. The duplicate detection job will use these configured fields to find duplicate articles.
Filter	Build a filter by adding knowledge related conditions such as Article ID, Base version and, Knowledge base.

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Field	Description
Duplicates generation frequency	Set the frequency at which the job for identifying the duplicate articles is run. **Note:** ○ The skill must be reset every time the frequency is set. ○ When you select the **Run once** option and activate the skill, the application runs the job immediately after its activation. Selecting any other option, runs the job soon after its activation and, as per the selected frequency in the subsequent runs.

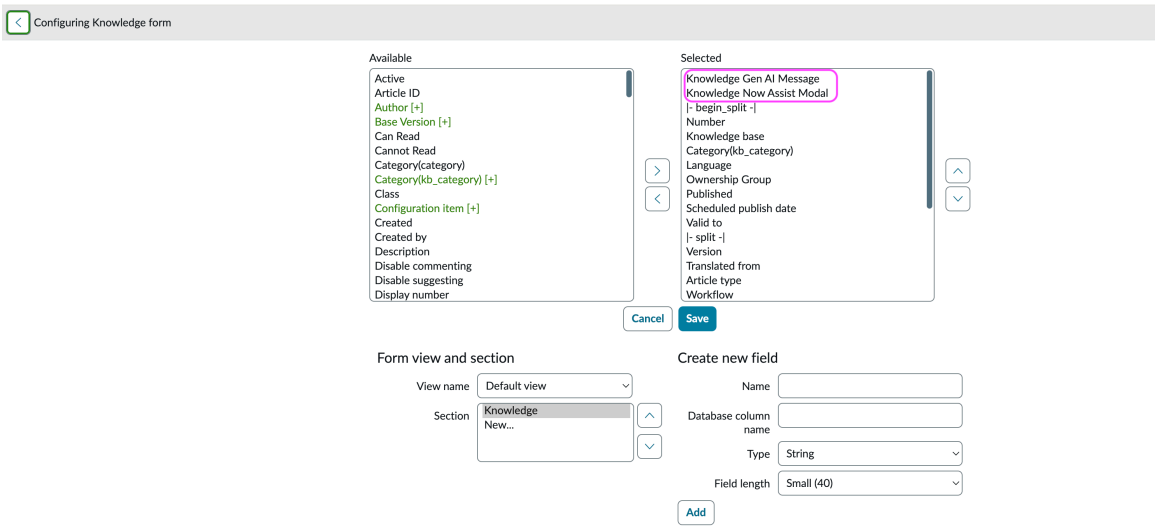
5. Select **Save and continue**.
6. Review your inputs in the Review and activate section and select **Done**.

Result
The Now Assist Identify duplicate articles skill is configured.

Configure skills with custom prompts for knowledge article templates

Now Assist in Knowledge Management has extended the out-of-box (OOB) KB generation skill to create custom prompts for OOB and custom knowledge article templates.

Before you begin
In the form configuration of the article record, admin must check for the availability of **Knowledge Gen AI Message** and **Knowledge Now Assist Modal**. For OOB configurations, they are automatically added to the form view configurator. However, for customized configurations, the admin must add them manually. To do so, navigate to the form layout from the header of the knowledge article (kb_knowledge.do) and add them from **Available** list to the **Selected** list and save. Navigate to Cache (cache.do) and clear cache.



Role required: sn_skill_builder.admin, sn_nowassist_admin.nsa_admin

About this task
To create custom prompts for OOB and custom knowledge article templates, clone the existing KB generation skill, from the Now Assist skill Kit (NASK). For more information, see Now Assist Skill Kit Configuration of the skill happens in three steps:

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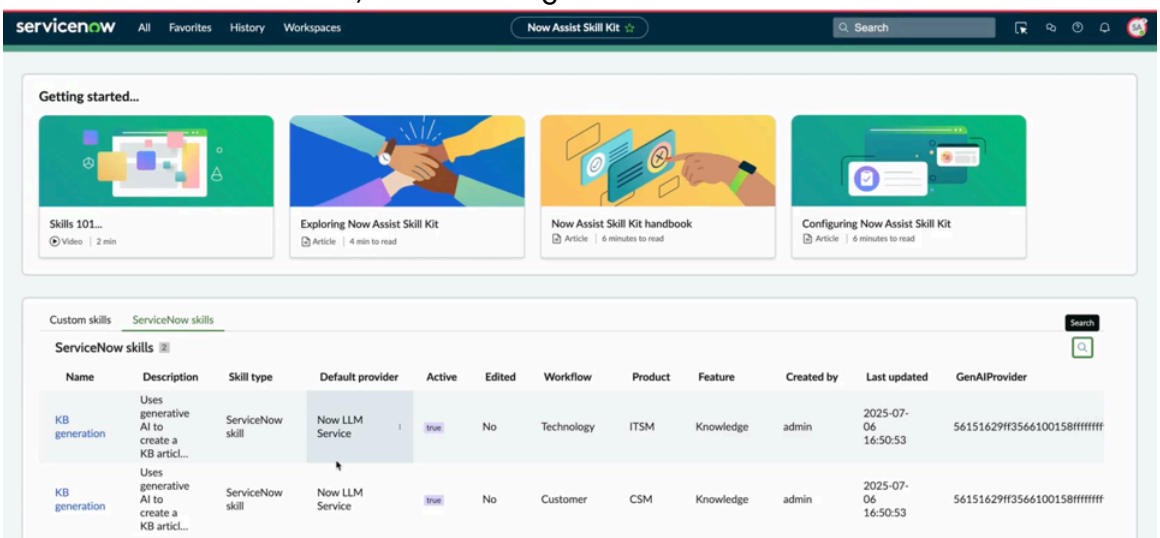
- Clone the OOB KB generation skill
- Prompt configuration
- Activate the skill

Procedure

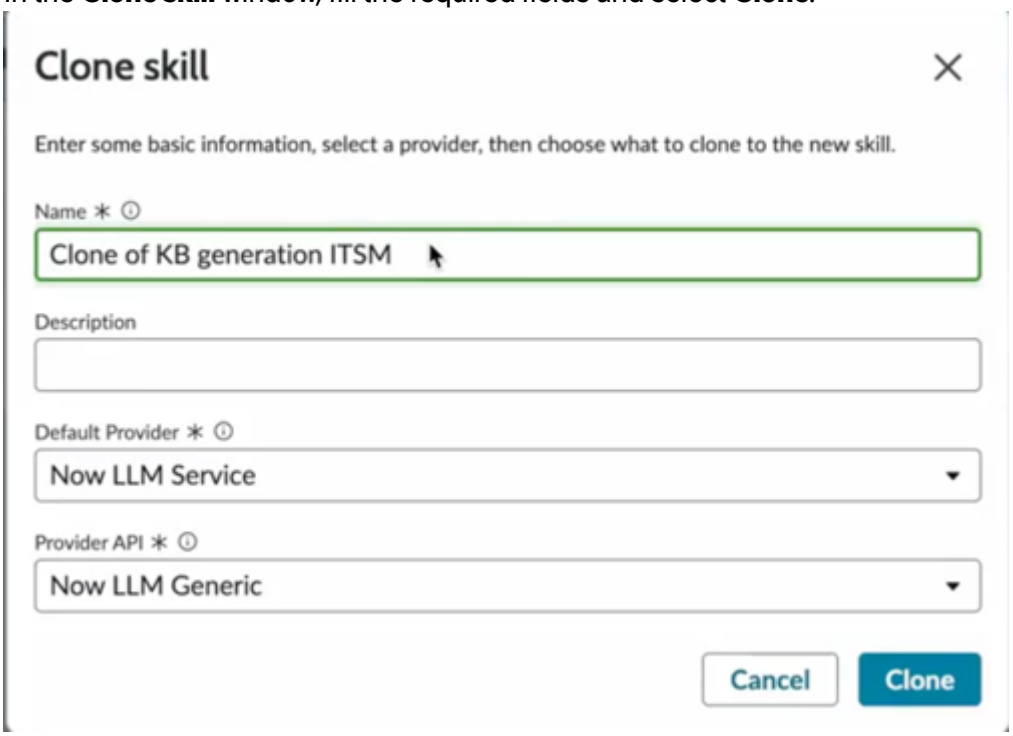
1. Navigate to **All** > **Now Assist Skill Kit** > **Home**.
2. In the **ServiceNow skills** tab, search for KB generation skill.



3. Open the KB generation skill associated with the workflow (ITSM, CSM, and so on) that you want to configure.
4. Select **Clone** to create a clone of the OOB skill.

> **Important:**
> Prompts can be configured only in the cloned skill and not the OOB skill.

5. In the **Clone skill** window, fill the required fields and select **Clone**.



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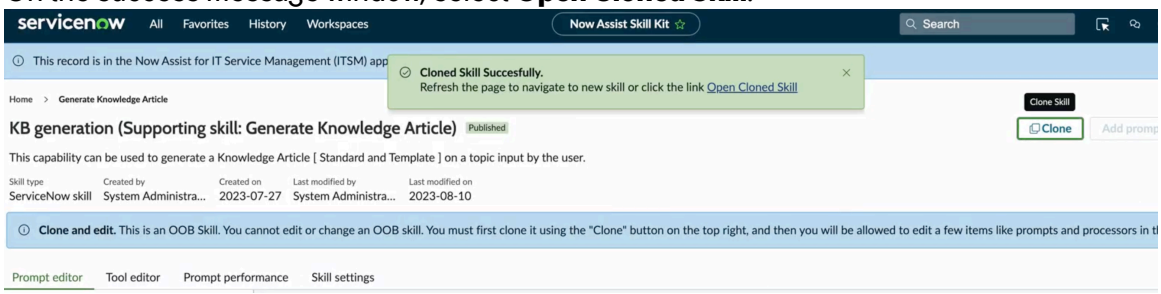
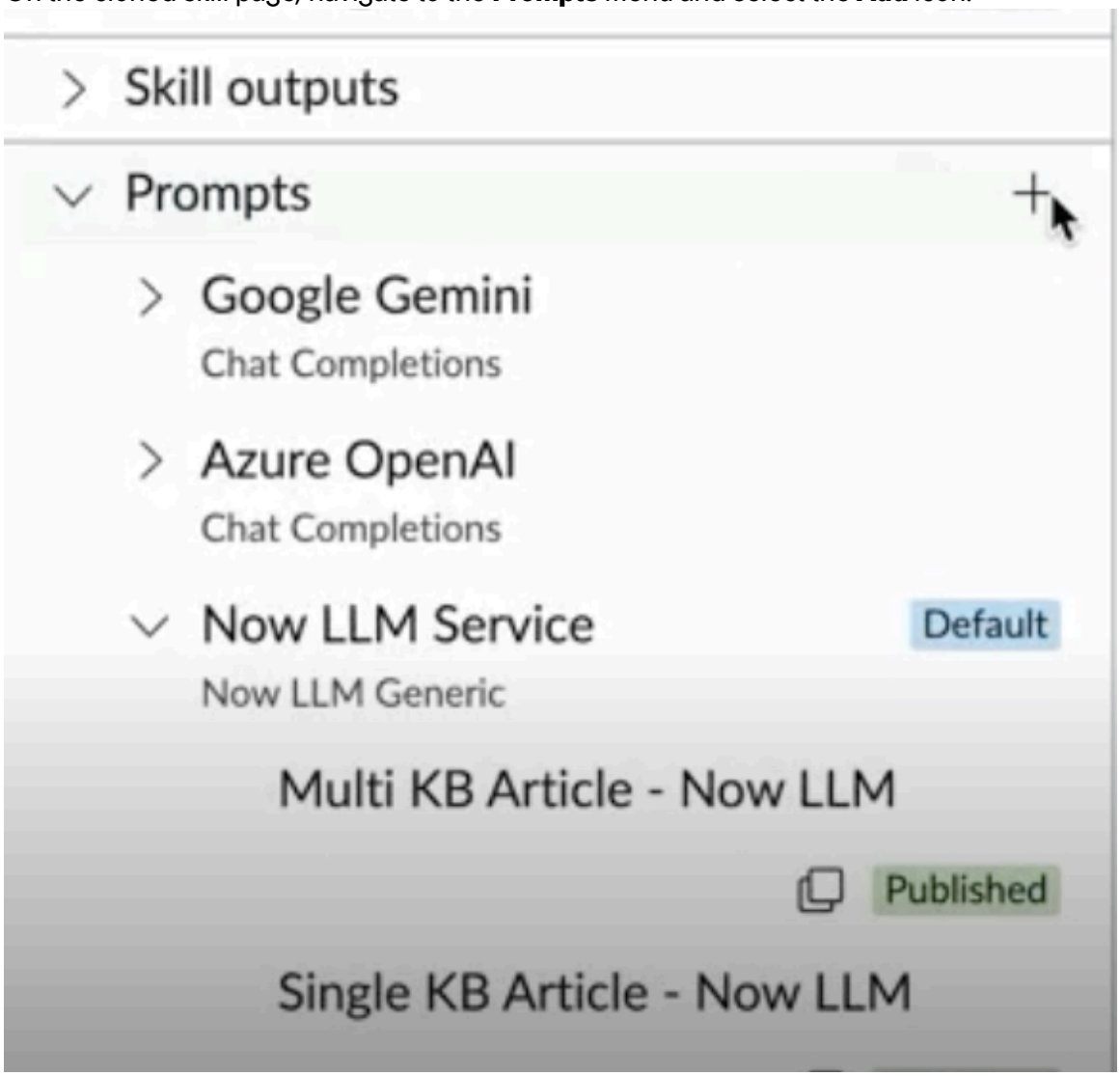
6. On the success message window, select **Open Cloned Skill**.



7. On the cloned skill page, navigate to the **Prompts** menu and select the **Add** icon.



8. In the **Add prompt** table, fill the required fields as follows and select **Add**.

Field name	Description
Prompt name	Enter a name to define your prompt
Provider	Select the third-party AI provider that you want to use
Provider API	Select the API details of the third-party AI provider

9. To develop a prompt, see Guidelines for creating prompts.

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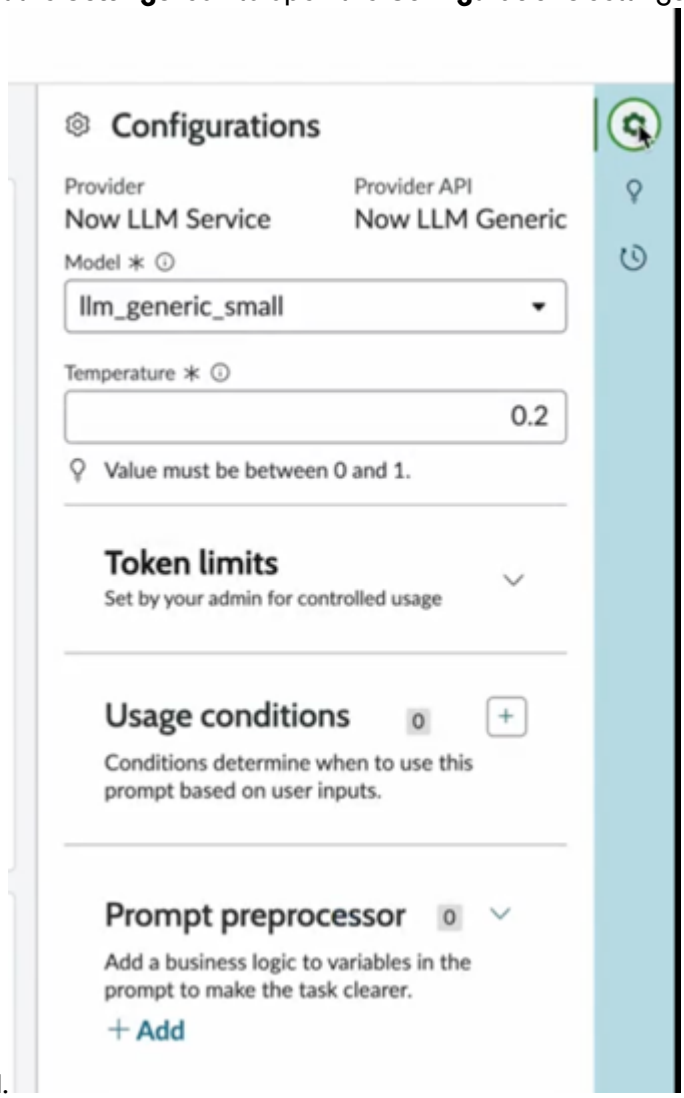
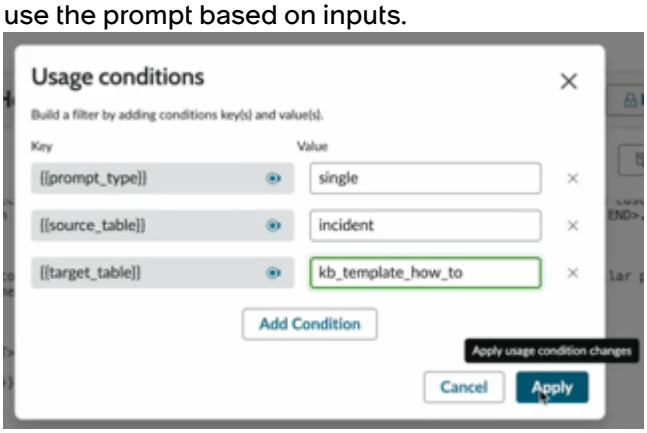
10. Save the prompt.
11. Evaluate the prompt.
    For more, see Evaluate a prompt
12. Select the **Settings** icon to open the **Configurations** settings panel.



13. Scroll down to **Usage conditions** and select the **Add** icon to define the conditions on when to use the prompt based on inputs.



14. Fill in the **Key** and **Value** fields to build filters in the **Usage conditions** modal and select **Apply**.

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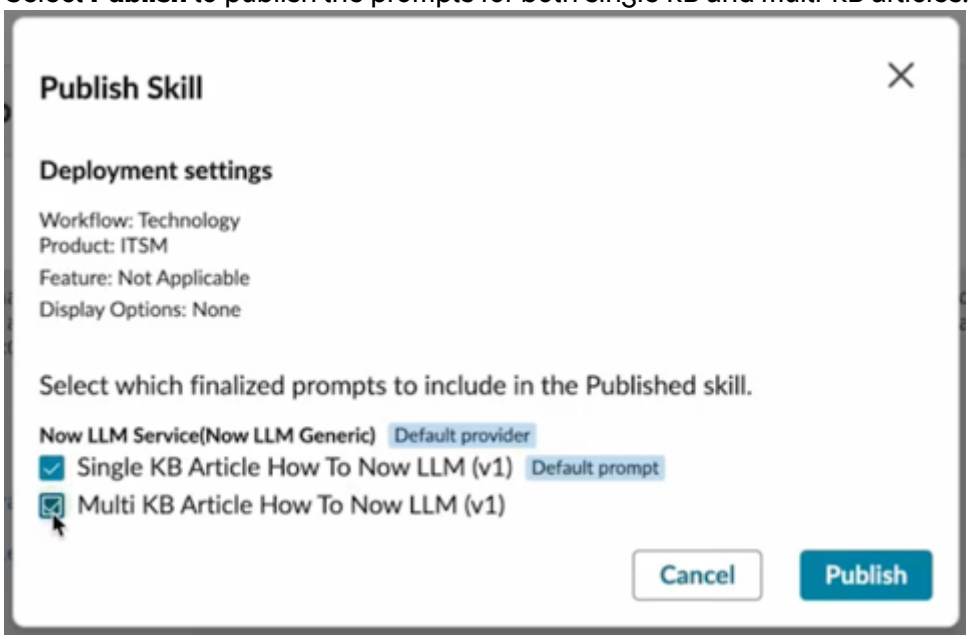
Key	Value
`prompt_type`	Type single or multi
`source_table`	Type the table name for the configured skill. For example, if you are working on cloned KB Generation skill for CSM then table name should be sn_customerservice_case.
`target_table`	Type name of the template table

15. Select **Finalize prompt**.
    Finalize the prompt after checking the JSON output map with the prompts provided.
16. Repeat the steps 8 to 15 to create prompts for MultiKB articles.

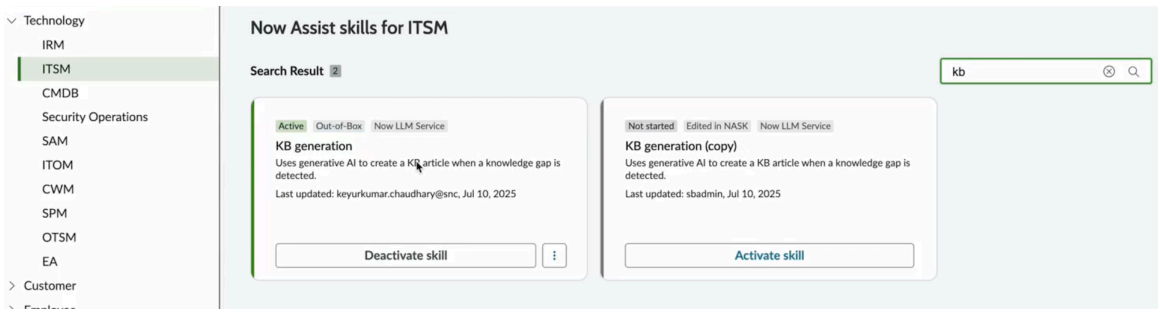
> **Note:**
>
> Finalize the prompts for both single KB and multi KB articles and only then publish the skill.

17. Select **Publish** to publish the prompts for both single KB and multi-KB articles.



The skill is published and available in the **Now Assist Admin** page for the selected workflow. However, the skill must be activated to be available for use during article generation from Now Assist.

18. To activate the skill, navigate to **Now Assist Admin** and select **Link to NAA** in the **Skill published** window.
19. Select **Activate skill** to activate the cloned skill.



The KB generation skill for Now Assist is activated and ready to use the custom templates as defined by the prompt.

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Guidelines for creating prompts

The guidelines help to write prompts for Out-of-Box (OOB) and custom knowledge article templates. Follow these instructions to create ideal prompts that optimize the use of AI models for generating knowledge articles.

Create prompts for a how-to article template for a case

An ideal prompt maps to the following three fields in the template form:

- Introduction: Includes the problem statement of the case along with the severity level.
- Instruction: Includes the resolution steps for the issue described in the incident.
- Short description: Includes the title of the issue described in the incident

Mapping between sections and template fields

Section	Template field
Problem	Introduction
Severity	Introduction
Instructions	Steps to resolve
Title	Short description

Structure of the prompt

Use the following prompt draft structure to create a prompt:

- Initial header instructions (the purpose of the prompt)
- Input source data
- Guidelines for generating the article
- Output structure along with mapping details, according to your requirements

Important:
When mapping, it's important that the mapping key matches with the article template's field key. The value must contain the sections that you intend to add.

Sample prompt for generating a single KB how-to template article

```
As a professional customer support agent, your goal is to create
 a clear and comprehensive article based on a customer's case
 with only the following sections:
Problem, Severity, Steps to resolve and Title.
Follow the structure below to ensure the article is easy for
 other customers to read and solve the problem independently.

Customer Case Input:
<CUSTOMER CASE START>
{{short_description}}
{{description}}
{{activities}}
{{close_notes}}
<CUSTOMER CASE END>
```

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Guidelines for Article Generation:

```
Do not use actual people's names, emails, phone numbers, or
 machine names from the case in the article.
Do not use your outside knowledge to write the article. Kindly
 use content from the case only.
In providing the content for each of the sections, if you are
 not confident, then return N/A for the specific section.
```

Content Guidelines for Each Section:

Problem:

```
Describe the issue comprehensively, in sentence format and
 include:
Observations of visible indications of the issue.
Relevant error messages or log details directly related to
 understanding the issue.
Steps to reproduce the problem with each step being a numbered
 list describing only a single action.
Add a new line character at the end of each step to display
 individual steps in separate lines in the final output.
```

Severity:

```
Calculate the severity of the problem after reading description
 from the case details and determine how critical it is to the
 users.
```

Steps to Resolve:

```
List each step required to resolve the issue, and ensure that
 each step is written in sentence format.
Attempted troubleshooting steps are included.
Steps should be in a numbered list with each step describing a
 single action.
Add a new line character at the end of each step to display
 individual steps in separate lines in the final output.
Derive information from comments, work notes, or resolution
 notes of the case, after verifying all relevant steps.
If no resolution is provided in the case, enter "N/A".
```

Title:

```
Provide a concise and formal title that accurately describes
 the issue. Derive the title from the short description of the
 incident
Use this structure to create a helpful and user-friendly article
 for other customers facing similar problems while adhering to
 the guidelines provided.
```

Output Format:

```
Before completing, verify that each list item is in a new line,
 in all cases of a numbered list. *Always generate a valid JSON
 object.
Generate a JSON response in the following format:
{
"kb_introduction": {
  "Problem": "string",
  "Severity": "string
},
"kb_instructions": {
  "Steps To Resolve": "string"
},
“short_description”: {
  “Title”: “string”
```

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```
}
}
```

Sample prompt for generating a multi-KB how-to template article

```
Act like a professional customer service agent and understand
 the content of the child articles provided below.
These child articles are used by customers to resolve issues
 encountered for different problems.
Each child article starts with <CHILD_ARTICLE_START> and ends
 with <CHILD_ARTICLE_END>.

CHILD ARTICLES:

{{intermediateKBGenerator.output}}
{{intermediate_article_1}}

Your job then is to combine these child articles and write one
 parent article that captures all the important information
 present in the child articles.
The parent article should show other customers how to resolve
 the problems on their own. Only use information present in the
 child articles.

The parent article must contain the following sections in the
 same order:
Problem:
Summarize problems from all child articles
Severity:
determine severity from all child articles
Steps to Resolve:
It should contain the detailed list of steps that customers can
 take to resolve the problem on their own. It should include all
 the steps and their details from the Steps to Resolve section
 of the child articles. Make sure to include all the relevant
 notes, code, scripts, references, additional information, URLs
 and any other entities that are needed for resolving the issue.
 For each separate problem, provide a title of the problem in
 a new line but do not include any generic words like "Issue",
 "Problem" or "Steps to Resolve" and do not add markdown format
 while generating the title for steps to resolve section and
 then the list of steps to resolve that problem. Make each step
 a numbered list item (starting with 1., 2., etc.). Then add a
 new line character at the end of each list item and 2 new line
 characters at the end of the last list item of each problem
 such that they appear in a new line in the final output with
 proper titles. Make sure to use full sentences for each step.
Title:
It should only contain a short description of the problem in
 formal language and only be a few words. It should be generic
 enough to capture the topics of the issues present in all the
 child articles.
For each section, if you are not absolutely sure, generate "Not
 enough information available for this section.".

Do not underline the section headers and titles.
Do not apply bold styling to section headers and titles.
```

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```
Do not add special characters "*", "-" or "#" to the section
 headers and titles.

Generate a JSON response in the following format:
{
"kb_introduction": {
  "Problem": "string",
  "Severity": "string
},
"kb_instructions": {
  "Steps To Resolve": "string"
},
“short_description”: {
  “Title”: “string”
}
}
```

Configure custom AI-based Article Optimization scans

The Out-of-Box (OOB) Knowledge Center settings provide default configurations for article optimization scans. However, you can customize scans for article optimization.

Before you begin

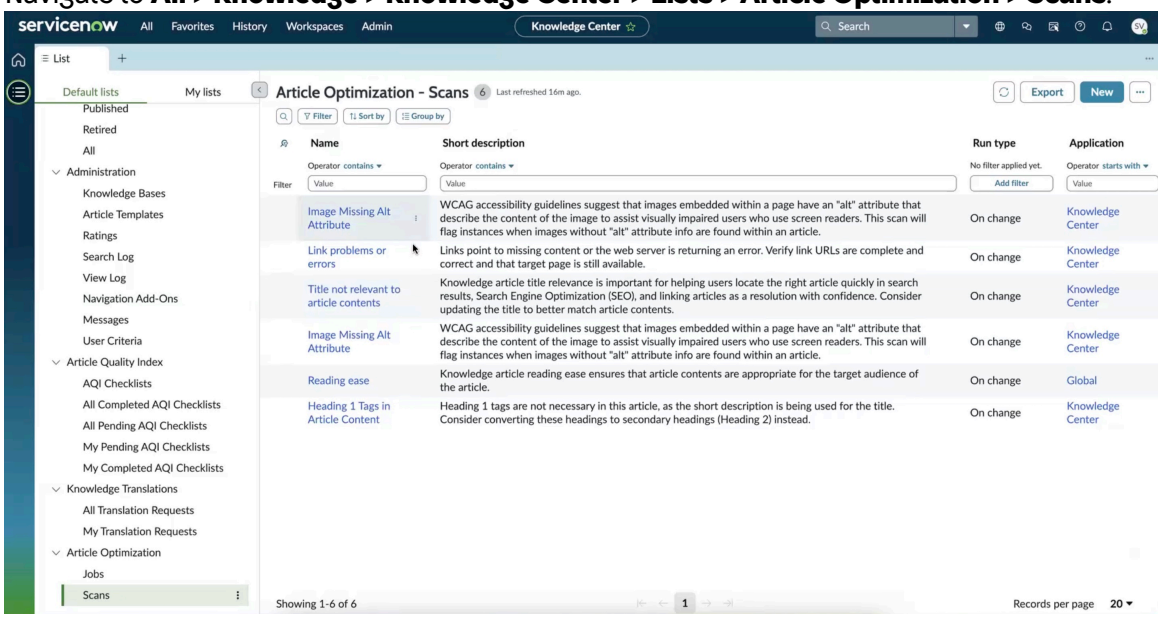
Role required: admin

About this task

Configure Article Optimization scans for articles in the Knowledge Center. Two types of Article Optimization scans are available in the Knowledge Center. One is a script-based scan and the other is a AI-based scan. If you are subscribed to Now Assist, you can configure and run both the scan types. If you are not subscribed to Now Assist, you can configure only the script-based scans, and Article Optimization runs only the script-based scans.

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge Center** > **Lists** > **Article Optimization** > **Scans**.



2. Select **New**.

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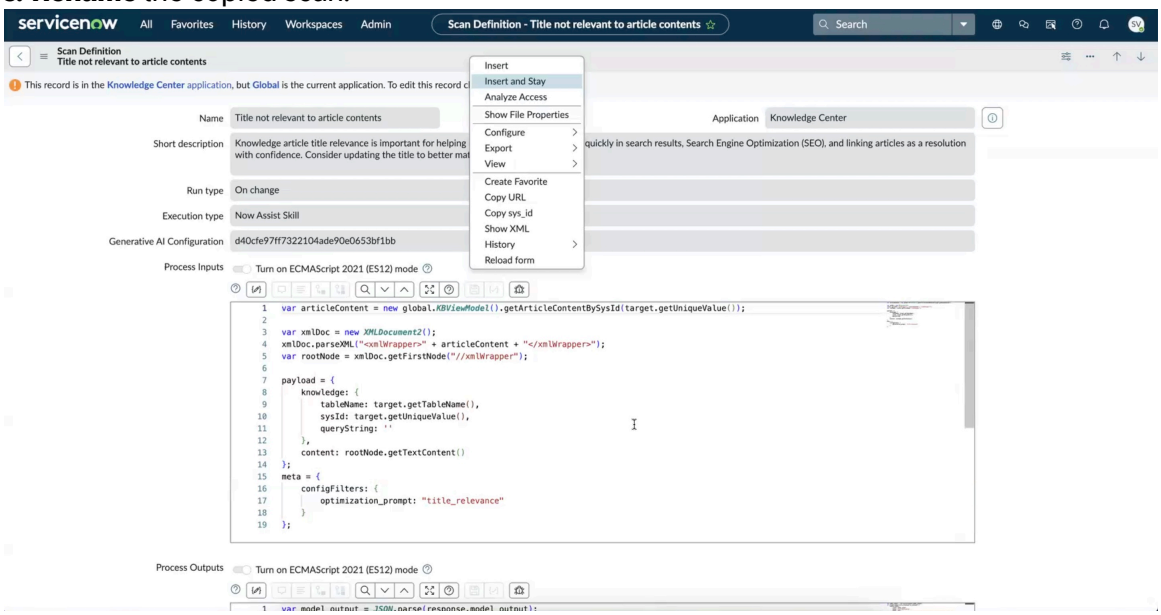
a. If you want to clone and modify an existing scan, go to the *kb_assist_scan_definition* table.

b. Open a record and select **Insert and stay** to copy the scan.

c. **Rename** the copied scan.



3. Fill out the record form as follows:

a. Set the **Run type** field to:

- **On change:** If you want the scan to run each time an article is saved.

> **Note:**
> the scan must still be associated with a job in order to run but the job schedule will not control when this scan runs.

- **Always:**If you want the scan to run based on the schedule set up in the associated job.

b. Set the **Execution type** to **Now Assist skill**.

c. Select the **Look-up** icon and open the **List filter**.

d. Set the condition to **Name** and enter part of your prompt name.

e. Select **Run** to view filtered results.

> **Note:**
> The list can show multiple results if the same prompt name is used in multiple skills or if there are multiple versions of a prompt due to modifications. In this case, select one of the prompts and use **Preview** to make sure that it's the prompt you want to select (the **Active** flag is a good indicator).

4. Add scripts to the **Process Inputs** and **Process Outputs** fields.

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Note:

- Using a copy of an existing scan can come in handy as this specific format has to be used for sending data to the Now LLM Service and processing the results.
- The last part of the **Process Outputs** script is used to define the finding record and what appears on the **Article Optimization** cards in the editor UI.

5. **Save** the record.

Result
The Article Optimization scan is custom configured.

What to do next
To run the scan, you must add the configured scan to a job. For more information see, Configuring Article Optimization jobs.

Related topics

Configuring custom script based Article Optimization scans

Configuring Article Optimization skill and prompts

Activate Article Optimization skill

Configuring Article Optimization skill and prompts

Create custom prompts for the default Article Optimization (AO) skill in the Knowledge Center application and prompts using standalone custom skills.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Now Assist Skill Kit** > **Home**.
2. Select **Create Skill** and complete the configuration form.
3. Select **Next**.

   a. Set **Role restriction** field to **Nobody**.

   b. Select **Choose from library** to import an existing prompt for reference, otherwise, select**Write from scratch**.

   Note:
   Using existing custom skills to modify prompts may result in unreliable article optimization scans. The easier option is to choose an existing prompt, then clone and modify to suit your specifications.

   c. Enter at least one value in the **Skill input** field.

   Note:
   The default value for **Datatype** is **Record** and that of **Table** is **Knowledge (kb_knowledge)**.

4. Select **Go to summary** and then **Finish**.

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5. Modify the existing prompt or select the **Plus** icon at the top of the prompt list to create a new prompt from scratch.
6. Navigate to the **Deployment settings** page for the skill.
7. Select **Publish** after ensuring that all the prompts and skill settings meet your specifications.
8. Navigate to the **sys_generative_ai_config** table and filter your prompt(s).
   a. Add the location where the skill should be located on the **Now Assist Admin** page (AO is located under **Platform Knowledge**.
   b. Enter the **Feature name**, which should be the name of this skill.
9. Open the record(s), scroll down to the **Generative AI Prompt Configs** related list and select **New**.
10. Add the following filter properties:
    - Name: **optimization_prompt**
    - Value: prompt name from the **Output format** section of prompt.

Result
Article optimization skill is now configured.

What to do next
After successfully configuring the skill, proceed to activate the article optimization skill. For more information, see Activate Article Optimization skill.

Related topics
Configure custom AI-based Article Optimization scans

Activate Article Optimization skill

Activate the Knowledge Center Article Optimization skill to enable use of article optimization features for generating knowledge articles in the Knowledge Center.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Now Assist Admin** > **Now Assist Skills**.
2. Select the list view and locate your new skill in the location specified during the setup (Platform > Knowledge > Skill Name).
3. Select **Activate Skill** on the skill card.

Result
The Article Optimization skill is activated.

Related topics
Configure custom AI-based Article Optimization scans

Configure Now Assist Skills for potential gaps

The Potential Gaps also known as the knowledge gaps feature identifies missing knowledge articles. This functionality is available only when the Knowledge Gaps skill is activated in Now Assist Admin. Configuring this skill is necessary when working with gaps.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **Now Assist Admin** > **Now Assist Skills** > **Platform** > **Knowledge**.
2. From the set of knowledge gap skills, you can **enable** or **disable** the following skills:
   - You can activate or deactivate the **Knowledge gaps identification (ITSM)** skill.
   - You can activate or deactivate the **Knowledge gaps identification (CSM)** skill.

   Verify that the skills display an **Active** or **Deactivated** status according to your selection.

   Once the skills are activated, you can view the gap recommendations on the Knowledge Center home page.

Related topics

Knowledge Center Home Page

Manage potential knowledge gaps

Enable multilingual service in Now Assist

Enable multilingual service in Now Assist Admin for Knowledge Management to support different languages in various third-party AI model providers. Select the languages that you want enabled for each of the AI model providers and enable native and dynamic translation support.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Now Assist Admin** > **Settings** > **Multilingual service**.
2. In **Native Translation**, select the toggle button to enable Now Assist to respond in user preferred languages using the AI model provider's built-in multilingual capabilities.
3. In **Dynamic Translation**, select the toggle button to get additional support for languages that aren't supported by the AI model providers.
4. Select **Edit** to manage addition or removal of a language support for an AI model provider.

Result

Multilingual service is enabled for Now Assist in Knowledge Management.

Using Now Assist in Knowledge Management

Now Assist in Knowledge Management enhances the agent experience by using artificial intelligence (AI) to generate a new knowledge article based on the resolution provided to a case or an incident.

Generating knowledge articles

You can generate knowledge articles in Now Assist for Customer Service Management (CSM), Now Assist for IT Service Management (ITSM), Now Assist for HR Service Delivery (HRSD), and Now Assist for Field Service Management (FSM). For more information, review the following.

- Generate a knowledge article from the CSM Configurable Workspace and classic environment with Now Assist .
- Generate a knowledge article from the Service Operations Workspace for ITSM and classic environment by using Now Assist .
- Generate a knowledge article from HR Agent Workspace with Now Assist for HRSD .

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- Generate a knowledge article from the CSM/FSM Configurable Workspace and classic environment with Now Assist
- To generate knowledge articles based on cases or incidents from the Now Assist panel, see Generate a Knowledge article from the Now Assist panel.
- Generate a Knowledge article from the classic environment with Now Assist.

Generate a Knowledge article from the Now Assist panel

Generate a new knowledge article for a case or an incident from the Now Assist panel.

Before you begin

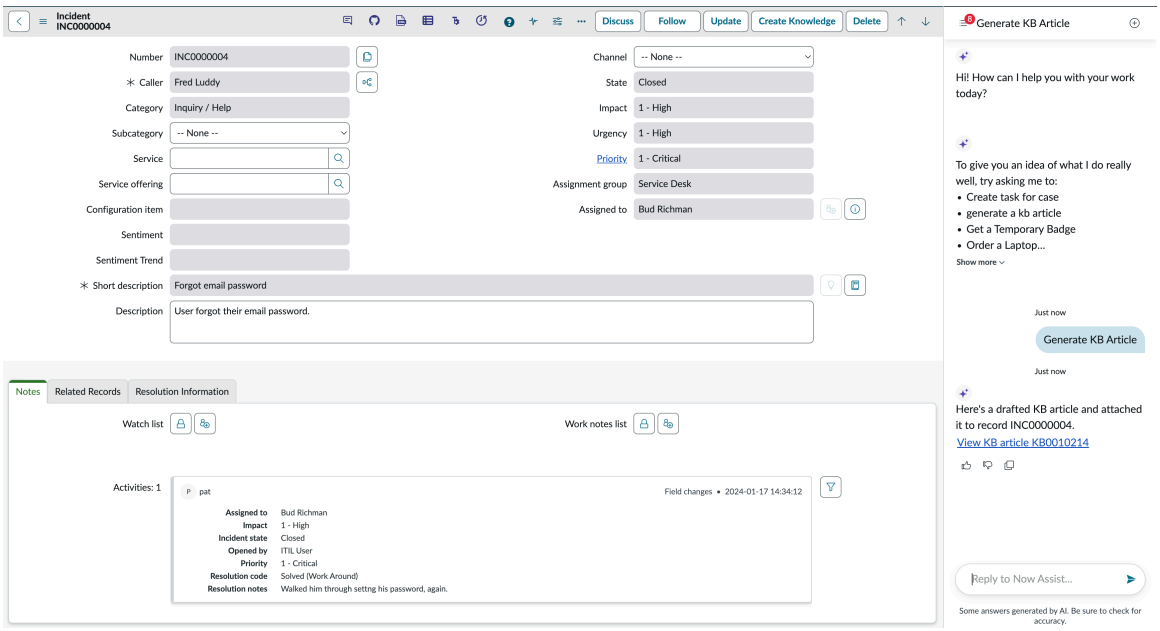
For Now Assist for HR Service Delivery (HRSD), Knowledge articles are only supported on the HR case record (sn_hr_core_case), not on the record from extended tables.

Role required: agent

Procedure

1. Open a case or an incident that is assigned to you.
2. Open the Now Assist panel by selecting the Now Assist icon ( ).
3. In the Now Assist panel, select or enter **Generate Article**.

   Now Assist generates a Knowledge (KB) article.



4. View the draft article by selecting the **View KB article** link in the chat window.
   The article appears in a new tab, with a unique ID number for the article.
5. Review the article and edit it if necessary.
6. View, edit, and publish the article by using the respective buttons on the screen.
7. **Optional:** Provide feedback on whether the article is helpful or not by selecting the liked icon ( ) or the not liked icon ( ).

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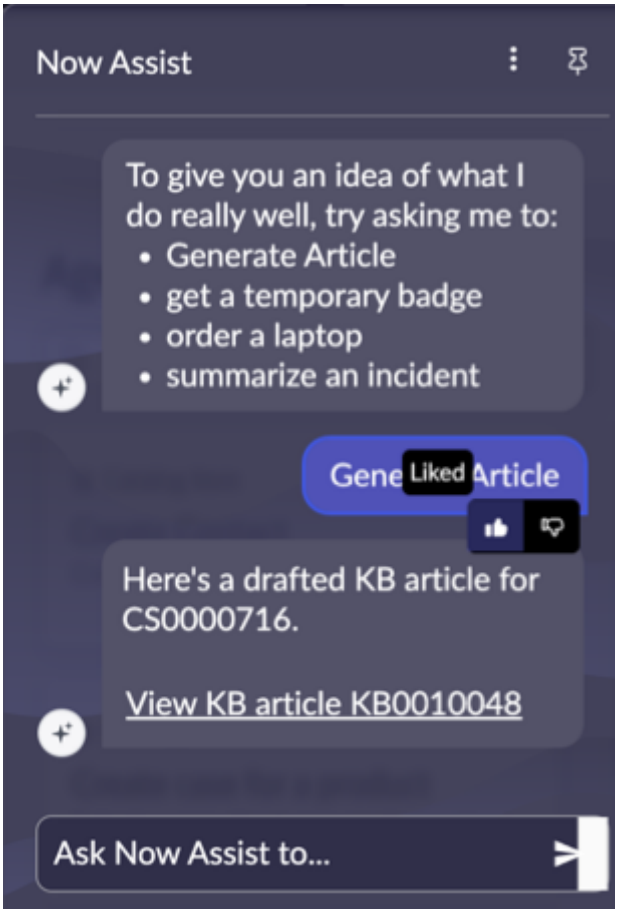
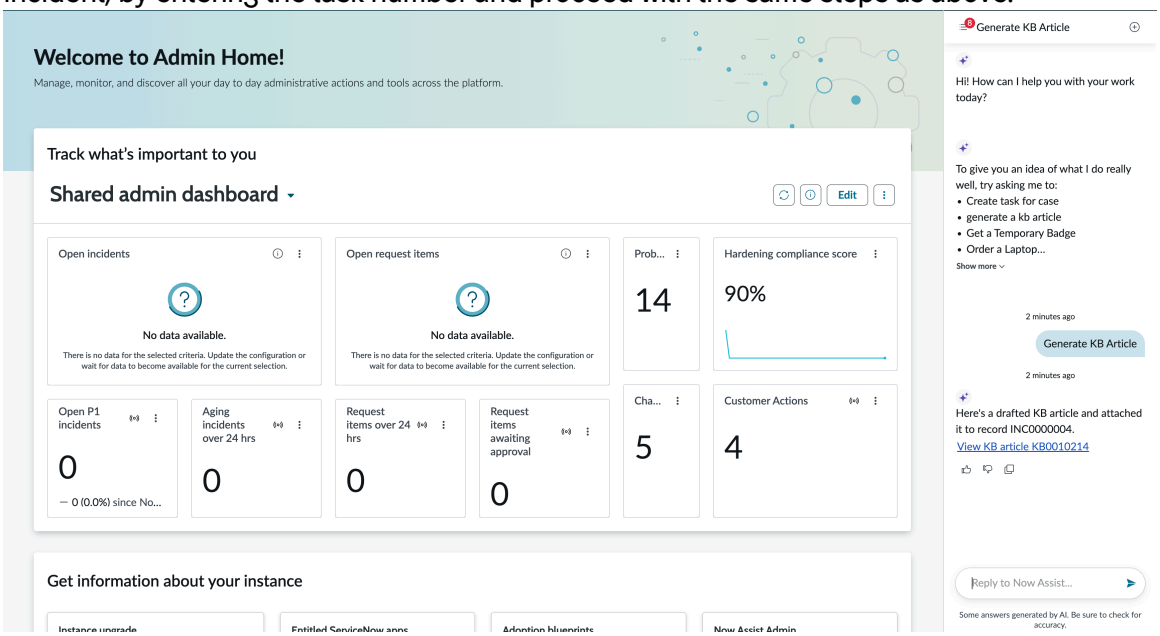


8. Alternatively, create an article directly from the Now Assist panel without opening the case or incident, by entering the task number and proceed with the same steps as above.



Generate a Knowledge article from the classic environment with Now Assist

As an author or an agent, generate new Knowledge articles using Now Assist on tasks within the classic environment.

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Before you begin

Only standard and KCS templates are available when generating Knowledge articles from the classic environment using Now Assist. For details on how to enable these settings in individual workspaces, refer to the respective knowledge article generation topics.

To see the Now Assist experience on the Create Article page, the following Knowledge generation criteria should be configured:

- Confirm that the KB generation skills are installed.
- In Now Assist Admin confirm with your admin that the following criteria are in place:
  - The table record and input fields must be specified.
  - The conditions for skill availability must be specified from the list of attributes.
  - The display of the KB generation feature In-product or Now Assist panel must be specified.

Role required: author or agent

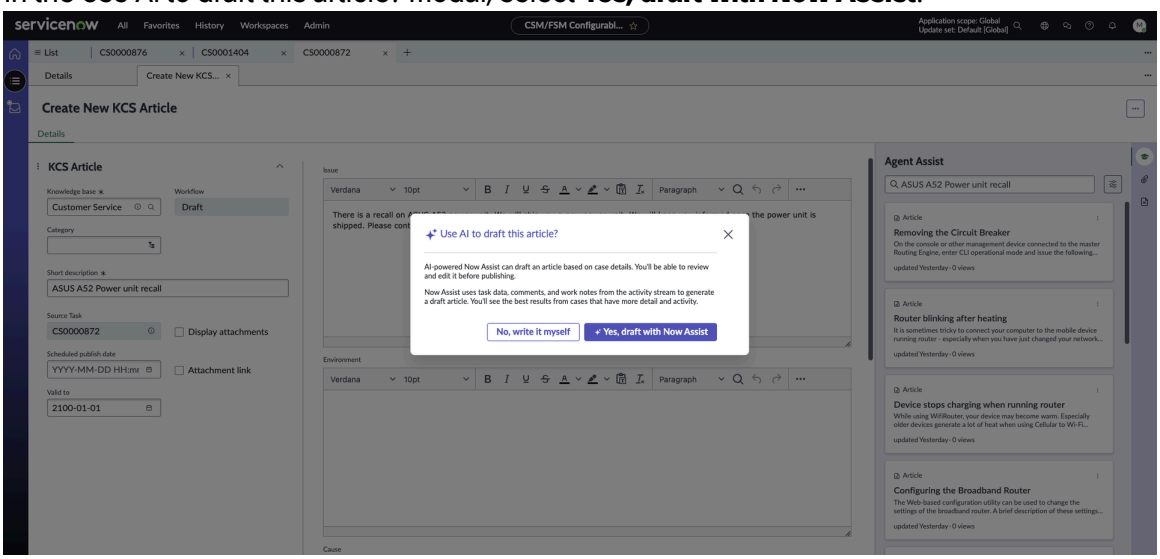
Generate article in classic environment for agents

Procedure

1. Open a task that is assigned to you.
2. Generate an article by using the UI actions that appear in the record.

> **Note:**
> Based on the template selection made by your administrator while configuring Knowledge Management system properties, you can apply either the KCS or standard template to the article.

3. In the Use AI to draft this article? modal, select **Yes, draft with Now Assist**.



4. Select up to five additional relevant cases in the new modal, powered by generative AI, to generate the article and select **Continue with selected tasks**.

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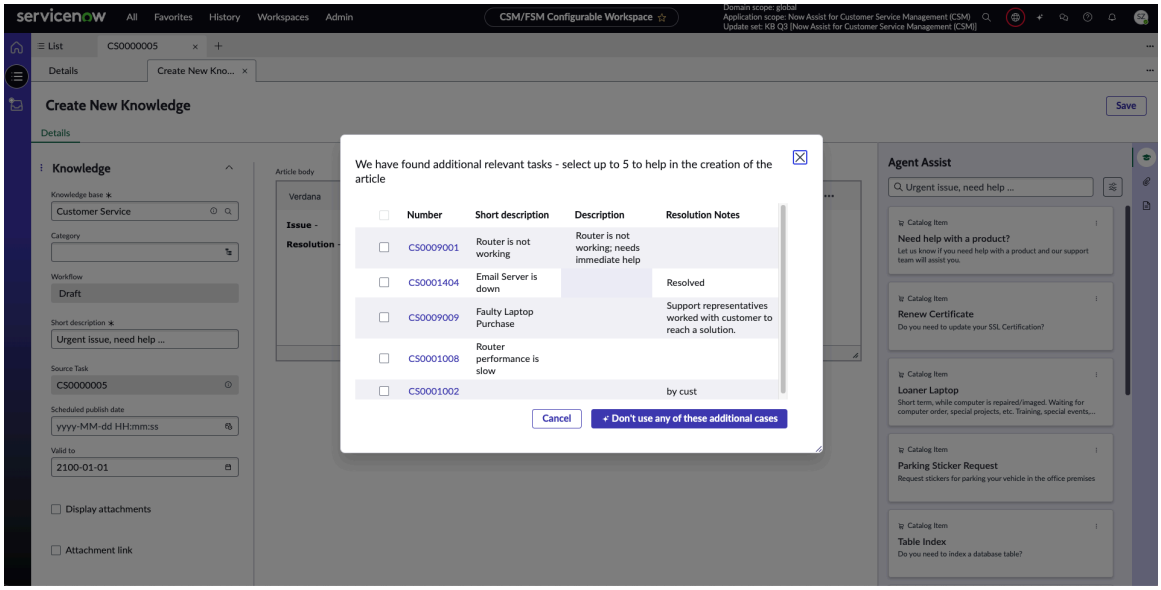


The article appears in a new tab with a unique ID number for the article.

Generate article in classic environment for authors

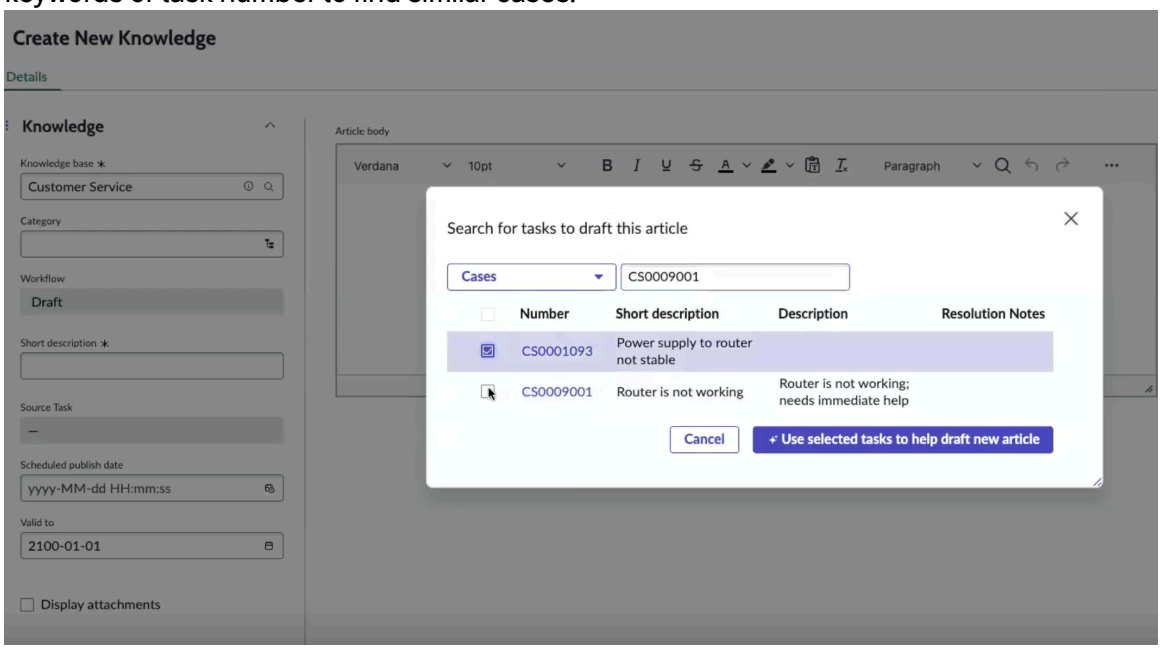
As an author, generate new Knowledge articles using Now Assist on tasks within the classic environment.

Before you begin

Role required: author

Procedure

1. For the author experience in a classic environment, navigate to **Lists** > **Knowledge** > **All articles** and select **New**.
2. In the Create article modal, select a Knowledge Base and an article template and select **Create Article**.
3. In the Use AI to draft this article modal, select **Yes, draft with Now Assist**.
4. In the Search for tasks to draft this article modal, select the up to five task types and enter the keywords or task number to find similar cases.



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5. Select **Use selected tasks to help draft new article** to generate the article.
   The completed article is displayed in the chosen template, along with the success message: `This article was drafted by Now Assist. Be sure to review it for accuracy before saving.`

   Note:

   - If no similar tasks exist, this modal won't appear, and the article is created. The generated article, based on the chosen relevant records, is linked to both the parent task and all the relevant cases selected.
   - You can modify the draft before saving it. The article appears in a new tab with a unique ID number for the Knowledge article and is attached to the parent record.
   - After reviewing the Now Assist generated article, when you select **Save** or **Publish**, the Now Assist success message disappears indicating that it's no longer a Now LLM Service- generated article.
   - If Now LLM Service fails to generate a result, an error message appears.
   - When creating an article using Now Assist, once the process is triggered, it can't be stopped. Now Assist continues to generate the article even if you close the modal.

6. Review the Now Assist generated article and select **Save** or **Publish**.
   The Now Assist success message disappears indicating that it's no longer a Now LLM Service-generated article.

Generate a Knowledge article using multi-language support

Now Assist in Knowledge Management provides multi-language support for Knowledge article generation. Generate knowledge articles in multiple languages with the Now Assist multi-language support for Knowledge Management. As an agent, you can generate articles from incidents, cases and other task types that are documented in languages other than English by using a language selector configured by the admin.

Before you begin

Languages available in the language selector are determined by:

- The language package installed for the Knowledge Base
- The language preference selected by the admin in the knowledge settings

Role required: author or agent

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **All**
2. Open a case or an incident assigned to you that is documented in a language other than English.
3. Select **Create Knowledge**.

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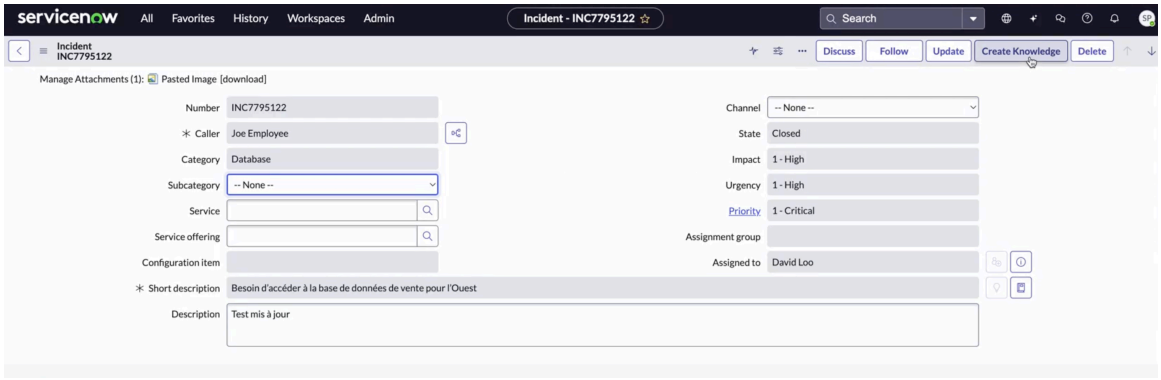
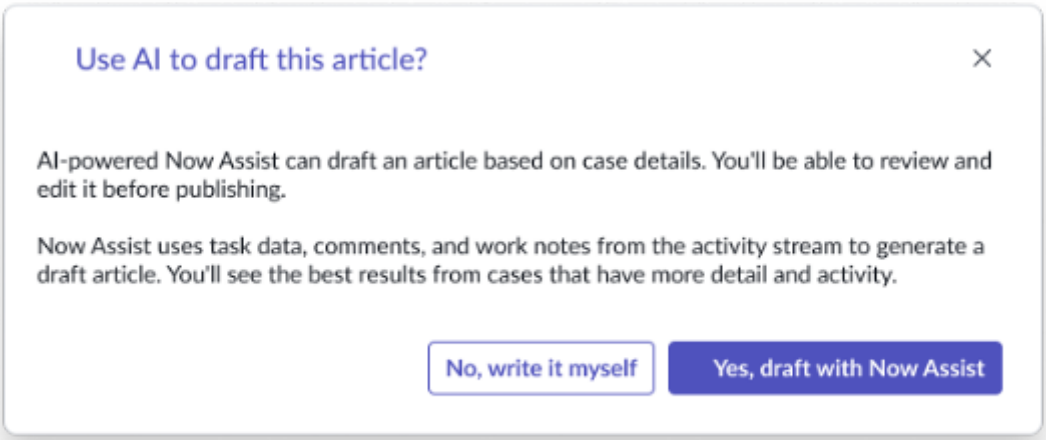
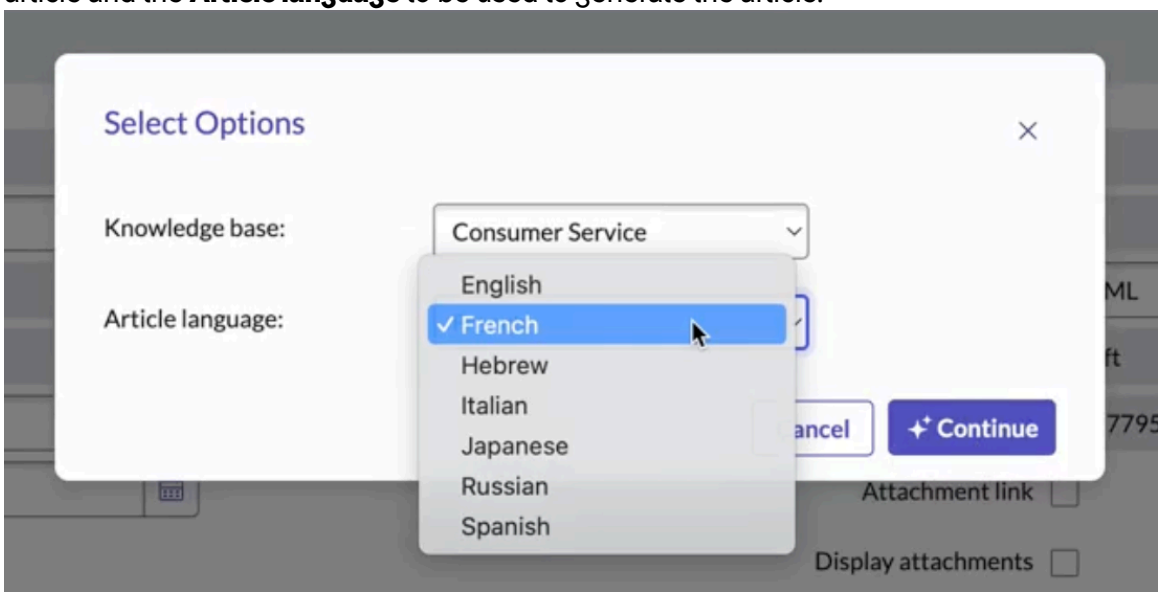


4. In the Use AI to draft this article? modal, select **Yes, draft with Now Assist**.



5. In the Select Options modal select the **Knowledge base** in which you would like to publish the article and the **Article language** to be used to generate the article.



6. Select **Continue**.

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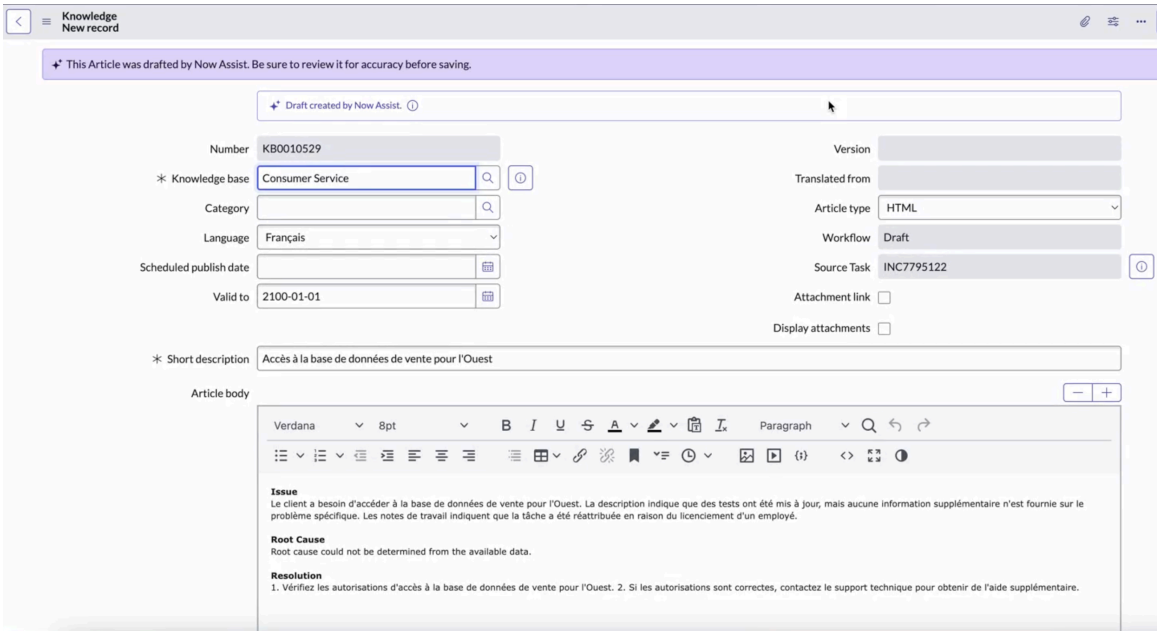


Now Assist generates the Knowledge article in the language selected.

Edit an article using the Now Assist context menu

Elaborate or shorten content within a Knowledge article using the Now Assist context menu feature that enables agents to leverage the generative AI capabilities of Now Assist in Knowledge Management.

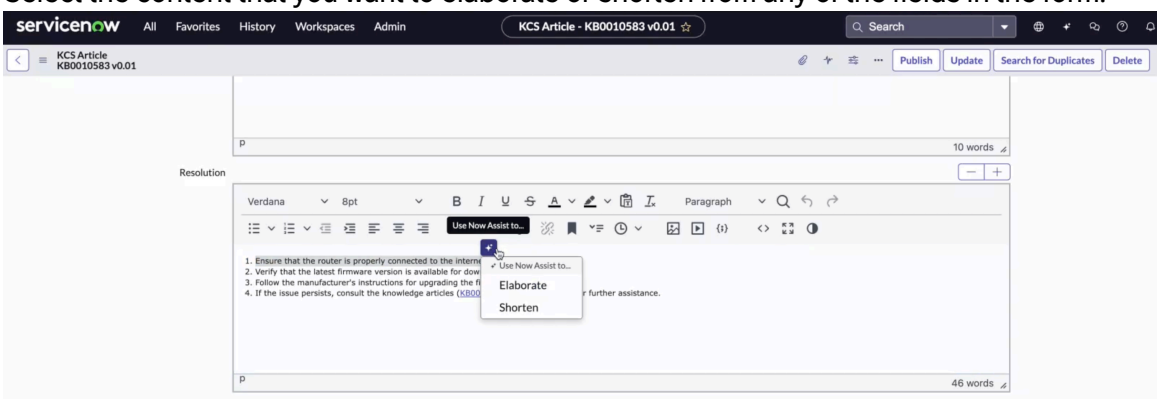
Before you begin

The Now Assist Knowledge content recommendation skill required to enable the context menu feature is activated by the admin. To configure the skill see Configure skill for Now Assist context menu the elaborate and shorten function of the context menu feature is available for all article templates.

Role required: author or agent

Procedure

1. Open a Knowledge article or create a new one.
2. Select the content that you want to elaborate or shorten from any of the fields in the form.



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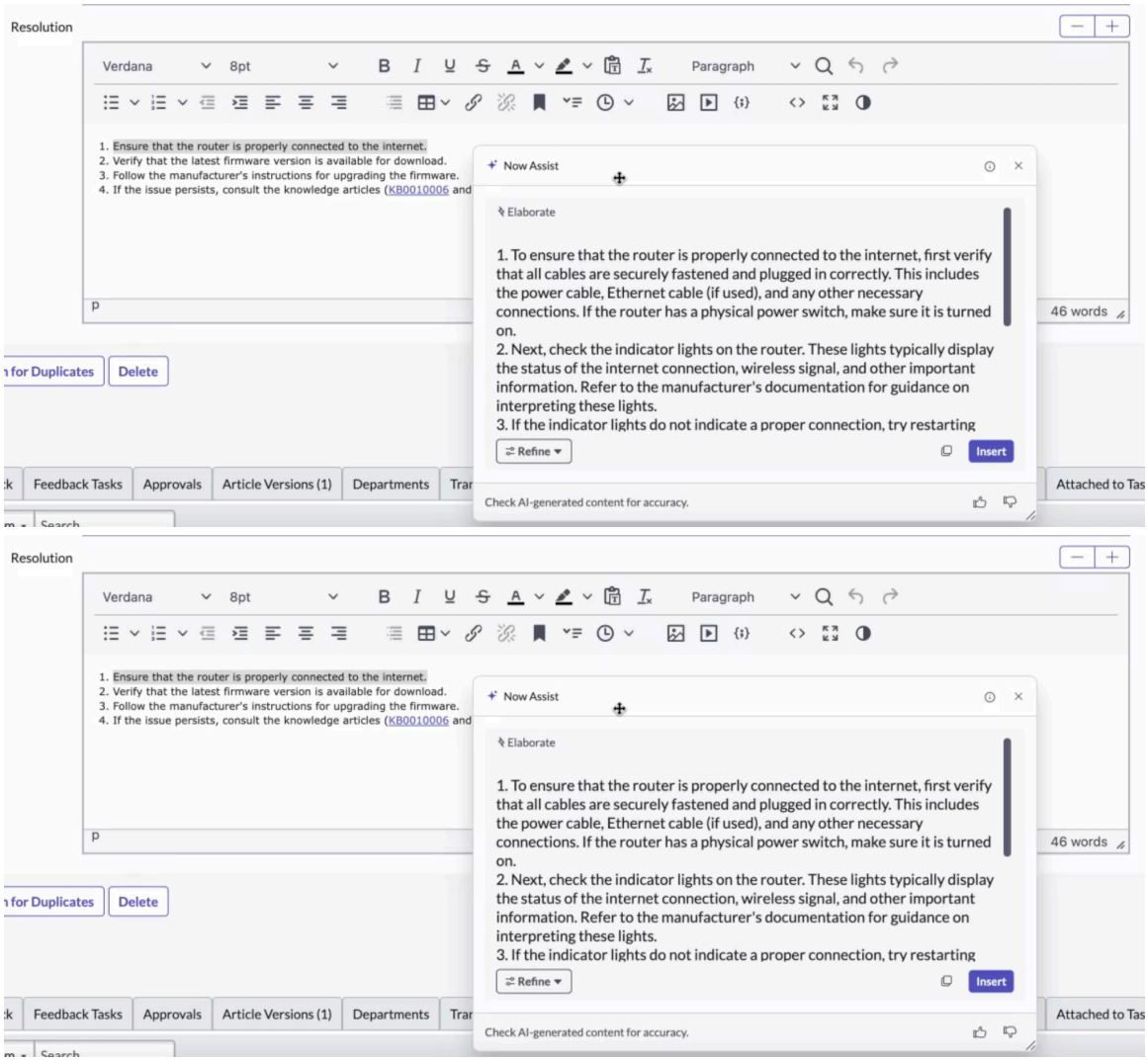
3. Select the Now Assist icon and select either **Elaborate** or **Shorten** from the context menu.



4. Select **Insert** to add the Now Assist generated content to the article.

Supported tags

The Now Assist Knowledge content recommendation skill currently supports only a limited set of HTML tags and styles.

The HTML tags supported and not supported by Now Assist Knowledge content recommendation are listed in the following tables. Using the content recommendation skill on text containing unsupported tags triggers an error message and requires the author to manually update the text.

Supported HTML tags

Tags	Description
p	Paragraph
br	Line breaks
ol, li, ul	Ordered and unordered list
h1, h2, h3, h4, h5, h6	Headers (H1 to H6)
strong, em, s	Bold

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Supported HTML tags (continued)

Tags	Description
a	Anchor (link to URL)

Unsupported HTML tags

Tags	Description
img, video, audio, picture, source, iframe, embed, object	Media tags
table, details, summary, knowledge blocks	Other tags

Note:

- Unsupported HTML tags in the selected content trigger the following error message:

```
Unsupported content such as a table, knowledge block, or
 media file is included in your selection. Reselect and
 try again.
```

- Styles such as bold, italics, tables, and links may not be retained and may result in unpredictable results.

Generate and edit articles using Now Assist in the Knowledge Center article editor

This task explains how to create and improve a knowledge article with the Knowledge center article editor.

Before you begin

Role required: admin

Suggested reading: Edit an article using the Now Assist context menu.

Procedure

1. Navigate to **All** > **Knowledge** > **Knowledge Center**.
   You can also access Knowledge Center through **Workspace** > **Knowledge Center**.
2. In the **Knowledge Actions**, select **Create an article**.
3. Select the desired knowledge base.
4. Choose either the desired template and select **Next** to open the Knowledge center article editor.
5. Enter the instructions for generating content, such as `Generate an article for password reset`.
   Review the generated article. You can edit the content, check grammar, and make the article easy to read. You can also select **Regenerate** to create an article based on your prompt.

   Using the Knowledge Center Article Editor helps you quickly produce high-quality, accurate, and lucid knowledge articles, saving time and improving support for your organization.

   Note:
   The instruction block's content should not include any of the following tags: `img`, `video`, `audio`, `canvas`, `svg`, `iframe`, `script`, `input`, and `button`. Additionally, some elements, when selected on their own, can prevent the Now Assist icon from appearing.

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Identify and review duplicate Knowledge articles

Review duplicate Knowledge articles using the Now Assist Identify and review duplicate articles feature.

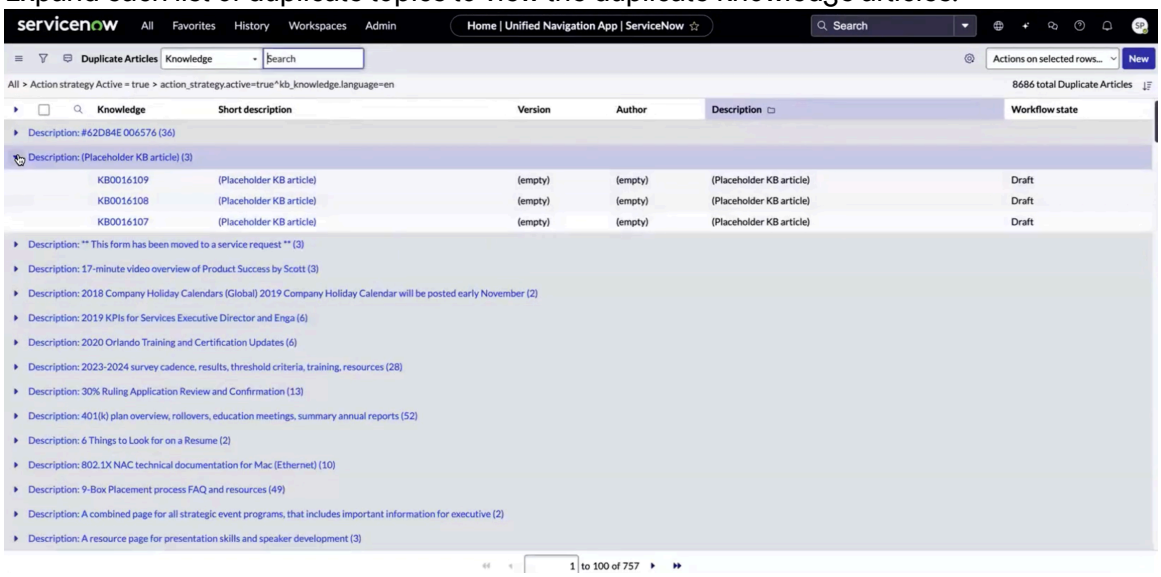
Before you begin

Role required: knowledge_admin and knowledge_manager

The Now Assist Knowledge skill required to enable the identify duplicate articles feature is activated by the admin. To configure the skill, see Configure and activate the Now Assist Identify duplicate articles skill.

Procedure

1. Navigate to **All** > **Knowledge** > **Articles** > **Duplicate Articles**.
2. Expand each list of duplicate topics to view the duplicate Knowledge articles.



3. Review the article categories and select the duplicate articles listed under it.
4. From the **Actions on selected rows** menu select the **Unmark as Duplicate** action to be applied on the selected articles.

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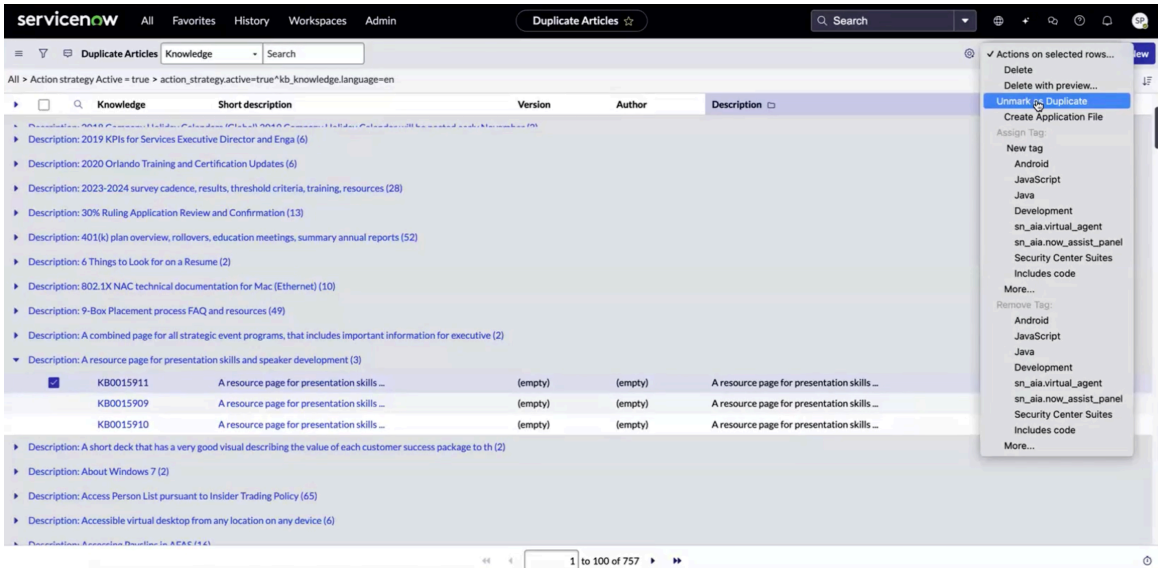

Important:

Articles unmarked as duplicates may reappear in the list during the next schedule of the job run due to regrouping of records. Grouping of records happens during every job run. Records created after a job run are considered for the next schedule.

This feature can be applied to new articles, published articles, new drafts or articles that are in review.

This feature may not work as expected for non-English articles.

Response templates

Resolve cases or support issues faster and more efficiently with response templates. Response templates (formerly known as templated snippets) are reusable messages that can be copied to case or task forms to provide quick and consistent messages to users, or to display standard chat response messages to requesters in Agent Chat.

Note:
Response templates are available only for existing records.

Assign response template roles

The following roles are installed when you activate the response templates plugin.

Response template role	Description
Response template administrator [sn_templated_snip.template_snippet_admin]	Grants access to scoped administration of the response templates feature.
Response template writer [sn_templated_snip.template_snippet_writer]	Grants access to create, read, update, and delete (CRUD) response template content.
Response template reader [sn_templated_snip.template_snippet_reader]	Grants access to read response template content.

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Response template role	Description
System Administrator [admin]	Response template administrator [sn_templated_snip.template_snippet_admin] **Note:** Admin inherits this role by default. When the Templated Responses [com.sn_templated_snip] plugin is activated without activating related HR applications, you can still use response templates. • Admin can reassign this role to other users. • Admin can also remove the Contained Role [sys_user_role_contains] table so Admin users do not inherit this role by default. Or: 1. Enter **sys_store_app_list.do** in the Filter navigator search bar of an instance, or **https://YOUR_INSTANCE/sys_store_app_list.do** from a web browser. 2. Search for and select **Templated Snippets**. 3. Scroll down to **Related Links**. 4. Click **Remove from the role contained by admin**.

Before you begin using response templates, you must assign these roles to the appropriate roles, groups, or users in your application.

- To assign a role to another role, see Add a role to an existing role.
- To assign a role to a group, see Assign a role to a group.
- To assign a role to a user, see Assign a role to a user.

For example,

- In the HR Service Delivery application, users with the HR administrator role are assigned the response template administrator role, users with the HR manager role are assigned the response template writer role, and users with the HR case writer role are assigned the response template reader role.
- In the Customer Service Management application, users with the customer service manager role (sn_customerservice_manager) inherit the response template writer role. Users with the customer service agent role (sn_customerservice_agent) inherit the response template reader role and can access response templates assigned to all groups to which they belong.

How to use response templates

Users with the response template writer [sn_templated_snip.template_snippet_writer] role can create response templates. Each template is associated with a table that is an extension of

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the Task [task] or Interaction [interaction] table. Response templates include a short name for specifying a shortcut that can be used to identify the message. For chat response templates used in Agent Workspace, agents use the slash command with a short name to present the standard message during a chat. You can also configure the template to

- Include variables pulled from a table
- Specify a condition builder to specify the conditions that must be met for the template to be available for use, such as for a specific HR service

For more information, see Create or modify a response template.

Users with the response template reader [sn_templated_snip.template_snippet_reader] role can then copy response template content and use it in their responses to users when working on case or task forms that meet the specified conditions. For example, a response template for payroll discrepancy cases enables HR agents to use a standardized message when responding to that case type. See Copy a response template to an HR case for an HR-specific example.

Example: Response template to escalate payroll discrepancy cases

You are part of an enterprise HR organization using the HR Service Delivery application. You want your HR agents to respond to and, when necessary, escalate payroll discrepancy cases quickly and consistently. Create a response template so that HR agents have a reusable message to use when responding to employees about that case type.

One of your HR managers with the response template writer role is responsible for creating the template to escalate payroll discrepancy cases. The template is associated with the HR Payroll Case [sn_hr_core_case_payroll] table, and a condition filters on cases that match the appropriate HR service called Payroll Discrepancy. In the template body, the response text appears with variables, such as the subject person name in the salutation.

HR case writers with the response template reader role can copy the response template content and use it in their responses to employees when working on cases. Response templates provide a faster and efficient way to resolve cases.

Activation information

To use response templates in your application, you must activate response templates. For information on what components are installed with the feature, see Components installed with response templates.

Activate response templates

You can activate response templates (formerly known as templated snippets) [com.sn_templated_snip] if you have the admin role. This plugin includes demo data and activates related plugins if they are not already active.

Before you begin

Role required: admin

Note:
If you are using Agent Chat, the Agent Chat (com.glide.interaction.awa) plugin automatically activates response templates.

About this task

Response templates activate these related plugins if they are not already active.

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Plugins for response templates

Plugin	Description
Scoped Application Restricted Caller Access [com.glide.scope.access.restricted_caller]	Allows scoped applications to restrict access to public tables and script includes.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Related topics

List of plugins (Madrid)

Components installed with response templates

Several types of components are installed with activation of the Templated Responses (com.sn_templated_snip) plugin, including tables and user roles.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available for this feature.

Roles installed

By default, the following HR roles contain the following response template roles.

Note:
The Templated Responses [com.sn_templated_snip] plugin activates the sn_templated_snip.min_admin_count system property [sys_properties.list]. This property prevents you from deleting your only Response Template admin user by requiring a minimum number (default is two) of active users with this role.

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Roles installed with response templates

Role title [name]	Description	Contains roles
Response templates administrator [sn_templated_snip.template_snippet_admin]	Grants access to scoped administration of the response templates feature.	sn_templated_snip.template_snippet_writer
Response templates writer [sn_templated_snip.template_snippet_writer]	Grants access to create, read, update, and delete (CRUD) response template content.	sn_templated_snip.template_snippet_reader
Response templates reader [sn_templated_snip.template_snippet_reader]	Grants access to read response template content.	None

You can assign these roles to the appropriate roles, groups, or users in your application.

- To assign a role to another role, see Add a role to an existing role.
- To assign a role to a group, see Assign a role to a group.
- To assign a role to a user, see Assign a role to a user.

For further information on user administration and how to manage users, see User administration.

Tables installed

Tables installed with response templates

Table	Description
Response Template [sn_templated_snip_note_template]	Stores response template information. Response templates are reusable messages that can be copied to case or task forms. Response templates provide quick and consistent messages to users, or display standard chat response messages to requesters in Agent Chat.
M2M Response Template to Channel [m2m_response_template_to_channel]	Maps channels to response templates.
Response Template Channel	Stores information about response template channels.

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Tables installed with response templates (continued)

Table	Description
[sn_templated_snip_channel]	
Note Template for Table [sn_m2m_note_template_for_table]	Maps notes to response templates.

For further information on table administration and how to manage data, see Table administration.

Create or modify a response template

Create or modify a response template (formerly known as a templated snippet) to define a reusable message that can be copied to case or task forms or used in Agent Chat sessions to provide quick and consistent messages to users.

Before you begin

Role required: sn_templated_snip.template_snippet_writer

About this task

Each response template is associated with a table that is an extension of the Task [task] table or, if using Agent Workspace, the Interaction [interaction] table. The template can be configured to include variables pulled from that table. You can also use a condition builder to specify the conditions that a case must meet for the template to be available for use, such as for a specific HR service or for chat. For chat response templates, you specify a short name (shortcut) that is used with the slash command as a quick way to present the response message to a user.

Procedure

1. Navigate to **All** > **System Definition** > **Response template configuration**.
2. Select **New** to create a response template.
   Or, select an existing response template to modify from the list.
3. Fill in the fields on the form.

Response template form

Field	Description
Name	Name of the response template.
Short Name	Short description that identifies the response template when using chat in Agent Workspace. Use the short name with a quick command (/) to show the text from the template body of the response template while in chat. This feature provides a fast and consistent way to populate text while in chat. For example, the short name `gm` identifies the chat response template for a Good Morning greeting. Enter **/gm** in a chat window to show the text from this response template.

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Field	Description
Table	Name of the table that the response template is associated with. If you are creating a response template for Agent Workspace chat, the associated table is the Interaction [interaction] table. For other response templates, the table must be an extension of the Task [task] table. **Note:** Creating custom COE tables do not allow you to add the Copy to Clipboard UI action. Users can still use the copy and paste function.
Condition	Conditions that determine when the response template is available for use. When defining conditions like case sensitivity or null values, see API GlideFilter - Scoped, Global. **Note:** The conditions available depend on the table you select. For chat response templates, specify the condition: **[Type] [is] [Chat]**
Application	The application that created the response template.
Group visibility	Indicates what groups have access to the response template. Adding groups filters who can view the response template. **Note:** Leaving this field empty makes the response template available to all groups.
Language	Language in which you want the response template to be translated. **Note:** Translation feature is available only when the required language plugins are installed on the instance.
Template body	Text of the response template providing instructions to the agent on how to respond to a specific case or task.

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Field	Description
	You can reference field values by selecting variables from the variables list based on the table you select. You can manually enter custom variable references: ○ Current user: `${current_user}` ○ Current date: `${Date}` Or, place your mouse where you want the custom variable reference to appear and select the **Insert Current User** or **Insert Current Date** buttons. **Note:** Response templates do not support rich text.
Select variables	Variables you can add to the template body. For example, if you choose the HR Case (sn_hr_core_case) table, you can select the Subject person variable to appear in the Template body and it will replace the variable with the actual name of the subject person when the response template is used. **Note:** The variables available depend on the table you select.

Example

The following GIF shows an example of an HR manager in the HR Service Delivery application creating a response template to escalate payroll discrepancy cases. The template is associated with the HR Payroll Case [sn_hr_core_case_payroll] table, and a condition is set to filter on cases that match the Payroll Discrepancy HR service. The template text is pasted into the body, and then a variable for the subject person is added to the salutation.

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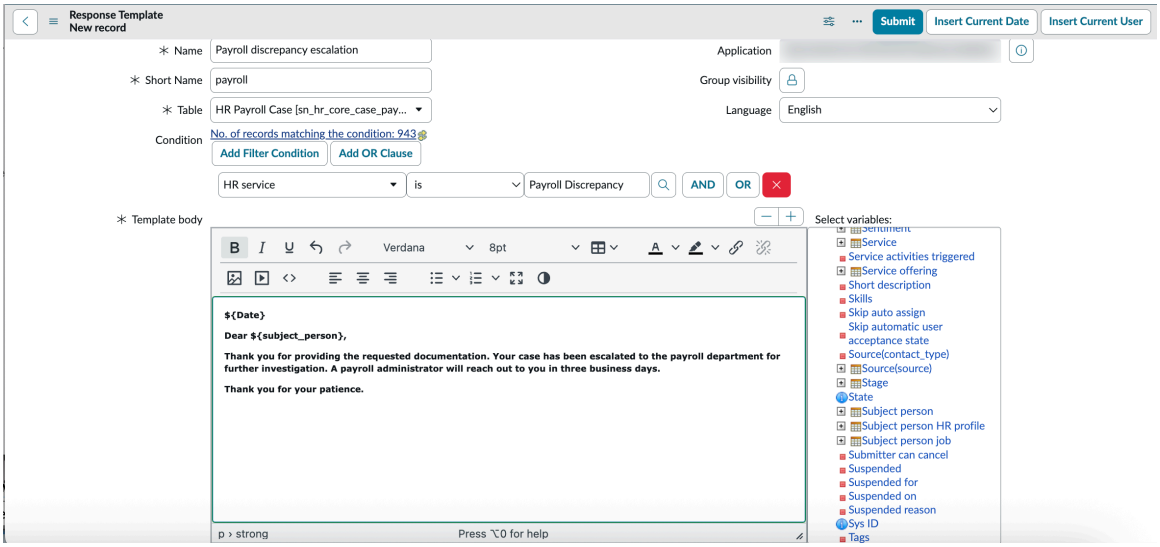
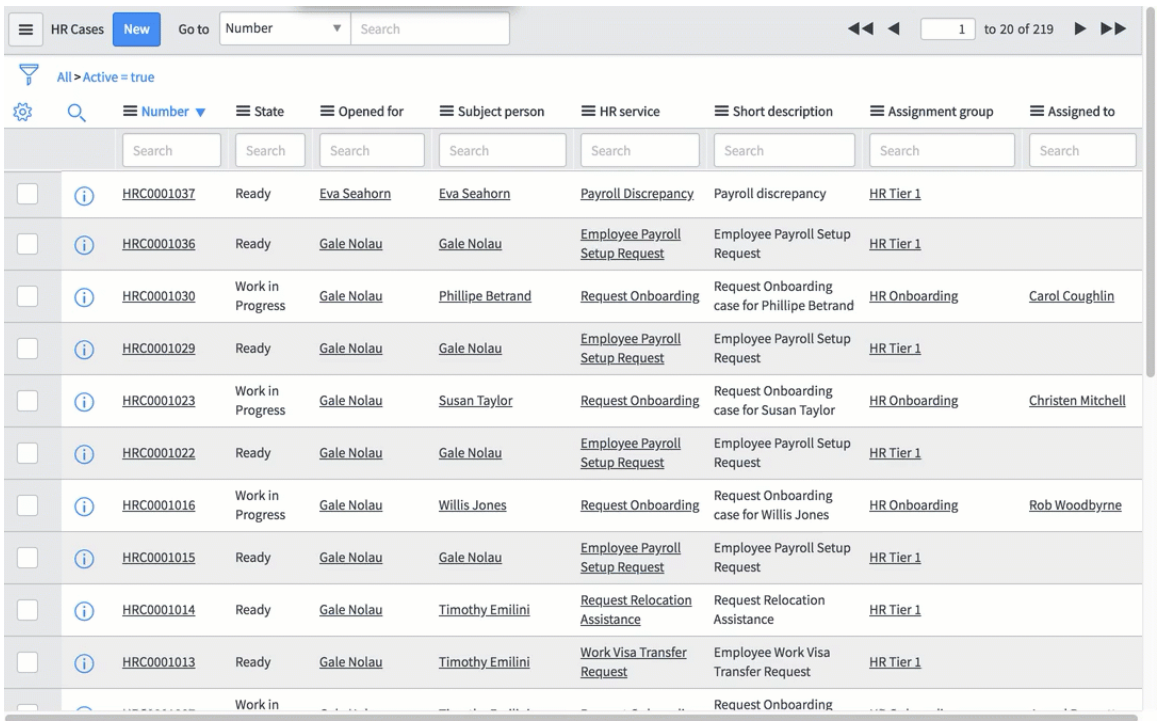


4. Click **Submit** or **Update**.
   Channels limit the response template to only the channels you add. If you leave this blank, the response template is available to no channels. This feature allows you to have different messages for chats, emails, or form. For more information, see Create a response template channel.
   The Channels related list appears.

What to do next

You can copy response template content to any field on a form that meets the specified conditions.

The following GIF shows an example of an HR case writer in the HR Service Delivery application opening a payroll discrepancy case and copying a payroll discrepancy escalation template to the comments field in the HR case form for the employee to read.



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Manage service capabilities

Give your customers tailored catalogs for products, and create portals for service requests, using the ServiceNow® Service Catalog app.

Self-service	Service administration	Service Catalog
Design an efficient front-end for your organization's IT support.	Control settings in all the support services for your business apps on the ServiceNow AI Platform.	Create and manage catalogs to give your customers self-service options.

Self-service

Make use of various common actions and catalog requests with Self-service. The ServiceNow AI Platform gives you access to homepages, knowledge articles, and catalogs, along with handling incidents and surveys. Go even farther with Service Delegation, and select other users to work with your approvals, tasks, and communications.

Service administration

Give tailored support to your business infrastructure with Service Administration. Use Assessments and Surveys to collect data from recipients or assess data from tables in your system. Track tasks with Approvals, and assign authorizing roles to users or groups. Customize data changes with State Flows, and create system work triggers based on those transitions. Give your team efficient travel routes and travel times with Geolocation.

Service Catalog management

Give your customers tailored self-service options, using the ServiceNow® Service Catalog app. Develop, test, and deploy catalogs with various products and services. The portals provide a quick and easy means to make those requests. With standardized fulfillment and inventory tracking, your catalog offerings stay accurate and efficient.

Password Reset

Maintain login security and user verification with the ServiceNow® Password Reset system. Give users self-service and agent-assisted options for handling their passwords, along with multiple verification and authentication types, and enrollments for various reset programs.

Self-service

The Self-Service application gives supported end users a clean, simple front end to their IT support organization.

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Get started

Explore Self-service

The Self-Service application gives supported end users a clean, simple front end to their IT support organization.

Configure Self-Service

Use ServiceNow's web-based interface to add new items to a request.

Explore Service Delegation

Service delegation is the ability to designate other users to view and interact with approvals sent or tasks assigned to you

Configure Service Delegation

Learn how to delegate approvals and tasks to another user, configure your user profile form to display the Delegates related list.

Exploring Self-service

The Self-Service application gives supported end users a clean, simple front end to their IT support organization.

By default, the Self-Service application provides access to common actions, such as viewing your homepage, accessing the Service Catalog, viewing knowledge articles, working with incidents, and taking surveys.

Service catalog requests

This page contains links to content on service catalog requests.

Add new request items

Use ServiceNow's web-based interface to add new items to a request.

Before you begin

Roles required: Only an administrator or a user with the catalog_admin role can add a new item to a submitted request.

About this task

Modifying a request does not resubmit it to the approval process.

Procedure

1. Navigate to **All** > **Service Catalog** > **Open Records** > **Requests** and open an existing request.
2. Click **Add New Item**.

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Note:
The Add New Item button appears only if the current **Request state** is **Pending Approval**. After the request is approved, this button is no longer available and you will not be able to add new items.

3. In the dialog box that appears, choose an item and a quantity to add.
4. Click **OK**.

Amazon EC2 instance request from the Service Catalog

Users can request the provisioning and deletion of virtual computers (Linux or Windows) in the Amazon EC2 virtual computing environment through the ServiceNow Service Catalog.

The Amazon EC2 offering requires the purchase and activation of ServiceNow Orchestration Automaton.

Note:
This feature has been deprecated and is no longer supported or available for new activation. For details, see the Deprecation Process [KB0867184] article in the Now Support knowledge base.

Request an instance

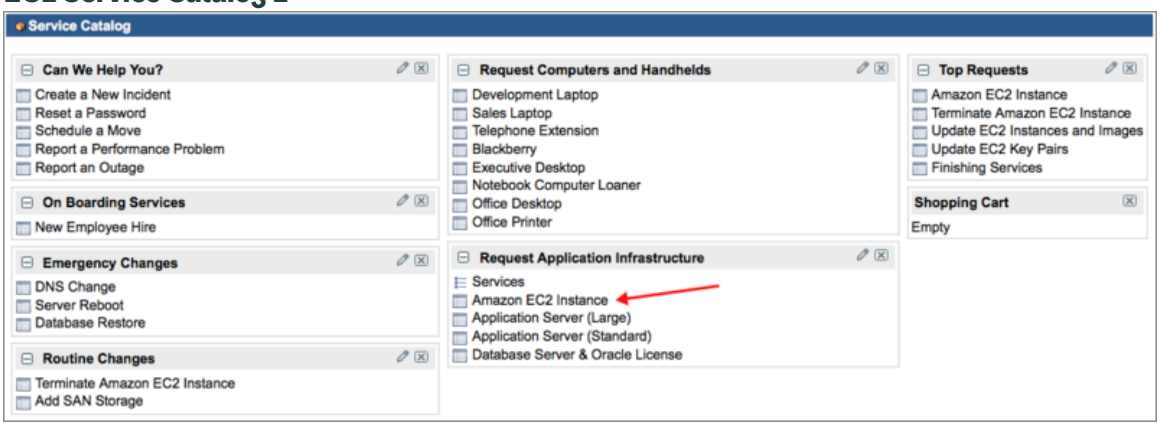
Request the provisioning of a new Amazon EC2 instance through the service catalog.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Self-Service** > **Service Catalog**.
2. Select **Amazon EC2 Instance** from the **Request Application Infrastructure** category.

EC2 Service Catalog 2



3. Select the operating system, the type of instance (Large or Small), and the number of instances requested.

   See the specifications for Large and Small instances in Amazon EC2 Instance Types.

4. Type a reason for the request.

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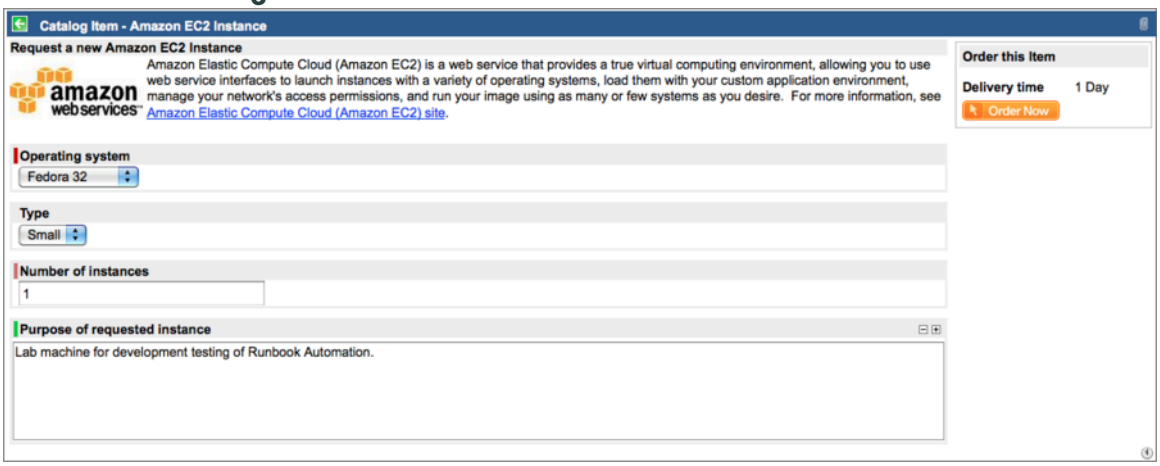
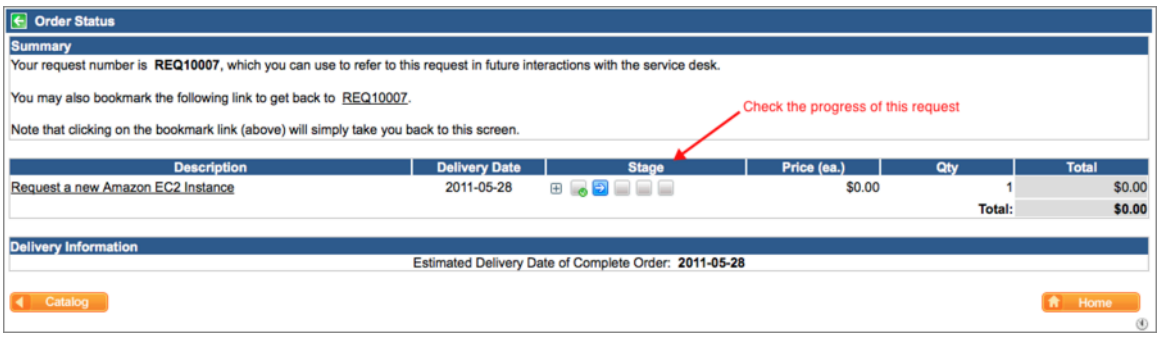
EC2 Service Catalog



5. Click **Order Now** to order the instance.

   The Order Status form appears, summarizing the request. A status bar tracks the progress of the approval and provisioning of the EC2 instance.

EC2 Order Status



   Upon successful creation of the instance, you receive an email containing the instance ID, IP address, and the public DNS for the instances created.

Terminate an instance

Shut down an Amazon EC2 instance through the service catalog.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Routine Changes** > **Terminate Amazon EC2 Instance**.

   A list appears displaying the instances that are assigned to you.

2. Select an instance from the list and click **Order**.

   This list does not support multi-line selection, and there is no **undo** feature.

Check-out redirect property

A property called One-step checkout redirect (*glide.vm.checkout_redirect*) controls the view presented to virtual machine requesters in the service catalog.

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By default, this property is set to **false**, which redirects the view to the Order Status form when the requester clicks **Order Now**. When this property is set to **true**, ServiceNow redirects the requester to their My Virtual Assets portal. This property is located in **Cloud Management** > **Administration** > **Properties**.

Delete request items

Use ServiceNow's web-based interface to delete items from a request.

Before you begin
Role required: admin

About this task
All users can delete items from their own requests any time prior to delivery. Modifying a request does not resubmit it to the approval process.

Procedure

1. Navigate to **All** > **Service Catalog** > **Open Records** > **Requests** and open an existing request.
2. In the **Requested Items** related list, select the check box beside the item to delete.
3. In the **Actions** choice list, select *Delete*.

   ServiceNow recalculates the price and delivery date for the order.

Place a request

Use ServiceNow's web-based interface for ordering predefined goods and services.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Self-Service** > **Service Catalog**.

   The default catalog view organizes items in categories and subcategories.

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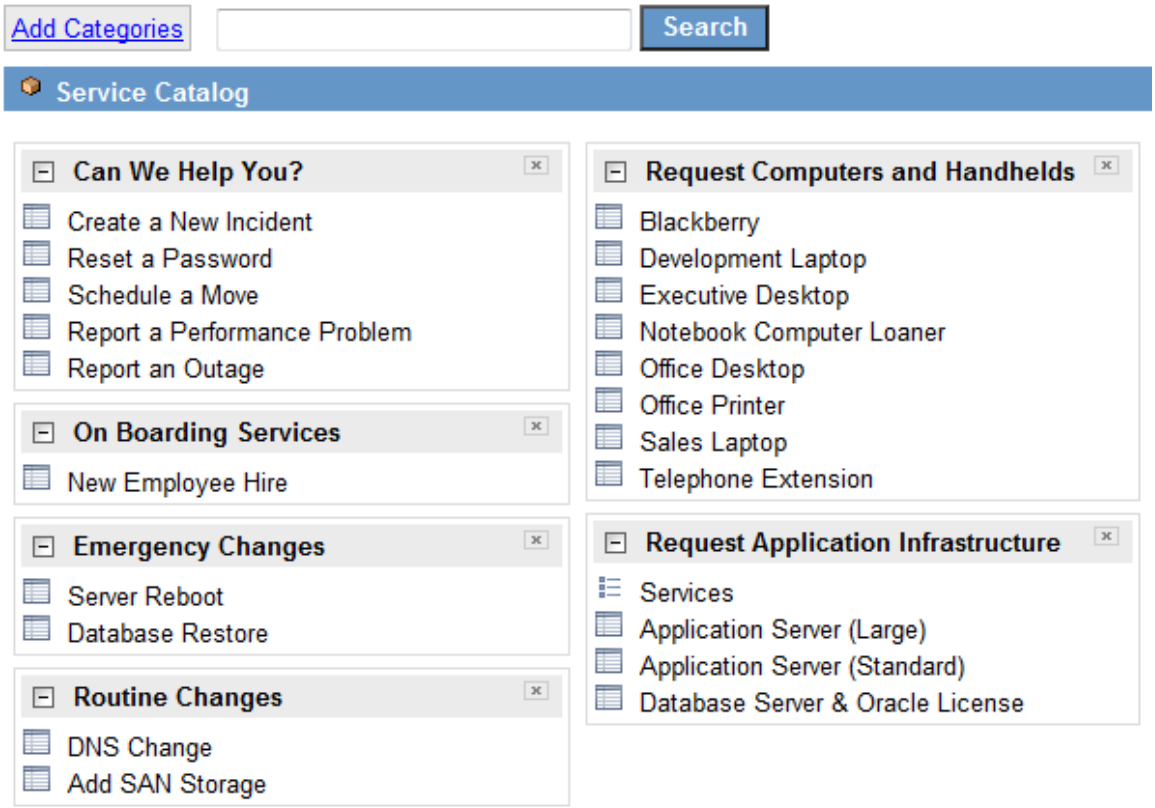
Default catalog view

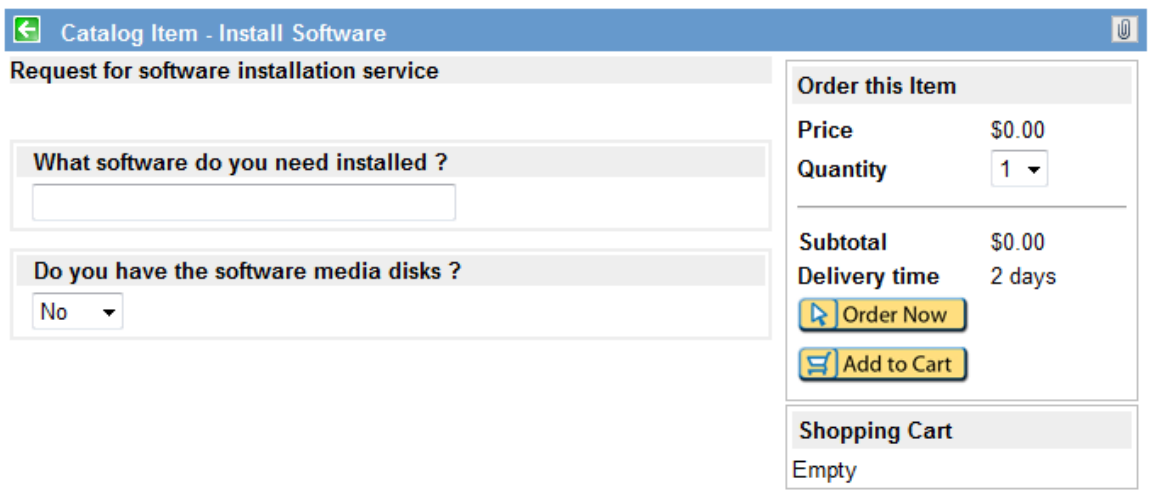


2. Select an item to order.

> **Note:**
> Some items are order guides, which combine related items for easier ordering. For example, an order guide called New Employee Hire presents a list of items that new employees typically receive (desk, phone, computer, email account). After you select the items you want to order, the order guide requests the information required and shows a separate time to delivery for each item ordered.

The order screen requests any additional information that's needed, such as the requester's name or location and the date the item is needed. It also displays the item's delivery time after approval.

Delivery time



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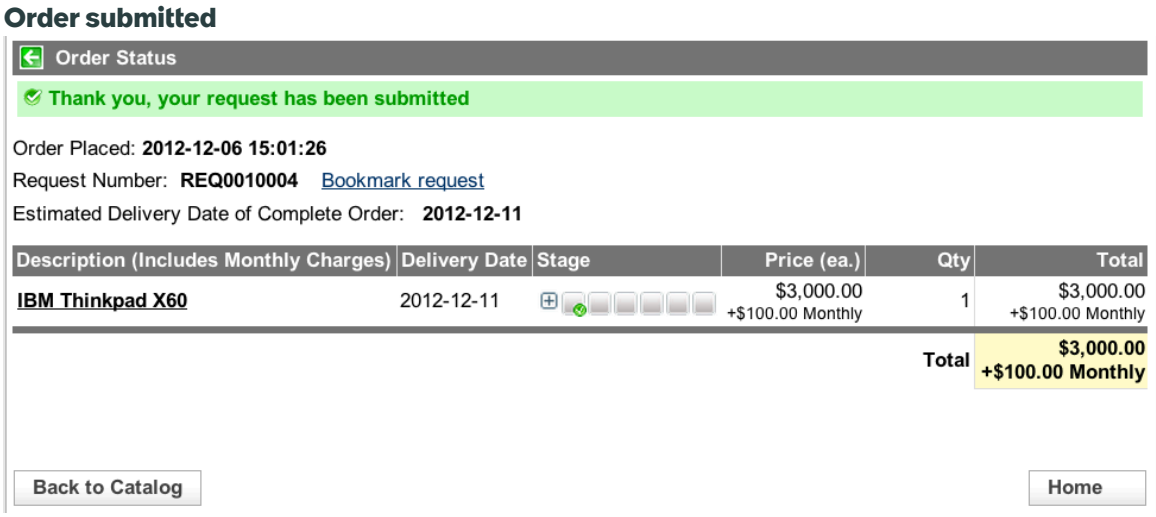
3. Enter complete and accurate information to expedite your order.
4. Order any other items required.
5. Click **Order Now** when the order is complete.

   ServiceNow displays a confirmation screen for your order:



   You can view the order's progress in the **Stage** column.

   Note:
   It may be useful to note the order number for future reference.

   ServiceNow automatically notifies the approvers if approval is required and creates work orders to fulfill the order according to your organization's process. For example, if you order a new notebook computer, the purchasing group might receive a work order to order the computer, and the desktop services group might receive a work order to configure the new computer and deliver it to your office after it arrives.

Create incidents and change requests from a requested item

You can quickly open an incident or a change request from a requested item. It also maintains a relationship between the requested item, and its associated incidents or change requests.

Before you begin

The administrator must enable the **Create Change** and **Create Incident** UI actions for the Requested Item [sc_req_item] table. The administrator must set the **Active** field to `true` when editing these UI actions .

Role required: itil

Procedure

1. Navigate to **All** > **Self-Service** > **Requested Items**.
2. Open a requested item.
3. Click the Additional actions menu icon and select **Create Change** or **Create Incident**

Related topics

Record Producer

Service catalog requests

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View request status

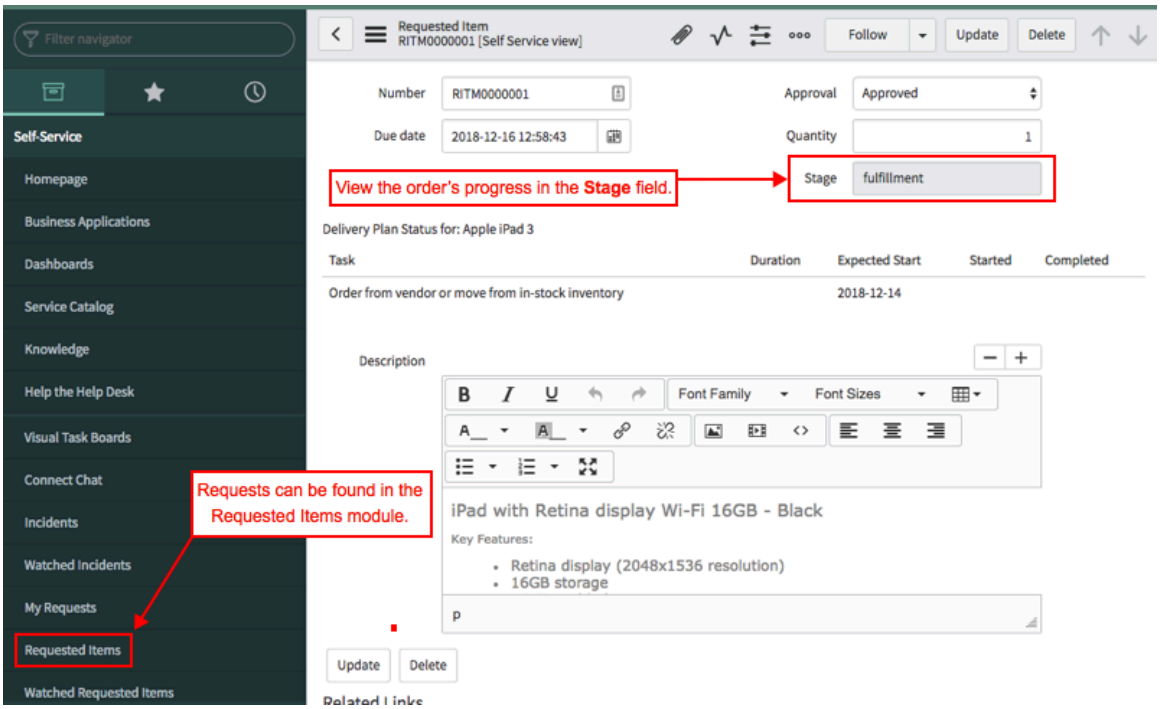
View the status of a request to see its progress, and determine when it may be fulfilled.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Self-Service** > **Requested Items**.
2. Click your order number to view details.
3. View the order's progress in the **Stage** field.



4. Check the **Backordered** field, and if the item is backordered, review comments for information about its return to stock.

Service Delegation

Service delegation is the ability to designate other users to view and interact with approvals sent or tasks assigned to you, and to receive copies of all email notifications sent to you.

Note:
Users to whom you delegate responsibility see all pending tasks and approvals regardless of the delegation period.

Note:
Delegation does not cascade. When a user acts as a delegate for another user, the delegate cannot in turn delegate to a third party. The original delegate is the only user who receives assignments and notifications. Delegation does not grant the delegate access to tasks where the caller or requester is the user for whom the delegate was created.

Add the Delegates related list to a user profile

To delegate approvals and tasks to another user, configure your user profile form to display the Delegates related list.

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Before you begin
Role required: personalize_list or admin

Procedure

1. Navigate to **All** > **Self-Service** > **My Profile**.
2. On the form context menu, navigate to **Configure** > **Related Lists**, and then add the **Delegate->User** related list.

Result
The Delegates related list displays at the bottom of the user profile form.

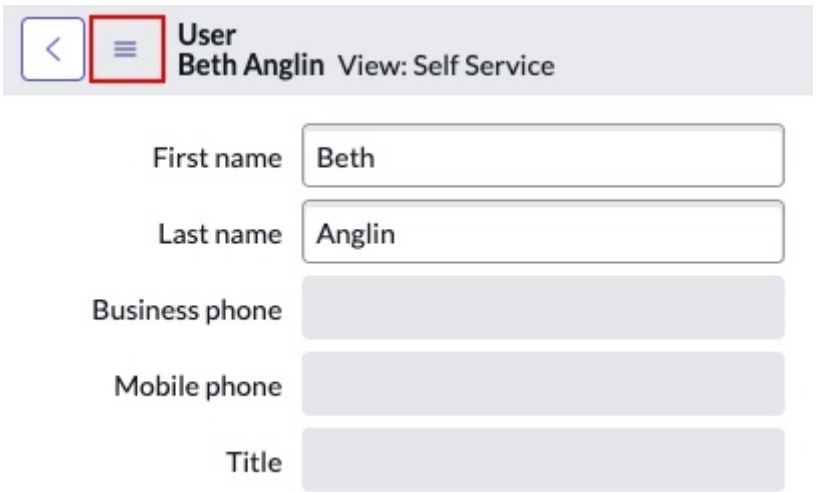
Delegate approvals and tasks to another user

If you're out of the office, you can delegate responsibilities to another active user for a period of time.

Before you begin
Role required: none

Ensure that the Delegates related list displays on the form. If the Delegates related list is not visible, do one of the following:

- Select a different view, such as the ITIL or Default view, by selecting the **Additional actions menu** > **View** > **(name of view)**.



- Configure the form to add the Delegates related list. For more information, see Configuring the form layout.

Procedure

1. Navigate to **All** > **Self Service** > **My Profile**.
2. In the **Delegates** related list, click **New**.
3. Select an active user as your Delegate.
4. Select date values from the **Starts** and **Ends** fields to set the period of time during which a delegate can work on your behalf.
5. Specify the responsibilities the delegate will assume by selecting the following check boxes. You can delegate:

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- **Approvals**: The delegate can approve items on your behalf.
- **Assignments**: The delegate can view and work on tasks assigned to you.
- **All notifications**: The delegate receives a copy of email notifications sent to you, except those marked as Meeting Invitation.

Note:

- If the **Approvals** check box is selected but **All notifications** is not, the delegate does not receive approvals.
- If your delegate gets email notifications, they will be the same email notifications sent to you. The delegate may be confused to see "Incident assigned to you" emails, so make sure they know they are a delegate.

- **Meeting invitations**: The delegate receives a copy of email notifications sent of the type Meeting Invitation.

Service Administration

Give tailored support to your business infrastructure with Service Administration.

Service Administration applications

Assessments and Surveys Assessments and Surveys application helps you create, send, and collect responses for surveys. It also helps you evaluate, score, and rank records from any table in the system.	Classic approvals Classic approvals are a legacy process to require authorization on tasks before the work is done.
State Flows State flows enable an administrator to customize transitions from one state to another and configure the system to perform work during transitions to specific states.	Geolocation The geolocation feature uses Google Maps to track users, plan efficient routes between locations, and assist in finding accurate travel times for applications that require this information, such as Work Management.

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Exploring Service Administration

Configure settings for services that support business applications or the platform.

Assessments and Surveys

The Assessments and Surveys application helps you create, send, and collect responses for surveys. The application also helps you evaluate, score, and rank records from any table in the system.

https://player.vimeo.com/video/1108236698?h=f16542e709&badge=0&autopause=0&player_id=0&app_id=58479

Get started

Explore Learn about Assessments and Surveys concepts and features.	
Use surveys Learn how you can use surveys.	Surveys reference Get details about surveys, such as fields and properties.
Use assessments Learn how you can use assessments.	Assessments reference Get details about assessments, such as fields and properties.
Use quizzes Learn how you can use assessments.	Quizzes reference Get details about quizzes, such as fields and properties.

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Troubleshoot and get help

- Ask or answer questions in the IT Service Management forum
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring Assessments and Surveys

The Assessments and Surveys application helps you create, send, and collect responses for surveys. The application also helps you evaluate, score, and rank records from any table in the system. Create questionnaires that you can assign to one or more users to assess their knowledge of any subject.

Create basic surveys to obtain collective data for analysis

You can create, send, and collect responses for basic surveys. If installed, you can also use a survey widget to set up a survey on Service Portal.

Evaluate, rank, and score the data to provide summarized results using Assessments

You can assess projects that executives want to evaluate for effective management, or rate and compare a vendor's goods and services. Use assessments to send custom questionnaires to selected users or write scripts that query the database directly.

Use quizzes to test user knowledge

The quiz functionality is built on the assessment engine and provides many of the same features as assessments and surveys.

Surveys

Two versions of the application are supported, Surveys, which is the latest version, and Legacy Surveys. Survey improves the user interface and extends the capabilities of the Legacy Surveys application.

Surveys | Getting started

Configuring surveys

There are many options for advanced configuration in Surveys:

- Create a survey, add questions, and choose recipients, all in one interface.
- Create conditional questions, which appear only when users answer other questions a certain way.
- Restrict a survey so only specific survey users can take it, and send invitations to those users simultaneously. Alternatively, make the survey a public survey so that any user can take the survey, even anonymous users (users who have not logged in to the ServiceNow system).

  Tip:
  The assessment_take2 UI page should be public for public surveys. If that page is not public, anonymous users do not have access to the page and public surveys do not work.

- Set a schedule to automatically assign a survey to users and to limit how often the same user can take a survey.

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- Customize the look and feel of survey questionnaires.
- Save anonymous survey responses.
- Convert survey responses to numerical scores and view them on scorecards.
- Deactivate a survey for maintenance or to retire it without deleting it.

Note:
Because surveys use the same tables and other back-end components as assessments, you may see assessment elements such as table and field names in certain places throughout the survey feature.

Legacy Surveys

Survey administrators can continue to use legacy survey functionality and data, however, it is recommended that you migrate legacy surveys to the Surveys application. Concurrent use of both survey applications can cause confusion and redundancy.

Survey wizards are not impacted and cannot be migrated.

Note:
The Legacy Surveys application is not described in the documentation that you are viewing. It is documented on the ServiceNow wiki.

Version comparison

Capability	Surveys	Legacy Surveys
Surveys in Service Portal.	✔	
Save new survey responses each time a user takes the same survey.	✔	
Create question templates to reuse sets of answer options.	✔	
Categorize survey questions and report on category results.	✔	
Deactivate a survey without deleting it.	✔	
Create conditional questions.	✔	
Send surveys automatically based on a schedule.	✔	
Customize survey questionnaire color scheme.	✔	
Save anonymous survey responses for logged-in users.	✔	
View survey responses on graphical scorecards.	✔	
Save surveys in a draft state until they are ready to publish.	✔	
Create and send surveys from one page.	✔	
Allow only specific users to access a survey.	✔	
Send surveys based on conditions.	✔	✔
Send survey email notifications.	✔	✔
Limit how often a user can take the same survey.	✔	✔

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Version comparison (continued)

Capability	Surveys	Legacy Surveys
Add introduction and end note text.	✔	✔
Create survey modules.	✔	✔
Public survey: Allow persons to take a survey without logging in.	✔	✔
Use update sets to track changes.	✔	✔

Related topics

- Legacy survey migration
- Survey designer
- Survey roles
- Surveys in Service Portal and the Now Mobile app
- Service Portal

Using surveys

Survey administrators—users with the survey_admin role—create and maintain surveys and configure how they are distributed and published. Surveys on Service Portal are also supported.

Survey questionnaires

All surveys that are assigned to you appear in your personal assessment and survey queue.

No special role is required to complete a survey but you must be logged in and the survey must be assigned to you. When you submit a survey, the system stores your responses.

Survey notification

If the system is configured to send email, it sends you a notification when a survey is assigned to you. The message contains a link to the survey and instructions for viewing the assessment and survey queue.

Take a survey

Take an assigned survey that appears in your assessment and survey queue.

Before you begin
Role required: none

About this task
Each assessment or survey appears as a clickable card in the queue, which can be launched by clicking the card. The card includes helpful information, including the survey name, state, and due date. You must answer every required question, indicated by a red asterisk, before you can submit the survey. If you start to take a survey but can't complete it, save your responses and return to it later. When you've answered all the questions and you're happy with the responses, submit the survey.

Note:
If you've signed in as a user who doesn't have access to the trigger record, and you access a survey using the URI parameters, the associated record number isn't displayed. You can still take the survey.

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Procedure

1. Navigate to **All** > **Self-Service** > **My Assessments & Surveys**.
   Users with the assessment_admin role, including survey administrators, can display other users' assessments and surveys in addition to their own. Use the **Show all** and **Show assigned to me** related links at the bottom of the queue to show and hide assessments and surveys. Click a card assigned to another user to open the associated metric type or survey definition.
2. Click the survey card to open the questionnaire.
   If there is more than one survey category, click the collapse icon ( ) or expand icon ( ) to hide or show the questions in the category.
3. Answer each question to the best of your ability.
   If you're unsure of how to respond to a question or if a question doesn't apply to a particular record, select **Not Applicable**, if available.
4. Complete one of the following steps.

Option	Description
Save your responses without submitting them	Click **Save**. You can close the questionnaire and access it later from your queue. **Note:** The system doesn't save the survey when there are invalid responses, such as a letter in a date field. You must enter valid responses or remove invalid responses before you can save the survey.
Submit the survey after answering all questions	Click **Submit**. You can't return to the questionnaire after submitting. **Note:** If there's an unanswered required question or an invalid response, an error message appears and the problematic questions are temporarily highlighted.

Survey responses and results

There is a metric result record for each user response to each question on every survey instance. Survey results for each question and category are calculated automatically based on the metric result records.

If you use survey result calculations for results and scorecards, ensure that the positive indicator field for the question is set appropriately, based on the answer options. To have any results, a category must contain scored questions.

Survey responses

Survey responses are stored in the Metric Result [asmt_metric_result] table and display the recipients' answers to each question in a category. To view general results, navigate to **Survey** > **Survey Responses**. To view results for a particular criterion, use a filter on the Metric Result [asmt_metric_result] table. For example, to view results based on the assignment group, apply a filter condition for assignment group.

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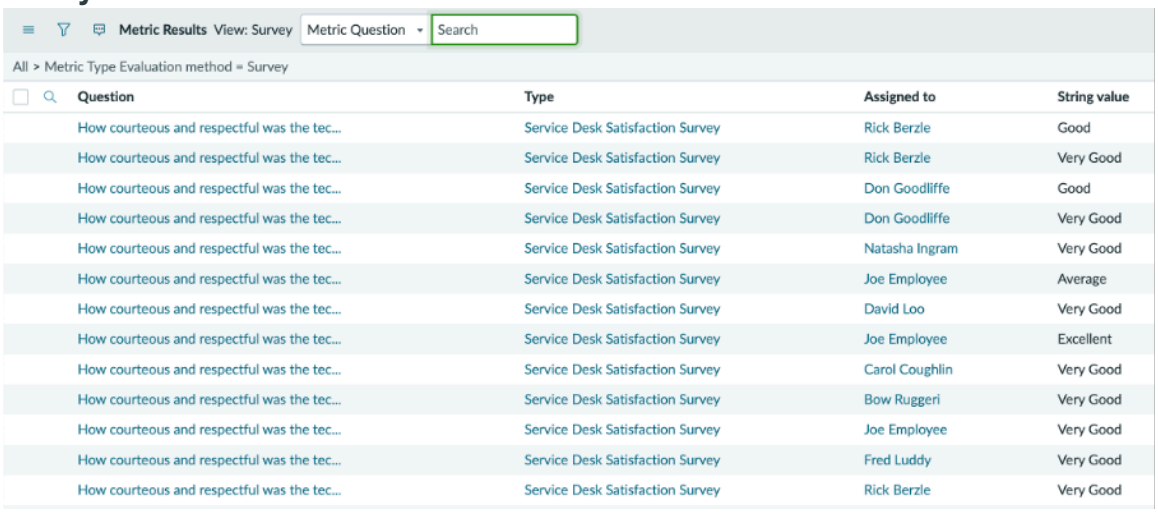
Survey metric results

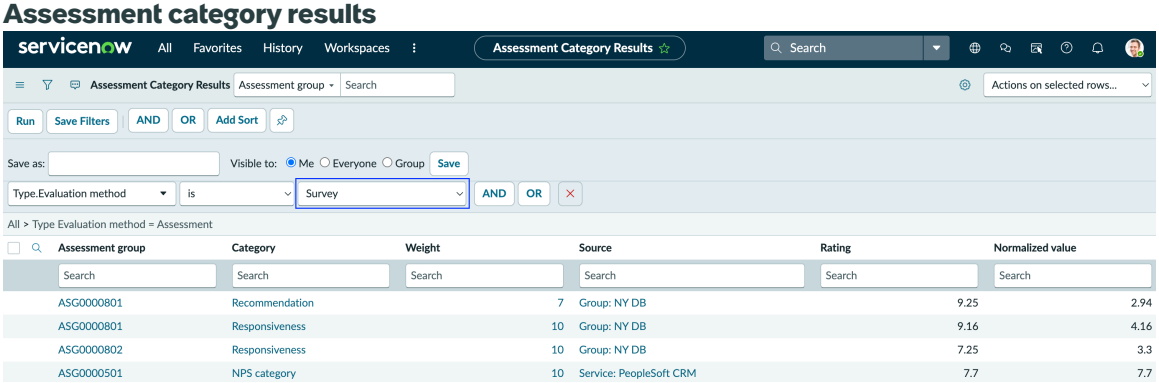


Question	Type	Assigned to	String value
How courteous and respectful was the tec...	Service Desk Satisfaction Survey	Rick Berzle	Good
How courteous and respectful was the tec...	Service Desk Satisfaction Survey	Rick Berzle	Very Good
How courteous and respectful was the tec...	Service Desk Satisfaction Survey	Don Goodliffe	Good
How courteous and respectful was the tec...	Service Desk Satisfaction Survey	Don Goodliffe	Very Good
How courteous and respectful was the tec...	Service Desk Satisfaction Survey	Natasha Ingram	Very Good
How courteous and respectful was the tec...	Service Desk Satisfaction Survey	Joe Employee	Average
How courteous and respectful was the tec...	Service Desk Satisfaction Survey	David Loo	Very Good
How courteous and respectful was the tec...	Service Desk Satisfaction Survey	Joe Employee	Excellent
How courteous and respectful was the tec...	Service Desk Satisfaction Survey	Carol Coughlin	Very Good
How courteous and respectful was the tec...	Service Desk Satisfaction Survey	Bow Ruggeri	Very Good
How courteous and respectful was the tec...	Service Desk Satisfaction Survey	Joe Employee	Very Good
How courteous and respectful was the tec...	Service Desk Satisfaction Survey	Fred Luddy	Very Good
How courteous and respectful was the tec...	Service Desk Satisfaction Survey	Rick Berzle	Very Good

Category results

Category results are stored in the Assessment Category Result [asmt_category_result] table and display the overall ratings for each category based on the weighted value for each scored question. To view these results, navigate to **Assessments** > **Results** > **Category results** and filter the results using the **[Type.Evaluation method] [is] [Survey]** condition.

Assessment category results



Assessment group	Category	Weight	Source	Rating	Normalized value
ASG0000801	Recommendation	7	Group: NY DB	9.25	2.94
ASG0000801	Responsiveness	10	Group: NY DB	9.16	4.16
ASG0000802	Responsiveness	10	Group: NY DB	7.25	3.3
ASG0000501	NPS category	10	Service: PeopleSoft CRM	7.7	7.7

Survey scorecards

A scorecard provides a visual breakdown of survey responses, based on the way questions were answered, by category. To access a scorecard, see View a survey scorecard.

Related topics

- View a survey scorecard
- Survey designer elements
- Configure category weights for a survey

View results for all surveys

You can view the survey responses that are stored on the Metric Result [asmt_metric_result] table.

Before you begin

Role required: survey_admin or survey_reader

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Procedure

1. Navigate to **All** > **Survey** > **Survey Responses**.
   Do not confuse this module with **Survey** > **Legacy Surveys** > **Survey Responses**, which displays legacy survey responses.

   The **Type** column displays the survey definition each response is associated with.
2. Select a response to view its details.

View the results for a survey

You can view the responses for one survey definition. Survey results are stored on the Metric Result [asmt_metric_result] table.

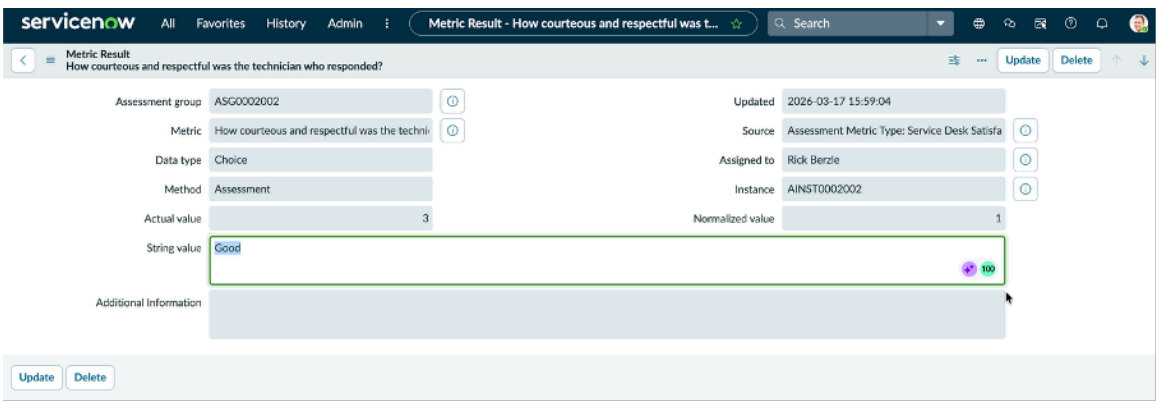
Before you begin

Role required: survey_admin or survey_reader

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
3. Under **Related Links**, select **View Responses** to view information regarding each user's response.
   The results are grouped by metric, which is what questions are called in assessments.
4. Under **Related Links**, select **View Scorecard** review the compiled data of all responses represented in pie charts.
   For detailed information, see View a survey scorecard.
5. Open a metric result to view more detail.
   The metric result contains the user's response and calculated values of interest to advanced survey administrators. Because the Metric Result table is also used by the assessment feature, many field names aren't clear in the context of surveys.

   Example



   For a description of the field values, see Metric Result form.

View a survey scorecard

A survey scorecard provides a visual breakdown of survey responses by category, based on the way questions were answered.

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Before you begin
Role required: survey_admin or survey_reader

About this task
A scorecard displays charts for survey results, in which category and question responses are analyzed and current ratings are compared with previous ratings. Users can examine ratings over time, compare question ratings, or compare the ratings of all categories. All ratings are averages for the time range selected. The system dynamically updates a scorecard each time you view it, so the ratings reflect recently completed surveys.

Procedure
1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
3. Select the **View Scorecard** related link.

Note:
The **View Scorecard** related link is available only if there are survey results to report.

The interactive scorecard displays the following filters:

- Question Results: Displays the result of all questions or an individual question.
- Category Results: Displays the results of all questions associated with an individual category or all categories.
- Average Ratings: Displays the result of weighted average rating for each survey question in an individual category or all categories.
- History: Displays the result of all questions in comparison with their history (by calendar year or quarters).
- Sentiment Analysis Results: Displays the results of sentiment analysis for the survey.

Survey scorecard category results

The Category Results view is a stacked bar chart showing survey results for all questions in an individual category or all categories by respondent count.

Select a category from the list to display the questions from that category in the chart.

This view displays responses that use the following data types:

- Checkbox
- Choice
- Likert Scale
- Number
- Template
- Yes/No
- Multiple selection
- Image Scale
- Numeric Scale

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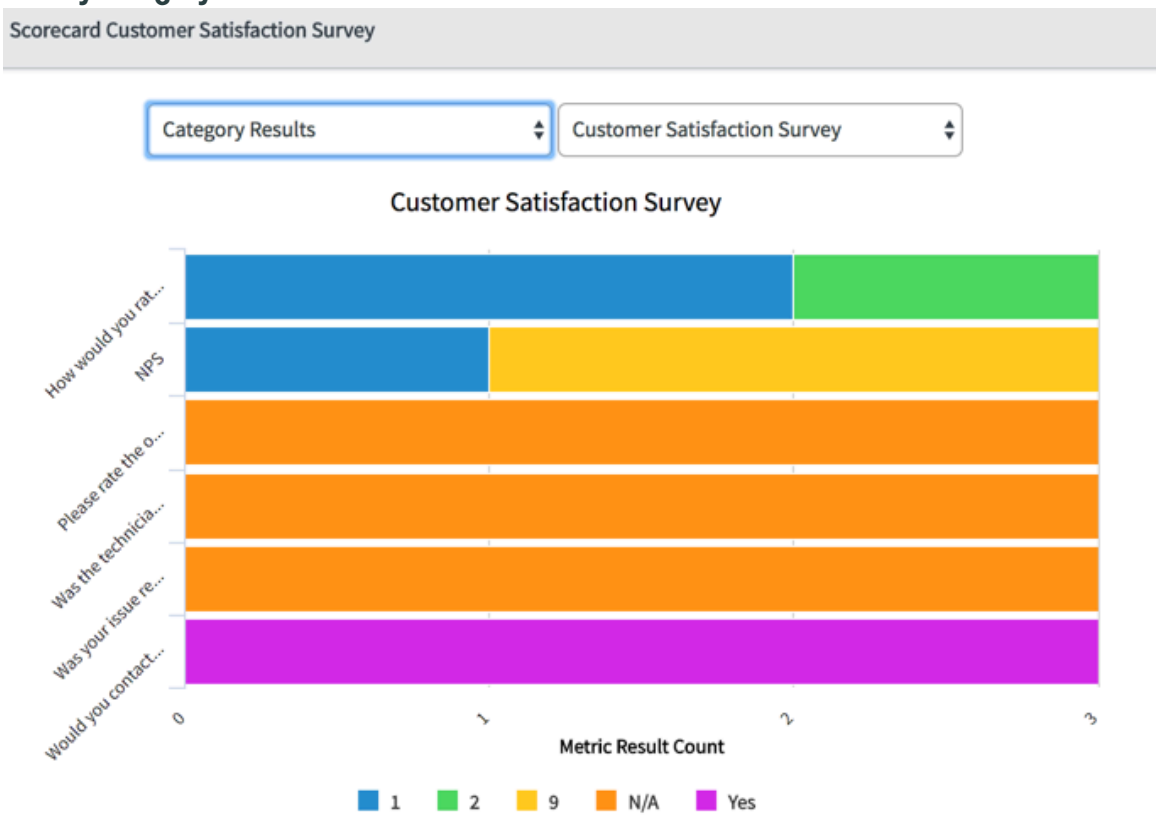
Note:
The **Checkbox** and **Yes/No** data types are combined into the **Boolean** data type in the Survey Designer

Survey category results



To view details about a specific response, point to the colored bar to display the response, the number of responses, and the percentage it represents of all the responses to that question.

Survey scorecard category results detail

Survey scorecard question results

The Question Results filter displays the result of all questions or an individual question using charts or lists. For the String, Attachment, Date, Date/time, Reference, and Ranking data types, the results are displayed in the list view. The results of all other data types are displayed in the pie chart view.

Pie chart

The pie chart shows question results for all data types other than those that are displayed in the list view. See Survey question data types.

- Checkbox.
- Boolean.
- Choice.
- Likert Scale.
- Number.

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- Percentage.
- Yes/No.
- Image Scale.
- Multiple Selection.
- Template. The question result shows the aggregated net promoter score (NPS) with promoters, detractors, and passives.

Net promoter score categories

Question score	NPS category
9 or 10	Promoter
7 or 8	Passive or Neutral
0 to 6	Detractor

The result is calculated as:

- %Promoters = Number of promoters / Sample size
- %Detractors = Number of detractors / Sample size
- %Passives = Number of passives / Sample size
- NPS = %Promoters - %Detractors

Note:
The **Checkbox** and **Yes/No** data types are combined into the **Boolean** data type in the survey designer.

When a user submits a survey, three records (one for each Timeframe) will be created/ updated- **Year**, **Quarter**, and **Monthly** in the **asmt_nps_result** table. For example, if a user submits a survey on November month of 2023, which falls under Quarter 3. Then three records are generated for the dates.

- Year: 2023-01-01
- Quarter: 2023-10-01
- Monthly: 2023-11-01

Now if a second user submits in December month of 2023, which falls under same Quarter 3, as above scenario. Then only a single record is created for Monthly Time frame.

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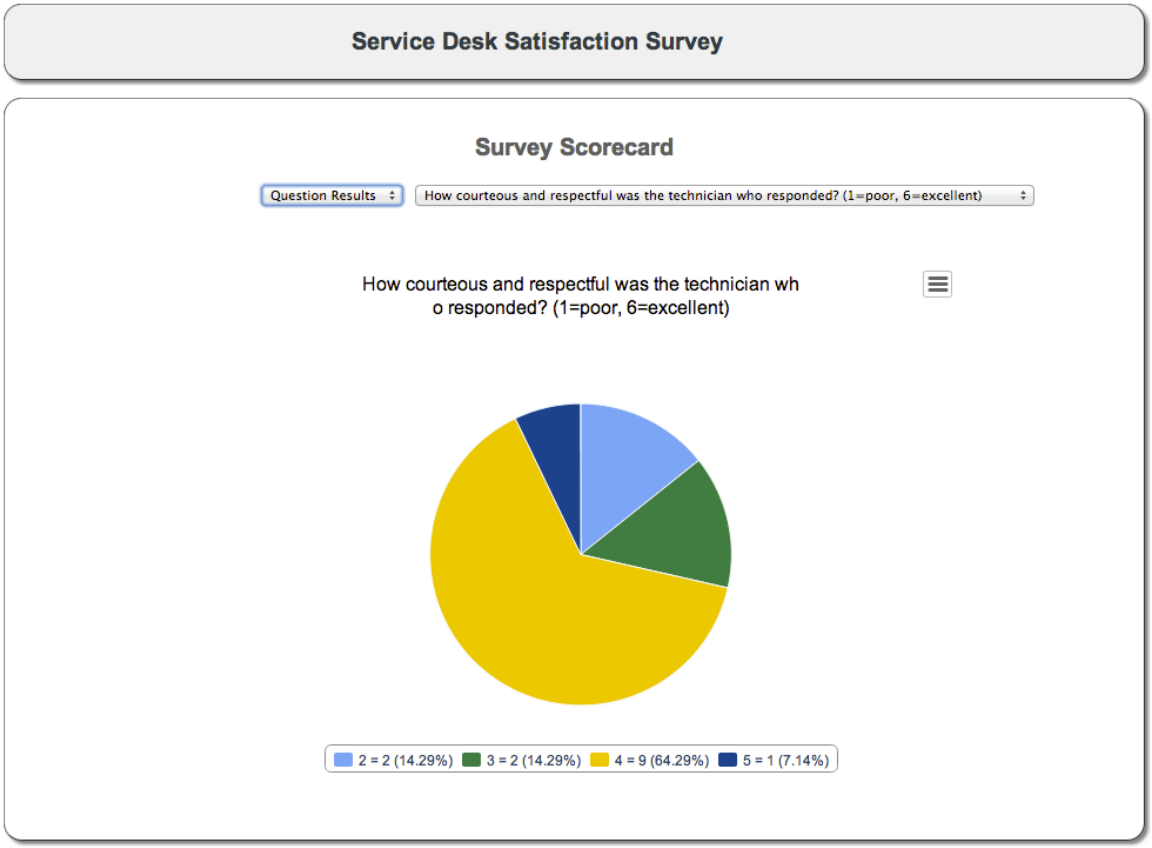
Survey scorecard question results - pie chart



Survey scorecard average ratings

The Average Ratings view displays the weighted average rating for each survey question in an individual category or all categories.

Use this view to learn how individual questions affect the overall rating for the category. Select a survey category from the choice list to display the chart for that category.

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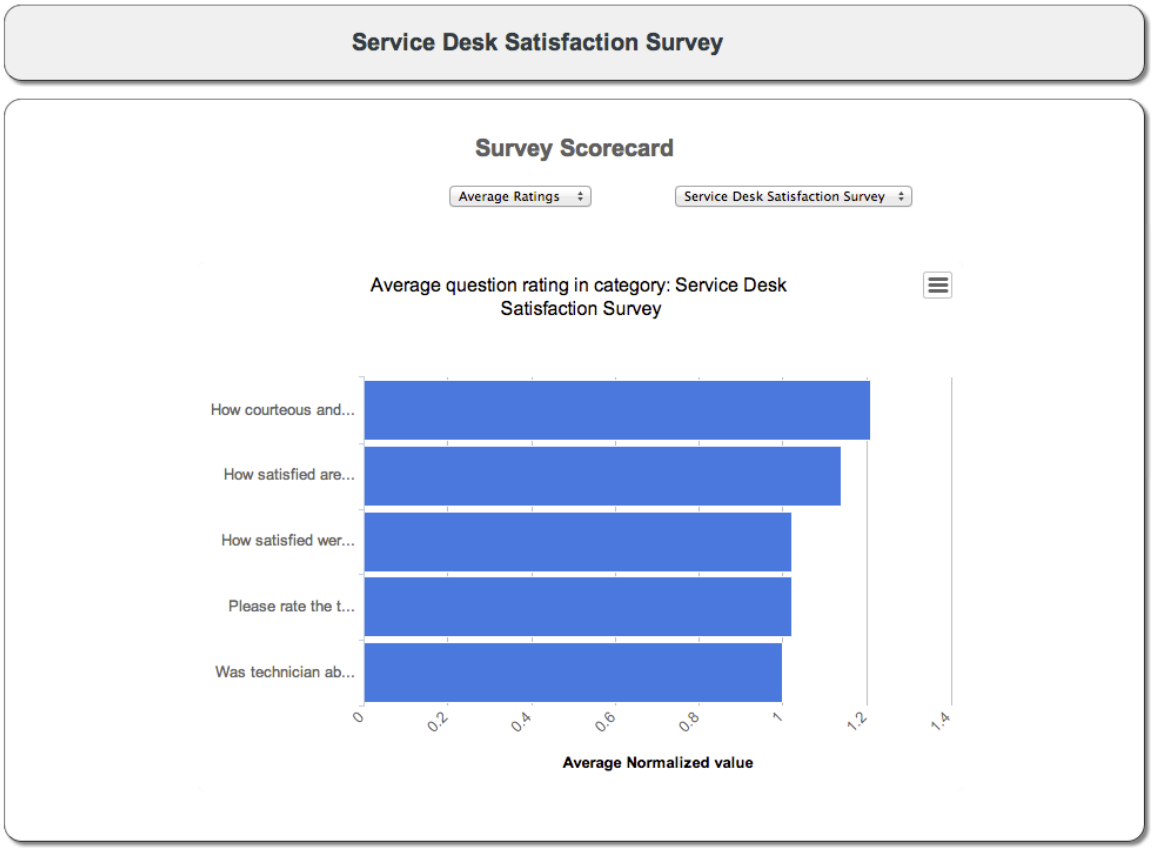
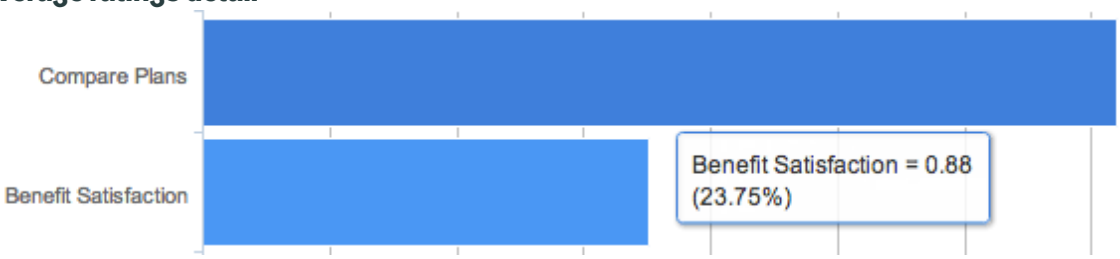
Survey scorecard average ratings



To view the effect of each question's ratings on the entire category's ratings, point to the colored bar. The pop-up box shows the percentage of the total ratings represented by each individual question's weighted average.

Average ratings detail



Survey scorecard history

The History view compares the current ratings for the categories and their questions with ratings from the previous three years or four quarters.

Ratings that have declined are highlighted in red and display negative numbers. Ratings that have improved are highlighted in green with positive numbers. Arrow icons beside the values in the **Diff** column indicate the trend of the current survey against the previous survey.

Point to a category to display a line chart that shows the rating trend for that category. Click a category to view the Survey Category form containing the survey questions.

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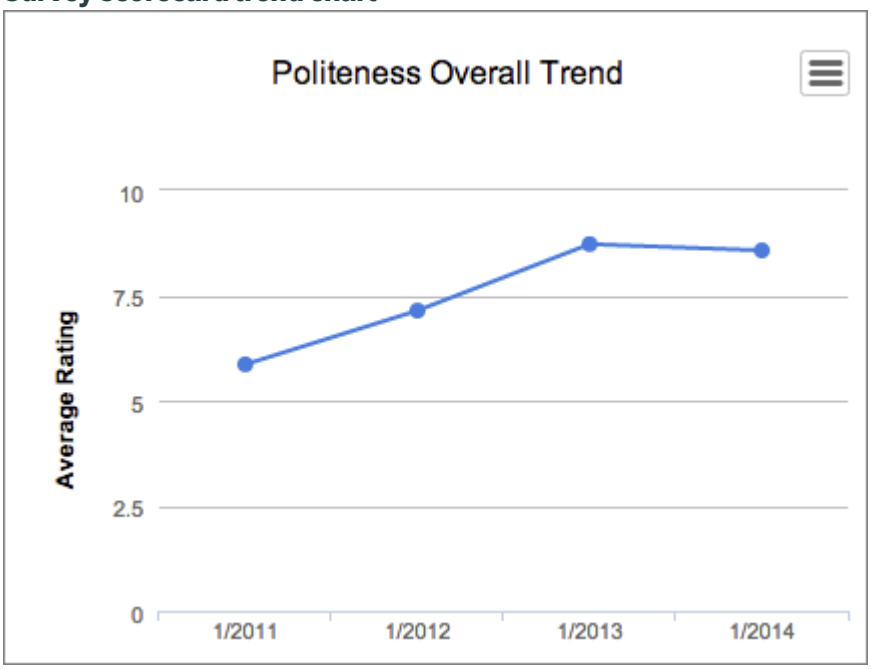
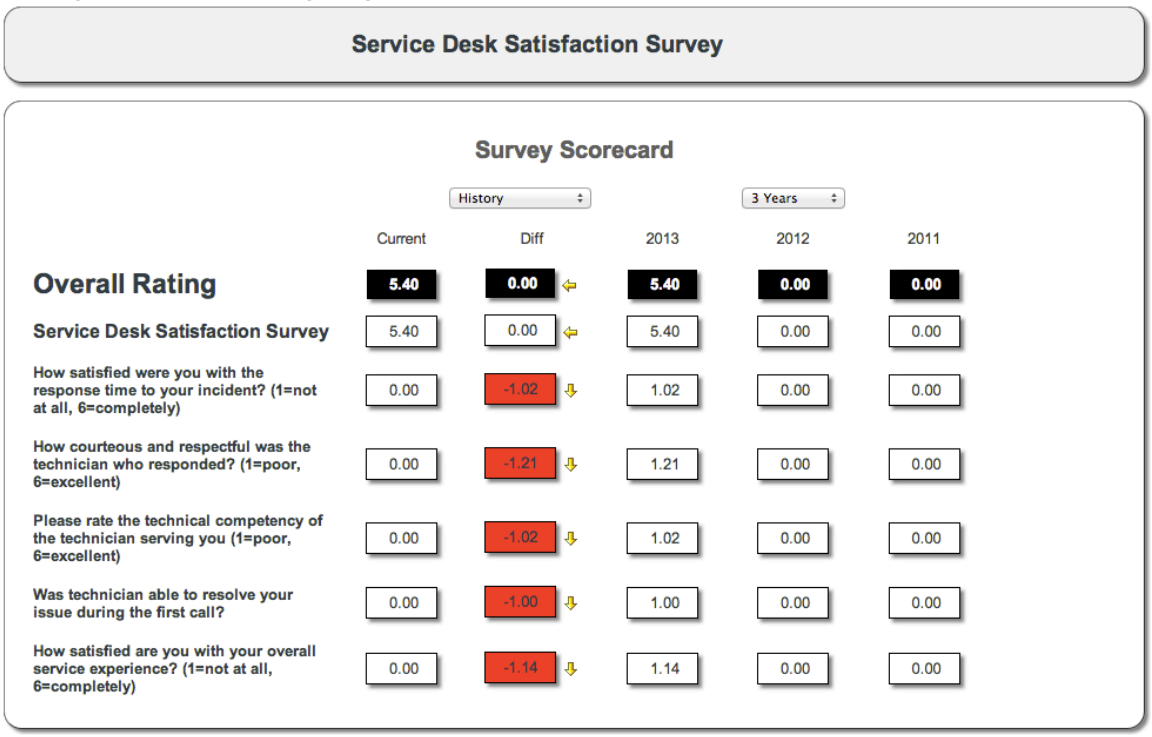
Survey scorecard trend chart



3 years

To calculate the current ratings, the system averages the ratings from the trailing twelve month (TTM) period. The **Diff** column shows the discrepancy between the current ratings and the previous calendar year's ratings.

Survey scorecard history - 3 years



4 quarters

Quarterly surveys compare the average rating for each question and category in the current quarter against the average ratings from the previous four quarters. The **Diff** column shows the discrepancy between the current ratings and the previous quarter's ratings. The column labels

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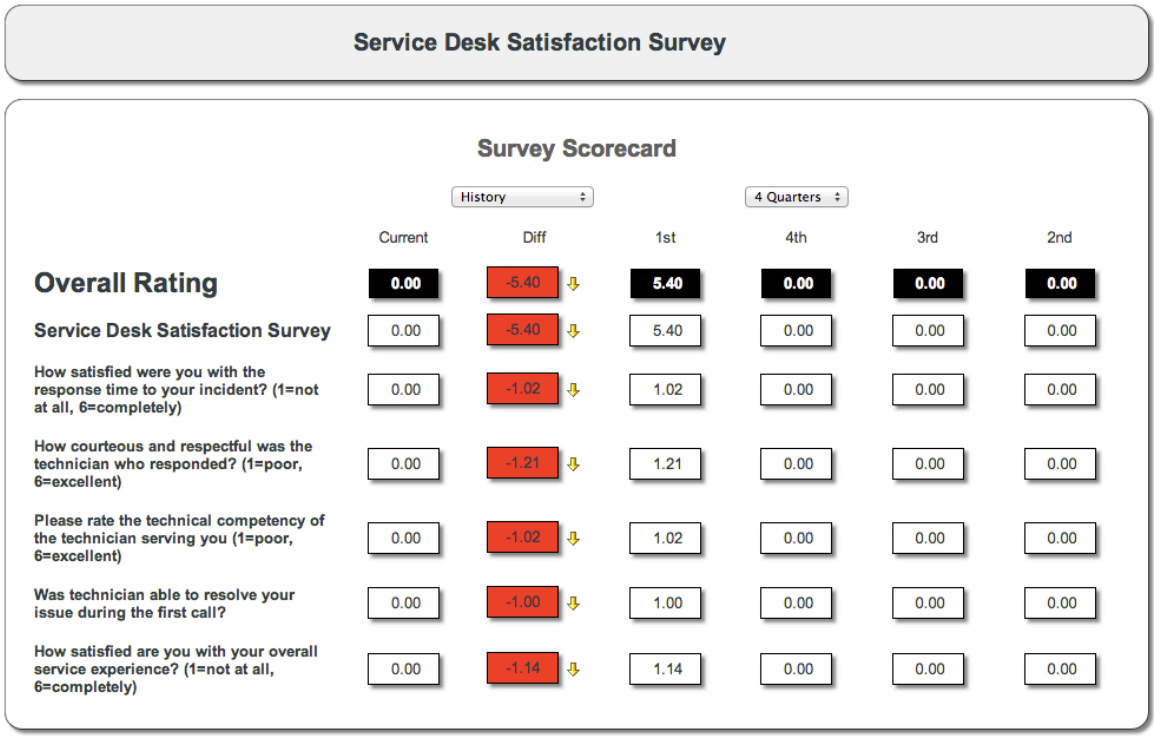
count backward, by quarter from the current quarter. For example, if the current quarter is the **3rd** quarter of 2015, then the previous quarters appear as **2nd** [2015], **1st** [2015], **4th** [2014], and **3rd** [2014]. All four of the previous quarters appear, whether or not there was any data for those quarters.

Survey scorecard history - 4 quarters



Export a survey scorecard as an image

You can export a scorecard as an image to use in presentations or other documents.

Before you begin

Role required: admin or survey_admin

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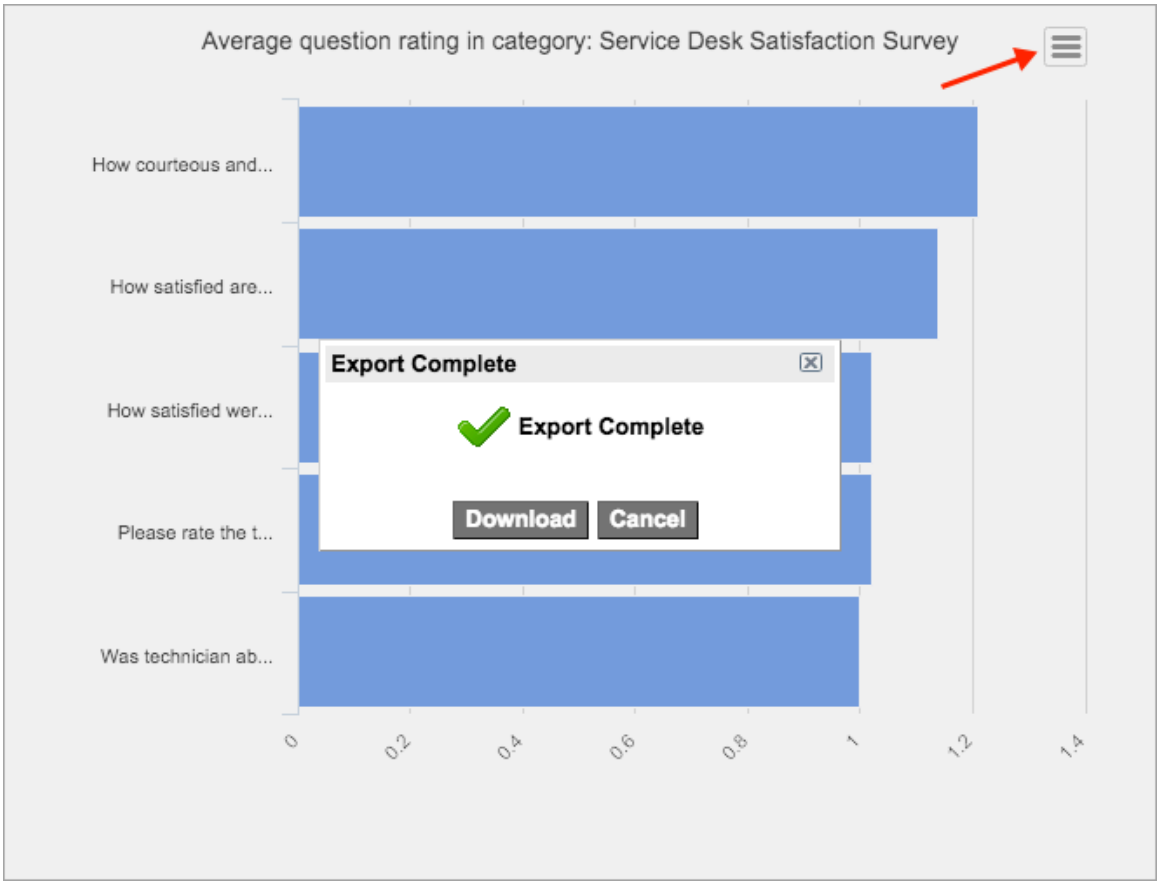
Procedure

1. Click the menu icon ( ) and select **Save as PNG** or **Save as JPEG** and wait for the export to complete.

   Example



2. Click **Download** and save the scorecard image to a storage location.

Export a quiz scorecard as an image

You can export scorecards as images.

Before you begin

Role required: assessment_admin or admin

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Procedure

1. Click the menu icon and select **Save as PNG** or **Save as JPEG** as the download format.
2. When the export is complete, select **Download** to save the scorecard image to a storage location.

Request translations for surveys

Request translations for surveys to localize them into one or more languages. Localization requested items that are created for the selected surveys in all the selected languages.

Before you begin

Role required: localization_requestor

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Select one or more surveys that you want to translate.
3. From the **Actions on selected rows** list, select **Request Translations**.
4. In the **Request Translations** dialog box, select the languages.
5. Click **Submit**.

   Localization requested items are created for the selected surveys in all the selected languages. A success message with a link to the list of requested surveys is displayed. You can click the link to see the list.

Edit translations for surveys

Edit the translations for surveys, and after you make the changes, you can publish the translation.

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Before you begin

You must install the Localization Framework Installer plugin (com.glide.localization_framework.installer) before you begin to edit the translations for a survey. To know more, see Localization Framework.

Role required: localization_editor

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey for which you want to edit translations.
3. Click **Edit Translations**.

   You can do the following actions while editing translations:

   - Edit translations manually.
   - Use machine translation (if you have configured in Localization Framework settings) to translate the fields, which are not translated. For more information about machine translation, see Create a translator configuration.
   - Export files for translation. To export files, click **Export Source File**, choose the file type, and then click **Export File**.
   - Import translated files to update the translations. To import files, from the **Export Source File** list, select **Import Translated File**.
4. After your changes are completed, click **Publish Translations**.

   After survey translations are published, they are made available to any user who takes a survey.

Survey responses in a database view

You can view survey responses in a database view for reporting purposes. For each survey instance, you can view the instance as a single row and the answers to each survey question (metric) in the corresponding columns. Analyze the responses easily and, if you want, export the survey responses.

You can create a database view on the Survey Definition form. After the database view is created, you can either export the survey response using the standard capabilities of the ServiceNow® platform or choose to create a report of the survey responses using the Reporting module.

Use the **View Responses in Rows** related link on the Survey Definition form to view each survey instance response in a separate row and each survey question as the name of the corresponding column. The answer to the question is displayed in that column. To export the survey response in a tabular form, in the context menu, click **Export**.

The first three columns of the form show the number of the survey instance (instance ID), who the survey is assigned to, and the task. A maximum of five active metrics are displayed in the view by default. The Survey Definition form doesn't show the **View Responses in Rows** related link when the following conditions occur.

- There are more than five active metrics.
- There are no responses to the survey instance.
- There are more than 100 K responses for that particular survey. To view this database view of the survey responses, the number of responses must be less than or equal to 100 K. But, the database view is still accessible for more than 100 K responses when it's already open in a new tab.

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The database view can show the start date, due date, expiry date, and completed date, but this information is not available by default. If the survey instance is triggered, then the trigger record is displayed in the Task column. The total number of survey responses isn't displayed in the database view. For the ranking and multiple-choice metrics, based on user survey responses, multiple records are displayed instead of one record per survey instance.

Note:
Any change or update to survey configuration or metadata (For example, addition or deletion of a new metric or category) might affect the database view. In such cases, an event (survey.results_view.updated) is generated so that users can take necessary actions to synchronize the data.

Survey administration

Survey administrators—users with the survey_admin role—create and maintain surveys and configure how they are distributed and published. Surveys on Service Portal are also supported.

Survey administration includes the following procedures.

- Create, customize, and publish surveys.
- Write and maintain survey questions.
- Define trigger conditions for when surveys are sent to users, such as when an incident closes.
- Maintain surveys and survey questions as the organization's needs change.

To set up surveys in Service Portal, you must first install Service Portal and then Create and edit a page using the Service Portal Designer on the page. The base system includes the Survey widget.

View survey reports

Use the Survey Overview dashboard to view various survey reports, such as Surveys by Metric Type and State.

Before you begin

Note:
The **Survey Overview dashboard** is deprecated. It is no longer deployed, enhanced, or supported. For details, see the Deprecation Process [KB0867184] article in the Now Support knowledge base.

Role required: survey_admin, survey_reader, or admin

About this task

The dashboard displays your survey reports arranged in widgets. You can add new widgets to the dashboard.

Procedure

1. Navigate to **All** > **Survey** > **Overview**.
2. Click the elements within the reports to view more information.

   For more information about working with dashboards, see Dashboards.

Survey designer

Users with the survey_admin role can use the survey designer. The survey designer lets you create survey categories and questions, configure the details, and publish the survey to specific users or groups.

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You can assign a survey to individual users or groups who receive all the questions from all the categories. You can also customize each question and make it dependent on the response to another question. The following describes the procedures you follow to create and publish a survey.

- Create survey categories.
- Create questions within each category.
- Configure survey details, such as introductory and closing remarks and time limit.
- Select recipients for the survey.
- Publish the survey to the selected users or groups.

Note:
The survey designer replaces the survey creator in the Legacy Surveys application. If you are using Internet Explorer version 8 or earlier, the system redirects you to the survey creator.

Related topics

Create a survey designer template question

Select recipients for a survey in the Survey Designer

Publish a survey in the Survey Designer

Survey designer elements

The survey designer is accessible from **Survey** > **Survey Designer**.

The survey designer contains the **Controls** tab, the **Questions** tab, the **Categories** tab,a header bar, and the design canvas.

Controls tab

To create a question, drag the appropriate data type control from the **Controls** palette and drop it onto the designer canvas.

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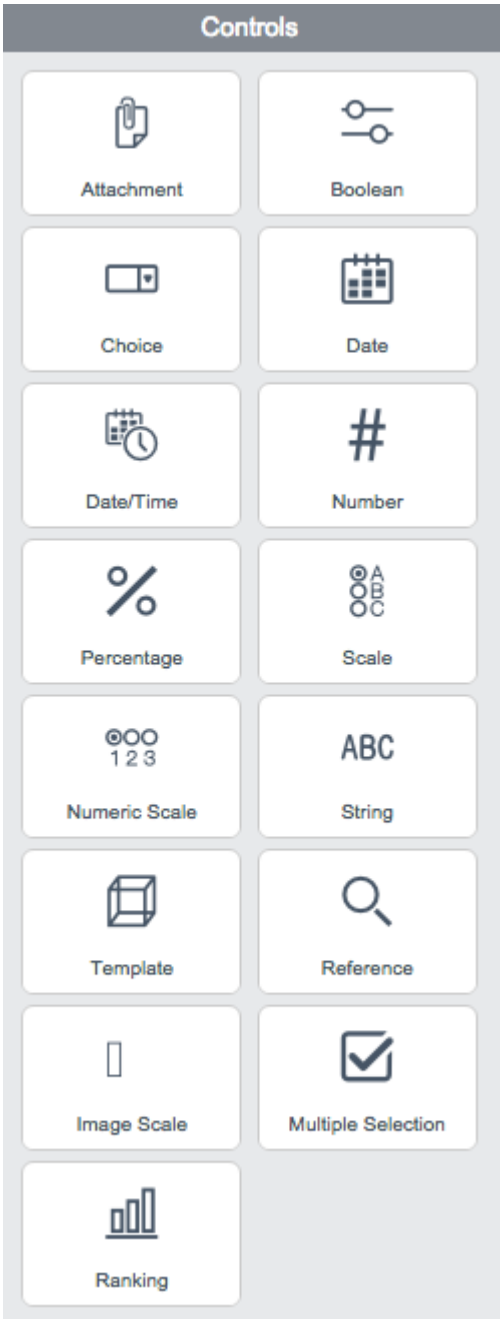
Controls



The assessment engine provides a built-in result calculation feature that converts responses to scored question data types to a score from 0 through 10.

Question data types

Data type	Scored	Description
Attachment	No	Question with a Manage Attachments icon that allows users to attach one or more files.
Boolean	Yes	Question with a check box or *Yes* and *No* choices for user responses.
Choice	Yes	List of predefined options. For more information, see the definition of the **Choices** field in Create a question in the survey designer.

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Question data types (continued)

Data type	Scored	Description
		Note: The Choice values can only be numeric, string values will not be saved.
Date	No	Date field.
Date/Time	No	Date and time field.
Number	No	Number field with predefined minimum and maximum values. The default is 1-10.
Percentage	No	Percentage field with a prescribed range.
Scale	Yes	Predefined Likert scale. Answer options appear as radio buttons.
Numeric Scale	Yes	Selectable number scale. The default is 1-5. Answer options appear as radio buttons.
String	No	Single or multi-line text field.
Template	Yes	Choice list of templates that provide a predefined scale of options. For details, see Quiz scorecards.
Reference	No	Choice list of fields from a specified reference table. This data type does not support reference qualifiers. For example, a user could select a user name if you specify sys_user as the reference table.
Image Scale	Yes	Question with a choice of images that can be selected. A template can be used to apply the same images to multiple questions.
Multiple Selection	Yes	Question with multiple check boxes that can be selected.
Ranking		Question with an order number to be selected for each option. One order number cannot be selected twice. This question can be mandatory and it can also be dependent on a parent question, but not vice versa.

Questions tab

This tab displays all metrics added to the question bank for surveys. Use the **Filter** field to search for questions. Each metric is displayed with its name and type.

Categories tab

This tab displays all metric categories added to the question bank for surveys. All metrics in the question bank are group under the corresponding metric category. Use the **Filter** field to search for categories or questions.

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Header bar

The tabs on the header bar display views and a menu of functions. Click a tab to change the view on the canvas:

- **Design**: Add and configure the properties of categories and questions. This is the default view.
- **Configuration**: Create introductions and end notes for surveys and select a signature.
- **Availability**: Select the recipients for each category in the survey.

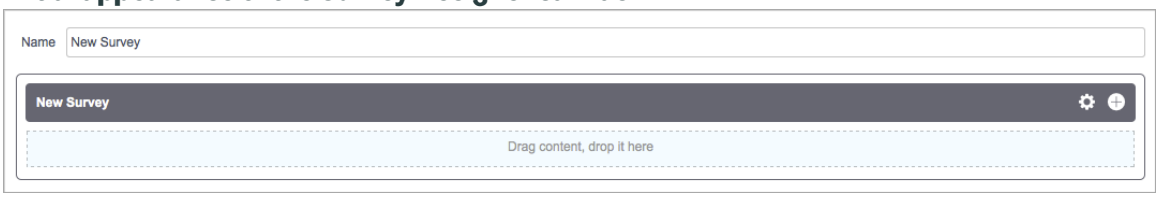
Point to the menu icon ( ) to select an option. The list of options depends on the currently open survey.

- **Save**: Save the current survey without changing its state.
- **Preview**: Display a preview of the survey as it appears to recipients.
- **Publish**: Distribute the survey to the selected recipients.
- **Save and Publish**: Save the survey to the **Draft** state and distribute the survey in one step.
- **New Survey**: Open a fresh canvas for a new survey.
- **Load Survey**: View the list of existing surveys.
- **Copy Survey**: Copy the current survey.

Design canvas

New surveys open in the canvas of the **Design** view. The survey **Name** field appears above first category in the canvas. A blank question field appears in the category container.

Initial appearance of the Survey Designer canvas



Configure a survey in the survey designer

Configuration settings apply to the entire survey.

Before you begin

Role required: survey_creator, survey_admin, or admin

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition in Survey Designer.
3. Select the **Configuration** tab.
4. On the Survey Designer Configuration form, fill in the fields.
   For a description of the field values, see Survey Designer Configuration form.
5. Select the **Availability** tab and complete the form.

Related topics

View a survey scorecard

Create a survey designer template question

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Select recipients for a survey in the Survey Designer

Publish a survey in the Survey Designer

Event scheduling

Create an assessment signature

Survey categories

Survey categories provide a way to group questions of a similar theme for a given survey.

There must be at least one survey category per survey definition and every survey question must be associated with a category. When you create a survey, the system generates one category, which all the questions belong to.

For simple surveys, one category is usually enough. Consider creating additional categories if you want to accomplish any of the following tasks.

- Separate groups of questions into collapsible sections by category on the survey questionnaire.
- Report on category scores, which are calculated based on responses for all questions within each category.

Create a category in the survey designer

A category represents a theme for evaluating a specific element of the survey topic and contains questions pertaining to that theme.

Before you begin

Role required: admin or survey_admin

About this task

When you create a survey, the system creates a default category, using the name of the survey. You can use this category, modify it, and create additional categories as needed. To have any results, a category must contain scored questions.

Procedure

1. Navigate to **All** > **Survey** > **Survey Designer**.
2. Enter the name of the survey in the **Name** field.
   The system uses this name as the name of the survey and of the first category.
3. To configure the category, click the gear icon in its title bar and complete the following steps in the Properties dialog box.
   a. Enter a new name and a description for the category.
   b. Enter text in the **Details** field that introduces or explains the category to recipients.
   c. Click the **X** icon to close the Properties dialog box and save your settings.
4. To add a new category, click the **+** icon in the title bar of an existing category.
   The new category appears below the category that you selected to create it. You can click the **X** icon in a category header to delete a category that you added in error.

Create a survey category in a survey

You can modify an existing survey to add one or more survey categories.

Before you begin

Role required: admin or survey_admin

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About this task
Only one category is required for each survey, but you can add additional categories as needed.

Procedure
1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
3. In the **Metric Categories** related list, open a category or click **New**.
   Each survey category is stored as a record on the Metric Category [asmt_metric_category] table with a modified view for survey use.
4. Enter the survey category name and description.
   The category name appears on questionnaires when either of the following is true.
   - There is more than one category for the survey.
   - There is only one category and its name is different from the survey definition name. If you create a survey using the survey creator, the category name is the same as the survey definition name.
5. Right-click the form header and click **Save**.
   The **Assessment Metrics** and **Users** related lists appear.
6. Click **Update**.

Create a question in the survey designer

You can create multiple questions for each category in the survey designer, but each question can only be associated with one category.

Before you begin
Role required: admin or survey_admin

About this task
The data type that you select for each question determines how it can be answered by survey recipients.

Procedure
1. In the Design view, drag a data type icon from the Controls palette and drop it into a category container.
2. To configure the question, click the gear icon in its title bar.
   The Properties dialog box opens.
3. On the Properties form, fill in the fields.
   For a description of the field values, see Properties form.
4. To create any special conditions that must be met before the question appears on the survey, click the Dependency tab.
   The question must have a data type of **Boolean**, **Choice**, **Scale**, or **Template**.

   For example, the question, “How many states have you visited in India”, is a dependent question for the current question “Have you visited any other state in India?”. The dependent question appears exactly below the current question only if your answer satisfies the condition in the current question. If not, the dependent question does not appear anywhere in the survey.

5. Select a question in the **Displayed when** field.
   The system selects the appropriate operator and displays the possible answers for the selected question.

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6. Select the answer that satisfies the condition.
   You can select more than one answer. Selected answers are indicated by a check mark.

   The system prevents recursive dependencies between questions. For example, if Question A depends on Question B, Question B cannot depend on Question A.
7. Click the **X** icon to close the question properties dialog box and save your settings.
8. To add a question with the same data type as an existing question in the category, click the **+** icon in the title bar of the existing question.
9. Drag and drop questions to change their order within a category or move them between categories.
10. To delete a question, click the **X** icon in its title bar.

Related topics

Survey question template

Create a survey designer template question

Survey question data types

You must choose a data type for each survey question. The data type determines the format of the question and the kind of data that is collected on survey questionnaires.

The following data types are available for surveys:

Attachment data type

On questionnaires, users can attach one or more files to a question.

Users click the Manage Attachments icon and select one or more files in the Attachments pop-up window to attach to the question. From this window, users can:

- View a list of the attached files.
- View an attached file in a separate window.
- Rename an attached file.
- Add or delete files

Once a survey has been submitted, attachments cannot be updated or deleted.

Any type of file supported by the platform can be attached to a question. One or more files can be attached a question while taking a survey or completing an assessment.

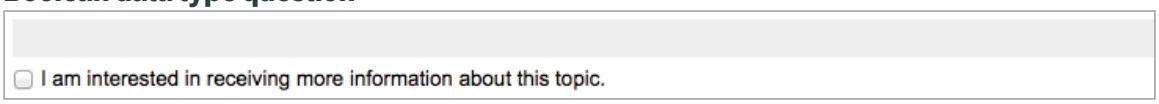
The assessment administrator can see the attachments associated with an individual question as well as those associated with the survey.

See Administering attachments for more information.

Boolean data type

On questionnaires, users select a check box beside a statement or leave it cleared.

Boolean data type question



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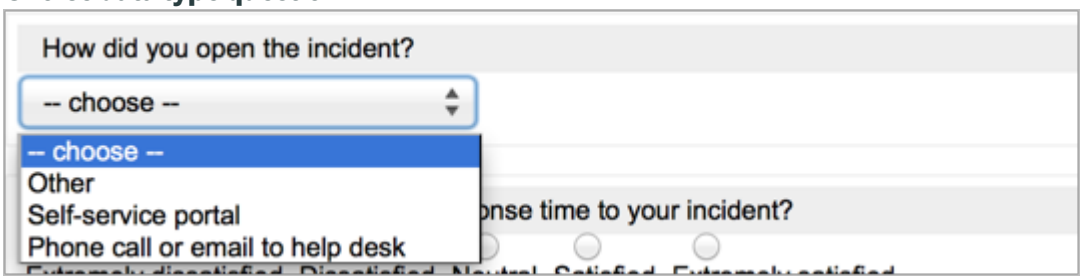
If you select **Boolean**, you must fill in the **Scale definition** field. Select **High** if it is best when users select the check box.

Choice data type

On questionnaires, users select a value from a list of choices.

Choice data type question



If you select **Choice**, you must fill in the **Scale definition** field and create answer options. Select **High** for the scale definition if the answer option with the largest metric definition **Value** is best.

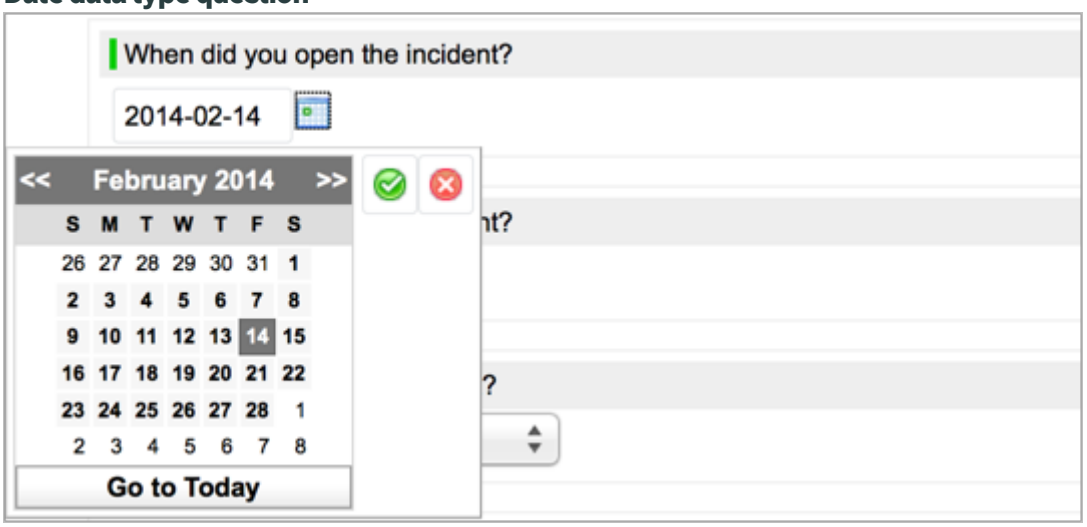
> **Note:**
> The system sets the **Min** and **Max** fields automatically based on the **Value** settings for the associated metric definitions.

Date and Date/Time data types

The **Date** and **Date/Time** data types are similar.

- **Date:** On questionnaires, users select a date.

Date data type question



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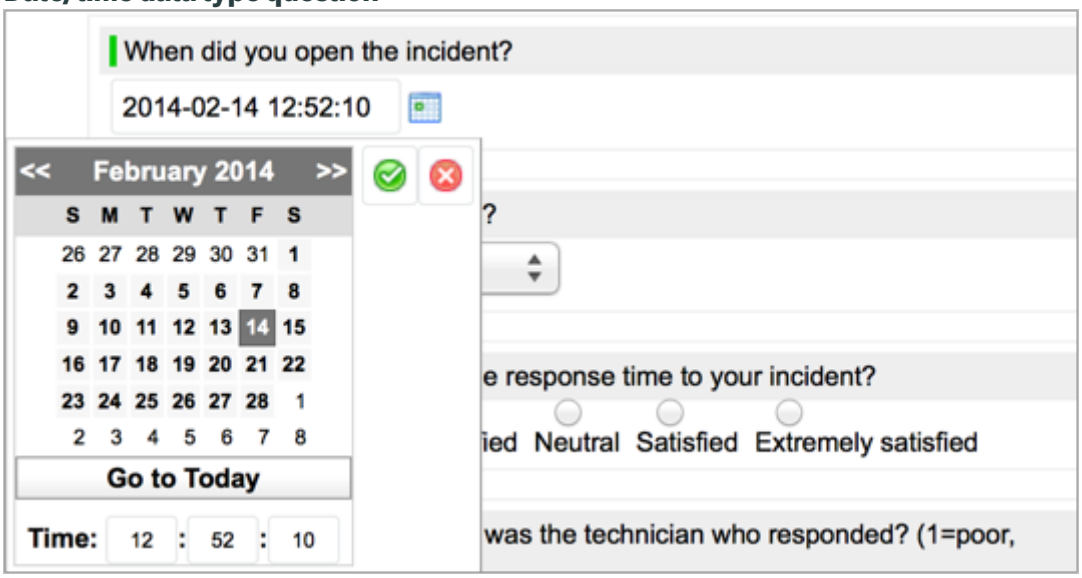
- **Date/Time:** On questionnaires, users select a date and time.

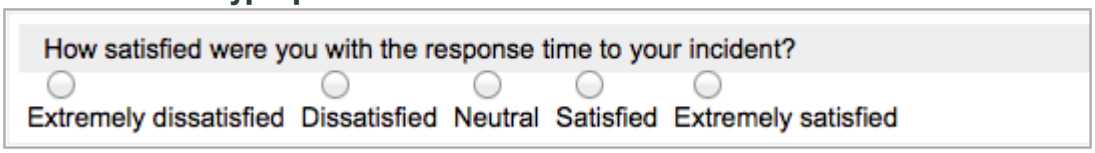
Date/time data type question



Likert Scale data type

On questionnaires, users select a multiple choice value from a custom Likert scale. Each answer option is represented by a radio button on the scale. A Likert scale question that evaluates an application's ease of use might have the answer options **Easy**, **Average**, and **Difficult**.

Likert scale data type question



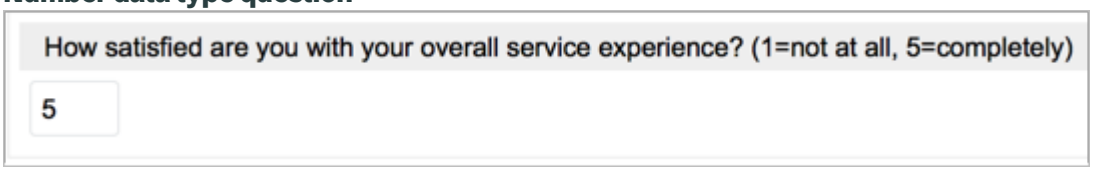
If you select **Likert Scale**, you must fill in the **Scale definition** field and create answer options. Select **High** for the scale definition if the answer option with the largest metric definition **Value** is best.

Note:
The system sets the **Min** and **Max** fields automatically based on the **Value** settings for the associated metric definitions.

Number data type

On questionnaires, users enter a number.

Number data type question



If you select **Number**, you must fill in these additional fields:

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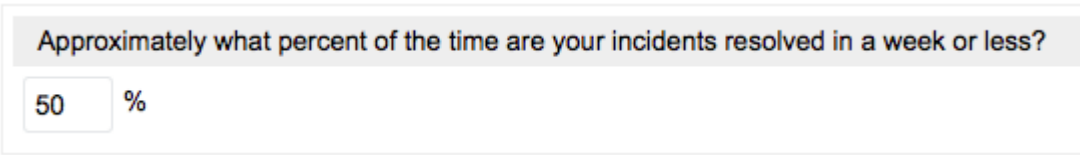
- **Scale definition**: Select **High** if a larger number is better, such as for a question that measures the number of sales made in a quarter.
- **Min** and **Max**: Enter the smallest and largest numbers users can enter. State the range of acceptable answers in the question text.

Percentage data type

On questionnaires, users enter a number.

Percentage data type question



If you select **Percentage**, you must fill in these additional fields:

- **Scale definition**: Select **High** if a larger percentage is better, such as for a question that measures the percentage of work an agent has completed.
- **Min** and **Max:** Enter the smallest and largest numbers users can enter. Generally **0** and **100** are appropriate minimum and maximum values. If you choose values other than **0** and **100**, it is usually best to state the range of acceptable answers in the question text.

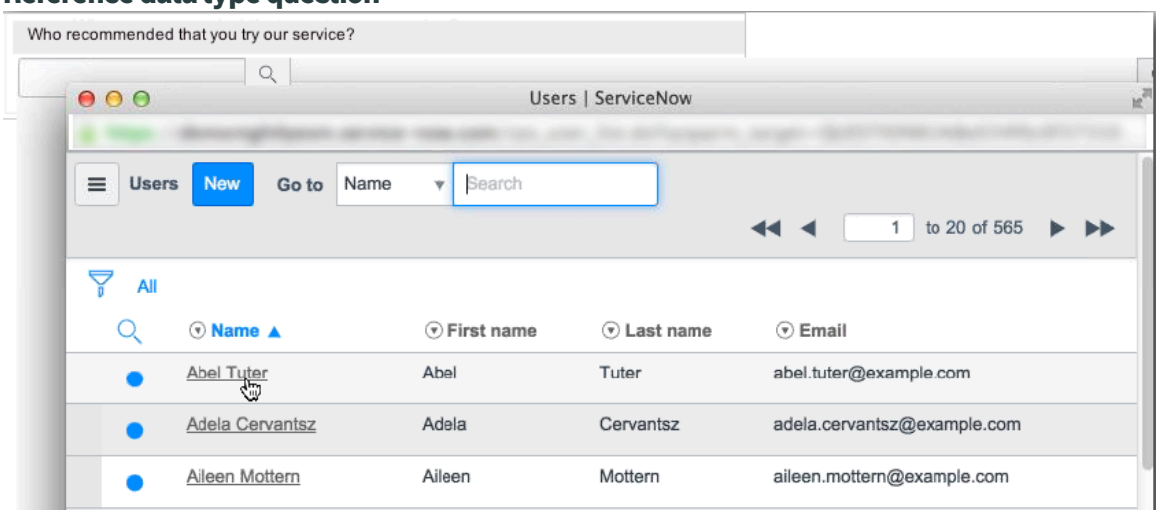
Reference data type

On questionnaires, users select a value from a list that is generated from a specified reference table. The response field supports auto-completion.

Note:
Reference qualifiers are not supported.

For example, a user could select a user name in response to a question if you specify User [sys_user] as the reference table.

Reference data type question



String data type

On questionnaires, users enter text. When you select **String**, the **String option** field appears. Select one of the following options to determine how the string field appears on questionnaires:

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- **Single line**

- **Single line wide**

- **Multiline**

Template data type

On questionnaires, users select a value from a predefined series of answer options. To use this data type, a question template must be defined.

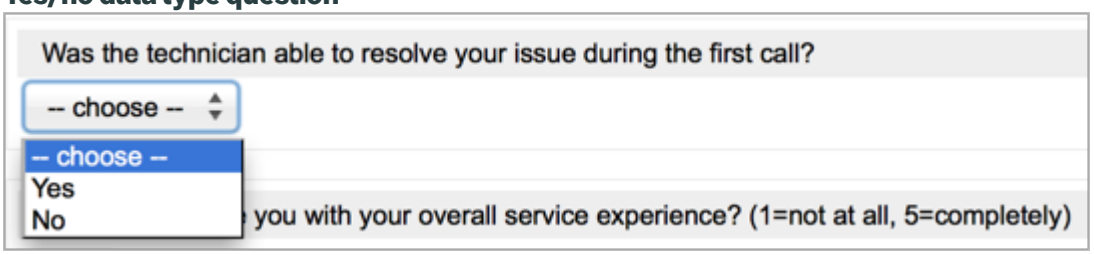
If you select **Template**, you must fill in these additional fields:

- **Template**: Select a template.
- **Scale definition**: Select **High** if the answer option with the largest template definition **Value** is best.

Yes/No data type

On questionnaires, users select **Yes** or **No** from a list.

Yes/no data type question



If you select **Yes/No**, you must fill in the **Scale definition** field. Select **High** if **Yes** is the best answer.

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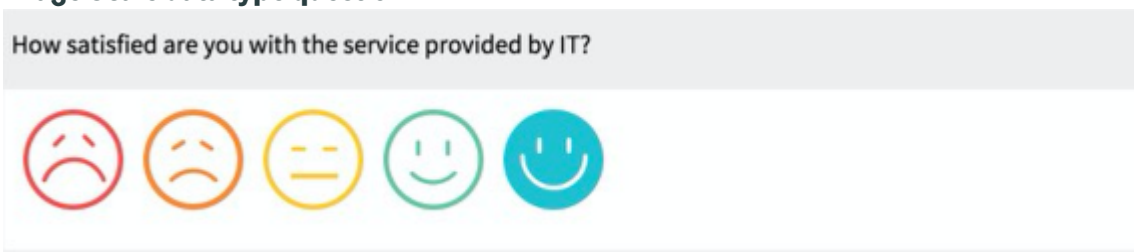
Image Scale data type

On questionnaires, users select an image from a predefined set of images as their response. Image scale questions can also be used in a template for better performance with surveys that have the same type of answer options.

Five emojis, similar to the Likert scale (very dissatisfied to very satisfied) are provided. However, you can upload additional images in JPG, PNG, or GIF format. Two images can be uploaded, one for selected case and another for unselected case. For example, the selected image can be , and the unselected image can be . Larger size images are reduced to 64 x 64 pixels.

Image Scale data type question



The result behavior depends on the presence of uploaded images. If no selected image is uploaded, then the question shows up blank.

Selected image	Unselected image	Result
Yes	Yes	Unselected image loads. Clicking the image changes it to the selected image.
Yes	No	Selected image loads with 50% opacity. Clicking the image changes the opacity to 100%.
No	Yes	A blank placeholder box is displayed.
No	No	A blank placeholder box is displayed.

Note:

- N/A option is not supported for image scale type question.
- For an image scale type question, an empty string is saved as an answer for a hidden and dependent question of an unselected image.

Multiple selection data type

On questionnaires, users can select multiple check boxes indicating all answers that apply. For instance, a user can be instructed to "Select all that apply" in a multiple selection question.

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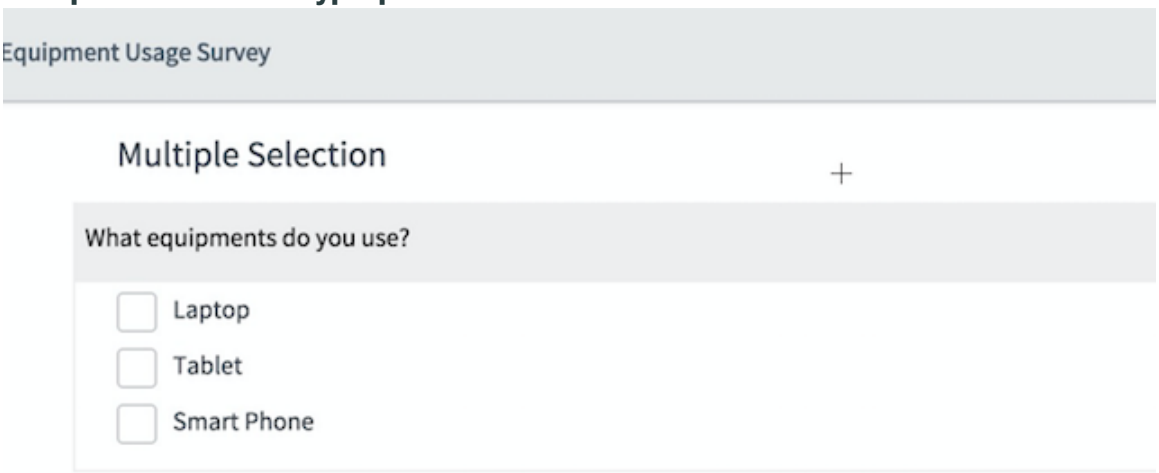
Multiple Selection data type question



Ranking data type

On questionnaires, users can select a different order number for each option to rank them. Drag-and-drop functionality is also supported, which allows a user to either fill in the number, or simply drag an option.

Setting the order of the options

One order number cannot be selected twice. This question can be mandatory and it can also be dependent on a parent question, but not vice versa.

Related topics

Survey question template

Create custom metric type

Create your own custom metric type if you don't find the metric type that you want in Survey Designer while designing surveys.

Before you begin

Role required: survey_admin, survey_creator, or admin

About this task

You can use the Custom Metric Type module for surveys to create the custom metric type. If you set the custom metric type using the Now Mobile app, ensure that the widgets support the current theme of Mobile Employee Service Portal.

Procedure

1. Navigate to **All** > **Survey** > **Administration** > **Custom Metric Type**.
2. On the Custom Metrics page, click **New**.

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3. On the Custom Metric form, fill in the fields.
   For a description of the field values, see Custom Metric form.
4. Select **Submit**.

Note:

- Updating or deleting existing values in the **Macro**, **Widget**, and **Result type** fields might cause inconsistent effects.
- The custom metric type that you created doesn't appear for the public surveys. To make it visible for the public surveys, open the Service Portal configuration and configure your survey widget to make it public. For more information about configuring widget security, see Configure widget security.
- If the custom metric type is inactive or deleted, the question is not rendered on the survey form.
- If the value in the **Macro** or **Widget** field is updated, the updated value is used to render a survey form even if an instance was created before updating the values for macros or widgets.

Edit a survey in the survey designer

You can modify surveys using the survey designer.

Before you begin

Role required: admin or survey_admin

About this task

You can edit a survey even after it has been distributed, with the following results.

- Added questions are available only on surveys that are distributed after this change.
- Changes to existing questions are immediately available to users before the survey is submitted or during the retake period. This includes changes to the answers, such as additional choices or changes to the data type.
- Deleted questions are also deleted from the distributed surveys in user queues.

Note:
You can only edit a survey that has the same application scope as that of your current session.

Procedure

1. Navigate to **All** > **Survey** > **Survey Designer**.
2. Point to the menu icon in the survey header bar, and select **Load Survey**.
3. Select a survey from the list and modify it as needed.

Note:
Update the **Sample metric** field only after you complete all other survey configurations. If you need to modify the survey configuration, first remove the question from the **Sample metric** field. After you finish making changes, add the question back to the field.

4. Point to the menu icon in the survey header bar, and select **Save** or **Save and Publish**.
   When you publish the edited survey, the system generates survey instances for any associated survey users.

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Configure category weights for a survey

You can assign a weight to each category in a survey. The system calculates results from the weight that you configure.

Before you begin

Configure the Survey Category form to display the **Weight** field.

Role required: admin or survey_admin

About this task

Weights are set to a value of **10** by default but can be changed.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys** and select a survey from the list.
2. In the Survey Definition form, select a category from the **Metric Categories** related list.
3. Edit the default weight value.
4. Click **Update**.

View a survey instance

A survey instance represents one questionnaire assigned to one user. You view an instance to verify that survey instances were created, to check the state of a survey instance, or to reassign a survey instance.

Before you begin

Role required: admin or survey_admin

Procedure

1. Navigate to **All** > **Survey** > **Survey Instances**.

   The following sub-modules are available based on the state of the instances:

   - **Ready to take**: Displays survey instances that are ready to be taken by the user. By default, these instances are sorted in ascending order by the **Number** field.
   - **In progress**: Displays survey instances that are in progress. By default, these instances are sorted in ascending order by the **Number** field.
   - **Completed**: Displays survey instances that are complete. By default, these instances are sorted in descending order by the **Taken on** field.
   - **Cancelled**: Displays survey instances that are cancelled. By default, these instances are sorted in ascending order by the **Number** field.
   - **All**: Displays survey instances in all states. By default, these instances are sorted in ascending order by the **Number** field.

2. Open a survey instance from the required sub-module.

   By default, you can view the following fields in the Survey Instance form for all sub-modules other than **Completed**.

   - **Number**
   - **Metric type**
   - **Due date**
   - **State**

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- **Assigned to**
- **Domain**
- **Expiration date**
- **View User's Response**
- **Retry Sentiment Analysis**
- **Assessment Instance Questions**

Note:

- When you open an instance in the **Completed** sub-module, you are redirected to the User's Response page.
- Each survey instance is stored as a record on the Assessment Instance [asmt_assessment_instance] table with a modified view for survey use.

Related topics

Schedule periods

Event scheduling

Survey users and groups

Survey users and survey user groups help survey administrators control who can take a survey.

Survey administrators can restrict a survey so that only specified users can access it unless a survey administrator manually assigns the survey to a different user. Survey user groups provide a way to quickly designate multiple survey users.

Administering survey users

The list of survey users for a survey is visible on the Survey Definition and Survey Category forms. You can add or remove users from the list of survey users at any point. Note that designating a survey user does not automatically generate a survey instance for that user unless both of the following conditions are true:

- The survey definition **Schedule** period is set to **Daily**, **Weekly**, **Monthly**, or **Yearly**. In this case the system assigns a new survey instance to each survey user at the beginning of each schedule period.
- The user has no instances of the survey that are incomplete or that have not yet reached their expiration date.

You can designate survey users from the Survey Designer, the Survey Definition form, or the Survey Category form.

Note:
If there are trigger conditions for a survey, do not create survey users. Instead, use the Trigger Conditions form to assign users.

Related topics

Send survey invitations to users

Survey trigger conditions

Survey categories

Survey definitions

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Create a survey user group

Survey user groups are groups that have the **Type** field set to survey and display only the information most relevant to surveys. You can assign survey groups or any user group to surveys.

Before you begin
Role required: admin or user_admin

About this task
Though it is possible to designate members of any group as survey users, one reason to create a survey group is to view it conveniently in the survey **User Groups** module.

By default, the Survey Creators user group is available. When you add a user to this group, the user will be assigned the survey_creator role to create surveys, quizzes, or assessments and view only those surveys, quizzes, or assignments created by the user.

Procedure

1. Navigate to **All** > **Survey** > **Administration** > **User Groups**.
2. Click **New**.
3. Complete the Group form.
4. Right-click the form header and click **Save**.
   The **Group Members** and **Groups** related lists appear.
5. To add group members, complete the following steps.
   a. In the **Group Members** related list, click **Edit**.
   b. Select users from the list on the left and add them to the **Group Members List** on the right.
   c. Click **Save**.

Related topics

Create a group

Select recipients for a survey in the Survey Designer

You can assign survey users while designing or modifying the survey.

Before you begin
Role required: admin or survey_admin

Procedure

1. In the Survey Designer, click the **Availability** tab.
2. Under **Accessible by:**, select the **Specific users** option, then select users.
3. If desired, select the **Survey groups only** check box, then select survey user groups or other groups.
4. Click **Save**.

Designate a survey user

You can designate one survey user at a time from the Survey Definition form.

Before you begin
Role required: admin or survey_admin

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Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
   There must be at least one category.
3. In the **Survey Users** related list, click **New**.
4. Select a **User**.
5. Click **Submit**.
   The Survey Definition form reopens.
6. **Optional:** To remove survey users, in the **Survey Users** related list, select the check box beside the user, and then select **Delete** from the action list below the list.

Designate or remove multiple survey users at one time

Use the Survey Category form to designate or remove multiple survey users at a time.

Before you begin
Role required: admin or survey_admin

Procedure

1. Open a survey definition.
2. In the **Metric Categories** related list, open a category.
   You can choose any category. The system applies survey user changes to all the survey's categories automatically.
3. In the **Users** related list, click **Edit**.
4. Use the slushbucket to add or remove survey users.
5. Click **Save** to return to the survey category.
   The changes are also reflected in the **Survey Users** related list on the survey definition.

Allow recipients to retake a survey

You can configure a survey to allow recipients to resubmit their answers as many times as they like, up to the survey's due date.

Before you begin
Configure the Survey Definition form to display the **Allow retake** field. For more information, see

Configure the form .

Role required: admin or survey_admin

About this task
Results are not calculated for the survey until the configured duration has elapsed. The card in the user's queue remains visible until the due date of the survey, and a button is displayed to allow retakes.

Procedure

1. Navigate to **All** > **Surveys** > **View Surveys**.
2. Select a survey from the list.
3. Select the **Allow retake** check box.
4. Click **Update**.

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Copy a survey

Create a copy of a survey with at least one category to reduce the effort of creating another survey with similar data.

Before you begin
Role required: survey_admin or admin, survey_creator

Note:
Users with the survey_creator role can copy a survey only if they own the survey. If they do not own the survey, they cannot copy it.

About this task
All associated questions (type), configurations, categories, metrics, domain separation rules, and role-based categories are copied. Assigned users, category users, instances, and trigger conditions are not copied.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
3. Perform any of the following steps.

Publish a survey

You must publish a survey to enable people to receive and complete survey instances.

Before you begin
Role required: admin or survey_admin, survey_creator

Note:
Users with the survey_creator role can publish a survey only if they own the survey. If they do not own the survey, they cannot publish it.

About this task
The **State** field on the Survey Definition form indicates whether the survey is in the **Draft** or **Published** state.

Note:
You cannot return a survey to the **Draft** state after it has been published. You do have the option to deactivate a survey by clearing the **Active** check box.

Procedure

1. Navigate to **Survey View Surveys** and select a survey to publish.
2. Click **Publish**.
   When you publish a survey, the system generates survey instances for any associated survey users. You can assign the survey to other users manually.

Publish a survey in the Survey Designer

You must save changes to a survey before you can publish it to the specified recipients or groups.

Before you begin
Role required: admin or survey_admin

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Procedure

1. In the Survey Designer, point to the menu and select **Load Survey**.
2. Select a survey to publish.
3. To preview the survey as a user, point to the menu icon and click **Preview**.
4. When you are satisfied with the survey, click either **Save and Publish** or **Publish** to distribute it. When you publish a survey, the system sends email notifications to the recipients and to their managers. The system displays a link to the survey on a card in each recipient's My Assessments & Surveys portal.

Customize the appearance of a survey

As an assessment and survey administrator, set properties to customize the color of various elements on the questionnaires.

Before you begin

Role required: survey_admin or admin

About this task

For color properties, enter either an HTML color name or hexadecimal (hex) value. For hex values, the # character is required. Values aren't case-sensitive.

For example, if all the following formats are valid: `LightGray`, `lightgray`, and `#D3D3D3`, a preview of the color appears next to the field.

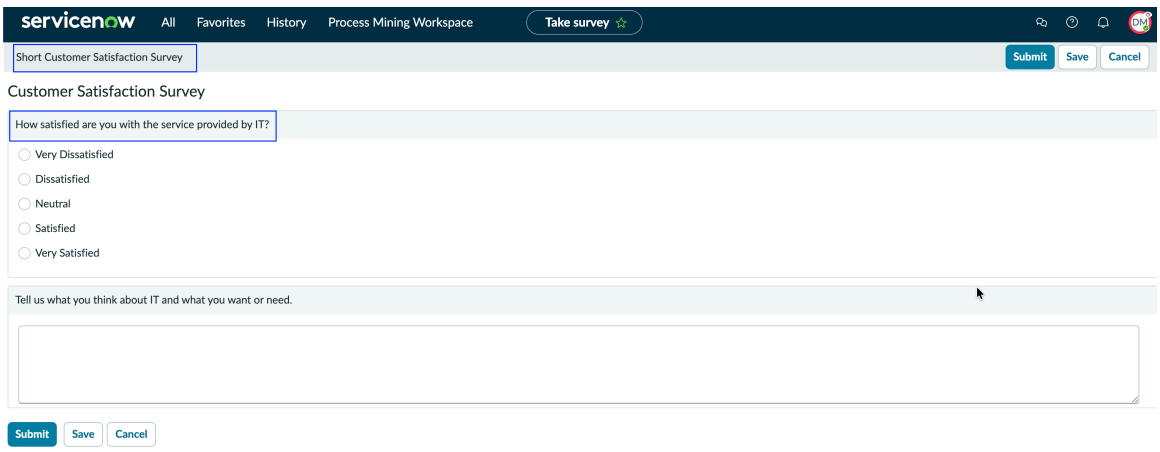
The customizations that you make apply to all assessments and surveys.

Procedure

1. Navigate to either of the following modules.
   - **Assessments** > **Admin** > **Assessment Properties**
   - **Survey** > **Administration** > **Properties**

   For a description of the properties, see .
2. On the Properties page, edit the properties as needed.
   Refer to the following screenshot to see which parts of the assessment questionnaires are controlled by the properties.

> **Note:**
> You can customize the **Caption font color**, **Caption background color**, and **Question header background color** only if Next Experience is turned off.



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3. Click **Save**.
   Clear the browser's cache to see updates.

Survey definitions

A survey definition is the root record upon which a survey is built.

The survey designer generates a survey definition automatically when you save or publish the survey. Survey administrators may want to modify the survey definition to configure additional options for the survey, or to publish the survey when it is ready for distribution.

Survey administrators and survey readers can also send survey invitations directly to users from the survey definition.

Related topics

Send survey invitations to users

Modify a survey definition

You can configure additional options for a survey definition.

Before you begin

Role required: admin, survey_creator, or survey_admin

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
   Each survey definition is stored as a record on the Assessment Metric Type `[asmt_metric_type]` table with a modified view for survey use.
2. Open a survey definition.
   The **Response Trend** chart with the weekly trend of the survey instance count, and the **Survey Summary** chart with the overall summary response based on instance states are displayed.
3. Modify the fields on the Survey Definition form.

Note:
You can only edit a survey that has the same application scope as that of your current session.

Survey Definition form

Field	Description
Name	Name of the survey which appears on the questionnaire.
Description	Helpful information about the survey.
Active	Check box to activate the survey definition. When the **Active** check box is cleared, new survey instances cannot be generated and users cannot complete existing survey instances. Use the **Active** check box to deactivate or activate a published survey.
Owners	Owners of the survey. You can add a user with the survey_creator, survey_admin, or assessment_admin role.
Anonymize responses	Check box to ensure that all responses for this survey are stored without the submitting user names. When a user submits a survey, the system clears the **Assigned to** field for the associated survey instance. Also, survey responses for anonymous surveys do not contain **Assigned to** values.

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Field	Description
	Note: The **Assigned to** field is cleared. However, each response record includes the **Created By** and **Updated By** fields that are accessible to users with the survey_admin role.
State	Status of the survey: **Draft** or **Published**.
Allow retake	Check box that allows users to modify their answers to a completed survey. Users can resubmit a survey as many times as they want until the due date. After that date, the system removes the survey from the user's My Assessments & Surveys page.
Scheduled job	Scheduled job that the system creates for this survey definition when the schedule period is a repeating interval. The system sets the scheduled job to run according to the selected schedule period. ○ If you change the schedule period and save the survey definition, the system deletes the old scheduled job. ○ If you selected a recurring schedule period, a new scheduled job is created. For example, if you change the schedule period from **Daily** to **Weekly** and save the record: ○ The system deletes the daily scheduled job. ○ Creates a weekly one set to run a week from the current date. This field is visible to administrators only if the schedule period is **Daily**, **Weekly**, **Monthly**, or **Yearly**.
Assessment duration	The length of time to complete assigned survey instances, starting from the time the survey instance is generated. The assessment duration sets the Due date for each survey instance. The default duration is 14 days. Configure the form to view this field.
Send notifications	Sends notifications to the assigned users when the survey is published if there is an active notifications setup. Configure the form to see the field.
Other Options	
Sample Metric	A metric of the current survey that you can include as an image in the email or invitation sent to a survey user. When the survey user clicks the image in the email or while previewing the HTML body, the entire survey is available to be taken. **Note:** You cannot edit or delete a metric that is selected in this field.
Signature	Acknowledgement by a survey recipient of requirements, admonitions, or policies related to the survey. The signature may require the recipient to select a check box or to type in a full signature to verify having read these assertions. You can display assertions without requiring a signature. Select an existing signature from the list or click **New** to create a new one. The signature form contains these fields:

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Field	Description
	○ **Name**: Descriptive name for this signature. ○ **Signature type**: Type of signature required. The selections are **Check box**, **Full name**, or **Assertion only**. If **Assertion only** is selected, no signature is required to submit the survey. ○ **Assertion**: Text you want to display to recipients. By default, a property called **Require authentication for user signature** (*com.snc.assessment.signature_authentication*) requires users to authenticate when providing a full name signature.
Schedule period	Option that determines how often a user can take the same survey and whether the system generates survey instances on a schedule. **Note:** If you use a trigger condition for a survey, ensure the schedule period is set to **No Limit**. Trigger conditions use a different method to regulate how often users can receive survey instances.
Do not show survey introduction notes	Check box to skip the introduction notes when a survey is launched. This functionality is applicable in both the ServiceNow AI Platform and Service Portal product versions.
Pagination setting for Service Portal view	The setting on which the pagination is based for desktop or tablet view in Service Portal. ○ Category: default ○ Question: 1 question per page (automatic for mobile) ○ None: no pagination **Note:** This field is displayed only when Service Portal is installed.
One Click Survey	Enables a One Click survey in Service Portal. **Note:** This option can be selected if the **Pagination setting for Service Portal view** is set to `None`.
Source Table	Table whose field is used as a dynamic value for a question in a triggered survey. **Note:** When you select a source table, ensure that its relevant field is selected as **Source Field** value of a metric.
Chat Survey	Option to validate if survey questions are supported in a chat survey. Enables conversational questionnaires (pre-chat and post-chat surveys) in the chat client. Also enables you to map chat context variables to survey questions. For information on a chat survey in ITSM Virtual Agent, see Surveys in ITSM Virtual Agent.

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Field	Description
	Note: This field is available only when the Glide Conversation Server plugin (com.glide.cs) is activated.
Outlook Actionable Message	Includes an embedded survey in the survey email notification. After you select this check box and save the survey, a validation is run to ensure all survey questions are supported. **Note:** This field is available only when the Outlook Actionable Messages(sn_ms_oam) plugin is installed.
Allow Sentiment Analysis	Enables sentiment analysis for this survey.
Introduction & End Notes	
Introduction	Introductory content to display on survey questionnaires. Consider adding a company logo, a welcome message, background information about the survey, or instructions.
End note	End note that appears when someone submits a survey questionnaire. Consider adding a thank you message, follow-up instructions, or other applicable information.
Related Links	
Enable Public Access Remove Public Access	Link that enables/disables the survey as a public survey. No login is required to take a public survey (including a survey with a trigger condition) and users or non-users can respond anonymously. For completed public surveys, the **Assigned to** field value is Guest. **Note:** You can use the **View Survey URL** related link to share the URL with users.
View Responses	Link that opens the list of responses for this survey. This related link is available only if there are results for the survey.
View Scorecard	Link that opens the scorecard for this survey. This related link is available only if there are results for the survey.
View Survey URL	Link that opens a dialog box that displays a URL for this survey. The URL is useful for sharing a public survey. This related link is available only if the **Active** check box is selected. The URL does not work until the survey definition is published.
Show Benchmarks	Opens the Benchmarks Dashboard that provides visibility into your key performance indicators (KPIs) and trends.

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Field	Description
	Note: ○ This related link is available only for survey_admin, assessment_admin and survey_reader with bm_viewer role. ○ You must opt in to Benchmarks to view the dashboard. ○ This is applicable only for a published survey.
Create Improvement Initiative	Opens the Improvement Initiative window to create an improvement initiative record that helps in improving the performance of the survey. **Note:** ○ This related link is available only for the survey_admin and assessment_admin role. A survey_reader can only view the created improvement initiative records. ○ You should activate the Continual Improvement Management plugin (com.sn_cim).
Retry Sentiment Analysis	Checks all survey instances of this survey that do not have sentiment analysis data and sends them for analysis.
Related Lists	
Trigger Condition	Displays all the trigger conditions associated with the survey.
Survey Responses	Displays all the responses associated with the survey.
Metric Categories	All survey categories for this survey.
Survey Users	All survey users who are authorized to take this survey. If no users are listed, any user can take this survey.
Assessment Instances	All survey instances for this survey. Configure the form to add this related list to see it. **Note:** If you add a related list to the form, use list control to omit the **New** button. The system generates survey instances to produce functional surveys.
Improvement Initiatives	Displays improvement initiatives associated with the survey. **Note:** This related list is available only when there is at least one improvement initiative record.

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Field	Description
Survey Recipients Lists	Recipients lists that are added to the survey.

4. Save the record.

Related topics

Survey trigger conditions

Publish a survey

Event scheduling

Schedule periods

The available schedule periods are **Only Once**, **No Limit**, **Daily**, **Weekly**, **Monthly**, and **Yearly**.

The default schedule period is **No Limit**. When you set the schedule period to anything except **Only Once** or **No Limit**, the system creates a corresponding scheduled job. The scheduled job performs the following actions.

- Ensures that a user can take one survey instance of the same survey per schedule period.
- Generates a new survey instance for each survey user at the beginning of the new schedule period, as long as the survey user does not have an incomplete instance of that survey. A survey instance is incomplete if the state is not **Complete**.

For example, if you set the schedule period to **Monthly** and someone attempts to send survey invitations twice in the same day, the system generates survey instances for the survey users the first time only. At the beginning of the next schedule period, the system generates another survey instance for each survey user who completed the previous one.

Schedule periods are enforced by the **Expiration date** field on the survey instance. As long as the survey instance expiration date has not passed, the assigned user cannot receive a new survey instance. When the system generates a survey instance and the schedule period is anything except **No Limit**, the **Expiration date** field is automatically set to the appropriate date. For example, if the schedule period is **Weekly**, the expiration date is a week after the survey instance is generated.

If you change the schedule period, the scheduled job updates automatically to the correct schedule. However, users who have survey instances for the survey cannot receive new survey instances until their existing survey instances expire, regardless of the new schedule period.

Consider the following example: Sal Pindell receives a survey instance when the schedule period is **Weekly**. The next day, a survey administrator changes the schedule period to **No Limit**. Sal cannot receive another survey instance until one of the following actions occurs.

- Seven days pass from the time Sal's survey instance was generated.
- A survey administrator deletes Sal's survey instance.

After one of these actions occurs, Sal can receive a new survey instance anytime, as long as he has no incomplete instances of the survey.

Note:
If you use a trigger condition for a survey, ensure the schedule period is set to **No Limit**. Trigger conditions use a different method to regulate how often users can receive survey instances.

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Related topics

Publish a survey

Survey trigger conditions

Create a survey designer template question

You can create a question that uses choice lists from a template.

Before you begin

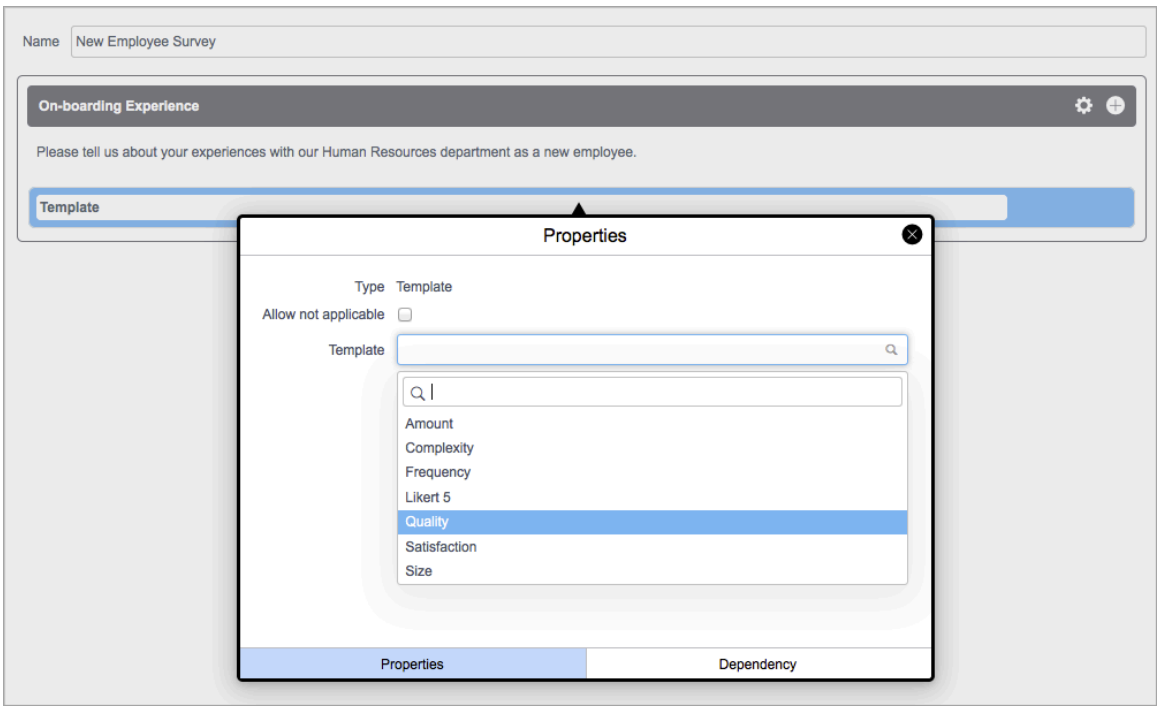
Role required: admin or survey_admin

About this task

For more information about the template, see Survey question template.

Procedure

1. Navigate to **All** > **Survey** > **Survey Designer** and load a survey or create a new survey.
2. Drag the **Template** data type icon into a category container.
3. Click the gear icon in the question title bar to open the template properties dialog box.
4. Select a predefined scale from the list.



Question entry fields appear for that template.

5. Enter one or more questions that are appropriate for the template.

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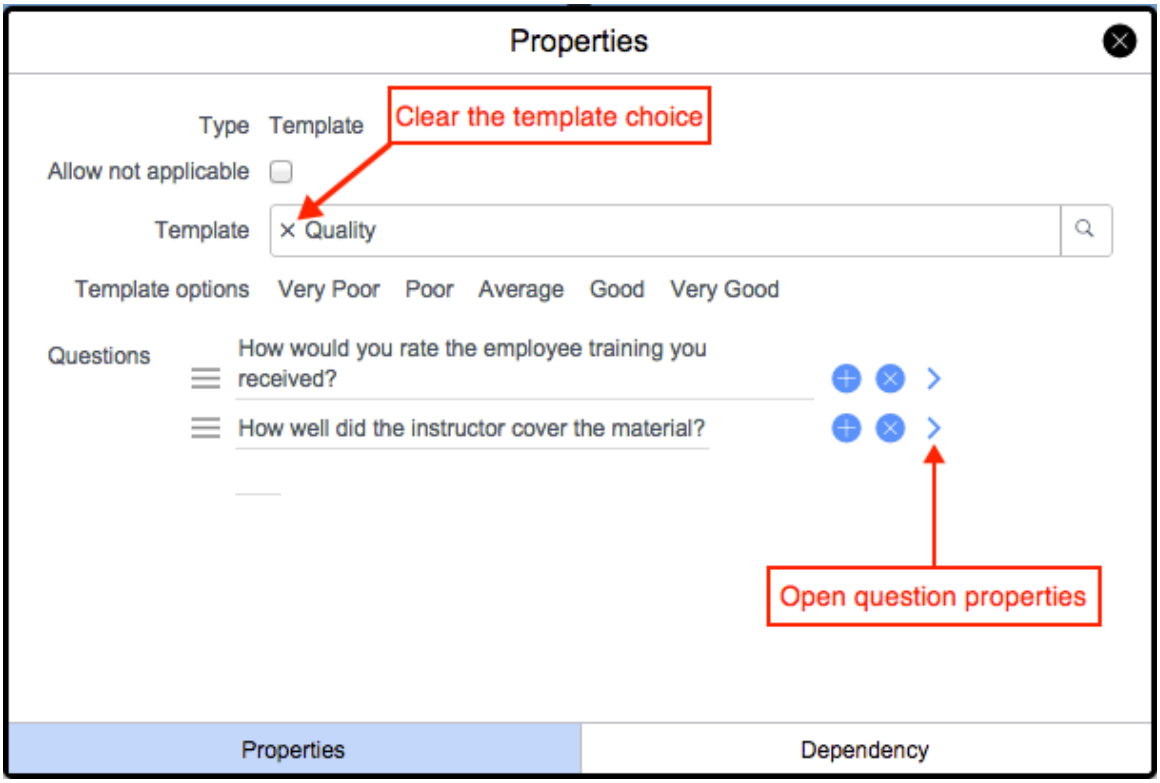
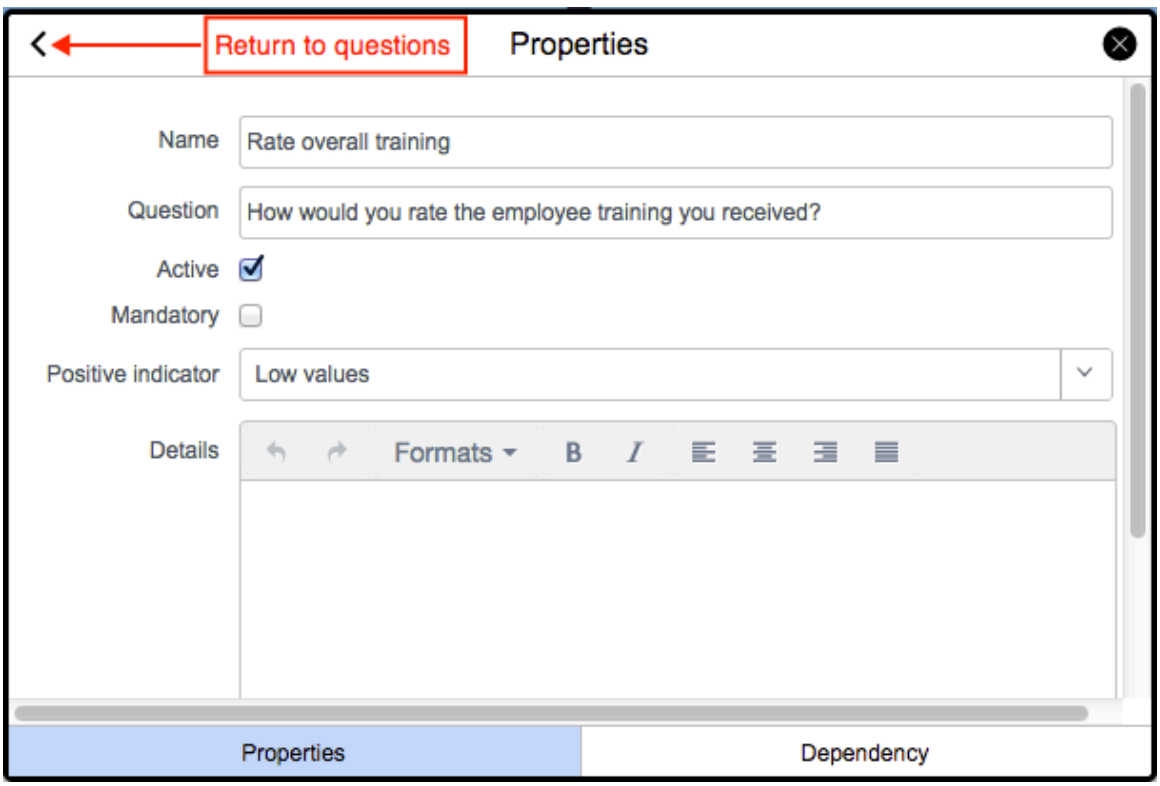


6. Click the arrow to the right of a question to configure its properties.
   You must provide a name for each question.



7. Click the back arrow to return to the template properties dialog box.
8. Configure the properties for the remaining questions.
9. Click the **X** icon to close the template properties dialog box and save your settings.

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Related topics

- Survey designer elements
- Survey designer
- Edit a survey in the survey designer

Survey questions

Survey questions appear on survey questionnaires for the associated survey definition.

The survey creator generates questions and answer options automatically. However, it provides only the basic configuration options for questions, such as the question text and the data type. You may want to create additional questions or set advanced configuration options for the questions, including making a question appear conditionally or making a question mandatory. You can also use question templates to define reusable sets of answer options.

Survey questions are available from **Survey** > **Questions**. The list displays information about each question, including the associated survey definition listed in the **Type** column, and the data type. Survey administrators can modify these questions.

Create or modify survey questions

You can create and administer survey questions.

Before you begin

Role required: admin or survey_admin

About this task

Changes to a survey, such as the addition of questions or the modification of question templates, do not apply immediately to the existing survey instances. However, the changes apply immediately to any new survey instances that are created after the changes are saved.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
3. In the **Metric Categories** related list, open a category.
4. In the **Assessment Metrics** related list, open an existing question or click **New**.
   Each survey question is stored as a record on the Assessment Metric [asmt_metric] table with a modified view for survey use.
5. On the Survey Question form, fill in the fields.
   The fields that appear depend on the selected **Data type**.

   For a description of the field values, see Survey Question form.
6. Save the record.

Note:

- Be sure to create answer options if you select the **Choice** or **Likert Scale** data type.
- You cannot delete a survey question (metric) with user responses. To delete a survey question with user responses, you should delete the responses, and then delete the survey question.

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Related topics

- Survey question template
- Trigger condition example
- Survey trigger conditions

Survey question data types

You must choose a data type for each survey question. The data type determines the format of the question and the kind of data that is collected on survey questionnaires.

The following data types are available for surveys:

Attachment data type

On questionnaires, users can attach one or more files to a question.

Users click the Manage Attachments icon and select one or more files in the Attachments pop-up window to attach to the question. From this window, users can:

- View a list of the attached files.
- View an attached file in a separate window.
- Rename an attached file.
- Add or delete files

Once a survey has been submitted, attachments cannot be updated or deleted.

Any type of file supported by the platform can be attached to a question. One or more files can be attached a question while taking a survey or completing an assessment.

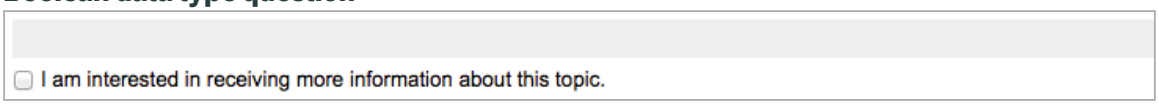
The assessment administrator can see the attachments associated with an individual question as well as those associated with the survey.

See Administering attachments for more information.

Boolean data type

On questionnaires, users select a check box beside a statement or leave it cleared.

Boolean data type question



If you select **Boolean**, you must fill in the **Scale definition** field. Select **High** if it is best when users select the check box.

Choice data type

On questionnaires, users select a value from a list of choices.

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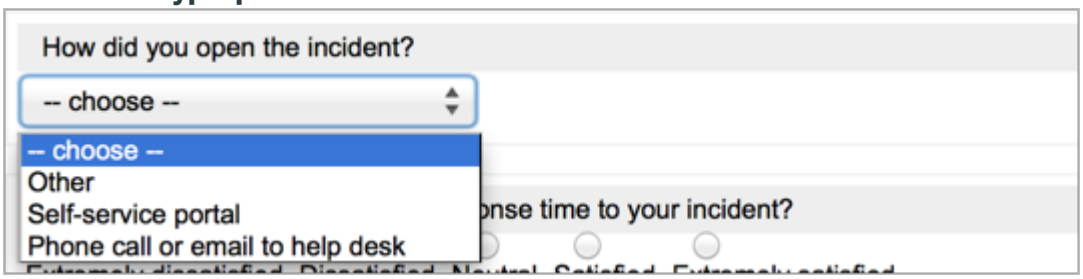
Choice data type question



If you select **Choice**, you must fill in the **Scale definition** field and create answer options. Select **High** for the scale definition if the answer option with the largest metric definition **Value** is best.

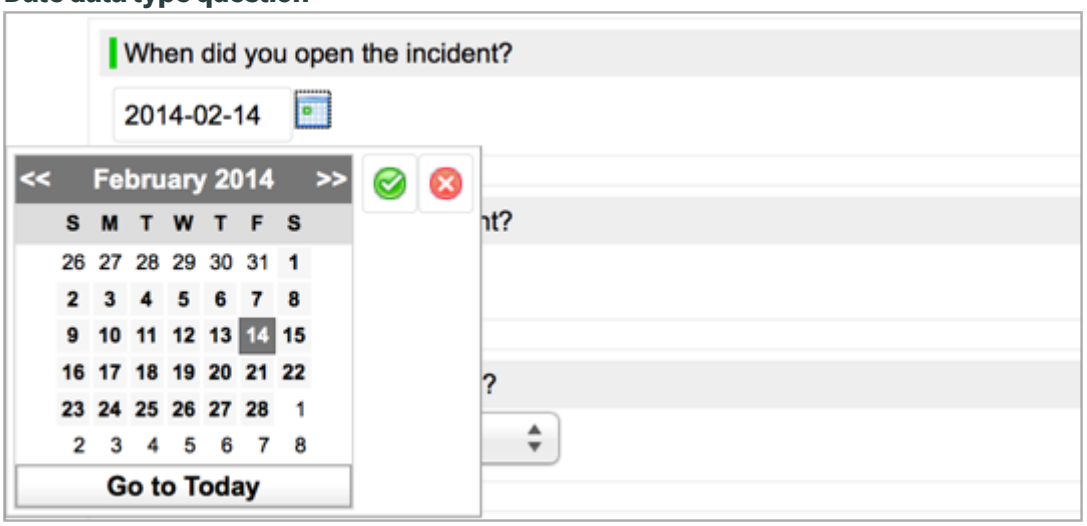
Note:
The system sets the **Min** and **Max** fields automatically based on the **Value** settings for the associated metric definitions.

Date and Date/Time data types

The **Date** and **Date/Time** data types are similar.

- **Date:** On questionnaires, users select a date.

Date data type question



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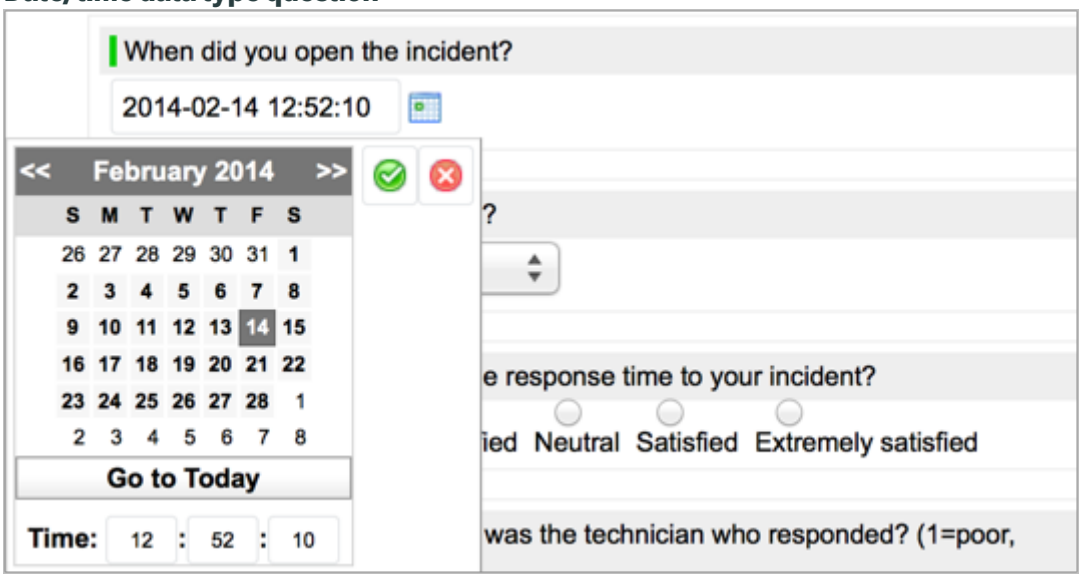
- **Date/Time:** On questionnaires, users select a date and time.

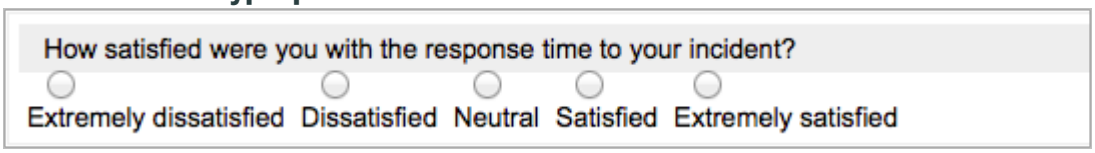
Date/time data type question



Likert Scale data type

On questionnaires, users select a multiple choice value from a custom Likert scale. Each answer option is represented by a radio button on the scale. A Likert scale question that evaluates an application's ease of use might have the answer options **Easy**, **Average**, and **Difficult**.

Likert scale data type question



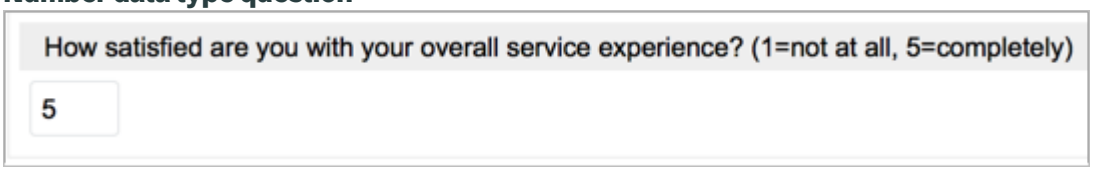
If you select **Likert Scale**, you must fill in the **Scale definition** field and create answer options. Select **High** for the scale definition if the answer option with the largest metric definition **Value** is best.

Note:
The system sets the **Min** and **Max** fields automatically based on the **Value** settings for the associated metric definitions.

Number data type

On questionnaires, users enter a number.

Number data type question



If you select **Number**, you must fill in these additional fields:

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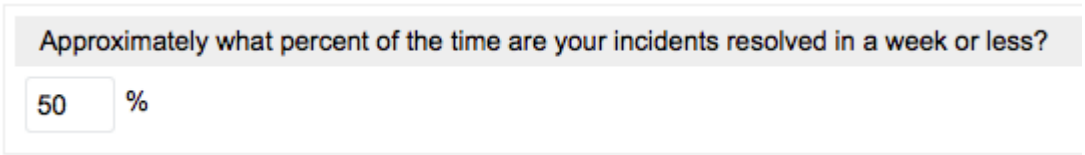
- **Scale definition**: Select **High** if a larger number is better, such as for a question that measures the number of sales made in a quarter.
- **Min** and **Max**: Enter the smallest and largest numbers users can enter. State the range of acceptable answers in the question text.

Percentage data type

On questionnaires, users enter a number.

Percentage data type question



If you select **Percentage**, you must fill in these additional fields:

- **Scale definition**: Select **High** if a larger percentage is better, such as for a question that measures the percentage of work an agent has completed.
- **Min** and **Max:** Enter the smallest and largest numbers users can enter. Generally **0** and **100** are appropriate minimum and maximum values. If you choose values other than **0** and **100**, it is usually best to state the range of acceptable answers in the question text.

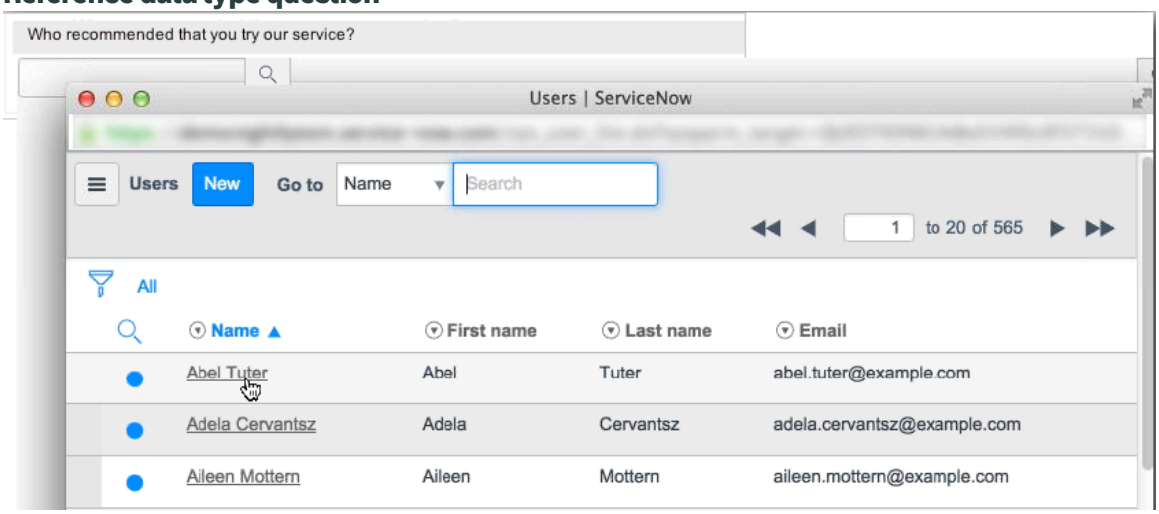
Reference data type

On questionnaires, users select a value from a list that is generated from a specified reference table. The response field supports auto-completion.

Note:
Reference qualifiers are not supported.

For example, a user could select a user name in response to a question if you specify User [sys_user] as the reference table.

Reference data type question



String data type

On questionnaires, users enter text. When you select **String**, the **String option** field appears. Select one of the following options to determine how the string field appears on questionnaires:

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- **Single line**

- **Single line wide**

- **Multiline**

Template data type

On questionnaires, users select a value from a predefined series of answer options. To use this data type, a question template must be defined.

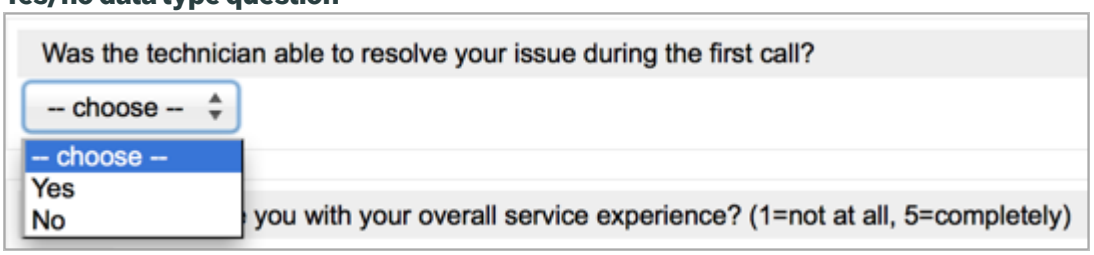
If you select **Template**, you must fill in these additional fields:

- **Template**: Select a template.
- **Scale definition**: Select **High** if the answer option with the largest template definition **Value** is best.

Yes/No data type

On questionnaires, users select **Yes** or **No** from a list.

Yes/no data type question



If you select **Yes/No**, you must fill in the **Scale definition** field. Select **High** if **Yes** is the best answer.

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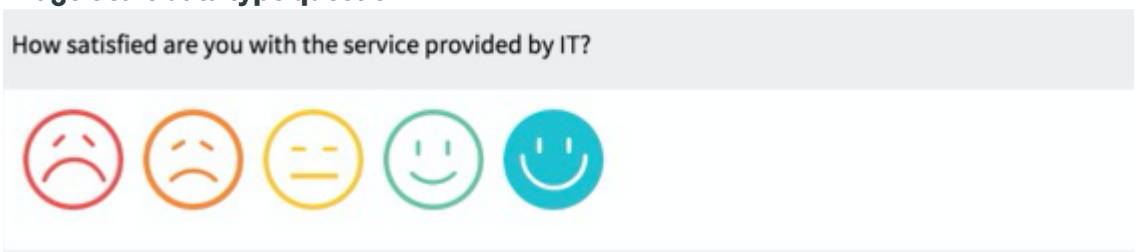
Image Scale data type

On questionnaires, users select an image from a predefined set of images as their response. Image scale questions can also be used in a template for better performance with surveys that have the same type of answer options.

Five emojis, similar to the Likert scale (very dissatisfied to very satisfied) are provided. However, you can upload additional images in JPG, PNG, or GIF format. Two images can be uploaded, one for selected case and another for unselected case. For example, the selected image can be , and the unselected image can be . Larger size images are reduced to 64 x 64 pixels.

Image Scale data type question



The result behavior depends on the presence of uploaded images. If no selected image is uploaded, then the question shows up blank.

Selected image	Unselected image	Result
Yes	Yes	Unselected image loads. Clicking the image changes it to the selected image.
Yes	No	Selected image loads with 50% opacity. Clicking the image changes the opacity to 100%.
No	Yes	A blank placeholder box is displayed.
No	No	A blank placeholder box is displayed.

Note:

- N/A option is not supported for image scale type question.
- For an image scale type question, an empty string is saved as an answer for a hidden and dependent question of an unselected image.

Multiple selection data type

On questionnaires, users can select multiple check boxes indicating all answers that apply. For instance, a user can be instructed to "Select all that apply" in a multiple selection question.

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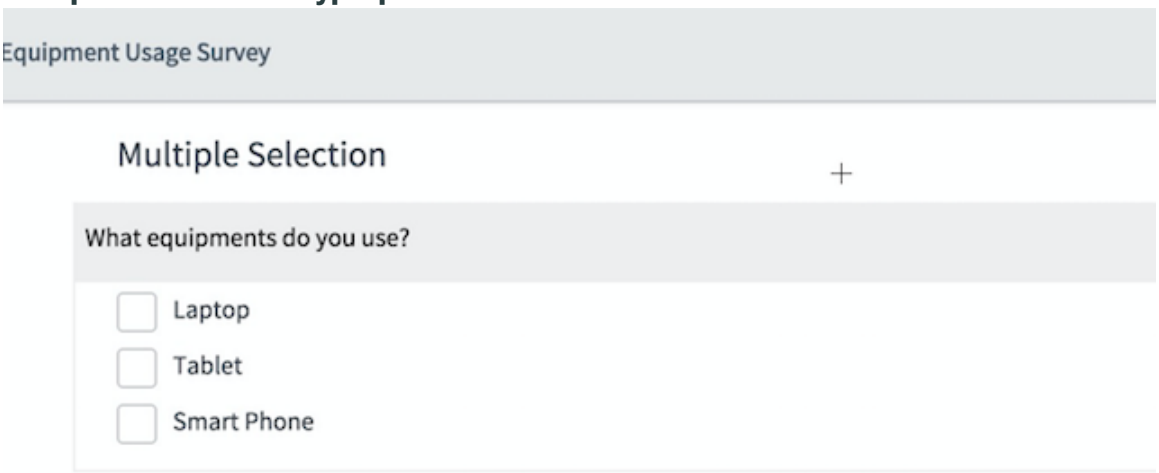
Multiple Selection data type question



Ranking data type

On questionnaires, users can select a different order number for each option to rank them. Drag-and-drop functionality is also supported, which allows a user to either fill in the number, or simply drag an option.

Setting the order of the options

One order number cannot be selected twice. This question can be mandatory and it can also be dependent on a parent question, but not vice versa.

Related topics

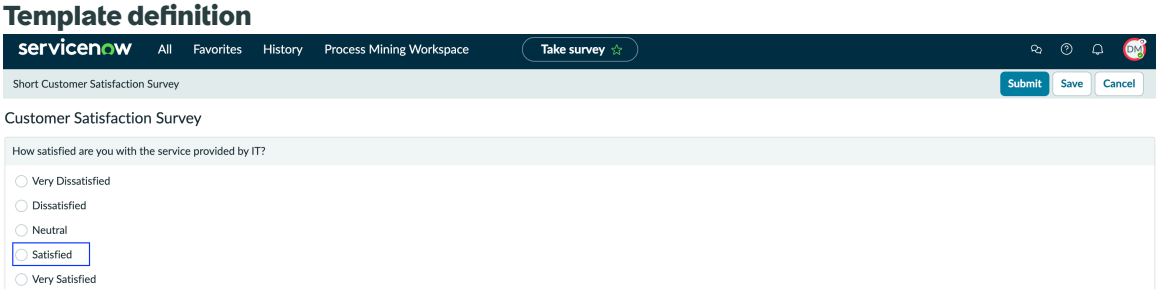
Survey question template

Survey question template

Question templates define reusable sets of answer options for survey questions.

Question templates define reusable rating scales for answering questions, where each answer option on the scale is a template definition. For example, the template named **Satisfaction** represents a satisfaction scale and contains the following template definitions: **Very Satisfied**, **Satisfied**, **Neutral**, **Dissatisfied**, and **Very Dissatisfied**.

Template definition



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Templates are available for survey questions that have **Data type** set to **Template**. The following question templates are available in the base system. You can create or update a template as described in Create a survey question template.

Default question templates

Name	Template definitions
Amount	None, Few or little, Average amount, Many, Quite a lot
Complexity	Very Complex, Complex, Moderate, Simple, Very Simple
Frequency	Never, Seldom, Sometimes, Most of the time, All of the time
Likert 5	Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree
Quality	Very Poor, Poor, Average, Good, Very Good
Satisfaction	Very Dissatisfied, Dissatisfied, Neutral, Satisfied, Very Satisfied
Size	Very Small, Small, Average, Large, Very Large

Create a survey question template

You can create and administer question templates.

Before you begin

Role required: admin or survey_admin

About this task

Changes to a survey, such as the modification of question templates, apply to existing survey instances immediately. Templates that you create are available for use with both surveys and assessments.

Procedure

1. Navigate to **All** > **Survey** > **Templates**.
   Each template is stored as a record on the Assessment Metric Template [asmt_template] table.
2. Click **New**.
3. Enter a **Name**.
4. Right-click the form header and click **Save**.
5. In the **Assessment Template Definitions** related list, click **New**.
   Create a template definition for each answer option you want to appear on a question.
6. Complete the form.

Field	Description
Display	Enter the text to appear as the answer option.
Value	Enter a numeric value, greater than or equal to zero, to which the answer option equates. Values are used in results calculations. When you view questions that use templates, answer options appear in order from smallest to largest **Value**. Each template definition for a given template must have a unique **Value**.

7. Click **Update**.

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Update min and max values to match templates

If you use survey result calculation data, ensure that the **Min** and **Max** values for a question that uses a template are equal to the smallest and largest template definition **Value**.

Before you begin
Role required: admin or survey_admin

About this task
When you create a question of the **Template** data type, the system sets the **Min** and **Max** fields based on the template definition values. The fields for existing questions are not updated if you add a new template definition to a template or if you update the **Value** of an existing template. If the new **Value** is less than the minimum value or greater than the maximum value of any questions that use the template, update the questions accordingly.

Procedure
1. Navigate to **All** > **Survey** > **Questions**.
2. Configure the list to show the **Min** and **Max** columns.
3. Add the following list filter condition: **[Template] [is] [<select the template you updated>]**.
4. Ensure the **Min** and **Max** values match the smallest and largest template definition **Value** for the selected template.
   If the values do not match, edit the **Min** and **Max** values directly from the list.

> **Note:**
> When the data type is **Template**, a UI policy prevents the editing of **Min** and **Max** from the form.

Add a metric category and metric in the question bank for surveys

Reuse the question categories (metric categories) and questions (metrics) added in the question bank for surveys. You can add metric categories or metrics from the question bank to a survey, or from the survey to a question bank.

Before you begin
Role required: admin or survey_admin
Activate the Survey Question Bank Sample Data plugin (com.snc.question_bank_data) to access the demo data for the question bank.

Procedure
1. Navigate to **All** > **Survey** > **Question Bank**.
2. Click **New**.
3. On the Metric Category form, fill in the fields.

Metric Category fields

Field	Description
Name	Name of the metric category.
Description	Description of the metric category.
Total metrics	Total number of metrics in the metric category. This number is automatically updated when you add or delete metrics from the category.

4. Right-click on the title bar and click **Save**.

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5. In the Assessment Metrics related list, click **New**.
6. In the Survey Question form, fill the fields.
   For information on these fields, see Create or modify survey questions.
7. Click **Submit**.

Configure metric categories or metrics for a survey using the question bank

Reuse question categories (metric categories) and questions (metrics) from the **Question Bank** module while creating or updating a survey.

Before you begin

Role required: admin or survey_admin
Activate the Survey Question Bank Sample Data plugin (com.snc.question_bank_data) to access the demo data for the question bank.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
3. **Optional:** To add metric categories to a survey from the question bank in Platform, perform the following steps.

   a. In the Metric Categories related list, click **New Category from Bank**.
   The New Category from Bank dialog box is displayed with a list of all metric categories added in the question bank.

   b. Select the required categories and click **Add Selected**.
   A copy of the metric category and the corresponding metric definitions is created in the Metric Categories related list.

4. **Optional:** To add metrics to a survey from the question bank in Platform, perform the following steps.

   a. In the Metric Categories related list, open a metric category definition.

   b. In the Assessment Metrics related list, click **New Metric from Bank**.
   The New Metric from Bank dialog box is displayed with a list of questions available in the question bank.

   c. Select the required metrics and click **Add Selected**.
   A copy of the metric and the corresponding metric definitions is created in the Assessment Metrics related list of the category.

5. **Optional:** To add a metric category to the question bank from a survey in Platform, perform the following steps.

   a. In the Metric Categories related list, open a metric category definition.

   b. Click **Add to question Bank**.
   A copy of the category is created along with its metrics and metric definitions in the question bank.

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6. **Optional:** To add a metric to the question bank from a survey in Platform, perform the following steps.

   a. In the Metric Categories related list, open a metric category definition.

   b. In the Assessment Metrics related list, open the required metric definition.

   c. Click **Add to Question Bank**.
   The Add to Question Bank dialog box is displayed.

   d. In the **Choose a question bank to add this question/metric** field, select a metric category that you want to add this metric to, and click **OK**.
   A copy of the metric and the corresponding metric definitions is created for the selected category in the question bank.

7. **Optional:** To add a metric category or metric to a survey from the question bank in Survey designer, perform the following steps.

   a. Open the survey in Survey Designer.

   b. **Optional:** To add a metric category from the question bank, from the **Categories** tab in the left panel, drag the required category banner and drop in the **Design** tab.

   c. **Optional:** To add a metric from the question bank, drag and drop the required metric from the **Questions** tab or the **Categories** tab.

   Note:

   - When you drag and drop a metric category, all dependencies within the category are also added to the survey.
   - From the **Categories** tab, you can drag and drop an individual metric within a metric category.
   - When you drag and drop a parent metric, all dependent questions are also added to the metric category.
   - When you drag and drop a child metric, only the child question is added to the metric category.

Create or modify answer options

You must create answer options, called metric definitions, for survey questions that have **Data type** set to **Choice** or **Likert Scale**.

Before you begin

Role required: admin or survey_admin

About this task

Changes to a survey, such as the addition or modification of answer options, apply to existing survey instances immediately.

Procedure

1. Navigate to **All** > **Survey** > **Questions**.
2. Open a choice or Likert scale survey question.
3. In the **Assessment Metric Definitions** related list, open a metric definition or click **New**.
   Each answer option is stored as a record on the Assessment Metric Definition [asmt_metric_definition] table.

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4. Complete the Assessment Metric Definition form.

Assessment Metric Definition fields

Field	Description
Display	Text to appear as the answer option.
Value	Numeric value, greater than or equal to zero, to which the answer option equates. Values determine the order in which answer options appear. See the example below. Values are also used to calculate survey results. Each metric definition for a given question must have a different **Value**.

5. Click **Submit**.

Example:

On survey questionnaires, the answer options for a question appear in order from smallest to largest **Value**. For example, consider the survey question **How do you feel?** with the answer options **Good**, **Neutral**, and **Bad**. The following table shows the answer option order based on the **Value**.

Answer option order based on value

Answer option	Value	Order
Good	1	First
Neutral	3	Second
Bad	5	Third

If you use survey result calculations, ensure the question **Scale definition** is set appropriately based on the answer options. In the previous example, if you want the answer option **Good** to earn the highest score, the scale definition should be **Low** because **Good** has the smallest value.

Change the order of survey questions

You can easily reorder survey questions at the category level or the question level.

Before you begin

Role required: admin or survey_admin

About this task

You can change the order in which the questions in one category appear relative to those in other categories for the same survey definition. If you add a new question manually after you create other questions, you may want to change the order of questions.

When you create questions using the survey creator, the system sets the **Order** field for the first question to **101**, the second to **102**, and so on. After you create a new question outside of the survey creator, the **Order** is set to **100** by default, which means it appears before all questions generated by the survey creator.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys** and open the appropriate survey definition.
2. In the **Metric Categories** related list, edit the values in the **Order** column.

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3. To change the order of questions within a category, complete the following steps.
   a. Open the **Assessment Metrics** related list.
   b. Edit the values in the **Order** column.
4. Click **Update**.

Survey trigger conditions

Trigger conditions specify when to send a particular survey and the persons to send it to.

Survey administrators can use trigger conditions to configure the system to generate a survey instance each time a specified action occurs on a specified table, for example, when an incident or change request closes. The system sends the survey to users that are related to the triggering record, for example, incident callers or change request assignees. You can choose to send a survey every time the condition is met, or you can set a probability for the system to send a survey at random when the condition is met.

Trigger conditions are ideal for sending transactional surveys. Transactional surveys generally measure satisfaction with a recent experience, such as closing an incident or purchasing an item.

Note:
Trigger conditions are comparable to survey conditions in legacy surveys. If you migrate a legacy survey that has survey conditions, ensure that the survey conditions are deactivated before you recreate them as trigger conditions.

Configure a trigger condition for a survey

Configure trigger conditions to specify when to send a particular survey and the persons to send it to.

Before you begin

Role required: admin or survey_admin or survey_creator

Procedure

1. Navigate to **All** > **Survey** > **Administration** > **Trigger Conditions**.
2. Click **New**.

   Note:
   Do not specify particular users for a triggered survey because only the specified users are allowed to take the survey.

3. On the Trigger Condition form, fill in the fields.

   For a description of the field values, see Trigger Condition form for surveys.

   You can also create a trigger condition directly from the survey creator. If you select **Certain users can take this survey, based on conditions** in the Survey User Access section, the Trigger Condition form opens automatically when you click **Save as Draft** or **Publish**.

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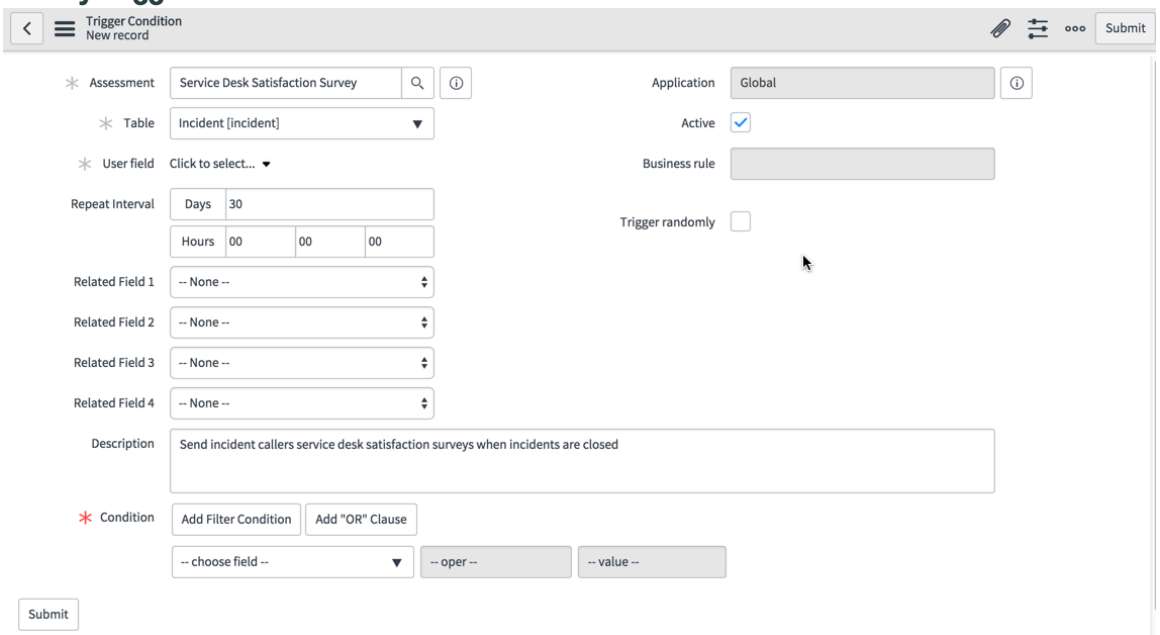
Example:

Survey Trigger Condition form



Related topics

Schedule periods

Trigger condition example

You can send out auto-triggered surveys when an incident is closed or resolved.

A trigger condition is configured as follows:

- **Assessment**: Service Desk Satisfaction Survey
- **Table**: Incident [incident]
- **User field**: Caller
- **Repeat interval**: 30 days
- **Active**: true
- **Trigger randomly**: false
- **Related Field 1**: Assigned to
- **Related Field 2**: Problem
- **Condition**: [State] [is] [Closed] [or] [State] [is] [Resolved]

C is the caller on incident INC00004305 that is assigned to B, a service desk technician. B creates PRB010101 based on C's complaint and closes the incident. The system creates a survey instance assigned to C so C can rate satisfaction with the incident experience.

Because two related fields were selected as part of the trigger condition, the survey instance stores the following information from the incident:

- User (Related Field 1): **Boris Catino**
- Problem (Related Field 2): **PRB010101**
- Task (automatically created): **INC00004305**

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Because the task field is automatically populated, UI-based filtering by dot-walking on incidents (or any task-based table) is supported when creating a report on survey results. For example, you can query all survey instances related to incidents assigned to a group (survey reports on all incidents assigned to `networking` group, for instance).

Even though the trigger condition is set to be triggered each time that the conditions are met, the **Repeat interval** setting ensures that C does not receive another survey for another of its incidents closes within 30 days of the first incident.

Survey report example based on task field

One of the most common use cases for Surveys is to send out an auto-triggered survey when an incident, request, or task is closed. Once you get the survey results back, you can filter the results by users and groups related to the ticket, such as Assignment Group, or Assignee.

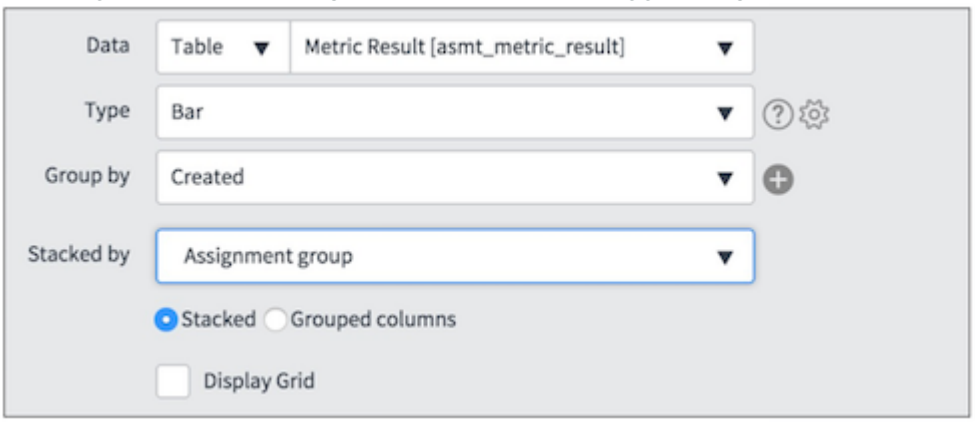
Filtering the survey results provides more detail on how people and teams are performing based on ticket data. Since this information is automatically captured, you can dot-walk while filtering the data (instead of utilizing a related field on the Survey trigger condition form, as previously required).

Using the Task as a filter for survey results

Number ▼	Metric type	Due date	State	Assigned to	Trigger table	Trigger ID	Task
AINST0010011	Customer Satisfaction Survey	2016-09-20	Ready to take	System Administrator	Incident [incident]	Incident: INC0010008	INC0010008

To create a report on incident-triggered survey responses by Assignment group, set up the report on the Task Assessment Details by navigating to **Reports View/Run** and clicking **Create a report**.

Defining a report on survey responses that are triggered by an incident



Survey distribution

There are several ways for survey administrators to distribute surveys to users.

Surveys are distributed using any of the following methods.

- Send survey invitations to users.
- Share a survey URL that opens the survey directly.
- Create a module that opens a survey.

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Email notifications for surveys

When an administrator creates a survey and assigns it to a user, an email notification is sent to the user. Selecting the survey link in the email notification redirects the user to the survey page, where the user can take the survey. This type of survey is called a non-triggered survey.

To configure the teams that must receive the notification, or modify the notification content, navigate to **All** > **System Notification** > **Email** > **Notifications** and open the **Survey Invitation** notification. For more information, see .

Note:
You can include an embedded survey in the survey email notification by using the **Outlook Actionable Message** check box. After you select this check box and save the survey, a validation is run to verify that all survey questions are supported. This field is available only when the Outlook Actionable Messages (sn_ms_oam) plugin is installed. For more information, see Outlook Actionable Messages.

Base system Survey Invitation notification

ServiceNow includes a pre-configured **Survey Invitation** notification for surveys. When a survey is assigned to a user and a non-triggered or triggered condition fires, this notification sends an email to the designated user. You don't need to create event or notification.

Send survey invitations to users

You can send survey invitations using the **Assign Survey** or **Send Invitations** buttons on the Survey Definition form.

Before you begin
Role required: admin or survey_admin

About this task
Use the **Send Invitations** button to immediately assign survey instances to each survey user that is listed in the survey definition. Use the **Assign Survey** button to assign a survey instance to any one user at a time.

Each of the buttons generates survey instances assigned to the appropriate users. In addition, if the instance is configured to send email, the system generates survey notifications. For either button to be available, the survey definition must meet all of the following conditions.

- **Active** check box is selected.
- **State** is **Published**.
- Survey is associated with at least one question.

Note:
You (or a trigger) can send more than one instance of a survey to a user at any time.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Select an active, published survey.
3. Complete one of the following actions.

Option	Description
Assign a survey to users listed in the Survey Users related list	Click **Send invitations**.

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Option	Description
Assign a survey to any user	Click **Assign Survey** and select one or more users, and then click **OK**.

The system creates a survey instance assigned to the user or users, assuming the user is eligible to receive a new survey instance. When you use the **Assign Survey** button, the selected user is not saved as a survey user.

Define a recipients list for surveys

Use a recipients list to define targeted set of users for whom the survey invite can be sent. You can use a recipients list for multiple surveys.

Before you begin

Role required: admin or survey_admin or survey_creator

Procedure

1. Navigate to **All** > **Survey** > **Administration** > **Recipients Lists**.
2. Click **New**.
3. On the Recipients List form, fill in the fields:
   For a description of the field values, see Recipients List form.
4. Click **Submit**.
   For recipients lists created by the file upload, clicking **Submit** validates the records in the Excel file. Following validation, the system displays a pop-up window with the upload results, including valid and invalid user records.
5. **Optional:** To get the updated user list, navigate to the recipient list and click **Refresh Recipient List**.

Add a recipients list to a survey

Send the survey invites to targeted sets of users by adding a recipients list to a survey.

Before you begin

Role required: admin or survey_admin
Recipients lists should be pre-defined in the Recipients Lists submodule. For more information on defining recipients lists, see Define a recipients list for surveys.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition.
3. Perform any of the following steps.

4. To send survey invites to all survey users and recipients lists, click **Send Invitations**.

Note:

- The **Send Invitations** UI action is available when there is at least one recipients list or survey user for the survey.
- If a user is available in the **Survey Users** related list and multiple recipients lists, the survey invite is sent only once to the user.

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Embed a survey within the Outlook email client

Embed an interactive survey in the email notification sent to a user. The user can answer the survey questions and submit the survey from the email client instead of opening the survey in a new browser tab.

Before you begin

Role required: admin or survey_admin
The Outlook Actionable Messages plugin (sn_ms_oam) should be activated.

Note:

- The Outlook Actionable Messages (OAM) feature is not supported in all Microsoft mail products and versions. To verify whether your version of Outlook supports OAM, refer to the Microsoft website.
- Actionable messages are supported only for emails sent from the @service-now.com email address. If you are sending an email from a customized email address, you should register as a new service in the Microsoft website setting the scope as **Organization**. Specify the provider ID value in the *sn_ms_oam.outlookactionable.originator* property.
- Actionable messages are based on the Sender Policy Framework (SPF)/DomainKeys Identified Mail (DKIM) validation for the email sender verification. If an email recipient receives email via an external provider, emails may not be rendered as adaptive cards.
- You cannot customize the default actionable message templates.

Procedure

1. Navigate to **All** > **System Notification** > **Email** > **Notifications**.
2. For the **Survey Invitation** notification, in the **What it will contain** tab, add the following script in the **Message** field in addition to the existing information.

   ```
   ${mail_script:include_survey_actionable}
   ```

   This script includes the Outlook actionable message in the email notification sent to the user.
3. Navigate to **Survey** > **View Surveys**, and open a survey.
4. To send an email notification to the survey user, select the **Send notifications** check box.
5. Select the **Outlook Actionable Message** check box and save the survey.

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Note:

- The Image Scale type question is supported only if there is a single question in the survey.
- Template type question with image option is supported only if there is a single question in the survey.
- Date/Time type question is supported in web client of Outlook and not in desktop client as Microsoft doesn't support Date/Time for Outlook desktop client.
- Two duplicate choice display values should not be used as the internal value may not be submitted incorrectly.
- The answer for String type question can be validated based on the option selected in the Field Validation field. For example, if you select the option as email address, then the answer entered can only be in the email-id format. Answers in any other format will not be accepted.
- The version of Microsoft Outlook does not support the following question types to create an embedded survey:
  - Attachment
  - Reference
  - Ranking
- Dependent questions are not supported.
- Signature is not supported.
- Mandatory questions are supported.

In both the Platform UI and Survey Designer, a validation is run to ensure all survey questions are supported.

6. Click **Assign Survey** and assign the survey to a user.
   An email notification with the embedded survey is sent to the user. The user can take the survey and submit it from the email client instead of opening the survey in a new browser tab.

Enable localization for a survey

Enable a survey user to take a survey in multiple languages.

Before you begin

Role required: admin or survey_admin
The plugin for the language that you want the survey to be available in should be installed.

Note:
Localization is applicable only for public surveys.

Procedure

1. Navigate to **All** > **Survey** > **Administration** > **Properties**.
2. Enable the **Enable/Disable whether to show language picker when a public survey is taken** (*show_lang_picker_for_publicsurveys*) property.
3. In the System Settings window, from the **Language** list, select the language that you want the survey to be available in.

Note:
The **Language** list is available only when a language plugin is installed.

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4. Navigate to **Survey** > **View Surveys** and open a public survey.
5. Enter the translated text for the survey title, questions, and answers.
6. Save and publish the survey.

Note:
The localization is also applicable in Service Portal if the **Assessment Properties** **Allow survey link from email to open in service portal view (applies only for surveys)** (*sn_portal_surveys.sp_survey.email_redirection*) property is enabled.

   - The survey is available for survey users in the translated language.
   - Users can change the language of the survey using the language picker.

Survey URLs

You can distribute a survey by giving survey users a survey URL.

Survey administrators can obtain one of the following types of URLs.

- A general URL for a survey, which users can open to take the survey questionnaire. The following process occurs.
  - When someone opens the URL, the system ensures that the person is logged in. It then searches for an instance of the associated survey that is assigned to the logged-in user.
  - If a survey instance is found, the appropriate action occurs based on the **State** of the survey instance (see table). If there are multiple active survey instances (**Ready to take** or **In progress**), the instance with the earliest due date opens.
  - If no survey instance is found, the system creates a new instance for the survey, assigns it to the user, and opens the survey questionnaire.
- A URL for a specific survey instance, which the assigned user can open to take the survey questionnaire. The following process occurs.
  - When someone opens the URL, the system ensures the person is logged in as the user the survey instance is assigned to. Only the assigned user can access the survey questionnaire.
  - The appropriate action occurs, depending on the **State** of the survey instance (see table).

Survey states

Survey instance state	Action upon opening URL
Ready to take: User has not saved any responses.	The survey questionnaire appears for the user to begin. The user can save or submit responses.
In progress: User has saved at least one response.	The survey questionnaire appears for the user to continue. Any previously saved responses are displayed. The user can save or submit responses.
Complete: User has submitted all required responses.	If the schedule period is **No Limit** or if the period restriction has expired, the survey questionnaire for a new survey instance appears for the user to begin. If the schedule period restricts the number of times a user can take the same survey, and the period restriction has not expired since the user last completed survey, an error message appears.

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If someone opens a URL for an unpublished or deactivated survey, an error message appears.

Obtain and distribute a general survey URL

You can distribute a general survey URL to allow any eligible user to open a survey questionnaire.

Before you begin
Role required: admin or survey_admin

About this task
The general URL is available on the Survey Definition form and on the survey creator. You can also email the URL for a public survey that is published.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Open a survey definition from the Assessment Metric Types list.
3. To view or copy the URL, click the **View Survey URL** related link.
   This related link is visible only if the survey definition is **Active**.
4. To distribute the URL to users, paste the copied URL as desired, or click the **Email** button to send via email.
   The **Email** button is visible only for a public survey that is published.

What to do next
When a survey user clicks the general survey URL, the system creates a survey instance for the survey user as long as the user does not have an instance in the **Ready to take** state. The system is configured by default to send an email notification when a survey instance is generated.

As a result, the survey user receives a second notification in addition to the notification that you sent with the general survey URL. This may confuse the survey user. To avoid this issue, you can deactivate auto-notification.

Deactivate auto-notification for surveys

Deactivate an auto-notification to avoid a problem that causes a second system-generated email notification being sent to a user.

Before you begin
Role required: admin or survey_admin

About this task
When a survey is assigned to a user, an email notification containing a general survey URL is sent to the user. However, when**Send to event creator** option is selected in the **Survey Invitation** notification, users receive a second system-generated notification. This occurs when the triggered surveys use a business rule event and the event creator is the same user as the survey recipient.

Procedure

1. Navigate to **All** > **System Notification** > **Email** > **Notifications**.
2. Open the **Survey Invitation** notification.
3. Configure the form to add the **Send to event creator** option to the Who will receive section.
   The **Send to event creator** option is selected by default.
4. Clear the **Send to event creator** check box.

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Obtain a survey instance URL

You can distribute a survey instance URL to allow the assigned user to open a survey questionnaire.

Before you begin
Role required: admin or survey_admin

About this task
The survey instance URL is available on the survey instance record.

Procedure

1. Navigate to **All** > **Survey** > **Survey Instances**.
2. Open the instance for the survey.
3. To view or copy the URL, click **View Instance URL** related link.
   The related link is available only when the survey instance **State** is **Ready to take** or **In progress** and the associated survey definition is **Active**.
4. In the dialog box, select and copy the URL then click **OK** or **Cancel**.
5. Distribute the URL to the assigned user.

Test a survey URL

When there are survey users associated with a survey, the survey is restricted so only those users can use the survey URL. You can test the survey URL to ensure it is restricted.

Before you begin
Role required: admin or survey_admin

Procedure

1. Navigate to **All** > **Survey** > **View Surveys** and open a survey for which you are not a survey user.
2. Under **Related Links**, click **View Survey URL**.
3. Copy the URL and click **OK** or **Cancel**.
4. Navigate to the URL.
   You see a message that you are not authorized to take the survey.

Create a survey module

You can create a module that opens a survey.

Before you begin
Role required: admin or survey_admin

About this task
When a user clicks a survey module, the system performs one of the following actions, depending on the configuration options for the survey and other factors.

- Creates a new survey instance
- Opens an existing survey instance
- Displays an error message.

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Procedure

1. Perform the appropriate action for your version of the UI:
   - **Core UI**: Point to the application menu that contains the module to which you want to add the survey module and click the edit application (pencil) icon.
   - **UI15**: Right-click the application menu you want to add the module to and select **Edit Application Menu**
2. In the **Modules** related list, click **New**.
3. Complete the following fields.
   - **Link type**: Assessment

     Do not select **Survey**, which is used for legacy surveys only.
   - **Assessment**: Select the survey you want the module to open.
4. Complete and save the form.

Sharing surveys

You can export a survey and then import it to a different ServiceNow instance.

Note:
Update sets are available in the Helsinki release and should be used to move data from one instance to another. For information about update sets, see System update sets.

The system exports a single XML file that contains a survey definition [asmt_metric_type] and the associated records, including the following.

- Assessment Metric Template [asmt_template]
- Assessment Template Definition [asmt_template_definition]
- Metric definitions [asmt_metric_definition] (survey question answer options)
- Scheduled Jobs associated with the Survey [sys_trigger]
- Survey categories [asmt_metric_category]
- Survey questions [asmt_metric]
- Survey users [asmt_m2m_category_user]
- Trigger Condition [asmt_condition]

Export a survey

You can export a survey and then import it to another instance.

Before you begin

Role required: admin, survey_reader, or survey_admin
For information about update sets, see System update sets.

Procedure

1. Navigate to **All** > **Survey** > **View Surveys**.
2. Right-click the name of a record to show the context menu.
3. Select **Export Assessment**.
4. If applicable, follow the prompt in your browser to save the XML file.

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Import a survey

You can import a survey that has been exported as an XML file. The exported XML file does not contain result data.

Before you begin

Role required: admin or survey_admin

Note:
Update sets are available in the Helsinki release and should be used to move data from one instance to another. For information about update sets, see System update sets.

About this task

Procedure

1. Verify that the target instance has assessments enabled.
2. Follow the steps in Import data from XML to import the assessment.

Use update sets for surveys and assessments

Use an update set to capture changes to surveys and assessments.

Before you begin

Role required: admin or survey_admin

Procedure

Create an update set and use it to make changes on a development instance.

Note:
For more information, see System update sets.

When developing surveys and assessments, use an update set to capture the changes and move them from a development instance to a production instance. Once an update set is created and marked current, all of the updates to the following tables are recorded in the update set.

The following tables are now update set enabled and also extend the application file:

- Assessment Metric Templates [asmt_template]
- Assessment metric type [asmt_metric_type]
- Assessment Template Definitions [asmt_template_definition]
- Assessment Metric Definitions [asmt_metric_definition]: survey question answer options
- Schedule [sys_trigger]: scheduled jobs associated with the survey
- Assessment Metric Categories [asmt_metric_category]: survey categories
- Assessment Metrics [asmt_metric]: survey questions
- Assessment Category Users [asmt_m2m_category_user]: survey users
- Trigger Conditions [asmt_condition]

Configure a survey in the Connect chat support

Enable a user to take a survey after chatting with a support agent.

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Before you begin

Role required: admin or survey_admin

Note:
The Connect Support plugin (com.glide.connect.support) should be activated.

Procedure

1. Navigate to **All** > **Connect Support** > **Support Administration** > **Chat Survey**.
2. Click **New**.
3. In the Chat Survey form, fill the fields.

Chat Survey form fields

Field	Description
Survey	Survey whose instance should be available in Connect Support.
Type	Type of chat where the survey is available. Connect: Survey is available in Connect Support.
Chat queue	Chat queue where the survey is available.
Active	Specifies if the chat survey configuration is active.
Description	Description of the chat survey configuration.

4. Click **Submit**.
   When a support agent of the assignment group associated with the chat queue ends a chat with a user, the survey instance is available in the chat window for the users.

Note:
The survey URL displayed after a connect chat is not a clickable link in the Virtual Agent chat widget. Copy and paste the URL to access the survey.

Related topics

Monitor incoming Connect Support conversations

Outlook Actionable Messages

Outlook actionable messages plugin enables users to respond to the survey from within the Microsoft Outlook application.

Install Outlook Actionable Messages plugin

Install Outlook Actionable Messages(sn_ms_oam) plugin to configure actionable messages.

Before you begin

Role required: oam_admin

Procedure

1. Navigate to **System Application** > **All Available Applications** > **All**.
2. In the search field, enter `Outlook Actionable messages`.
   You can search for the application by its name or ID. If you cannot find an application, you may have to request it from ServiceNow store. Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative

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release note information for all released apps, see the ServiceNow Store version history release notes.

3. Click **Install**.

Customize fields for the approval message

Customize the body message for a request, change, and request item approval sent in Microsoft Outlook.

Customize fields in the approval message for request

Customize the body message for a request and request item sent in Microsoft Outlook.

Before you begin

Role required: oam_admin

Procedure

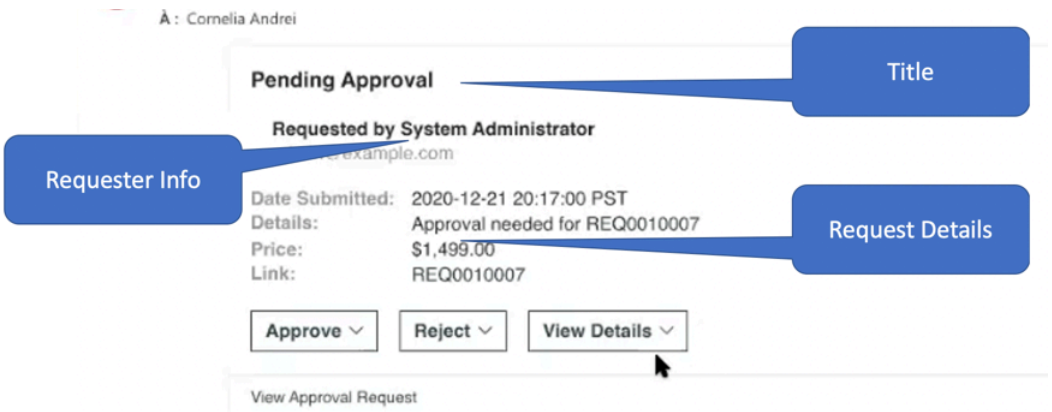
1. Navigate to **All** > **Actionable Messages** > **OAM Definition**.
2. Choose one of the following:

OAM definition

Option	Action
Request	Click **OAM Request Approval**
Request Item	Click **OAM RITM Approval**

3. In the OAM Container section, customize the following fields as required:
   a. **Title**: Title of the Outlook approval notification.
   b. **Requester info**: User who created the request.
   c. **Request Details**: This field can be customized. You can also add additional fields as per the requirement.
4. Click **Update**.

The approval message is displayed in Microsoft Outlook as shown below. Click **View Details** button to view the request in ServiceNow instance.



Customize fields in the approval message for change request

Customize the body message for a change request approval sent in Microsoft Outlook.

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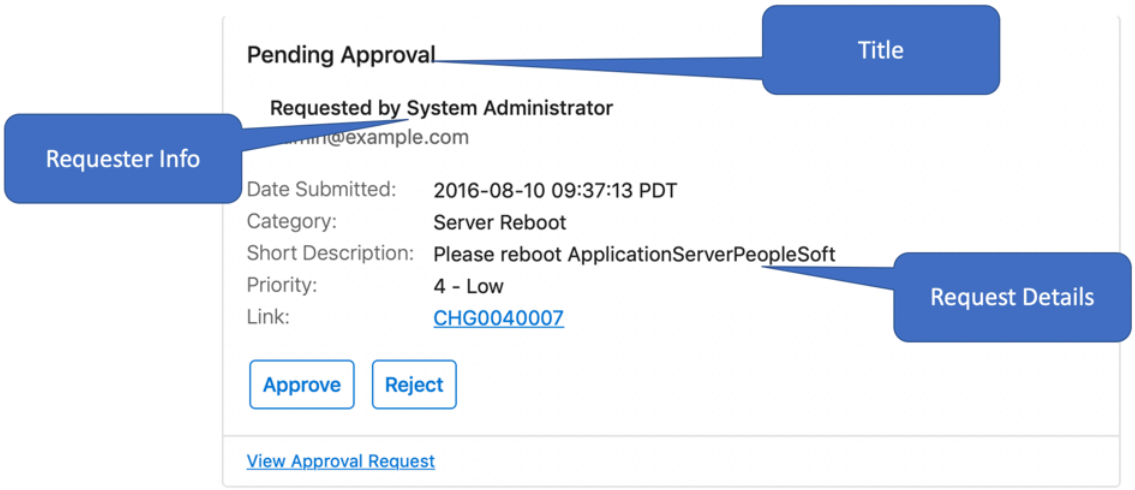
Before you begin
Role required: oam_admin

Procedure
1. Navigate to **All** > **Actionable Messages** > **OAM Definition**.
2. Click **OAM Change Approval**.
3. In the OAM Container section, customize the following fields as required:
   a. **Title**: Title of the Outlook approval notification.
   b. **Requester info**: User who created the request.
   c. **Request Details**: This field can be customized. You can also add additional fields as per the requirement.
4. Click **Update**.

   The approval message is displayed in Microsoft Outlook as shown below. Click **View Approval Request** to view the request in ServiceNow instance.



Enable Advanced view for Outlook Actionable Message definition

Enable the advanced view to customize the actionable message as per the requirement for Microsoft Outlook.

Before you begin
Role required: oam_admin

Procedure
1. Navigate to **All** > **Actionable Messages** > **OAM Definition**.
2. Choose one of the following:

OAM definition

Option	Action
Request	Click **OAM Request Approval**
Request Item	Click **OAM RITM Approval**
Change	Click **OAM Change Approval**

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3. Click **Advanced OAM** under **Related Links**.
4. In the OAM Definition form, perform the following actions:
   a. Modify the script as required.
   b. Click **Update**.

Sentiment analysis for surveys

You can use sentiment analysis to determine whether user responses for a survey are considered positive, negative, or neutral.

Activate the Sentiment Analysis (com.snc.sentiment_analysis) plugin.

For a survey, you can select questions that should be used for analysis. The survey responses of these questions are sent to the thirdparty platforms for analysis through the specified connector configurations.

Note:
You can only use string type questions for sentiment analysis.

The sentiment analysis results are displayed under **Survey** > **Question Sentiment Results**. The sentiment label is based on the normalized score:

Sentiment label

Normalized score	Sentiment label
-1 to 0	Negative
0	Neutral
0 to 1	Positive

Configure a sentiment connector

Specify the service URL and other configuration information for third party APIs that are used for sentiment analysis.

Before you begin

Role required: admin

Procedure

1. Change the scope of the current session to **Sentiment Analysis**.
2. Navigate to **Sentiment Analysis** > **Sentiment Connector Configurations**.
3. Add or edit the connector configuration for a third party vendor such as Google, IBMWatson, and MSAzure.

Note:
By default, placeholders are available for configuring connectors for Google, IBMWatson, and MSAzure.

Sentiment connector fields

Field	Description
Name	Name of the sentiment analysis connector configuration.

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Field	Description
Active	Check box to activate the connector configuration.
Credential Alias	Credential alias associated with the connector configuration. It has a reference to the system level table (sys_alias_list).
Default	Check box to make this as the default connector configuration.
Description	Description of the connector configuration.
Script	Script to call the Sentiment Analysis API and the normalize the values.

4. Configure the connector credentials

   a. Open the record referred in the **Credential Alias** field.

   b. Under the **Connections** tab, select the connection.

   c. In the **Connection URL** field, enter the value.

   d. Open the record referred in the **Credentials** field.

   e. Enter the credential information.

   Note:

   - You should obtain the connection credentials from the respective third-party vendors.
   - If the credential is an API key, specify its value. If the credential is basic authentication, that is, user name and password, specify the corresponding information.

   f. Select the **Active** check box and click **Update**.

5. Select the **Active** check box for the connector configuration and click **Update**.

Sentiment analysis property

You can use the sentiment analysis property to customize the **Sentiment Analysis** module.

Sentiment analysis property

Name	Description
Response time for the outbound call of Sentiment Analysis API (*sn_nlp_sentiment.glide.sentiment.transaction.timeout*)	Maximum time (milliseconds) expected for executing the outbound call for Sentiment Analysis API before it's timeout.

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Related topics

Sentiment analysis for surveys

Sentiment analysis results

The sentiment analysis results view contains a bar chart that displays the percentage of positive, negative, and neutral results, along with the instance count for each category.

Color indicators

Following are the color indicators in the bar chart:

- Green: Positive
- Red: Negative
- Blue: Neutral

Surveys in Service Portal and the Now Mobile app

If you've installed Service Portal, you can use the My Assessments and Surveys widget in Service Portal. Users can view surveys in Service Portal. Service Portal also supports surveys for users on mobile devices that have the Now Mobile app installed. The My Assessments and Surveys widget is available by default on the Service Portal home page.

Surveys in Service Portal

To create an intuitive interface for your users, you can set up surveys in Service Portal . Activate Service Portal to view the My Assessments and Surveys widget, which appears on the Service Portal home page.

To learn more about activating Service Portal, see Activate Service Portal .

To learn more about configuring a widget, see configure widget instances .

To configure a survey widget on a Service Portal page, press the CTRL key, right-click the widget heading, and select **Instance Options**.

Instance options (properties) for the survey widget on Service Portal

Property	Description
Max records	Maximum number of surveys to list in the widget on the Service Portal home page. Click the **View all** link to view all surveys. Default: **5**
Title of the widget	Text that appears in the title bar of the surveys widget. Default: **My Assessments and Surveys**

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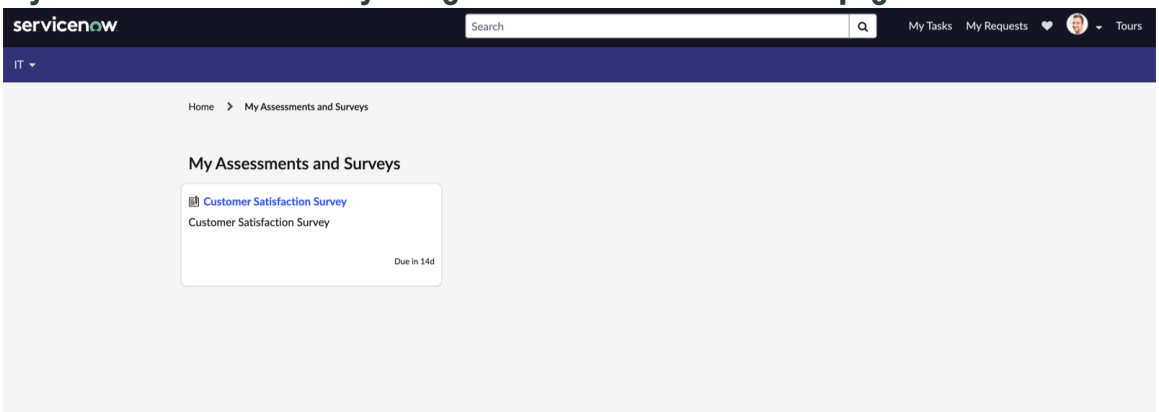
My Assessments and Surveys widget on the Service Portal home page



Surveys in the Now Mobile app

Users can view and take the surveys on mobile devices using the My Assessments and Surveys applet launcher that is available by default in the Now Mobile app.

When you assign a survey to a user an email notification about taking the survey is sent to the user. If users have installed the Now Mobile app, a mobile push notification is also sent on mobile devices. Tapping the notification opens an introduction page for a survey in the Mobile Employee Service Portal in the Now Mobile app. The page shows a **Get started** link. The introduction page and the **Get started** link are available only if the related settings are enabled. Users can tap the link to view and take the survey. You can activate push notifications by setting the *glide.sg.universal_links.enabled* system property to **true**.

Note:
A push notification doesn't apply for a triggered survey. For a triggered survey, an event is inserted in the event queue. The event can be configured to determine whether to send a notification or not.

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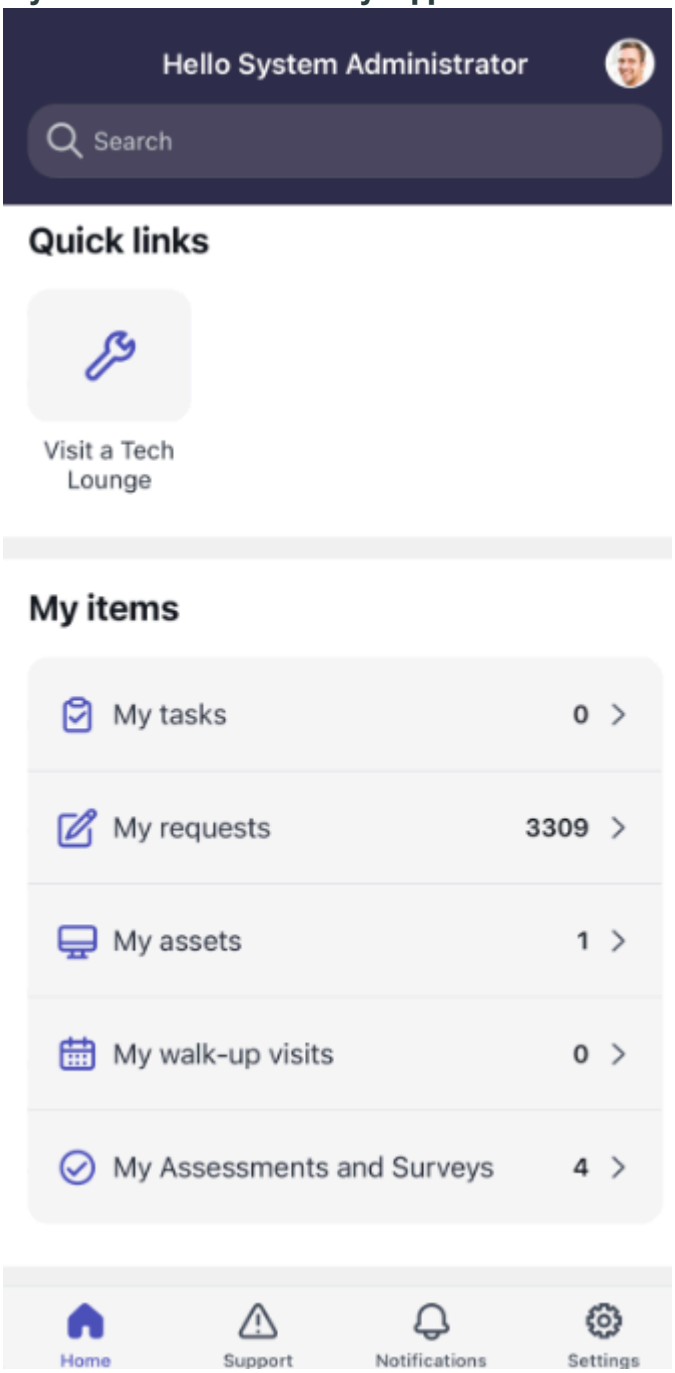
My Assessments and Surveys applet on a mobile device



Note:
In the Zurich version, you now see the assessments and surveys assigned in the card view instead of the item view. If you customize the styles of the legacy card item views in older versions of Assessments and Surveys, the card continues to appear in the item view even after you upgrade to Zurich. You can view the new card view in Zurich only if no customizations were made to the legacy cards.

When users open a survey either in Service Portal or the Now Mobile app, the surveys provide the following features:

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- A survey page shows breadcrumb navigation on the Service Portal. Users can click the links in the breadcrumb to navigate to previous pages or a home page. For example, clicking the **My Surveys** link in the breadcrumb navigates users to a page, which shows a list of all the surveys.
- When the survey is in progress, the progress bar, which is available on each page of the survey, shows the progress in percentage. The percentage of completion is based on the pages on the survey. For example, suppose that there are three pages of a survey. The third page shows 66% completion of the survey. But giving a response to one of the questions on the third page opens a new question on a separate page, which is the fourth page. The fourth page shows the progress of the survey as 75% completed, which affects the overall progress and page indicators. Users can see the pagination (total number of pages) for the entire survey as well as the current page that the users are on. To hide or show this progress bar, you can use the *sn_portal_surveys.sp_survey.show_progress_bar* property.
- Each user response is saved automatically when users move to the next page in the survey. If users don't answer the required survey questions before clicking **Next**, the page shows an error message at the top for all required and unanswered questions. This error message helps users find the exact location of the unanswered and required question. Any question that is not required and is not responded to before clicking **Next** is considered answered. The question is counted as completed.
- When the details of a survey question contain more than four or five lines of text, the text after these lines disappears. In such cases, users can see the complete details by clicking the **Show more** link. Users can go back to the default behavior by clicking the **Show less** link.
- For a question that has the answer options of **Yes**, **No**, and **Not Applicable**, the **Not Applicable** option appears last in the list of options. The **Not Applicable** option can be configured while creating a question.
- When the survey users leave the survey without submitting it, they can start the survey later from the same page where they left off in the previous session.

Note:
For mobile users, the pagination is always by question for surveys. For more information about pagination settings, see Configure a survey in the survey designer.

One Click survey

A One Click survey has no introduction page in Service Portal. This survey doesn't have the **Submit** and **Cancel** buttons in the desktop and iPad view.

Note:

- The One Click Survey is not supported in the mobile device view.
- The **One Click Survey** field should be selected in the survey definition.
- When the public access is enabled for a One Click survey, a user can submit the survey without having to log in.
- When the public access is enabled for a survey, you can't configure a signature or an attachment for the survey.
- For a published public survey, the Signature field is hidden and you can't add an attachment.

A kiosk survey is a One Click survey with only one question of any of the following types:

- Image Scale
- Choice

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- Likert Scale
- Numeric Scale
- Yes/No

When users click the answer for the kiosk survey question in Service Portal, the survey is submitted, and the end note is displayed on the same page that contains the survey questions. The kiosk survey becomes read-only after it's clicked.

Note:

- A kiosk survey doesn't have any **Submit** or **Cancel** buttons.
- A kiosk survey can't have a signature, dependent questions, or additional information.
- A kiosk survey doesn't display introduction notes.

URI parameters for One Click survey

Pass these URI parameters through the *createAssessment()* API to store their values in the asmt_assessment_instance table for both platform view and Service Portal view.

URI parameters

Parameter	Description
sysparm_refresh_interval	Refresh the time, in seconds, after the survey submission to create another instance. For example, sysparm_refresh_interval=5.
sysparm_trigger_table	Location that is stored as the **Trigger Table** field in the asmt_assessment_instance table. For example, sysparm_trigger_table=incident.
sysparm_trigger_id	Location sys_id that is stored as the **Trigger ID** field in the asmt_assessment_instance table. For example, sysparm_trigger_id=1c741bd70b2322007518478d83673af3.
sysparm_kiosk	When set to **true**, both the sysparm_trigger_table and sysparm_trigger_id parameters should be specified. This parameter is required for kiosk requests. For example, sysparm_kiosk=true.

Related topics

Service Portal

Create and edit a page using the Service Portal Designer

Survey designer

Configure a survey in the survey designer

Surveys in ITSM Virtual Agent

You can use surveys in ITSM Virtual Agent to collect survey responses from users through conversational questionnaires (pre-chat and post-chat surveys) in the chat client.

A chat survey is available in ITSM Virtual Agent through the Provide Virtual Agent Feedback topic. The logic that renders the survey dynamically is called from the re-usable Survey topic block. It is common to use the Provide Virtual Agent Feedback topic as the survey setup topic in the general

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definitions of ITSM Virtual Agent, so that users automatically receive a survey at the end of their conversations. For information about the Survey topic block, see ITSM Virtual Agent.

When you select the **Chat Survey** check box for a survey, the following conditions are validated for surveys on ITSM Virtual Agent.

- Survey should contain only one metric category.
- Survey can contain only these metric types.
  - Attachment
  - Boolean
  - Check box
  - Choice
  - Date
  - Date/Time
  - Image scale
  - Number
  - Numeric scale
  - Percentage
  - Scale
  - String

For information on configuring a survey, see Modify a survey definition and Configure a survey in the survey designer.

The following capabilities are supported for the survey:

- Dependent survey fields
- Introduction and end notes

Association between a survey and Virtual Agent chat

After a survey is submitted in a Virtual Agent conversation, a survey instance is created. This instance displays the following information:

- Trigger ID, which is the sys_id of the associated interaction ID created in the Virtual Agent chat
- Trigger table, which is the interaction table

Related topics

ITSM Virtual Agent

Legacy survey migration

Users with the survey_admin role can migrate legacy survey data to create copies of legacy surveys and their related records in assessment tables. The Survey Management application, which is built on the assessment engine, is available as an alternative to legacy surveys.

The following legacy survey components are migrated:

- Survey masters
- Supported survey questions and question choices

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- Survey instances
- Survey responses

Legacy survey conditions are not migrated and must be recreated as trigger conditions.

Note:

- The **Legacy Surveys** and **Legacy Administration** modules are available on instances upgraded from a previous release but not available for new instances. Customers using legacy survey or survey wizard should plan to migrate to the Survey Management application to create modern and high quality surveys for their users.
- The following legacy survey plugins are inactive by default, and are available upon request:
  - Best Practice - Task Survey Management (ID: com.snc.bestpractice.task_survey)
  - Survey Management (ID: com.glideapp.survey)
  - Assessment Components (ID: com.snc.assessment)
  - Survey Wizard (ID: com.glideapp.survey_wizard)
- Survey wizards cannot be migrated.

Migrate a legacy survey

Migrate a legacy survey and its related records to take advantage of a more powerful feature set.

Before you begin

Role required: admin or survey_admin

About this task

To avoid timing out for very large surveys, you can disable the transaction quota. See Transaction quotas.

Procedure

1. Navigate to **All** > **Survey** > **Legacy Surveys** > **Masters**.

   The list of legacy survey masters appears. By default, the list shows only survey masters that have not been migrated. To show all survey masters, remove the **Assessment is empty** breadcrumb.

2. Open a survey and click the **Migrate to New Survey Management** related link or **Migrate to New Survey Management** in the title bar.
   A dialog box describes what happens when you migrate the survey. Note that certain types of survey questions cannot be migrated.
3. Click **OK**.

   The system generates records on assessment tables based on the survey master, eligible questions and choices, results, and other related survey components. The original survey components are unaffected.

   System messages may appear at the top of the Survey form to notify you of questions that could not be migrated and to advise you to review migrated **Multiple Choice** questions.

4. **Optional:** Click the reference icon beside the **Assessment** field to view the new survey definition.

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5. **Optional:** Remove survey users from the assessment survey if you want all users to be able to take it.
   When you migrate a survey, any users who have taken it are automatically associated with the assessment survey and become survey users. When there are survey users associated with an assessment survey, only those users can take it.
6. Deactivate any survey conditions associated with the survey by completing the following steps.
   a. Navigate to **Survey** > **Legacy Administration** > **Survey Conditions**.
   b. In the **Active** column, ensure the value is false for any survey conditions that reference the migrated survey.
7. Navigate to **Survey** > **Administration** > **Trigger Conditions** to create new trigger conditions for the migrated survey.

Result

The **Migrate to Assessment** related link on the legacy survey record becomes unavailable after the migration. However, if you delete the record referenced in the **Assessment** field, the related link reappears and you can migrate the legacy survey again.

Survey question migration

Before you migrate a legacy survey, understand that some legacy survey questions cannot be migrated due to incompatible question types.

Legacy survey questions are migrated from the Survey Question [survey_question_new] table to the Assessment Metric [asmt_metric] table. In legacy surveys, the **Type** field on the Survey Question table determines how the question renders on the survey questionnaire. In assessment surveys, the **Data type** field on the Assessment Metric table serves a similar purpose. Certain legacy survey types are not supported in assessment surveys.

The following table shows the conversion path for each legacy survey question type to an assessment data type, if there is one.

Survey question migration

Legacy survey type	Assessment data type
Break	Not available
CheckBox	Checkbox
Date	Date
Date/Time	Date/Time
HTML	Not available
Label	Not available
List Collector	Not available
Lookup Multiple Choice	Not available
Lookup Select Box	Not available
Macro	Not available
Macro with Label	Not available
Multi Line Text	String (**String** option set to **Multiline**)

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Survey question migration (continued)

Legacy survey type	Assessment data type
Multiple Choice	Likert Scale
Numeric Scale	Number
Reference	Not available
Select Box	Choice
Single Line Text	String (**String** option set to **Single line**)
UI Page	Not available
Wide Single Line Text	String (**String** option set to **Single line wide**)
Yes / No	Yes/No

Migrated components

When you migrate a survey, the system maps records from survey tables to assessment tables.

To create a functional survey on the assessment framework, the system converts survey records to the most logical equivalent assessment survey records. This may mean multiple assessment survey records represent one legacy survey record.

Migrated components

Survey component	Assessment survey components
Survey master [survey_master]	• Survey definition [asmt_metric_type] • Assessable record [asmt_assessable_record], for system use only • Survey category [asmt_metric_category]
Survey question [survey_question_new]	Survey question [asmt_metric]
Question choice [question_choice]	Assessment metric definition [asmt_metric_definition]
Survey instance [survey_instance]	• Assessment group [asmt_assessment], for system use only • Survey instance [asmt_assessment_instance]
Survey response [survey_response]	• Survey instance question [asmt_assessment_instance_question] • Survey response [asmt_metric_result] • Category result [asmt_category_result], for system use only

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Migrated question review

To maintain accurate result calculations, you may need to make minor adjustments to some of the migrated survey records to ensure results are calculated correctly.

Note:
The assessment engine provides a built-in result calculation feature that converts each survey response to a score between 0 and 10. The configuration required to maintain accurate result calculations is advanced and is not recommended for basic survey implementations. If you do not plan to use result calculation data, ignore the information in this section.

For each legacy question migrated, the system creates a survey question record on the Assessment Metric [asmt_metric] table. For legacy questions of the **Multiple Choice** and **Select Box** types, the system also creates a metric definition record, on the Assessment Metric Definition [asmt_metric_definition] table, for each legacy question choice.

Comparable metric definitions and survey question choices

Survey question choice field	Related metric definition field
Text	Display
Value (can be any string value)	Value (must be a numerical value)
Order	Value (metric definition with smallest **Value** is first)

When the system migrates legacy survey question choices, it uses the legacy **Order** to set each metric definition **Value**. For the legacy question choice with the smallest **Order**, the corresponding metric definition **Value** is set to **1**. For the legacy question choice with the next smallest **Order**, the metric definition **Value** is **2**, and so on.

The **Scale definition** field on the migrated Survey Question form determines whether smaller or bigger metric definition values equate to a good score in survey result calculations. By default, the scale definition is set to **High**, meaning bigger values are good. When you migrate a legacy survey, check that the default scale definition makes sense for each question.

For example, the following tables depict a sample migrated question and the metric definitions automatically created for it. Recall that the system uses the order of the legacy survey question choices to set the metric definition value. **Excellent** has the lowest **Order** value, so when the system creates a metric definition for this question choice, the **Value** is set to **1**. In this case the default scale definition value, **High**, does not make sense, as the system will calculate the worst scores for responses of **Excellent**.

Legacy question: Please rate the overall quality of your service

Question choice text	Question choice vlue	Question choice order
Excellent	A	100
Good	B	200
Fair	C	300
Poor	D	400

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Migrated question: Please rate the overall quality of your service

Metric definition display	Metric definition value
Excellent	1
Good	2
Fair	3
Poor	4

If there are no **Order** values for the legacy survey question choices, the system sets each corresponding metric definition **Value** based on the alphanumeric order of the legacy **Text** value.

Migrated question: Please rate the overall quality of your service

Metric definition display	Metric definition value
Excellent	1
Good	2
Fair	3
Poor	4

You may also need to change the **Scale definition** setting for other migrated questions. For details, see the scale definition recommendations for each survey question data type.

Surveys reference

Reference topics provide additional information about the forms, fields, and properties you use while working with surveys.

Survey roles

The Survey application uses the following roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

No role is required to take assigned survey questionnaires.

Survey administrator [survey_admin]

Create and administer surveys. Survey administrators know what types of surveys are necessary, when to send a survey, and to whom. Survey administrators can use all modules in the Survey application menu.

Contains Roles

List of roles contained within the role.

- survey_reader
- assessment_admin

Groups

List of groups this role is assigned to by default.

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None.

Special considerations

None.

Survey reader [survey_reader]

View surveys and related information, such as survey responses, survey groups, scorecards, and reports.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Survey creator [survey_creator]

Create a survey and assign it to the user who can take the survey and submit it. A survey creator can also create assessments.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Key survey terms

These survey terms are used throughout the documentation to describe survey management functions and capabilities.

Key survey terms

Term	Description
Survey definition	Root record on which a survey is built. A survey definition contains information such as the survey name, state, and distribution schedule. Each survey definition has its own categories and questions.

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Key survey terms (continued)

Term	Description
	Survey definitions are comparable to legacy survey masters.
Public survey	Any user can take a public survey, even users who have not logged in to the ServiceNow system. For a completed survey, the **Assigned to** field value is Guest.
Survey category	Represents a theme for survey questions. Categories contain one or more questions. The system creates one category per survey by default. Additional categories are optional.
Survey question	A question that appears on a survey questionnaire for the associated survey definition. Survey questions are comparable to legacy survey questions.
Survey user	User who is authorized to receive invitations for a restricted survey.
Survey instance	Represents one survey questionnaire assigned to one user. Survey instances are comparable to legacy survey instances.
Trigger condition	Defines a rule that enables the system to send a survey when an action occurs on a table, such as when an incident closes. Trigger conditions are comparable to legacy survey conditions.
Scorecard	Visual representation of survey responses. Scorecards display a variety of data summaries for one survey definition.

Survey Overview dashboard

The Survey Overview dashboard displays various survey reports, such as Surveys by Metric Type and State.

Note:
The **Survey Overview dashboard** is deprecated. It is no longer deployed, enhanced, or supported. For details, see the Deprecation Process [KB0867184] article in the Now Support knowledge base.

Survey Overview dashboard reports

Report	Table
Assignment Group Customer Satisfaction 90 Day Average	Metric Results [asmt_metric_result]
Service Desk Survey 'Timely Response' 90 Days	Metric Results [asmt_metric_result]
Surveys by Metric Type and State	Assessment Instances [asmt_assessment_instance]
Service Desk Survey 'Overall Experience' 60 Days	Metric Results [asmt_metric_result]
Service Desk Survey 'Tech Courteous' 90 Days	Metric Results [asmt_metric_result]

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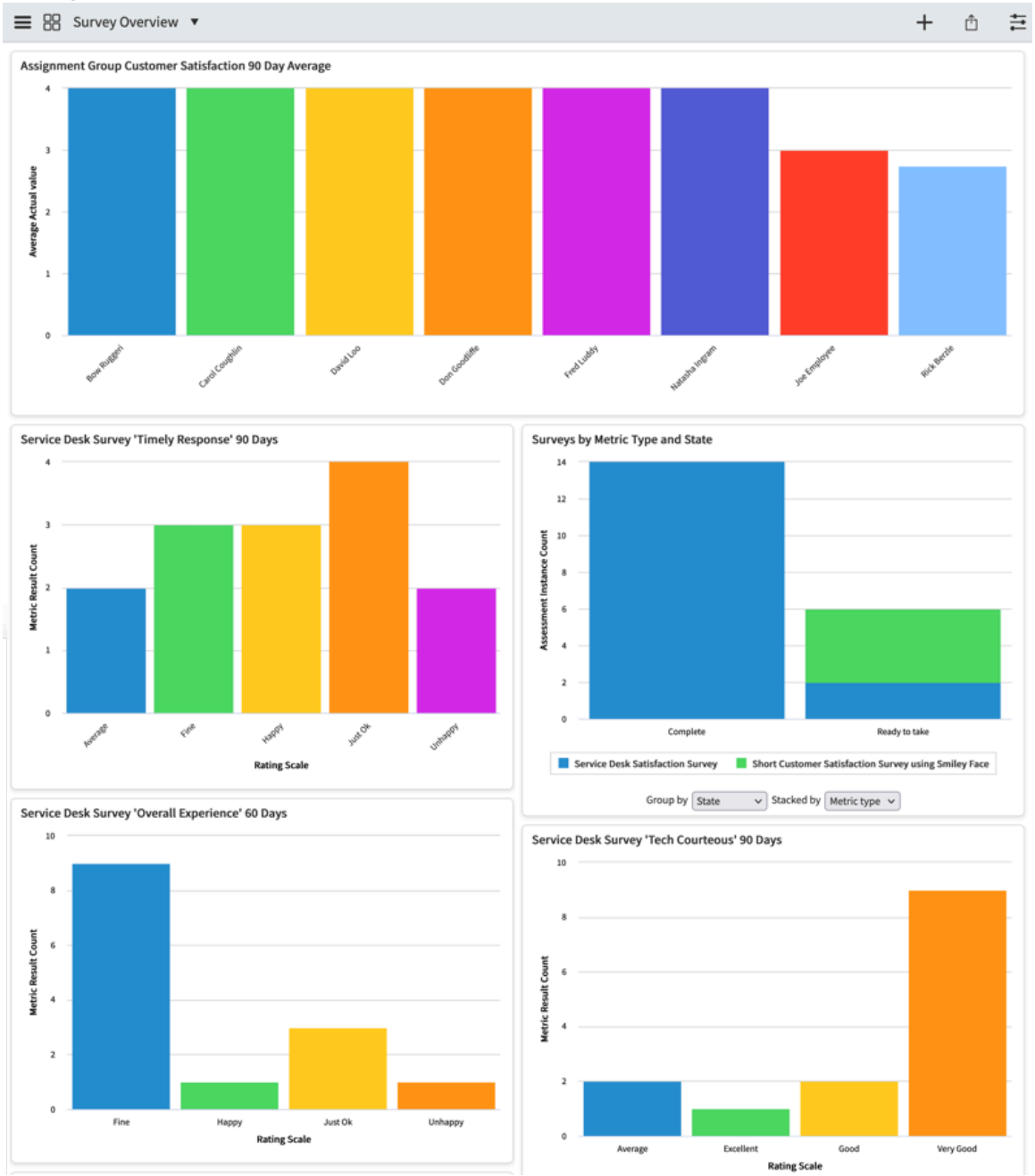
Survey Overview dashboard reports (continued)

Report	Table
Service Desk Survey 'First Call Resolve' 60 Days	Metric Results [asmt_metric_result]
Service Desk Survey 'Tech Competence' 60 Days	Metric Results [asmt_metric_result]

Survey report



Metric Result form

Description of the field values for the Metric Result form.

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Metric Result form

Field	Description
Assessment group	Assessment group to which the metric result belongs. An assessment group is a container for survey instances and results generated in a single occurrence. The system generates an assessment group every time at least one survey instance is created. If multiple survey instances are created at once, such as when a survey administrator sends invitations to a list of survey users, they are all stored in the same assessment group.
Metric	Question that the user answered.
Data type	Data type of the question the user answered.
Method	Assessment method. Always **Assessment** for surveys.
Updated	Date and time the metric result was last updated.
Source	Survey definition from which the associated survey instance was generated.
Assigned to	User who completed the survey questionnaire.
Instance	Survey instance completed by the **Assigned to** user.
Actual value	Value obtained from the user response to the question. The actual value is determined by the question data type: • **Checkbox:** The actual value is *0* if the check box is cleared and *1* if it is selected. • **Choice** or **Likert Scale:** The actual value is equal to the **Value** of the metric definition associated with the chosen answer option. • **Date**, **Date/Time**, or **String:** The actual value is *-1* to indicate that these data types do not contribute to category result calculations. • **Template:** The actual value is equal to the **Value** of the template definition associated with the chosen answer option. • **Yes/No:** The actual value is *0* if the response is **No** and *1* if it is **Yes**.
Normalized value	Adjusted value that accounts for the **Scale definition** setting, minimum and maximum values, and other factors. The equation that generates the value and an example calculation appear in Normalized value for an assessment.
String value	Value that displays the response as it appears on a questionnaire. In some cases this is the same as the **Actual value**, such as when the question data type is **Percentage**. The string value is N/A for unanswered questions of certain data types.

Normalized value for an assessment

The normalized value is calculated based on a linear equation and the scale definition of the metric. This value can be used for risk assessment.

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Normalized value for any metric

The normalized value is directly proportional to the scale definition of the metric. If the scale definition is low, that is, the lower scale values are better, then `Normalized value = 1.0 – Normalized value`.

For the reporting purpose, use the Metric Result [asmt_metric_result] table.

```
Normalized value = (Input Value - Min value defined in metric) / (Max value defined in metric - Min value defined in metric) * (current metric weight * bias / (sum of all metric weight in the metric category)) * scale_factor
```

Bias is the ratio of total metric weight in the category and the sum of valid metric weight in the metric category. While calculating bias, the scripted metrics are excluded.

Note:

- If a metric is skipped when taking the assessment, its weight is excluded when calculating `sum of valid metric weight in the metric category`.
- The following metric types are excluded in the normalized value calculation:
  - String
  - Date
  - Date/Time
  - Reference
  - Attachment
  - Ranking

For example, consider the following scenario.

Calculate the normalized value for the **Please rate the competency of the technician** metric.

Values of the metric

Input value	3
Minimum value	1
Maximum value	6
Current metric weight	10
Number of metrics in the metric category	6 • 4 of type=number • 1 of type=yes/no • 1 of type=string (invalid data type; value cannot be calculated)
Valid metric weight of each response	10
Scale factor	10

```
Normalized value = (3 - 1) / (6 - 1) * (10 / (10 + 10 + 10 + 10 + 10)) * 10 = 0.8
```

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Normalized value for a multiple selection metric

The normalized value for a multiple selection metric is calculated by using the weight of the metric and the score for each choice of the metric.

In a multiple selection metric, for each choice that should be used for the normalization calculation, define the normalization input value.

```
Normalized value = (Score of all choices) * (current metric weight / (sum of valid metric weight in the metric category)) * scale_factor
```

Here, score of all choices of the metric is the sum of individual scores of each choice.

- `Score of each choice in a multiple selection metric= Normalization input of the choice / max value of the metric`
- `max value of the metric = Sum of the normalization input for all choices of the metric`
- `min value of the metric is always 0`

For example, consider the following scenario.

Calculate the normalized value for the multiple selection metric, **Please rate the competency of the technician**, with three choices, A, B, and C.

Values of the metric

Choice A	Normalization input is 1
Choice B	Normalization input is 1
Choice C	Normalization input is 2
Minimum value	0
Maximum value	4
Current metric weight	10
Number of metrics in the metric category	5
Valid metric weight of each metric	10
Scale factor	10

If Choice A and B are selected, `Normalized value = ((1 / 4) + (1 / 4)) * (10 / (10 + 10 + 10 + 10 + 10)) * 10 = 1`

Weighted value for a risk assessment

For a risk assessment, the weighted value from metric results table is calculated as following.

```
weighted_value = metric.weight * result.actual_value
```

Domain separation and Surveys

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

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Support level: Basic

- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

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

Overview of Domain Separation

As a survey creator, survey_admin can create surveys in the assigned domain. A Global domain survey_admin can create or edit survey in any domain.

As a survey taker, a user can access the survey record and take the survey based on the domain of the survey record and user. Global domain users can take a survey in any domain.

How domain separation works in Surveys

There are several main areas to consider in how domain separation works in Surveys.

Surveys in domain-separated instances

The following domains are available by default after activating the Domain Support-Domain Extensions Installer [com.glide.domain.msp_extensions.installer] plugin. Only ServiceNow employees can activate this plugin.

- Global
- Acme
- Cisco

Access to surveys in domain-separated instances

Based on the domain of the survey record and users, users can access the survey record and take the survey.

Global domain users can access survey records in any domain. Users in any other domain can access records in their domain and Global domain. For example, users in the Acme domain can access records in the Acme domain and the Global domain.

Global domain users can take a survey in any domain. Users in any other domain can take surveys in their domain as well as the Global domain. For example, users in Acme domain can take surveys in the Acme domain and the Global domain.

Location of the survey record	**Users who can access and take the survey**		
N/A	Global	Acme	Cisco
Global	Yes	Yes	Yes

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Acme	Yes	Yes	No
Cisco	Yes	No	Yes

Any domain user can assign a survey in that domain to the same domain user or a Global domain user. For example, an Acme domain user can assign a survey to a Global domain user or an Acme domain user. Users from other domains are not visible to the Acme domain user.

Although the Global domain user can view a survey from other domains, this user cannot assign the survey of one domain to a user from a different domain. For example, a Global domain user can assign a survey from the Acme domain to another Global domain user or an Acme domain user, but not to a Cisco domain user.

Note:
When a task is closed in a child domain and the assigned survey is either in the child domain or the global domain, the user from the child domain can then take the survey.

Trigger conditions in domain-separated instances

A Global domain user can create a triggered condition for a survey from any domain. The Global domain user can create an incident and trigger the survey by selecting a user from the other domain in the **User field** under **Caller**. However, the Global user cannot assign the survey to the user of different domain.

A user can assign a trigger condition to a survey if the user belongs to the Global domain or the Survey domain.

If there is no domain path for a trigger condition, users from any domain can view the trigger condition. For example, in the `asmt_condition` table that has no column for the domain path, users from the Acme domain can view the trigger condition created by the Cisco domain users.

Related topics

Domain separation for service providers

Survey Designer Configuration form

Description of the field values for the Survey Designer Configuration form.

Configuration tab fields

Field	Description
Active	Select the check box to enable the distribution of this survey to recipients.
Survey Owners	Owners of the survey. You can add a user with the survey_creator, survey_admin, or assessment_admin role.
Anonymize responses	Select the check box to collect survey responses anonymously. Recipients are not listed with survey results. When a user submits a survey, the system clears the **Assigned to** field for the associated survey instance. Also, survey responses for anonymous surveys do not contain Assigned to values. **Note:** The **Assigned to** field is cleared. However, each response record includes the **Created By** and **Updated By** fields that are accessible to users with the survey_admin role.
Description	Description of this configuration or the survey to which it is attached.

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Configuration tab fields (continued)

Field	Description
Do not show survey introduction notes	Check box to skip the introduction notes when a survey is launched. This functionality is applicable in both the ServiceNow AI Platform and Service Portal product versions.
Introduction	Introductory content to display on surveys. You can add a welcome message or background information about the survey.
Signature	Acknowledgement by a survey recipient of requirements, admonitions, or expectations related to a survey.
Return URL	Destination address of a web page that is presented to users after they submit a completed survey. When a return URL is configured, the **End note** content does not appear.
End note	Content that is displayed to recipients after they submit a completed survey. You can add a thank you message, follow-up instructions, or other applicable information. End notes are not displayed if a **Return URL** is specified.
Public Survey	Enables public access to the survey. No login is required to take a public survey and users or non-users can respond anonymously. For completed public surveys, the **Assigned to** field value is Guest. **Note:** This check box is available only after you save the survey.
Survey Publish URL	Specifies a URL of the survey that can be shared with users. **Note:** This field is available only after you publish the survey.
Sample metric	Specifies the metric that appears as a sample in emails sent to users.
Pagination setting for Service Portal view	Specify how the user will see pages on the desktop or tablet view in Service Portal. • **Category**: Display each category on a separate page. • **Question**: Display each question on a separate page. This happens for mobile regardless of this setting. • **None**: All items on a single page—no pagination Default: **Category** **Note:** This field appears only when Service Portal is installed.
Chat Survey	Option to validate if survey questions are supported in a chat survey. Enables conversational questionnaires (pre-chat and post-chat surveys) in the chat client. Also enables you to map chat context variables to survey questions. For information on a chat survey in ITSM Virtual Agent, see Surveys in ITSM Virtual Agent

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Configuration tab fields (continued)

Field	Description
	Note: This field is available only when the Glide Conversation Server plugin (com.glide.cs) is activated.
One Click Survey	Enables a One Click survey in Service Portal. **Note:** This option can be selected if the **Pagination setting for Service Portal view** is set to `None`.
Source Table	Table whose field is used as a dynamic value for a question in a triggered survey. **Note:** When you select a source table, ensure that its relevant field is selected as **Source Field** value of a metric.
Allow Sentiment Analysis	Enables sentiment analysis for this survey.
Duration	Amount of time that recipients are given to complete this survey, starting from the time that the survey is generated. The default duration is 14 days.
Outlook Actionable Message	Includes an embedded survey in the survey email notification. After you select this check box and save the survey, a validation is run to ensure all survey questions are supported. **Note:** This field is available only when the Outlook Actionable Messages(sn_ms_oam) plugin is installed.

Availability tab fields

Accessible by	Defines who can access the survey. Possible values are • Anyone: Accessible by anyone with the survey link. • Specific users: Accessible by specified users.
Survey groups only	If selected, a survey is available for survey groups only. **Note:** This field is displayed only if the **Accessible by** is `Specific users`.
Add group users	Group users for whom the survey is available.

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Availability tab fields (continued)

	Note: This field is displayed only if the **Accessible by** is `Specific users`.
Add users	Users for whom the survey is available. **Note:** This field is displayed only if the **Accessible by** is `Specific users`.
Add recipients lists	Recipients lists for whom the survey is available. **Note:** This field is displayed only if the **Accessible by** is `Specific users`.

Properties form

Description of the field values for the Properties form of survey designer.

Question property fields

Field	Description
Name	Concise name of the question. The system uses this value to identify the question in Assessment Metric lists and in scorecard charts.
Question	Text to display as the question on surveys. Enter a clear, straightforward question that is easy to understand.
Type	Data type selected for this question. See the table in Controls for the available data types.
Active	Check box that determines whether this question is available on a survey. A question does not appear on surveys that are generated after the question becomes inactive.
Mandatory	Check box to require users to answer the question. Mandatory questions are denoted by a red field status indicator and must be answered before the survey can be submitted. This field is available when the question does not have a dependency and the question type is not **Boolean** with a check box option.
Allow Additional Information	If selected, the **Additional Information Label** field is enabled. The **Additional Information Label** field value is displayed as a field on the survey response page to provide additional information for a question. **Note:** This is not applicable for the String and Template data types.

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Question property fields (continued)

Field	Description
Boolean option	Whether a check box or a **Yes/No** list appears as the option for a Boolean question.
String option	Setting for the appearance of a string field in a question. This field is available when the question type is **String**. The string options include the following. • **Single line**: Single-line text field 40 characters in length that allows strings of any length. • **String line wide**: Full page width text field that allows a single-line entry of any length. • **Multiline**: Full page width multiline text field that allows word wrap and returns
Min	Lowest positive whole number that users can enter or select to answer the question. This field is available when the question type is **Number**, **Percentage**, or **Numeric Scale**.
Max	Highest positive whole number that users can enter or select to answer the question. This field is available when the question type is **Number**, **Percentage**, or **Numeric Scale**.
Allow not applicable	Check box for including **Not Applicable** as an option for this question. Users can select **Not Applicable** if they do not have sufficient information to respond to a question. User responses of **Not Applicable** are excluded from results calculations. This field is available when the question does not have a dependency and the question type is not **Boolean** with a check box option.
Randomize answers	Check box for displaying answer options in a random order. Answer preference is sometimes influenced by the order in which options appear, which can result in biased results. Randomizing options can help prevent this bias. **Note:** Randomizing options for certain questions may make those questions confusing for users. In general, only randomize options that do not follow a logical order.
Positive indicator	Setting that determines whether smaller or larger numerical values equate to a good score in result calculations. Select **Low values** if smaller numerical values are better, such as for a question that measures the number of incidents for a vendor. Select **High values** if larger numerical values are better, such as for a question that measures user satisfaction on a scale of one to five.
Source Field	Source table field that appears as a dynamic value for the question in a triggered survey. When this field value is selected, a *`${param}`* placeholder is added at the end of the question label. **Note:** You can move this placeholder anywhere in the question label. When a user takes the survey, the question with dynamic value is included in the survey instance and *`${param}`* placeholder is replaced with the source field value.

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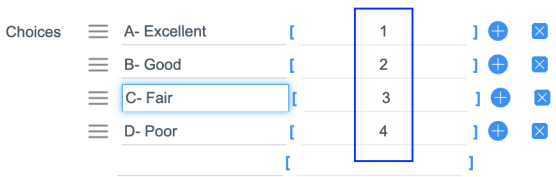
Question property fields (continued)

Field	Description
	If the record table specified in the trigger condition does not match the source table specified for the survey, or if the system fails to get the dynamic value from the source record, the *${param}* placeholder is not replaced by any value and is displayed as is in the question. For example, if the survey is triggered from a **PRB** record and the survey question is configured with a dynamic value from **Incident**, the *${param}* placeholder in the survey question label is not replaced by any dynamic value and is displayed as is. When survey questions are translated to other languages by a survey admin, the *${param}* placeholder should not be translated.
Allow Sentiment Analysis	Includes this question for the sentiment analysis of a survey. **Note:** This field is available only for String type questions.
Details	Information about the question that is displayed on the survey. Include details that help users understand how to answer the question.
Choices	Options for a question with a data type of **Choice** or **Scale**. The system automatically adds text and values that you can edit for each option. You must have at least two options, and each option must have a unique value. Click the **+** icon to add an option, or click the **X** icon to delete an option. By default, the system arranges options in the order established by their values. To change the order, drag and drop the options. **Note:** Value numbers also contribute to the calculations of survey response scores, which can be used by advanced survey administrators. 

Custom Metric form

Description of the field values for the Custom Metric form.

Custom Metric form

Field	Description
Name	Name of your custom metric type. The name appears on the Custom Metrics page.
Application	Name of the application that you are creating the custom metric type for.
Icon	An icon for the custom metric type. The custom metric type appears as the selected icon in Survey Designer.

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Custom Metric form (continued)

Field	Description
Active	Option to enable or disable the custom metric type. If selected, the Survey Designer shows the custom metric type.
Macro	A macro that is used to render the custom metric type. **Note:** • If the **Macro** field is empty, the question is not rendered on the platform form. • The macro record that you select must contain an input element with the following attributes. This input element holds the value for the metric. ◦ `datatype="custom"` ◦ `name= "${jvar_question_name}"` • Value parameters can be accessed in a macro using the *`${jvar_value_params}`* object.
Widget	The widget is used to render the custom metric. **Note:** • If the **Widget** field is empty, the question is not rendered on the portal form. • The widget record that you select must contain an input element with the following attributes. This input element holds the value for the metric. ◦ `ng-model="page.fieldValue"` ◦ `ng-model-options="{getterSetter: true}"` • The client script must have *`$scope`* as one of the parameters in the function definition. The value parameters can be accessed using the *`$scope.page.field.value_params`* object.
Result type	Result type for the custom metric type. If a value is changed, the new results are stored as per the new value and the previous results remain unchanged. If a value is changed from string to number, the reports might not show the charts properly. If a value is changed from number to string, the scorecard is shown in a list view.
Value parameters	Value pairs that are passed to the custom metric type renderers. For example, in star ratings, you can pass a value as 5 for 5 stars or 10 for 10 stars.

Survey Instance form

Description of the field values for the on the Survey Instance form.

Survey Instance form

Field	Description
Number	Automatically generated record number.

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Survey Instance form (continued)

Field	Description
Metric type	Survey definition this survey instance was created from. Survey definitions are stored on the Assessment Instance table, and the field label on that table is **Metric type**.
Due date	Date by which the survey instance should be completed. The system populates the due date based on the **Assessment duration** of the associated survey definition, which is set to 14 days by default. The survey due date is not enforced in the base system. If you want to enforce the due date, consider using a workflow or other mechanism to send survey recipients reminders when a survey is overdue. **Note:** By default, the system runs the *Cancel Expired Assessments* script every 30 days to cancel expired survey, assessment, and quiz instances that are in the Work in progress or Ready to take states.
State	State of the survey instance.
Assigned to	User this survey instance is assigned to. This field becomes read-only when the state is In progress, Complete, or Canceled.
Domain	Domain associated with the instance.
Expiration date	Date on which the assigned user can receive a new instance of the same survey definition. The system automatically populates the expiration date based on the **Schedule period** of the associated survey definition.
Related Link	
View User's Response	Shows a read-only version of the survey responses completed by the user.
Retry Sentiment Analysis	Sends the survey instances for sentiment analysis. **Note:** This link is available only if any sentiment analysis result is not available for this instance under **Survey** > **Question Sentiment Results**
Related List	
Assessment Instance Questions	All instance question records, which store user response values for each question on the survey questionnaire. The following columns are relevant to surveys: • **Category**: Displays the survey categories the questions belong to. • **Metric**: Displays the survey questions.

Related topics

View a survey instance

Survey Question form

Description of the field values for the Survey Question form.

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Survey Question form

Field	Description
Name	Name of the question. When you create a survey, the question name is the same as the text in the **Question** field.
Question	Text to use for the question, which appears on survey questionnaires.
Data type	Data type of the question. The fields for the response depend on the data type. **Note:** If another question depends on this question, you cannot change the data type.
Template	Question template to use for the answer options. This field is visible and required only if the data type is **Template**. **Note:** If another question depends on this question, you cannot change the template.
Scale definition	Setting that determines whether smaller or larger numerical values equate to a good score in result calculations. Select **Low** if smaller numerical values are better, such as for a question that measures the number of incidents for a vendor. Select **High** if larger numerical values are better, such as for a question that measures user satisfaction on a scale of one to five. This field is visible and required only when certain data types are selected.
Randomize answers	Check box that determines whether to present the answer options for this question in a random order each time a user opens the survey. Answer preference is sometimes influenced by the order in which answer options appear, which can result in biased results. Randomize answer options to help prevent this bias. This field is visible only if the data type is **Choice** or **Likert Scale**. **Note:** Randomizing answer options may make a question confusing. In general, only randomize answer options that do not follow a logical order.
Mandatory	Check box that makes the question mandatory (selected) or optional (cleared) on survey questionnaires. Users cannot submit questionnaires until they provide valid responses to all mandatory questions, which are denoted by a red field status indicator. This field is visible only when the **Depends on** field is empty and the data type is not **Checkbox**. Questions that depend on other questions and check box questions cannot be mandatory.
Allow not applicable	Check box that determines whether to include a **Not Applicable** answer option for this question on survey questionnaires. User responses of **Not Applicable** are excluded from results calculations.

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Survey Question form (continued)

Field	Description
	This field is visible only if the data type is **Choice**, **Likert Scale**, **Template**, or **Yes/No**.
Allow Additional Information	If selected, the **Additional Information Label** field is enabled. The **Additional Information Label** field value is displayed as a field on the survey response page to provide additional information for a question. **Note:** • This is only available on the Service Portal and is not supported on the Platform or Mobile views. • This is not applicable for the String and Template data types.
Depends on	Setting used to make this a conditional question, meaning that it only appears when users answer another question a certain way. To make a question depend on another question, select an existing question from the list, which displays **Checkbox**, **Choice**, **Template**, and **Yes/No** questions of the same category as this question. Then, use the **Displayed when** field to set the conditions that cause this question to appear on surveys. The system prevents the creation of recursive dependencies between questions. For example, if Question A depends on Question B, Question B cannot depend on Question A.
Displayed when	Answer options for the selected **Depends on** question which, when chosen on surveys, display this question. This field is visible and required only when the **Depends on** field is set.
Min	Smallest numerical value to be used as an answer option for this question. This field is visible and required only if the data type is **Choice**, **Likert Scale**, **Number**, or **Percentage**.
Max	Largest numerical value to be used as an answer option for this question. This field is visible and required only if the data type is **Choice**, **Likert Scale**, **Number**, or **Percentage**.
String option	Selection that determines what kind of response text box appears for this question on survey questionnaires. This field is visible and required only if the data type is **String**.
Source Field	Source table field that appears as a dynamic value for the question in a triggered survey. When this field value is selected, a *`${param}`* placeholder is added at the end of the question label. **Note:** You can move this placeholder anywhere in the question label. When a user takes the survey, the question with dynamic value is included in the survey instance and *`${param}`* placeholder is replaced with the source field value. If the record table specified in the trigger condition does not match the source table specified for the survey, or if the system fails to get the dynamic value from

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Survey Question form (continued)

Field	Description
	the source record, the *${param}* placeholder is not replaced by any value and is displayed as is in the question. For example, if the survey is triggered from a **PRB** record and the survey question is configured with a dynamic value from **Incident**, the *${param}* placeholder in the survey question label is not replaced by any dynamic value and is displayed as is. When survey questions are translated to other languages by a survey admin, the *${param}* placeholder should not be translated.
Allow Sentiment Analysis	Includes this question for the sentiment analysis of a survey. **Note:** This field is available only for String type questions.
Condition	Condition to filter the reference records from the table specified in the **Reference** field. **Note:** This field appears only for the Reference metric type.
Field validation	Validate the value entered for a String type metric of a survey. Possible validations are: • Email • IP Address(IPV4,IPV6) • Phone Number (E.164) • URL **Note:** This field appears only for the String metric type.
Related Lists	
Assessment Metric Definitions	Answer options for this question. This related list is available only if the **Data type** is **Choice** or **Likert Scale**.

Related topics

Create or modify survey questions

Trigger Condition form for surveys

Description of the field values for the Trigger Condition form for surveys.

Trigger Condition form

Field	Description
Assessment	Survey to send.

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Trigger Condition form (continued)

Field	Description
Table	Table to run the trigger condition on. You can select only tables in the current application scope. For example, to send a survey whenever an incident closes, select the Incident [incident] table.
User field	Field that stores the users you want to send the survey. You can select any field, on the selected table or on a referenced table, that references the User [sys_user] table. Use the tree picker to select a field. **Note:** To avoid requiring users to log in to take a survey with a trigger condition, set the survey to **Public**.
Repeat interval	Minimum period that must pass before the trigger condition can resend the survey to the same user. For example, assume the repeat interval is set to 30 days. Even if the same user qualifies for multiple surveys from this trigger condition, the system can send only one survey every 30 days. **Note:** • Ensure that the Schedule period of the selected survey definition is set to **No Limit**. If the schedule period is set to a different value, it prevents the trigger condition from sending surveys as expected. • Trigger condition creates a survey instance irrespective of the repeat interval if the survey is set as anonymous.
Application	[Admin only] Application is set to Core.
Active	Check box that determines whether this trigger condition is active (selected).
Business rule	[Admin only] Business rule the system creates to monitor the selected table. When the condition is met, the business rule sends the survey to the correct user. No configuration is necessary for this business rule.
Trigger randomly	Check box that determines whether to send the survey to the appropriate user every time the condition is met (cleared) or only a percentage of the time (selected).
Probability (%)	Approximate probability that the survey is sent each time the condition is met. For example, if the probability is set to 50, the system sends the survey approximately 50% of the time the conditions are met. There are no repeat interval restrictions is assumed. This field is visible and required only when *Trigger randomly* is selected.
Related Field 1- 4	Field that contains a value you want to store for reporting purposes. You can pick any reference field on the selected table. When the trigger condition generates a survey instance, the system stores the value from the triggering record. Specify up to four fields. For example, select the Incident table, **Assigned to** and **Problem** as related fields. The system stores the assigned user and problem associated with the incident as Related record 1 and Related record 2 in the survey instance record. To view the fields, configure the form for any survey instance.

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Trigger Condition form (continued)

Field	Description
	Note: You cannot use a related field for the ticket number because you cannot select the Number column. You can, however, use the trigger_id column of the table.
Description	Summary information to identify the trigger condition. **Note:** For a triggered record, the table title is used for the survey description.
Condition	Condition builder that defines the criteria that must be true to send the survey. For example, to send a survey whenever an incident closes, create the condition **[State] [is] [Closed]**. **Note:** • When defining conditions like case sensitivity or null values, see API GlideFilter - Scoped, Global. • Survey triggers will not function as expected when you use dot-walk conditions in the **Condition** field.

Related topics

Configure a trigger condition for a survey

Recipients List form

Description of the field values for the Recipients List form.

Recipients List form

Field	Description
Name	Name of the recipients list.
Type	Type of users to include in the list. Possible values are: • Contacts • Internal Users The selection of each type changes the dynamic conditions. For example, if you select **Internal Users**, the **Table** field displays the value as **User [sys_user]**.
State	State of the recipients list. • **New**: List has not yet been generated. • **In Progress**: List is currently being generated. (You can see this state only when generating a very large list of recipients.) • **Complete**: List is generated.
Setup	

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Recipients List form (continued)

Field	Description
Method	Method used to generate the recipients list. Possible values are: • `Upload File`: Upload an Excel file with the recipients list using the specified template. • `Dynamic Condition`: Run a script or condition builder to create the recipients list. **Note:** When the **Method** is `Dynamic Condition`, you can either use a script or a condition builder to create the recipients list.
Choose File	Allows you to download an Excel template, and then upload the Excel file with user information using the specified template. **Note:** • This field is available only if the **Method** is `Upload File`. • The templates vary based on the entity selected in the **Type** field. For accounts, the template includes columns for sys_id and account number values. For contacts, consumers, and internal users, the template includes columns for sys_id and email values.
Show Script	If selected, displays the script to create the recipients list. **Note:** This field is available only if the **Method** is `Dynamic Condition`.
Script	Script to create the recipients list. **Note:** This field is available only if the **Method** is `Dynamic Condition` and the **Show Script** check box is selected.
Table	Table that stores the user information. The table is selected based on the **Type** field. **Note:** This field is available only if the **Method** is `Dynamic Condition`.
User Field	Table field that refers to users. **Note:** This field is available only if the **Method** is `Dynamic Condition`.
Conditions	Condition builder to create the recipients list based on the specified table and user field. A condition is made up of a selected field, an operator, and a value. Add conditions using the AND and OR buttons. Delete conditions by clicking the Delete button to the right of a condition.

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Recipients List form (continued)

Field	Description
	Note: This field is available only if the **Method** is `Dynamic Condition`.

Related topics

Define a recipients list for surveys

Create a recipients list

Assessments

Use assessments to evaluate, score, and rank records from any table in the system.

You can assess projects that executives want to evaluate for effective management, or rate and compare a vendor's goods and services. Use assessments to send custom questionnaires to selected users or write scripts that query the database directly. You can then compare assessment results for the records using unique graphical views designed to highlight key performance information. Share an assessment between ServiceNow instances by using update sets, which is the recommended way to move assessment data from one instance to another.

The Assessments plugin is enabled by default.

You can only edit an assessment that has the same application scope as that of your current session.

The difference between assessments, surveys, and quizzes, and when to use each; also provides a quick look at the three stages in the survey process: designing, sharing, and evaluating.

Using assessments

Before you create assessments, assign the assessment_admin role to the appropriate users in your organization and determine your objectives for the assessment.

Assessment administrator tasks

Before you create assessments, assign the assessment_admin role to the appropriate users in your organization and determine your objectives for the assessment.

Decide which sets of records in the system to assess, which themes you are interested in, and which traits to measure. Consider your organization's options for obtaining the data to compare. If you intend to use assessment questionnaires, consider which people can answer the questions.

Assessment terminology

Assessment admins use several terms when working with assessments.

Term	Description
Metric type	A metric type defines a set of records to evaluate, such as vendors, projects, or employees.
Assessable record	An assessable record links a record to evaluate, such as the company record for Amazon or the user record for a sales representative, to a metric type, such as

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Term	Description
	vendors or employees. You define sets of assessable records when you create metric types.
Metric category	A metric category represents a theme for evaluating assessable records. Categories contain one or more individual metrics, which define specific traits or values that comprise the theme. Examples of categories include overall vendor performance or quality of delivery services. You can also set filter conditions that control which assessable records to evaluate for the metrics in a category.
Metric	A metric is a trait or value used to evaluate assessable records. A metric can measure subjective values in an assessment questionnaire, or gather objective values in a database query run by a script. Examples of metrics include perceived courtesy of sales representatives or number of incidents per vendor.
Category user	A category user is a person who knows about a specific category. One person can be a category user for multiple categories. Examples of category users include a vendor manager who oversees all purchasing operations or a supervisor of a sales team.
Stakeholder	A stakeholder is a category user who knows about a specific assessable record. Examples of stakeholders include a vendor manager who coordinates purchases from Amazon or a supervisor of a sales team who manages a specific employee.
Assessment instance	An assessment instance represents one assessment questionnaire assigned to one user. The system generates a new assessment instance for each assigned user when: • The assessment generation scheduled job runs. • An assessment administrator creates an on-demand assessment.
Scorecard	A scorecard provides a visual illustration of an assessable record's performance, based on assessment results. Use scorecards to view a variety of data summaries for one assessable record and to compare the ratings with other assessable records.
Decision matrix	A decision matrix is a graph with two axes that plots the assessment results for multiple assessable records. Use decision matrixes to determine the relative standing of assessable records in selected categories.
Bubble chart	A bubble chart is a graph with three axes that plots the assessment results for multiple assessable records. Use bubble charts to determine the relative standing of assessable records in selected categories, with an emphasis on one category.

Assessment roles

The Assessments application requires certain roles to perform assessment tasks. No role is required to take assessment questionnaires that are assigned to you.

Role Title	Role Name	Description
Assessment administrator	assessment_admin	Assessment administrators set up assessments. They know which records to evaluate, the criteria on which to evaluate the records, and who to assign assessments to.

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Role Title	Role Name	Description
		Note: By default, users with the assessment_admin role have limited system rights and might not have access to all source records to assess. When planning assessments, grant additional roles to assessment administrators as needed. For example, to create and manage vendor assessments, the assessment administrator must also have the vendor_manager role, which grants access to the Company table and other relevant tables.
ITIL user	Base system roles	ITIL users perform basic technician operations in the system. In the Assessments application, they have read access to the Assessable Record table.
Administrator	Base system roles	Administrators have access to all aspects of the assessment process. Only administrators can set up assessment schedules.

Assessment methods

The available methods are **Assessment**, for non-scripted metrics, and **Script**, for scripted metrics. Each method serves a different function and can be used with certain data types.

Use the **Method** field to specify how to use the metric.

Assessment method

Metrics with the Method set to Assessment are called non-scripted metrics. Use each non-scripted metric to define a question for assessment questionnaires. Non-scripted metrics are useful if you want to obtain subjective data like personal opinions.

You can use the Assessment method with these *Data type* values:

- Attachment
- Checkbox
- Choice
- Date
- Date/Time
- Likert Scale
- Number
- Percentage
- String
- Template
- Yes/No

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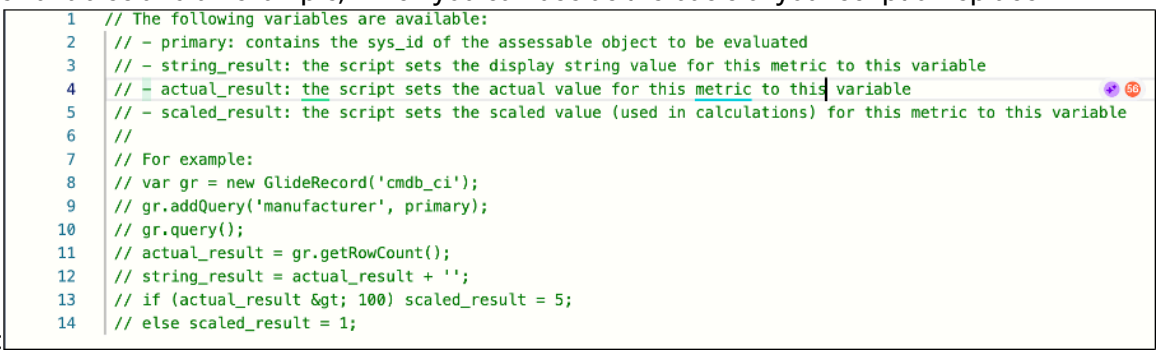
Script method

Metrics with the Method set to Script are called scripted metrics. Use each scripted metric to define a custom script for database queries. Scripted metrics are useful if your system contains reliable data for the traits you want to evaluate.

You can use the Script method with these *Data type* values:

- Duration
- Number
- Percentage

Use the Script field to write JavaScript code. By default, the field contains information about available variables and an example, which you can use as the basis of your script or replace entirely:



```
// The following variables are available:
// - primary: contains the sys_id of the assessable object to be evaluated
// - string_result: the script sets the display string value for this metric to this variable
// - actual_result: the script sets the actual value for this metric to this variable
// - scaled_result: the script sets the scaled value (used in calculations) for this metric to this variable
//
// For example:
// var gr = new GlideRecord('cmdb_ci');
// gr.addQuery('manufacturer', primary);
// gr.query();
// actual_result = gr.getRowCount();
// string_result = actual_result + '';
// if (actual_result &gt; 100) scaled_result = 5;
// else scaled_result = 1;
```

You must use the following variables in your script:

- *primary*: Input variable used to access the sys_id of the record being assessed.
- *string_result*: Output variable that contains the display string value for this metric
- *actual_result*: Output variable that contains the actual value for this metric. The system uses this variable to populate the Actual value field on the Metric Result form. For each *actual_result,* you must specify a corresponding **scaled_result** value.
- *scaled_result*: Output variable that contains a numerical scaled value to represent an actual value. The system uses this variable to populate the **Scaled value** field on the **Metric Result** form. Ensure the scaled values you specify are between or equal to the **Min** and **Max** values for the metric. The **Scale definition** field determines how the system uses the scaled value. A scale definition of **Low** means smaller numbers are better, such as for a metric that measures the number of incidents for a vendor. **High** means larger numbers are better, such as for a metric that measures user satisfaction on a scale of one to five.

Script example

The metric Number of active devices uses the script pictured below. The *primary* variable is used to find CIs that are associated to the vendor record being assessed. The script retrieves the actual_result, the number of CIs associated to the vendor, then calculates the correct scaled_result. The script uses a series of scaled values, from the **Min** to the **Max** value, to represent actual values. Because the **Scale definition** is set to **High**, the greatest scaled values are best, meaning a vendor associated to the most CIs scores highest. The system stores the actual and scaled values in a metric result record for the vendor.

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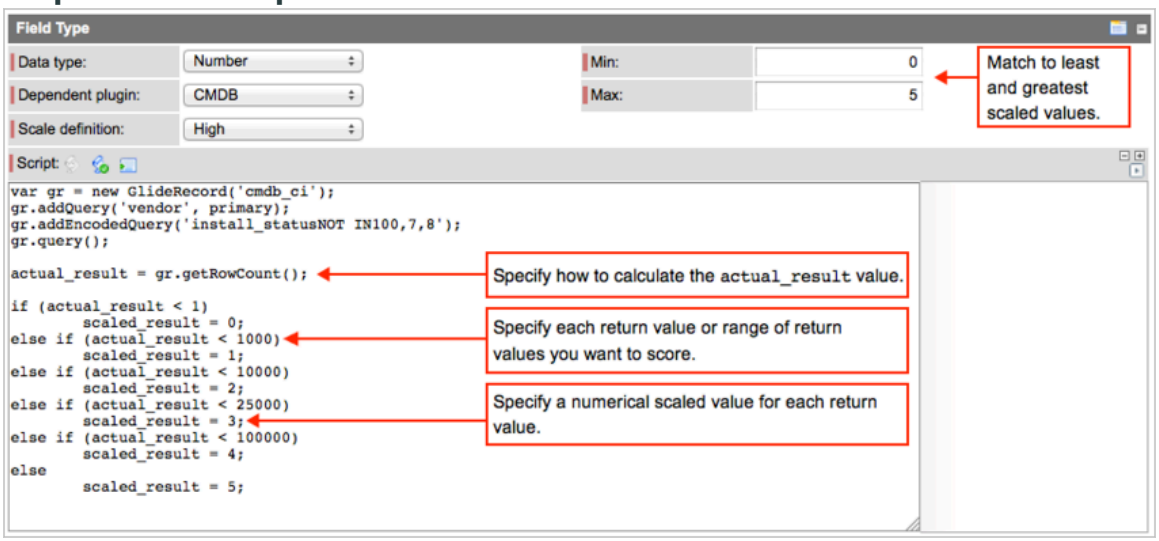
Scripted metric example



Related topics

- Assessment metrics
- Create an assessment metric for a category
- Create an assessment metric definition
- Update a metric minimum and maximum value to match a template

Configure an assessment

You can create a new assessment on a selected assessable records to evaluate, score, and rank records from any table in the system. Then create a metric category and assessment metrics for the assessment, publish the assessment, and assign it to the selected users.

Before you begin

Role required: admin, survey_creator, or assessment_admin

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Click **New**.
3. On the Assessment Metric form, fill in the fields.
   For a description of the field values, see Assessment Metric form.
4. Create a new assessment and assign it to the assessors.
   Do the following in the Assessment Metric form.
   a. Add a condition: In the **Condition** tab, add a condition to define the assessable records on which the assessment is created.
   b. Add decision matrix fields: In the **Decision Matrix** tab, add the required filter field to identify filter menu choices on decision matrices and scorecard averages for this type. For more information, see Decision matrixes .
   c. Select the Assessors: In the **Assessors** tab, select the users to whom the assessment will be assigned.
   d. Generate Assessable records: When you save the assessment and click **Generate Assessable Records**, an assessable record is created for each unique user of the user field.

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Note:

- You must generate the assessable records, each time you update the condition.
- You can generate the assessable records only after updating the condition.

A new assessment is created. You must now create metric category and add assessment metrics to each metric category. Then publish the assessment and assign the assessment to the selected users.

e. Create a metric category: To create a metric category, do the following:

i. Open the assessment you just created and click **New** in the **Metric Categories** tab. Fill the form.

For more information about form fields, see Metric Category formform.

Tip:
To know how to create metric category alternatively, see Create a category for assessable records.

ii. Open a metric category, add a condition, and click **Assessable records** tab. The assessable records appear based on the selection made in the metric category form.

iii. Open a metric category, click **Assessment Metric** tab to add the questions. Click **New**.

For more information about form fields, see Assessment Metric form for a category.

Tip:
To know how to create assessment metric category alternatively, see Create an assessment metric for a category.

f. Click **Publish**, to publish the assessment. For more information, see Publish a metric type.

g. Assign the Assessment to the required users. Do the following:

i. For an on-demand Assessments, click either the **Assign Assessment** or **Assign to Assessors** link to assign the assessment. For more information, see Generate an on-demand assessment for multiple assessable records.

ii. For a scheduled Assessment, click the **Generate Assessments** link to trigger the scheduled job immediately. For more information, see Generate a scheduled assessment manually.

Assessment generation

In the Assessments application, administrators or assessment administrators can trigger the system to generate scheduled assessments or on-demand assessments when all the prerequisite steps are completed.

An assessment administrator must publish the metric type to enable assessment generation.

The system performs these tasks when it generates assessments:

- Creates assessment questionnaires from non-scripted metrics and assigns the questionnaires to users. When users complete their assigned questionnaires, the system uses their responses to calculate assessment results.
- Runs scripted metrics from each category to query the database and calculate assessment results.

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Each time the system generates assessments, it creates some or all of the following components. Consider having an administrator set a schedule for recurring data cleanup, as the system can potentially generate a considerable amount of assessment data.

- Assessment group
- Assessment instances
- Assessment results

Assessment groups

An assessment group is a container for assessment instances and assessment results generated in a single occurrence.

The system generates an assessment group every time the scheduled job runs or the API is called, when there is at least one assessable record associated to a category in the type. You can find assessment group records in **Assessments** > **Assessment Groups**.

The Assessment Group form displays the group **Number**, the associated **Metric type**, and these related lists:

- **Assessment Instances**: Lists all assessment instances within this group. There may be no records in this related list. The system does not generate assessment instances if there are only scripted metrics for the type.
- **Metric Results**: Lists all metric results for this group. There may be no records in this related list initially. The system generates metric results immediately for scripted metrics, but not for non-scripted metrics, which appear as questions on assessments and require user response. The system dynamically updates the records in this list as users complete assessment questionnaires.
- **Assessment Category Results**: Lists all category results for this group. There may be no records in this related list initially. The system generates category results immediately if there are only scripted metrics in a category. Otherwise, the system does not calculate category results until a user completes an assessment questionnaire that contains questions from the category.

Note:
To prevent the loss of important assessment data, you cannot delete an assessment group if it contains any assessment instances, metric results, or category results.

View an assessment metric category

View assessment metric categories that are used with assessment metric types and assessment metrics in generating the bubble charts on the Demand Workbench. The bubble charts help the demand managers to assess the demands visually.

Before you begin
Role required: it_pps_admin

About this task
The Demand Management application comes with an assessment metric type named **Demand**, five default assessment metric categories, and assessment metrics.

Procedure

1. Navigate to **All** > **Project Administration** > **Settings** > **Assessments Metric Categories**.
2. Open an assessment metric category to review it.
   The following default assessment metric categories are available with the Demand Management.

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Demand assessment metric categories

Assessment metric category	Data source	Description
Size	**T-Shirt size** field on the Demand form.	Assesses demand size relative to the size of other demands.
Strategic Alignment	View an assessment category result field in the assessment category result for the Strategic Alignment metric category.	Assesses how closely the demand aligns with strategic goals of the organization compared to other demands.
Risk	**Rating** field in the assessment category result for the Risk metric category.	Assesses demand risks compared to other demands.
ROI	**Impact** and **Financial return** fields on the Demand form.	Assesses demand return on investment compared to other demands.
Cost	**Labor costs**, **Capital expense**, and **Operating expense** fields on the Demand form.	Assesses demand cost compared to other demands.

Assessment metric categories

In the Assessments application, a metric category represents a theme for evaluating assessable records in a given metric type.

Each category has a numeric weight value to indicate its importance relative to other categories. Within a category, records called metrics are the traits or values used to evaluate assessable records. For example, there are many categories within the **Vendor** metric type, including Support Rating, which contains metrics that measure the quality of vendors' customer support services. Assessable records must be associated to categories to be eligible for evaluation. Assessment administrators create categories and manage which assessable records each category is associated to.

Weight categories and metrics

When you create a metric category or metric, you must specify a weight, a numeric value that indicates the importance of the category or metric relative to other categories and metrics.

The greater the weight value, the more important the item is. The system uses weight values in assessment result calculations. Consider these recommendations when choosing weight values.

- Determine a weighting scale and use it consistently. In general, use a scale with a small numeric range. A standard 1-10 scale is usually appropriate, where 1 is least and 10 most important. Understand that increasing the maximum value of a weighting scale impacts all related result calculations.
- Use the same weighting scale for metric categories and metrics. Though there is no limitation, consider using the same or very similar weighting scales for both categories and metrics to make it easier to remember which values to use. A scale of 1-10 is an effective and simple weighting system, but may not be suitable for all organizations.

Note:
If you do not want to use weighting, set the same weight value for all categories and metrics. The default weight value is 10.

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Related topics

- Assessment metrics
- Create an assessment metric for a category
- Create an assessment metric definition
- Metric templates
- Update a metric minimum and maximum value to match a template

Create a category for assessable records

After you create a metric type and generate assessable records, create categories for the themes you are interested in using to evaluate the assessable records.

Before you begin

Role required: none

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Categories**.
2. Click **New** to create a new metric category.
3. On the Metric Category form, fill in the fields.
   For a description of the field values, see Metric Category form.

Related topics

- Assessment metrics
- Assessment metric categories
- Assessable record associations

Assessable record associations

Only the assessable records associated to a category can be evaluated using metrics in that category. Manage which assessable records you evaluate for each category by creating and removing the associations.

Only the assessable records associated to a category can be evaluated using metrics in that category. Manage which assessable records you evaluate for each category by creating and removing the associations.

Note:
You can also manage which categories an assessable record is associated to using the Assessable Record form.

Related topics

- Assessment metrics
- Create a category for assessable records

Manage an assessable record automatically

Define at least one filter condition in the Metric Category form to automatically associate assessable records with the category.

Before you begin

Role required: assessment_admin or admin

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Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Categories**.
2. Open a category.
3. In the **Filter** field, create a condition statement that defines the records you want to associate to this category.

   The available fields are from the table defined for the metric type. For example, for a category in the **Vendor** type, you might create the condition **[Country] [is] [Germany]**. Metrics in the category will be used only to evaluate vendors that are located in Germany.
4. Save the record.

   The system associates this category to all assessable records that match the filter condition. As the system generates new assessable records that match the condition, it associates them to this category. If you change the filter condition, the system removes and creates assessable record associations, as appropriate.

   Note the following:

   - The system does not remove assessable record associations created manually, even if the assessable records do not match the filter conditions.
   - The system deletes any related stakeholders, if applicable, when it disassociates assessable records from a category.
   - The system does not create or remove assessable record associations if the related source records change. For example, consider the previous example in which all assessable records for vendors based in Germany were associated to a particular category. Assume that a user changes the **Country** of one of the vendor records from **Germany** to **Canada**. The system does not disassociate the related assessable record from the category, even though it no longer matches the filter condition.

   Note:
   To configure the system to automatically associate all assessable records from a metric type to a category, use the same category condition as the metric type condition. For example, if the **Vendor** metric type has the condition **[Vendor] [is] [true]**, create the same condition for the category. If the metric type does not have a condition specified, you can use the category condition **[Sys ID] [is not empty]**, which includes all records from any table.

Related topics

Assessment metrics

Create a category for assessable records

Manage an assessable record manually

You can manually create and remove assessable record associations for a category using a related list on the Metric Category form.

Before you begin
Role required: assessment_admin or admin

About this task
Keep in mind that when you disassociate an assessable record from a category, the system deletes any related stakeholders, if applicable, and you can no longer evaluate the assessable record using metrics in that category.

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Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Categories**.
2. Open a category.
3. In the **Assessable records** related list, click **Edit** and use the slushbucket to add or remove one or more assessable records.

   Only assessable records associated to this category's metric type are available for selection.

Related topics

Assessment metrics

Create a category for assessable records

Delete a category

When you delete a category, the system also deletes the associated category users and stakeholders.

Before you begin

Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Categories**.

   Alternatively, navigate to a record that contains a related list for categories.
2. Open a record from the list.
3. On the Metric Category form, click **Delete**.
4. Click **OK** when asked to confirm the action.

   The system displays messages at the top of the form describing the actions taken.

Related topics

Assessment metrics

Create a category for assessable records

Assessment metrics

In the Assessments application, a metric is a trait or value used to evaluate assessable records.

Depending on the metric method, a metric can be used as either of the following:

- A question on assessment questionnaires, to obtain a subjective value such as how much people enjoy using each cell phone offered in the service catalog.
- A script that queries the database, to obtain an objective value such as the number of incidents related to each cell phone.

Each metric is associated to one metric category and can be used to evaluate assessable records for that category only. For example, the Support Rating category contains metrics that measure the quality of vendors' customer support services. One metric addresses the quality of product documentation. Others address the strength of the user community, self-service options, online training, and other support services. Each metric has a numeric weight value to indicate its importance relative to other metrics in the same category.

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Assessment administrators can create and administer metrics and metric templates, which define reusable sets of answer options for metrics used as assessment questions. If you decide to use metric templates, you may want to create them before you create metrics.

Note:
Changes to assessment metrics and metric templates are reflected in assessment questionnaires and results, even if users have saved responses already. If possible, avoid changing the original meaning of a metric question, the data type, or any metric templates in use by existing assessments.

Related topics

Update a metric minimum and maximum value to match a template

Create an assessment metric for a category

After you create a category, create metrics you can use to evaluate the assessable records for that category.

Before you begin
Role required: assessment_admin or admin

About this task
When you create metrics, consider the focus of the category and what characteristics you want to measure for the items you will assess.

Procedure

1. Navigate in one of the following ways.

Option	Description
Assessments > **Metric Definition** > **Categories**	Open a category, and locate the **Assessment Metrics** related list. This is the suggested navigation path, as the system links metrics to the category from which they are created.
Assessments > **Metric Definition** > **Metrics**	

2. Click **New**.
3. On the Assessment Metric form, fill in the fields.
   For a description of the field values, see Assessment Metric form for a category.
4. Save the record.
   When you create a **Choice** or **Likert Scale** question, reopen the Assessment Metric form after you submit it to create a metric definition. If you distribute a questionnaire without creating the answers for questions with these data types, recipients are unable to answer the quesitons. If the questions are mandatory, the recipients are unable to submit their questionnaires.

Related topics

Assessment metrics

Create an assessment metric definition

Update a metric minimum and maximum value to match a template

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Create an assessment metric definition

Metrics with Choice or Likert Scale data types must have metric definitions defined to represent answer options on questionnaires.

Before you begin
Role required: assessment_admin or admin

About this task
Each metric definition appears as one answer option for a question on an assessment questionnaire. For example, a metric for the question "How satisfied are you with the quality of this vendor?" has three metric definitions to create these answer options: **Very satisfied**, **Somewhat satisfied**, and **Not at all satisfied**.

Procedure

1. Open the metric record you want to edit.
2. In the **Assessment Metric Definitions** related list, click **New** to create a new metric definition.
3. Fill in the fields:
   - **Display:** Enter the text you want to appear as the answer option.
   - **Value:** Enter the numeric value, greater than or equal to zero, to which the answer option equates. Values are used to calculate metric results. When you view assessment questions, metric definitions appear in order from least to greatest value.
     - The system sets the minimum and maximum values according to the metric definition values.
     - To prevent reporting confusion, no two metric definitions for a given metric should have the same Value.
4. Click **Submit**.

Related topics

Assessment metrics

Metric templates

Change the order of an answer

By default, the order of answer options is established when a question is created with a data type of **Choice** or **Likert Scale**.

Before you begin
Role required: assessment_admin or admin

About this task
The system creates an Order value for each choice based on where it appears in the original list when you submit it. This order corresponds to the **Value** setting you give the answer. The choice with the lowest order number appears first, and the choice with the highest order number appears last. If you want to reconfigure the order of the answer options, you must do so by editing the **Order** field and not the **Value** field.

The **Order** column is hidden in the base system.

Procedure

1. Access the question record.
2. Configure the Assessment Metric Definitions related list to display the **Order** column.

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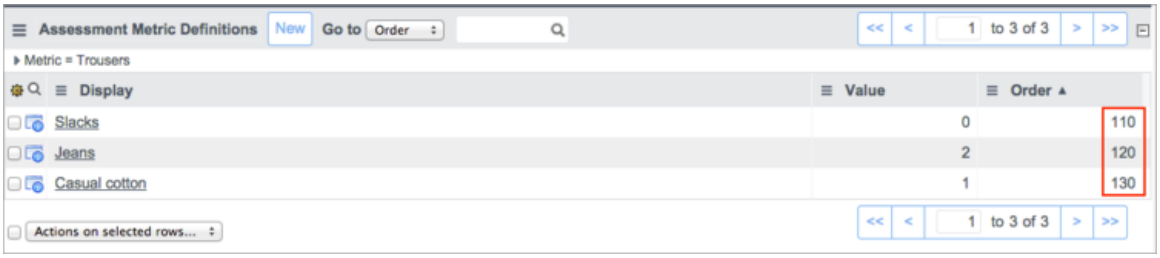
3. Edit the order number in the list.

Note:
The **Value** setting remain the same for each answer option after reorganization.



Related topics

Assessment metrics

Metric types and assessable records

In the Assessments application, assessment administrators create and administer metric types and assessable records.

A metric type defines a set of records an organization wants to evaluate, such as vendors, projects, or employees. For each type, the system generates unique assessable records that link the type to records that need to be evaluated, such as the individual records for the vendors Amazon and Intel. There may be multiple assessable records for the same source record if the source record meets the criteria for more than one type. For example, you might want to evaluate a record on the Company table, such as Intel, as a vendor and as a manufacturer, with different categories and metrics.

For configuration suggestions, see Assessment administrator tasks.

Assessable records

An assessable record links a source record you want to evaluate, such as the company record for Amazon or the user record for a sales representative, to a metric type, such as vendors or employees.

You use assessments to evaluate the assessable record. The system generates assessable records from the source records that match the table and conditions set on the Assessment Metric Type form. You evaluate the assessable records with metric categories and metrics, which define traits and values to assess. For metric types with the **On demand** schedule type, you can generate on-demand assessments from the Assessable Record form. This method of assessment generation makes it easy to create and preview short questionnaires or to quickly obtain assessment results for specific assessable records.

You can set up an assessment description that includes information from multiple fields on an assessable record and is displayed on multiple lines. This set up provides the user who is taking the assessment with a more detailed and understandable description of the information being requested on the assessment questionnaire. Create a multi-line description using table titles, which can be defined to use one or more fields from the selected table.

Related topics

Use update sets for surveys and assessments

Metric types and assessable records

View an assessable record

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Create metric types and generate assessable records

Create a metric type, which sets a table and filter conditions that define a set of records to evaluate.

Before you begin

Role required: assessment_admin or admin

About this task

For example, the Vendor Performance application provides the **Vendor** metric type, which defines an assessable record for each source record in the Company [core_company] table that has the **Vendor** field selected. Create a metric type for each set of records you want to evaluate, such as vendors, users within an organization, or projects.

In addition to defining assessable records, metric types also determine how to filter decision matrix data and set the schedule type, which determines whether assessments are on-demand or scheduled.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Click **New**.
3. On the form, fill in the fields.

Metric types form

Field	Description
Name	[Required] Name of the type. It may be practical to give the type a name that indicates which records it defines.
Assessment duration	Amount of time assessors have to complete their assigned questionnaires, starting from the time the assessment is generated. The assessment duration sets the **Due date** that appears on assessment instances. Changes made to the duration of an attestation in the GRC Control Test Definition form are updated dynamically in this field. The default duration is 14 days.
Live feed	Check box that determines whether to enable (selected) or disable (cleared) the Live Feed view in scorecards for all assessable records created from this type.
Notify manager if overdue	Check box that determines whether to send (selected) email notifications a user's manager when that user fails to submit an assigned questionnaire on time.
Assessment manager	Manager for this assessment metric type. These users are responsible only for managing the assessment process and not the results. The system notifies the assessment manager when an assessment for this metric type is past due.
Scoring type	Scoring method to use for questions with a data type of attestation. The possible selections are: ○ **Percent**: Attestation score as a weighted percentage of correct answers for scored questions. When you select this scoring type, categories can be scored as **Percent** or **All or nothing**. ○ **All or nothing**: Requires all answers for attestation type questions to be correct, or the score is zero for the entire attestation. When you select this scoring type, all categories are scored automatically as **All or nothing**.

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Field	Description
Scale factor	[Required] Number to represent the best possible score for assessment results. All results for assessments of this type are scaled to this number. 10 is generally a good scale factor. **Note:** This field becomes read-only when it contains a value and you save the metric type. Choose a scale factor you are satisfied with before you save the metric type.
Pagination setting for Service Portal view	Specify how the user will see pages on the desktop or tablet view in Service Portal. ○ **Category**: Display each category on a separate page. The categories appear in the following order: ▪ Each category appears in sequence on a separate page for the first assessable record ▪ Then each category appears in sequence on a separate page for the next assessable record ▪ and so on ○ **Question**: Display each question on a separate page. Questions appear on separate pages for mobile devices regardless of this setting. Each question appears for each category as described for the **Category** setting. ○ **None**: All items on a single page—no pagination Default: **Category** **Note:** This field appears only when Service Portal is installed.
Roles	Additional user roles that can view the results and access records associated with this type. Users with the specified roles have read access to this type record as well as to associated categories, metrics, assessable records and scorecards, category users, stakeholders, and decision matrixes. **Note:** Users with these roles do not have access to Assessments modules unless they are also assessment administrators. Users with these roles can navigate to the records by other means, such as from reference fields on assessment instances. This field provides the option to easily grant certain users access to specific assessment data in special cases. For example, the **Vendor** metric type provides access to users with the vendor_manager role so they can view results and compare assessable records when they open scorecards or decision matrixes in the Vendor Performance application.
Signature	[Optional] Acknowledgement by a survey recipient of requirements, admonitions, or expectations related to an assessment. For more information, see Create an assessment signature.
Return URL	Destination address of a web page that is presented to users after they submit an assessment for this metric type. When a return URL is configured, the end note content does not appear.
State	[Read-Only] Status of the assessment: **Draft** or **Published**.

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Field	Description
Business rule	[Admin only] Business rule the system creates to monitor the specified table. When a new record is added to the table that meets the metric type conditions, the business rule generates a corresponding assessable record. If someone changes the table or conditions of the metric type, the system updates the business rule to reflect the changes. Existing assessable records associated with the metric type are not affected.
Schedule type	Setting that determines which assessment process to use. Select **On demand** or **Scheduled**.
Scheduled job	[Admin only] Scheduled job the system creates to generate assessments for this metric type. This field is populated the first time you save the record. The scheduled job name follows the format <type name> Assessment Creation. Administrators can configure a recurring assessment generation schedule for the metric type. This field is visible only when the schedule type is **Scheduled**. **Note:** If you change the schedule type from **Scheduled** to **On demand**, the system deletes the scheduled job. If you change the schedule type back to **Scheduled**, the system creates a new scheduled job. The previous assessment generation schedule is not saved, but can be reconfigured if desired.
Evaluation method	[Admin only] Indicates the evaluation method for this metric type. The system sets this field based on how the metric type is created. The possible evaluation methods are: ○ **Assessment**: Default filter value for metric types. Only this evaluation method uses assessable records, conditions, and stakeholders. ○ **Attestation**: For details, see Attestations - Legacy. ○ **Survey**: For details, see Survey definitions.
Scale factor	[Required] Number to represent the best possible score for assessment results. All results for assessments of this type are scaled to this number. **10** is generally a good scale factor. **Note:** This field becomes read-only when it contains a value and you save the metric type. Choose a scale factor that you are satisfied with before you save the metric type.
Allow retake	Check box that allows users to modify their answers to a completed assessment, quiz, survey, or attestation. After the due date, the system removes the assessment from the user's My Assessments and Surveys page.
Active	Check box that determines whether the metric type is active. When the metric type is inactive (cleared), assessment generation is disabled and users cannot take existing assessments.
Description	Helpful information about this type. Enter a clear description of the type and its purpose.

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Field	Description
Introduction	Introductory content to display on assessment questionnaires. Consider adding a company logo, a welcome message, background information about the survey, or instructions. You may need to configure the form to see this field.
End note	Content to display on the screen that appears when someone submits an assessment questionnaire. Consider adding a thank you message, followup instructions, or other applicable information. You may need to configure the form to see this field. End notes are not displayed if a **Return URL** is specified.
Send notifications	Select the check box to send notifications for this assessment, survey, or attestation. You may need to configure the form to see this field.
Condition section	
Table	[Required] Table that contains the records you want to evaluate. The system creates assessable records for records on this table that meet the conditions you specify, if any. The number of matching records appears as a link by the **Condition** field. The link dynamically updates if you change the table selection. Click the link to open the list of matching records in a new tab or window. **Note:** Additional roles are required to view the records on certain tables. If you select a table that you do not have access to, a warning message appears by the **Condition** field where the number of matching records would be. You cannot generate assessable records for tables you do not have sufficient roles for.
Enforce condition	Check box that determines what happens to assessable records when you change the selected table or conditions.
Condition	Condition builder that defines specific records to assess from the selected table. If you do not specify any conditions, the system creates assessable records for all records on the selected table. Click the refresh icon to update the adjacent record count. **Note:** If you change the table or conditions, you must click **Generate Assessable Records** to create new assessable records.
Decision Matrix section	
Filter field	[Required] Field on the selected table that can be used to filter results on decision matrixes and scorecards. For example, if the selected table is **Company** `[core_company]` and you choose **Vendor type** as the filter field: ○ When you view decision matrixes for this type, the decision matrix menu to filter plotted items lists vendor types: **Applications**, **Hardware**, **Services**, and **Software**. ○ On scorecards for this type, the Averages view displays ratings by vendor type.
Filter condition	Condition builder that defines which records from the table are available as choices on the filter menu. For example, if the filter field is **Vendor type** and you create the filter condition **[Name] [does not contain] [Hardware]**, only records with vendor types of **Applications**, **Services**, and **Software** are possible choices as decision matrix filters.
Default matrix filter	Record to use as the default filter choice on decision matrixes and scorecards. The selected **Filter field** and **Filter condition** control the available record

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Field	Description
	choices. To see the records, if any, click the refresh icon next to the field. Consider the case that the filter field is **Vendor type** and you select **Applications** as the default matrix filter. The filter choice on decision matrixes for this type is set to **Applications** by default. If you change the value of the **Table** or **Filter condition** field, you must click the refresh icon to view the updated **Default matrix filter** choices. If you do not, the system selects the first available choice from the updated field choices when you save the record.
Related Lists	
Metric Categories	All metric categories associated with the type.
Assessable Records	All assessable records associated with the type. This related list is hidden in the Attestation view of this form.

The **Generate Assessments** button is visible to administrators in certain cases for scheduled assessments. Do not click the button until after completing the prerequisite tasks.

4. When you are satisfied with the type settings, click **Generate Assessable Records** to save the record and create assessable records.
   You must click **Generate Assessable Records** to create the initial set of assessable records based on the table and conditions specified on the type record. After that, the system creates an assessable record each time a new matching record is created. **Generate Assessable Records** is located under **Related Links**.

   Note:
   Clicking **Generate Assessable Records** can trigger the deletion of existing assessable records under certain circumstances. For more information, see Enforce a condition to delete an assessable record.

   The page redirects to the list of assessable records created.

Related topics

- Assessment scorecard averages
- Schedule an assessment
- Schedule types
- Set an assessment generation schedule
- On-demand assessments
- Enforce a condition to delete an assessable record
- Metric types and assessable records
- Configuring the form layout

Delete a metric type

Deleting a metric type entails deleting many related records.

Before you begin

Role required: assessment_admin or admin

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About this task

You must delete some of these records manually before deleting the type, while the system deletes others automatically with the type.

Procedure

1. Delete the records associated with the type to delete:
   - Assessment results (metric and category results)
   - Assessment instance (questions and assessment instances, in that order)
   - Assessment groups
2. Delete the type.

   A confirmation dialog box appears and alerts you that certain records associated with the type will also be deleted.
3. Click **OK** to delete the type and these related records:
   - Scheduled job for assessment generation
   - Business rule for assessable record generation
   - Assessable records
   - Metric categories
   - Category users
   - Stakeholders
   - Metrics
   - Metric definitions
   - Decision matrixes

Related topics

Metric types and assessable records

Export an assessment

You can share assessments between ServiceNow instances by exporting an assessment and then importing the assessment on another instance.

Before you begin

Role required: assessment_admin or admin

Note:
Update sets are available in the Helsinki release and should be used to move data from one instance to another. For information about update sets, see System update sets.

About this task

Note:
The system exports a single XML file that does not contain result data.

The XML file contains a metric type `[asmt_metric_type]` and the following records that are associated with the type:

- Assessable records `[asmt_assessable_record]`
- Metric categories `[asmt_metric_category]`

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- Metrics `[asmt_metric]`
- Metric definitions `[asmt_metric_definition]`
- Category users `[asmt_m2m_category_user]`
- Stakeholders `[asmt_m2m_stakeholder]`
- Decision matrixes `[asmt_decision_matrix]`, `[asmt_m2m_xcategory_matrix]`, and `[asmt_m2m_ycategory_matrix]`

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Right-click the record and select **Export Assessment**.
3. Save the XML file.

Related topics

Import an assessment

Metric types and assessable records

Import an assessment

Share assessments between ServiceNow instances by importing a previously exported assessment.

Before you begin

Role required: admin

Note:
Update sets are available in the Helsinki release and should be used to move data from one instance to another. For information about update sets, see System update sets.

Procedure

1. Ensure that the target instance has assessments enabled.
2. Follow the procedure detailed in Import data from XML.

Related topics

Export an assessment

Use update sets for surveys and assessments

Use an update set to capture changes to surveys and assessments.

Before you begin

Role required: admin or survey_admin

Procedure

Create an update set and use it to make changes on a development instance.

Note:
For more information, see System update sets.

When developing surveys and assessments, use an update set to capture the changes and move them from a development instance to a production instance. Once an update set is

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created and marked current, all of the updates to the following tables are recorded in the update set.

The following tables are now update set enabled and also extend the application file:

- Assessment Metric Templates [asmt_template]
- Assessment metric type [asmt_metric_type]
- Assessment Template Definitions [asmt_template_definition]
- Assessment Metric Definitions [asmt_metric_definition]: survey question answer options
- Schedule [sys_trigger]: scheduled jobs associated with the survey
- Assessment Metric Categories [asmt_metric_category]: survey categories
- Assessment Metrics [asmt_metric]: survey questions
- Assessment Category Users [asmt_m2m_category_user]: survey users
- Trigger Conditions [asmt_condition]

Create an assessment signature

A signature on an assessment questionnaire contains assertions that can communicate directions, a legal statement, or any text that you want the recipient to consider.

Before you begin

Role required: assessment_admin or admin

About this task

You can require the recipient to select a check box or provide a full signature to acknowledge acceptance of the assertion before submitting the form. You can display assertions without requiring a signature. An assessment property called **Require authentication for user signature** allows you to require users to provide their user name and password when an assessment asks for a full name signature.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Signatures**.

   All signatures in the system appear in this list.

2. Click **New**.
3. Complete and submit the form using the fields in the table.

Assessment signature fields

Field	Description
Name	Descriptive name for this signature
Signature type	Type of signature required. The selections are **Checkbox**, **Full name**, or **Assertion only**. If **Assertion only** is selected, no signature is required to submit the questionnaire. By default, the system requires user authentication for a full name entry.
Assertion	Text to present to recipients that requires acknowledgement.

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Assessable records

An assessable record links a source record you want to evaluate, such as the company record for Amazon or the user record for a sales representative, to a metric type, such as vendors or employees.

You use assessments to evaluate the assessable record. The system generates assessable records from the source records that match the table and conditions set on the Assessment Metric Type form. You evaluate the assessable records with metric categories and metrics, which define traits and values to assess. For metric types with the **On demand** schedule type, you can generate on-demand assessments from the Assessable Record form. This method of assessment generation makes it easy to create and preview short questionnaires or to quickly obtain assessment results for specific assessable records.

You can set up an assessment description that includes information from multiple fields on an assessable record and is displayed on multiple lines. This provides the user who is taking the assessment with a more detailed and understandable description of the information being requested on the assessment questionnaire. Create a multi-line description using table titles, which can be defined to use one or more fields from the selected table.

Related topics

Metric types and assessable records

View an assessable record

View an assessable record

View the Assessable Record form to edit preferences and perform various actions.

Before you begin

Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Assessable Records**.
2. Open a record from the list.
   By default, the list displays only assessable records with **Active** metric types.
3. On the Assessable Record form, edit fields and perform other actions as necessary (see table).

Viewing Assessable Records

Field	Description
Name	[Read-Only] Assessable record name based on the Select a field as the table display value of the source record. The name appears on assessment questionnaires.
Source	[Read-Only] Source record the assessable record is linked to. The **Source** reflects the table name and source record display value. For example, if the **Name** field is the display value for the Company table, the assessable record for a company record named **Amazon** has the **Source** value **Company: Amazon**.
Live feed	Check box that, when selected, creates a Live Feed group for the assessable record, which appears on the scorecard. If you clear the check box after a Live Feed group has been created, the system deletes the Live Feed group and all its messages.
Type	[Read-Only] Metric type from which the assessable record was generated.

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Field	Description
Decision matrix	Check box that, when selected, enables this assessable record's results data to appear on decision matrixes of the same metric type. Decision matrixes are graphs that plot the assessment results for multiple assessable records. If you clear the check box, the assessable record still appears on the default decision matrixes if you click the **View Matrix** related link on the assessable record's scorecard.
Live feed group	[Read-Only] Live feed group for this assessable record. When you select the **Live feed** check box and save the record, the system populates this field.
Related Links	
View Scorecard	Opens the scorecard for the assessable record.
Related Lists	
Category	All metric categories associated with the assessable record. An assessable record must be associated to a category to be evaluated. Click **Edit** to add or remove category associations. Note that it is often more efficient to associate assessable records to categories using the Metric Category form.
Category users	All stakeholders who can take assessment questionnaires about this assessable record. Click **Edit** to create and delete stakeholders. For more information about this and other methods of creating stakeholders, see Stakeholders. This related list is available only when the associated metric type has the **Scheduled** schedule type.

Related topics

Metric types and assessable records

Enforce a condition to delete an assessable record

By default, the system does not delete assessable records, even if you change the table or conditions for the type and the existing assessable records no longer match.

Before you begin

Role required: assessment_admin or admin

About this task

The system can be configured so you can trigger the deletion of assessable records that do not match the type table and conditions.

Procedure

1. On the Assessment Metric Type form, select the **Enforce condition** check box to enable deletion of existing assessable records of this type that do not match the table or conditions specified.

   When the check box is cleared, the system retains existing assessable records of this type, even if they do not match the table and conditions specified.

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2. Click **Generate Assessable Records** to delete all assessable records associated with the type that do not match the current table and conditions.

   The system does not automatically delete assessable records, even if the **Enforce condition** check box is selected. You must click **Generate Assessable Records** with the check box selected every time you want the system to delete non-matching assessable records.

Related topics

Metric types and assessable records

Delete an assessable record

When you delete an assessable record, the system deletes any stakeholders for the record.

Before you begin

Role required: assessment_admin or admin

About this task

Note:
If a source record is deleted, the system deletes the associated assessable record. To delete the source record, you must first delete all associated metric results and category results.

Procedure

Delete the assessable record:

- To delete a single record, open the record and click **Delete**.
- To delete multiple records, use the Assessable Records list.

Related topics

Metric types and assessable records

Add a metric category and metric in the question bank for assessments

Reuse the question categories (metric categories) and questions (metrics) added in the question bank for assessments. You can add metric categories or metrics from the question bank to an assessment, or from the assessment to a question bank.

Before you begin

Role required: admin or assessment_admin

Procedure

1. Navigate to **All** > **Assessments** > **Question Bank**.
2. Click **New**.
3. In the Metric Category form, fill in the fields.

Metric Category fields

Field	Description
Name	Name of the metric category.
Description	Description of the metric category.

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Field	Description
Total metrics	Total number of metrics in the metric category. This number is automatically updated when you add or delete metrics from the category.

4. Right-click on the title bar and click **Save**.
5. In the Assessment Metrics related list, click **New**.
6. In the Assessment Metric form, fill the fields.
   For more information on assessment metric fields, refer to .
7. Click **Submit**.

Configure metric categories or metrics for an assessment using the question bank

Reuse question categories (metric categories) and questions (metrics) from the **Question Bank** module while creating or updating an assessment.

Before you begin

Role required: admin or assessment_admin

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definitions** > **Types**.
2. Open an assessment definition.
3. **Optional:** To add metric categories to an assessment from the question bank in Platform, perform the following steps.

   a. In the Metric Categories related list, click **New Category from Bank**.
   The New Category from Bank dialog box is displayed with a list of all metric categories added in the question bank.

   b. Select the required categories and click **Add Selected**.
   A copy of the metric category and the corresponding metrics is created in the Metric Categories related list.

4. **Optional:** To add metrics to an assessment from the question bank in Platform, perform the following steps.

   a. In the Metric Categories related list, open a metric category definition.

   b. In the Assessment Metrics related list, click **New Metric from Bank**.
   The New Metric from Bank dialog box is displayed with a list of questions available in the question bank.

   c. Select the required metrics and click **Add Selected**.
   A copy of the metric and the corresponding metric definitions is created in the Assessment Metrics related list of the category.

5. **Optional:** To add a metric category to the question bank from an assessment in Platform, perform the following steps.

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a. In the Metric Categories related list, open a metric category definition.

b. Click **Add to Question Bank**.
A copy of the category is created along with its metrics and metric definitions in the question bank.

6. **Optional:** To add a metric to the question bank from an assessment in Platform, perform the following steps.

a. In the Metric Categories related list, open a metric category definition.

b. In the Assessment Metrics related list, open the required metric definition.

c. Click **Add to Question Bank**.
The Add to Question Bank dialog box is displayed.

d. In the **Choose a question bank to add this question/metric** field, select a metric category that you want to add this metric to, and click **OK**.
A copy of the metric and the corresponding metric definitions is created for the selected category in the question bank.

Copy an assessment

Create a copy of an assessment with at least one category to reduce the effort of creating another assessment with similar data.

Before you begin
Role required: assessment_admin or admin

About this task
All associated questions (type), configurations, categories, metrics, domain separation rules, and role-based categories are copied. Assigned users, category users, instances, and trigger conditions are not copied.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Select an assessment metric type.
3. In the title bar, click **Copy**, or click the menu icon, and select **Copy**.

Create a metric template

Create a metric template to define reusable rating scales for evaluating non-scripted metrics.

Before you begin
Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Templates**.
2. Click **New**.
3. Fill in the **Name** field on the Assessment Metric Template form.
4. To use images for template choices, such as for image scale questions, select **Allow Image**.

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5. Click **Submit**.
6. Under the **Assessment Template Definitions** related list, click **New**.
   Create a template definition for each answer option you want to appear on an assessment question.
7. Fill in the following fields:
   - **Display:** Enter the text to appear as the answer option.
   - **Value:** Enter a numeric value, equal to or greater than zero, that you want the answer option to equate to. Values are used in results calculations.
   - **Selected Image**: Click to add the image to use for selected state.
   - **Unselected Image**: Click to add the image to use for unselected state.

   When you view assessment questions that use templates, answer options appear in order from least to greatest Value.

   Tip:
   To prevent reporting confusion, no two template definitions for a given template should have the same Value.

8. Click **Update**.

Related topics

Assessment metrics

Create an assessment metric for a category

Create an assessment metric definition

Metric templates

Metric templates define reusable rating scales for evaluating non-scripted metrics.

Each answer option on the scale is defined as a template definition, much like a metric definition. For example, the metric template named Satisfaction contains the template definitions: **Very Satisfied**, **Satisfied**, **Neutral**, **Dissatisfied**, and **Very Dissatisfied**.

Metric templates are available for metrics that have **Template** as the Data type. The following metric templates are available by default.

Default metric templates

Name	Assessment template definition
Likert 5	Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree
Satisfaction	Very Dissatisfied, Dissatisfied, Neutral, Satisfied, Very Satisfied
Frequency	Never, Seldom, Sometimes, Most of the time, All of the time
Amount	None, Few or little, Average amount, Many, Quite a lot
Size	Very Small, Small, Average, Large, Very Large
Quality	Very Poor, Poor, Average, Good, Very Good
Complexity	Very Complex, Complex, Moderate, Simple, Very Simple

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Related topics

Assessment metrics

Create an assessment metric definition

Update a metric minimum and maximum value to match a template

For assessment results to be properly calculated, the Min and Max values of a metric that uses a template must be equal to the smallest and largest template definition Value, respectively.

Before you begin

Role required: assessment_admin or admin

About this task

The system sets the **Min** and **Max** fields automatically when you create a metric of the Template data type, based on the template definition values. However, the system does not update these fields for existing metrics if you add a new template definition to a template or if you update the Value of an existing template definition. If the new Value is less than the minimum value of any metrics that use the template or greater than the maximum value, update the metrics accordingly.

To edit the minimum and maximum values for a question that has the Template data type:

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Metrics**.
2. Configure the Configure the list layout to show the **Min** and **Max** columns.
3. Run the following list filter condition: `[Template] [is] [<select the template you updated>]`
4. Ensure the Min and Max values match the smallest and largest template definition Value for the selected template, respectively.

   If the values do not match, edit the Min and Max directly from the list.

   Note:
   When the data type is Template, a UI policy prevents the editing of Min and Max from the form.

Related topics

Assessment metrics

Create an assessment metric for a category

Create an assessment metric definition

Category users and stakeholders

Users who take assessments are individuals in your organization who have specific knowledge of the assessment categories and the records being assessed.

A person who is qualified to answer assessment questions from metrics in a specific category becomes a category user when associated to that category. A category user then becomes a stakeholder when associated to a specific assessable record.

The system determines which assessable records and questions a user receives by looking at the metric categories and assessable records for which those users are stakeholders. Assessment administrators can create and manage category users and stakeholders.

Note:
Category users and stakeholders are used only for scheduled assessments.

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Category users

Category users are users who can potentially answer assessment questions about a particular metric category for scheduled assessments. Category users should have special knowledge of the categories and the metrics those categories contain. A category user becomes a stakeholder when associated to an assessable record. Create at least one category user for each category you want to use for assessment questionnaires. There is no need for category users if the category contains only scripted metrics.

Stakeholders

A stakeholder is a category user with specific product or service knowledge, who is associated to an assessable record. A stakeholder is familiar with the assessable record and all the metrics within a specific category. The same category user can be associated to multiple assessable records, in which case the system creates a stakeholder record for each association.

There are multiple ways to create stakeholders:

- Configure the system to create stakeholders automatically.
- Associate multiple category users to multiple assessable records.
- Associate multiple category users to one assessable record.
- Associate one category user to one assessable record.

Note:
Ensure you establish the desired user and assessable record associations to categories before attempting to creating stakeholders.

Related topics

Create a category user

Associate multiple category users to multiple assessable records

Associate multiple category users to one assessable record

Associate one category user to one assessable record

Delete a stakeholder for multiple assessable records

Delete a stakeholder for one assessable record

Create a category user

Create category users by associating users in the system to metric categories.

Before you begin

Role required: assessment_admin or admin

About this task

When you create category users, choose users who are knowledgeable and can answer questions from that category. For example, a purchasing agent is a good category user for metrics that evaluate a vendor's discount practices.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definitions** > **Categories**.
2. Open a category record.

Note:
The category must be associated to a metric type that has the **Schedule type** set to **Scheduled**.

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3. In the **Users** related list, click **Edit**.
4. Select the appropriate users for this category.

Related topics

- Category users and stakeholders
- Associate multiple category users to multiple assessable records
- Associate multiple category users to one assessable record
- Associate one category user to one assessable record
- Delete a stakeholder for multiple assessable records
- Delete a stakeholder for one assessable record

Create stakeholders automatically

You can configure the system to create stakeholders automatically from all category users and assessable records associated with a category using the **Create stakeholders** check box on the Metric Category form.

Before you begin

Role required: assessment_admin or admin

About this task

If you associate a user to the category, the system makes the resulting category user a stakeholder for all the assessable records associated to the category. Similarly, if you associate a new assessable record to the category, the system makes all category users stakeholders for that record if they are not already stakeholders.

Note:
Use the **Create stakeholders** check box with caution. You can end up with more stakeholders than you want and a large amount of unnecessary assessment data. Automatic stakeholder creation is best suited to assessment implementations in which category users are knowledgeable about all or most of the assessable records associated to each category.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Categories**.
2. Select a category.
3. Associate category users and assessable records to the category.
4. Select the **Create stakeholders** check box.
5. Click **Update**.
   All the category users are associated to all the assessable records as stakeholders.
6. In the **Assessable Records** related list, click **Edit**.
7. Using the slushbucket, associate an assessable record to the category.
8. Click **Save**.
   The system makes all category users stakeholders for the new assessable record.
9. Delete stakeholders as needed.

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Related topics

- Category users and stakeholders
- Create a category user
- Associate multiple category users to multiple assessable records
- Associate multiple category users to one assessable record
- Associate one category user to one assessable record
- Delete a stakeholder for multiple assessable records
- Delete a stakeholder for one assessable record

Associate multiple category users to multiple assessable records

The stakeholder list helper in the create stakeholders module is the most efficient way to associate multiple category users to multiple assessable records in a single interface.

Before you begin

Role required: assessment_admin or admin

About this task

You can select category users from one category at a time.

Note:
You cannot edit or delete stakeholders using the list helper.

Procedure

1. Navigate to **All** > **Assessments** > **Advanced** > **Create Stakeholders**.
   The stakeholder list helper appears.
2. Select a metric type from the list of available types.

   Note:
   Only metric types for scheduled assessments are available. On-demand assessments do not use category users or stakeholders.

3. Select a category from the list of available categories.

   Note:
   Only categories within the selected metric type are available.

   The system populates the **Category User** and **Assessable Records** lists with category users and assessable records associated to the selected category.
4. Select one or more category users from the **Category Users** list.
5. Select one or more assessable records from the **Assessable Records** list.
6. Click the **Associate** arrow between the lists to complete the association.
   A message above the list helper advises you that the selected category users are now stakeholders for the selected assessable records.

Related topics

- Category users and stakeholders
- Create a category user
- Associate multiple category users to one assessable record
- Associate one category user to one assessable record

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Delete a stakeholder for multiple assessable records

Delete a stakeholder for one assessable record

Delete a stakeholder for multiple assessable records

You can delete stakeholders for multiple assessable records.

Before you begin

Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Advanced** > **Assessment Stakeholders**.
2. Sort the list by **Assessable Record** or **Category User** depending on the perspective you want.
3. Select the check box for each stakeholder you want to delete.
4. Select **Delete** in the **Actions** choice list.
5. Click **OK** to confirm the action.
   The system deletes the stakeholders.

Related topics

Category users and stakeholders

Create a category user

Associate multiple category users to multiple assessable records

Associate multiple category users to one assessable record

Associate one category user to one assessable record

Delete a stakeholder for one assessable record

Associate one category user to one assessable record

Create a single stakeholder using the list in the Assessment Stakeholders module.

Before you begin

Role required: assessment_admin or admin

About this task

Associate any category user to any assessable record.

Procedure

1. Navigate to **All** > **Assessments** > **Advanced** > **Assessment Stakeholders**.
2. Click **New**.
3. On the Assessment Stakeholders form, fill in these fields:
   - **Category user**: Select a category user.
   - **Assessable record**: Select an assessable record.
4. Click **Submit**.

Result

The selected category user becomes a stakeholder for the selected assessable record. To verify the association, navigate to the assessable record and note that the selected category user is on the Category users related list.

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Note:
Do not create stakeholders from category users and assessable records of different metric types.

Related topics

- Category users and stakeholders
- Create a category user
- Associate multiple category users to one assessable record
- Associate multiple category users to multiple assessable records
- Delete a stakeholder for multiple assessable records
- Delete a stakeholder for one assessable record

Associate multiple category users to one assessable record

Create many stakeholders for a single assessable record from the Assessable Record form.

Before you begin
Role required: assessment_admin or admin

About this task
You can also edit or delete stakeholders from the form.

Procedure

1. Navigate to **All** > **Assessments** > **Assessable Records**.
2. Open a record from the list.
3. In the **Category users** related list, click **Edit**.
   These category users are the stakeholders for this assessable record.
4. Add category users to create stakeholders or remove category users to delete stakeholders.
   The system shows only category users for categories associated to the assessable record. For example, if an assessable record is associated only to the Compliance Score and Support Rating categories, User Satisfaction category users will not be listed.

Related topics

- Category users and stakeholders
- Create a category user
- Associate multiple category users to one assessable record
- Associate one category user to one assessable record
- Delete a stakeholder for multiple assessable records
- Delete a stakeholder for one assessable record

Delete a stakeholder for one assessable record

You can delete stakeholders for one assessable record.

Before you begin
Role required: assessment_admin or admin

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Procedure

1. Navigate to **All** > **Assessments** > **Assessable Records**.
2. Open an assessable record.
3. In the **Category Users** related list, select the check box for each stakeholder you want to delete.
4. Select **Delete** in the **Actions** choice list.
5. Click **OK** to confirm the action.
   The system deletes the stakeholders.

Related topics

- Category users and stakeholders
- Create a category user
- Associate multiple category users to multiple assessable records
- Associate multiple category users to one assessable record
- Associate one category user to one assessable record
- Delete a stakeholder for multiple assessable records

On-demand assessments

On-demand assessments can be generated for metric types with the *Schedule type* field set to *On demand*.

For the system to properly generate on-demand assessments, the metric type must be active and published. The metric type must also be associated to at least one metric category. That metric category must be associated to one or more of each of the following items:

- Assessable record
- Metric

By default, an assessment administrator can generate an on-demand assessment for one assessable record or multiple assessable records.

Related topics

- Assessment generation
- Scheduled assessments
- Generate an on-demand assessment for multiple assessable records
- View an assessment instance
- Clean up assessment data

Generate an on-demand assessment

Use on-demand assessments to familiarize yourself with the basic assessment process and test your questionnaires using minimal configuration.

Before you begin

Role required: assessment_admin or admin

About this task

Select the assessable records to evaluate, create the categories and questions, and then assign an assessment to a user in the system. Pre-configured stakeholders are not used for on-demand assessments.

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Procedure

1. Create a metric type and set the **Schedule type** to **On demand** to allow for testing of your assessment configuration.
2. Generate the assessable records for the metric type you created.
3. Create the metric categories required to evaluate the assessable records selected.
4. Create one or more assessment questions, or metrics, for each category.
5. Publish the assessment.
6. Perform an on-demand assessment to test your categories and metrics.
7. Analyze the assessment ratings in an assessment scorecard or decision matrix.

Related topics

Assessments

Generate an on-demand assessment for one assessable record

When you generate an on-demand assessment from the Assessable Record form, the resulting assessment contains questions from the categories associated to the assessable record.

Before you begin

Role required: assessment_admin or admin

Publish the assessment.

Procedure

1. Navigate to **All** > **Assessments** > **Assessable Records**.
2. Open an assessable record associated to a metric type that has the **On demand** schedule type.
3. To assign the assessment to users configured in the **Assessors** tab of the assessment, and other specified users, perform these steps.
   a. On the Assessment Metric Type form, click **Assign Assessment**.
   b. Select a user from the Recent Assessors list or select a different user.
   c. Click **OK**.
4. To assign the assessment to users configured in the **Assessors** tab of the assessment, click **Assign to Assessors**.

Result

The system generates an assessment instance assigned to the selected users.

Related topics

Assessment generation

Scheduled assessments

Clean up assessment data

Generate an on-demand assessment for multiple assessable records

When you generate an on-demand assessment from the Assessment Metric Type form, the resulting assessment contains questions from all categories associated to any assessable records for the metric type.

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Before you begin

Role required: assessment_admin or admin
Publish the assessment.

About this task

For example, if there are 15 assessable records associated to at least one category with assessment metrics, the assessment contains questions for all 15 assessable records.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Open a metric type that has the **On demand** schedule type.
3. To assign the assessment to users configured in the **Assessors** tab of the assessment, and other specified users, perform these steps.
   a. On the Assessment Metric Type form, click **Assign Assessment**.
   b. Select a user from the Recent Assessors list or select a different user.
   c. Click **OK**.
4. To assign the assessment to users configured in the **Assessors** tab of the assessment, click **Assign to Assessors**.

Result

The system generates an assessment instance assigned to the selected users.

Related topics

Assessment generation

Generate a scheduled assessment manually

Assessment groups

Clean up assessment data

Generate an assessment with the on-demand API

The Assign Assessment buttons call an API to generate on-demand assessments.

Before you begin

Role required: assessment_admin or admin

About this task

Procedure

1. To generate an assessment, call the AssessmentCreation API from any script in the system, such as a business rule or client script.
2. Use the sys_ids of these items:
   - An assessable record to evaluate. The assessable record must be associated with an on-demand type and at least one category that contains non-scripted metrics.
   - One or more users who should perform the assessment. The API generates a questionnaire about the specified assessable record for each user.

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Related topics

- Assessment generation
- Scheduled assessments
- Generate a scheduled assessment manually
- Generate a vendor type assessment manually
- Set an assessment generation schedule
- Assessment instances
- View an assessment instance
- Clean up assessment data

Scheduled assessments

The system generates a unique scheduled job for each metric type with the **Schedule type** field set to **Scheduled**.

The system generates a unique scheduled job for each metric type with the **Schedule type** field set to **Scheduled**. Each scheduled job generates assessment components for the related metric type. By default, the scheduled job runs when an administrator executes it manually, but administrators can set a schedule to generate assessments automatically on a recurring basis.

For the system to properly generate scheduled assessments, the metric type must be active and published. The metric type must also be associated to at least one metric category. That metric category must be associated to one or more of each of the following items:

- Assessable record
- Stakeholder associated to one of the assessable records
- Metric

Related topics

- Assessment metrics

Schedule an assessment

After you have evaluated your questionnaires using on-demand assessments, edit your categories and metrics as needed, reset your metric type record, and select the users who are qualified to evaluate the assessable records.

Before you begin

Role required: assessment_admin or admin

Procedure

1. Open the metric type you created for the on-demand assessment and set the **Schedule type** to **Scheduled**.
2. Make sure the categories and metrics you created for the on-demand assessment are correct.
3. Create category users who have special knowledge of your categories.
4. Create stakeholders by associating category users to specific assessable records.
5. Set a schedule for automatic assessment generation or generate the assessment manually.

Note:
This procedure must be done by a system administrator.

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6. Configure email notifications to remind users of their assigned assessments and to report to managers when an employee misses an assessment deadline.
7. Analyze the assessment ratings in an assessment scorecard or decision matrix.

Related topics

Assessments

Schedule types

You can schedule assessments for preconfigured users or send them to any user on demand.

On-demand assessments require less setup. Scheduled assessments define users, or stakeholders, who have specific knowledge of the records being evaluated, and automatically send out assessment questionnaires to those users at scheduled intervals. The best practice is to configure an on-demand assessment first to familiarize yourself with the process and test your questionnaires. When you are satisfied with your categories and questions, reconfigure for a scheduled assessment. These configuration paths are the easiest for both assessment types. Refer to Key Terms for definitions of the terms used in these procedures.

Related topics

Assessments

Set an assessment generation schedule

You can set assessment generation schedules. You must set a schedule for each metric type individually.

Before you begin

Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Open the appropriate metric type record.
3. Click the reference icon next to the **Scheduled job** field to open the Schedule Item record.
4. Locate the **Trigger type** field and set a recurring schedule for the scheduled job.

   For example, if you want to generate assessment components each month, select the **Interval** or **Repeat** trigger type and specify a **Repeat** value of 30 days. Alternatively, select **Day in Month** and specify a Run time and Run day of month.

   The optimal frequency of assessment generation is subjective. When you set the schedule, keep in mind the number of records to evaluate, how often your organization requires updated assessment results, the time and effort required of users to complete assessments, and other relevant factors.

Publish a metric type

Before it is possible to generate assessments, an assessment administrator must publish the associated metric type.

Before you begin

Role required: assessment_admin or admin

About this task

The **State** field on the Assessment Metric Type form indicates whether the type is published. The default state is **Draft**, which disables the system from generating assessments.

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Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Open a metric type record, and click **Publish**.

   The **Publish** button is available only if the state is **Draft** and there is at least one metric associated with the type.

> **Note:**
> A metric type cannot be moved back to the **Draft** state after it has been published.

Generate a scheduled assessment manually

Administrators can generate scheduled assessments manually.

Before you begin
Role required: assessment_admin or admin

About this task
Use this option, for example, if you have set a schedule but want to generate assessments before the next scheduled run date.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Open the appropriate metric type record.
3. Click **Generate Assessments** to trigger the scheduled job immediately.

> **Note:**
> Be careful to click **Generate Assessments**, not **Generate Assessable Records**.

Generate a vendor type assessment manually

The Vendor Performance feature provides a direct method of generating assessments for the Vendor metric type.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Vendor Performance** > **Admin** > **Generate Assessments**.
2. Click **Generate Assessments** to execute the scheduled job for the **Vendor** type.

Clean up assessment data

The assessment process generates a considerable amount of data, some of which is not useful after a short time.

Before you begin
Role required: assessment_admin or admin

About this task
The assessment process generates a considerable amount of data, some of which is not useful after a short time. Assessments include a scheduled job called *`Remove Old Assessment Data`* that is available to administrators only. The scheduled job removes these items if they are more than a year old:

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- Assessment instance questions
- Assessment instances
- Metric results

By default, the scheduled job is executed manually. Administrators can configure the scheduled job to run automatically on a recurring schedule.

Procedure

1. Navigate to **All** > **System Scheduler** > **Scheduled Jobs** > **Scheduled Jobs**.
2. Open the **Remove Old Assessment Data** record.
3. On the Schedule Item form, set the **Trigger type** field to run the scheduled job on a recurring schedule.

   It is recommended to set the scheduled job to run on a weekly or monthly basis.
4. **Optional:** Click **Execute Now** to run the scheduled job.

Assessment instances

An assessment instance represents one occurrence of a questionnaire assigned to one user.

The system generates assessment instances only when the required conditions are met, as described in Scheduled assessments and On-demand assessments, and there are non-scripted metrics in at least one category.

When the system generates scheduled assessments for a metric type, each assessment instance contains questions about assessable records and categories related to the stakeholder to which it is assigned.

Example:

Recall that there can be multiple stakeholder records associated with one user record. Minh Leclare is a stakeholder for these items related to the **Vendor** metric type:

Assessable records

Assessable record	Category
Amazon	User Satisfaction
Acme	User Satisfaction
Acme	Reliability
Cisco	Reliability

When the system generates a scheduled assessment, Minh is assigned one assessment instance to evaluate Amazon, Acme, and Cisco by answering questions from the categories as a stakeholder. Assuming that there are three questions in the User Satisfaction category and six questions in Reliability, Minh's questionnaire contains three questions about Amazon, nine questions about Acme, and six questions about Cisco.

When the system generates an on-demand assessment for a specific assessable record, the assessment instance contains questions about that assessable record and all its associated categories. When the system generates an on-demand assessment for a metric type, the assessment instance contains questions about all that metric type's assessable records and their associated categories.

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View an assessment instance

An assessment instance represents one occurrence of a questionnaire assigned to one user.

Before you begin

Role required: survey_admin, assessment_admin, or admin

Procedure

1. Navigate to **All** > **Assessments** > **Assessment Instances**.
   The following sub-modules are available based on the state of the instances:
   - **Ready to take**: Displays assessment instances that are ready to be taken by the user. By default, these instances are sorted in ascending order by the **Number** field.
   - **In progress**: Displays assessment instances that are in progress. By default, these instances are sorted in ascending order by the **Number** field.
   - **Completed**: Displays assessment instances that are complete. By default, these instances are sorted in descending order by the **Taken on** field.
   - **Cancelled**: Displays assessment instances that are cancelled. By default, these instances are sorted in ascending order by the **Number** field.
   - **All**: Displays assessment instances in all states. By default, these instances are sorted in ascending order by the **Number** field.
2. Open the record from the required sub-module by clicking an assessment instance number.

   By default, the fields in the following table are displayed in the Assessment Instance form for all sub-modules other than **Completed**.

   Note:
   When you open an instance in the **Completed** sub-module, you are redirected to the User's Response page.

Field	Description
Number	Auto-generated record number.
Metric type	Metric type of this assessment.
Assessment group	Assessment group to which this assessment belongs.
Due date	Date by which the assessment instance must be completed. The system populates the due date from the value in the metric type **Assessment duration** field. The system generates email notifications related to the due date. **Note:** By default, the system runs the *Cancel Expired Assessments* script every 30 days to cancel expired survey, assessment, and quiz instances that are in the Work in progress or Ready to take states.
State	State of the assessment.
Domain	Domain associated with the instance.
Assigned to	User this assessment is assigned to. This field becomes read-only when the state is **In progress**, **Complete**, or **Canceled**.

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Field	Description
Signature	Name of the signature record attached to this assessment. A signature requires that assessment recipients acknowledge that they have read any assertions attached to a questionnaire.
Signature result	Verification provided by the recipient when a signature is required. This value is either the recipient's full name from the User [sys_user] table or **checked**, indicating that the recipient acknowledged reading the assertion by selecting a check box.

3. Click **Take assessment** to open the questionnaire.
   For more information, see Take an assessment.

   This button is available if all the following conditions are true for the assessment instance:

   - It is **Assigned to** you.
   - The **State** is **Ready to take** or **In progress**.
   - The associated metric type is **Active**.

Related topics

Assessment generation

Generate a scheduled assessment manually

Event scheduling

Configure trigger conditions for an assessment

Trigger conditions specify when to send a particular assessment and who to send the assessment to.

Before you begin
Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Admin** > **Trigger Conditions**.
2. On the Trigger Condition form, fill in the fields.
   For a description of the field values, see Trigger Condition form for assessments.

Related topics

Survey trigger conditions

Assessable records

Assessment trigger conditions

A trigger condition tells the system who to send a designated assessment to and when, based on specific conditions.

With trigger conditions, assessment administrators can configure the system to generate assessments each time a specific action occurs, such as when an incident or change request closes. The trigger condition sends the assessment to specified users who are related to the triggering record, such as incident callers or change request assignees. You can choose to send the assessment every time the condition is met, or set a probability for the system to send the assessment at random when the condition is met.

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For a description of the field values in Trigger Condition form, see Trigger Condition form for assessments.

Trigger condition configuration

Assessment	Vendor
Table	Incident `[incident]`
User field	Assigned to
Repeat Interval	30 days
Active	true
Trigger randomly	false
Assessable Record Field	Vendor This is a field in the table that is selected from the **Table** field. The reference record selected in the field specified must have an assessable record. **Note:** The values in this field must have assessable records of the selected metric type. If this condition is met, then only the assessment is triggered.
Related Field 1	Caller
Related Field 2	Vendor
Condition	[State] [is] [Closed] and [Vendor] [is not empty]

Trigger condition example

Modesto Scroggie is the caller on an incident that is assigned to Boris Catino, a service desk technician. Boris contacts a vendor to resolve Modesto's issue and sets the **Vendor** field to **Microsoft**. When the incident closes, the system creates an assessment instance assigned to Boris so Boris can evaluate Microsoft as a vendor.

Because two related fields were selected as part of the trigger condition, the assessment instance stores the following information from the incident:

- **Related record 1:** User: Modesto Scroggie
- **Related record 2:** Company: Microsoft

Note:
Even though the trigger condition is set to be triggered every time the conditions are met, the **Repeat Interval** setting ensures that Boris does not receive another assessment if another vendor incident assigned to him closes within 30 days of the first one.

Enable manager notifications

Users with the assessment_admin role can enable the Notify manager assessment is overdue email notification.

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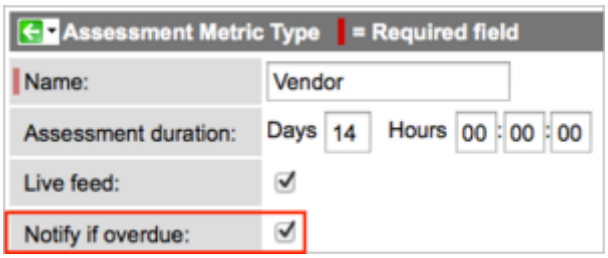
Before you begin
Role required: assessment_admin or admin

About this task
This notification sends emails to assessors' managers when assessors do not complete their assigned assessments on time. For more information, see the table of assessment notifications. You must enable or disable this email notification separately for each metric type.

Procedure
1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Open a metric type.
3. Select the **Notify if overdue** check box.



   To disable manager notifications, clear the check box.

4. Save the record.

> **Note:**
> The assessor's user record must have a manager specified in the **Manager** field to use this notification. You might need to configure the form to use this field.

Assessment notifications

You can configure the system to send email notifications for assessments.

You can configure any of the following types of notification during the process of generating assessable records:

- Notify assessment user: This messages notifies you of an assigned an assessment and includes the type, the due date, and basic instructions. The message also contains a link to the record where you take the assessment.

  > **Note:**
  > If a user has a pending assessment, then the system will not generate another instance of the same assessment.

- Remind assessment user: This message reminds you of the due date if half the time passes and you have not completed the assessment. The message content is the same as the first notification.
- Notify manager assessment is overdue: If you do not complete an assessment by the due date, the system may send a notification to your manager, depending on configuration.

> **Note:**
> By default, the system runs a script every 30 days to cancel expired assessment and survey instances that are in the **Work in progress** or **Ready to take** states.

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Related topics

Create metric types and generate assessable records

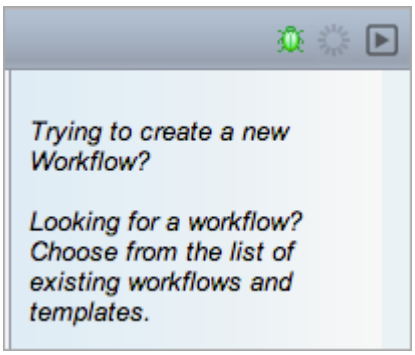
Event scheduling

Assessment notification workflow

The system sends assessment notifications according to the Notify assessment user workflow. Users with the workflow_admin, workflow_creator, or workflow_publisher roles can view workflows.

1. To open the graphical Workflow Editor, navigate to **Workflow** > **Workflow Editor**.
2. In the activity menu, click the link to choose an existing workflow.

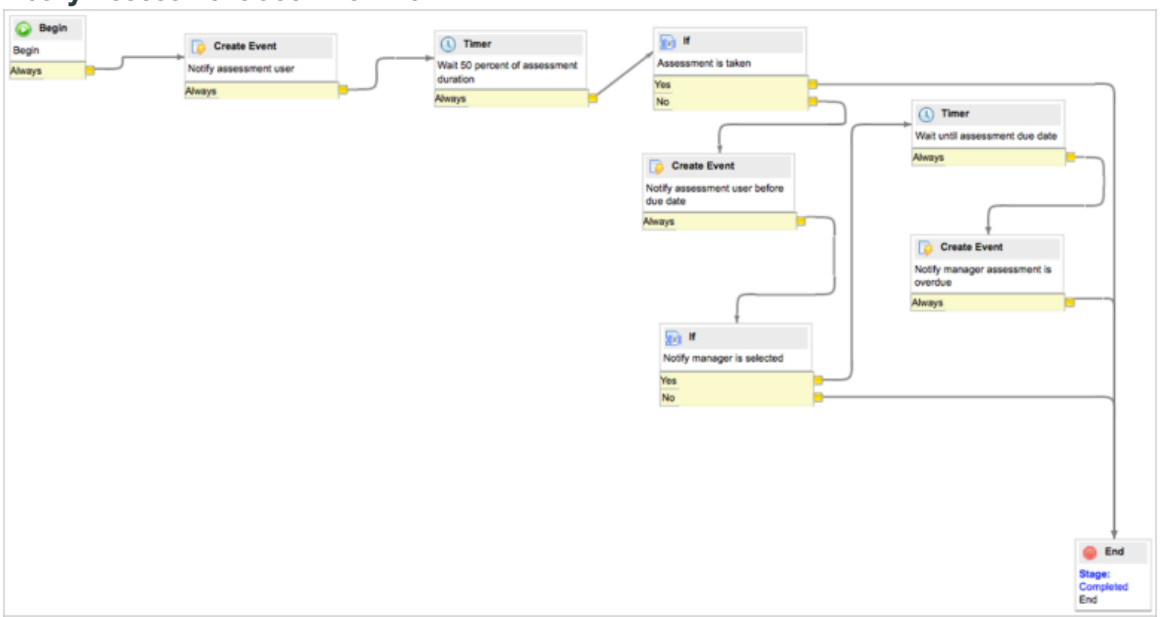
Workflow Window



3. Select **Notify assessment user** from the Workflow Versions list.

   The workflow appears.

Notify Assessment User Workflow



Related topics

Assessment notifications

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View a metric result

Metric results contain values that represent an evaluated record's performance for a specific metric, based on a single evaluation from one user or from the execution of a script. Metric results contain actual values as well as calculated values. The system uses values from metric results to calculate category results.

Before you begin

Role required: assessment_admin or admin

About this task

If there is an active scripted metric when the assessment is generated, the system automatically produces a metric result for each associated assessable record. The system produces an additional metric result for each question a user answers on a completed assessment questionnaire. If multiple users complete questionnaires with the same questions on the same assessable records, the system produces metric results for each user's responses. For example, three users complete questionnaires that contain the same four questions about the Acme Corporation record. The system produces 12 metric results: one per user for each question.

Procedure

1. Navigate to **All** > **Assessments** > **Results** > **Metric Results**.
2. Open the metric result record you want to view.
   All fields on the form except **Updated** and **String value** are read-only.

Metric Result form fields

Field	Description
Assessment group	Assessment group to which the metric result is associated.
Metric	Name of the metric to which these metric result values apply.
Data type	Data type of the metric.
Method	method of the metric.
Updated	Date and time the metric result was last updated.
Source	Source record of the assessable record evaluated.
Assigned to	User who completed the assessment questionnaire. This field is blank when the method is **Script**.
Instance	Assessment instance completed by the **Assigned to** user. This field is blank when the method is **Script**.
Actual value	Unscaled value from a user response or script, depending on the method: ○ **Assessment**: Value obtained from the user response to the assessment instance question. The actual value is determined by the metric data type: ▪ **Checkbox**: The actual value is 0 if the check box is cleared and 1 if it is selected. ▪ **Choice** or **Likert Scale**: The actual value is equal to the Value of the metric definition associated with the chosen answer option. ▪ **Date**, **Date/Time,** or **String**: The actual value is -1 to indicate that these data types do not contribute to category result calculations.

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Field	Description
	▪ **Template**: The actual value is equal to the **Value** of the template definition associated with the chosen answer option. ▪ **Yes/No**: The actual value is 0 if the response is **No** and 1 if it is **Yes**. ○ **Script**: Value the script placed in the *actual_result* variable. This field is hidden and left blank when the data type is **Duration**.
Duration value	Specific kind of actual value that is only applicable if the data type is **Duration**. The duration value is the value obtained by the script query from the *actual_result* parameter, such as the average duration of outages for a vendor.

Scaled value	Appropriate value from the *scaled_result* variable in the associated metric script. The code in a scripted metric defines a scaling scheme for the actual values it obtains. For example, a scripted metric queries the CMDB to return the number of configuration items (CIs) for a vendor. The code includes this scaling scheme, where *actual_result* is the number of CIs, and *scaled_result* is a representation of the quantity of CIs:
	`if (actual_result < 1)`
	`  scaled_result = 0;`
	`else if (actual_result < 1000)`
	`  scaled_result = 1;`
	`else if (actual_result < 10000)`
	`  scaled_result = 2;`
	`else if (actual_result < 25000)`
	`  scaled_result = 3;`
	`else if (actual_result < 100000)`
	`  scaled_result = 4;`
	`else`
	`  scaled_result = 5;`
	If the script detects 315 CIs for the vendor, the *Actual value* is 315 and the *Scaled value* is 1 for this metric result.
	Note: Although this field is visible only when the method is **Script**, the system populates the field with the *Actual value* when the method is **Assessment**, as the scaled value is used in the **Normalized value** calculation.

Normalized value	Adjusted value that accounts for weights, scale definition, minimum and maximum values, and other factors that impact the metric (like the survey responses or the input value—the actual value given by the user). See the example for **Normalized value** in View an assessment category result.
String value	Value that displays the response as it appears on a questionnaire. In some cases this is the same as the *Actual value*, such as when the metric data type is **Percentage**. The string value is **N/A** for unanswered questions of certain data types. For the **Attachment** data type, the names of the attached files are displayed as comma-separated values.

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Assessment results

In the Assessments application, when the system processes completed questionnaires or gathers values returned from scripted metric queries, it generates assessment result records called metric and category results.

Assessment administrators can view assessment results.

The system calculates metric results first, normalizes the scores, and then calculates category results. Each metric and category result record stores data from one assessment group, for a particular category and source record evaluated. Specifically:

- Metric results: store data calculated from one evaluation of one metric.
- Category results: store data calculated from a weighted average of all metrics in the category.

Note:
Although results data is available to view in the form of metric and category result records, the most meaningful way to view results is in scorecards and decision matrixes. These tools display only the most pertinent data in graphical, comparative formats.

Excluded Responses

The system creates metric results for responses but does not include them in category result calculations if any of the following are true:

- The user selects the **Not Applicable** answer option on a questionnaire.
- The user does not answer the question and the data type is not *Checkbox*.
- The question data type is one of the following: *Date*, *Date/Time*, or *String*.
- The metric result **Actual value**, **Scaled value**, and **Normalized value** fields are set to *-1*.

Metric Attachments

After a survey or assessment is submitted, any attachments that have been added by a user are moved to the metric result record. The names of the attached files are added to the **String value** field on the Metric Result form.

Note:
You cannot add or remove attachments from a metric result.

Assessment Overview dashboard

The Assessment Overview dashboard displays various assessment reports, such as Assessable Records by Type, Total Metrics by Metric Type, and Assessments by State.

The dashboard might not show all these reports. If you want to view a particular report, you can add that report to the dashboard.

Assessment Overview dashboard reports

Report	Table
Assessable Records by Type	Assessable Records [asmt_assessable_record]
Assessment Instances by Assessment Group	Assessment Instances [asmt_assessment_instance]
Assessments by State	Assessment Instances [asmt_assessment_instance]

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Assessment Overview dashboard reports (continued)

Report	Table
Answered Questions by Assigned User	Assessment Instance Questions [asmt_assessment_instance_question]
Average Rating by Type	Assessment Category Results [asmt_category_result]
Category Result Ratings by Category	Assessment Category Results [asmt_category_result]
Metrics by Data Type	Assessment Metrics [asmt_metric]
Stakeholders per Category	Assessment Stakeholders [asmt_m2m_stakeholder]
Top Rated Items	Metric Results [asmt_metric_result]
Total Metrics by Metric Type	Assessment Metrics [asmt_metric]]
Unanswered Questions by Assigned User	Assessment Instance Questions [asmt_assessment_instance_question]

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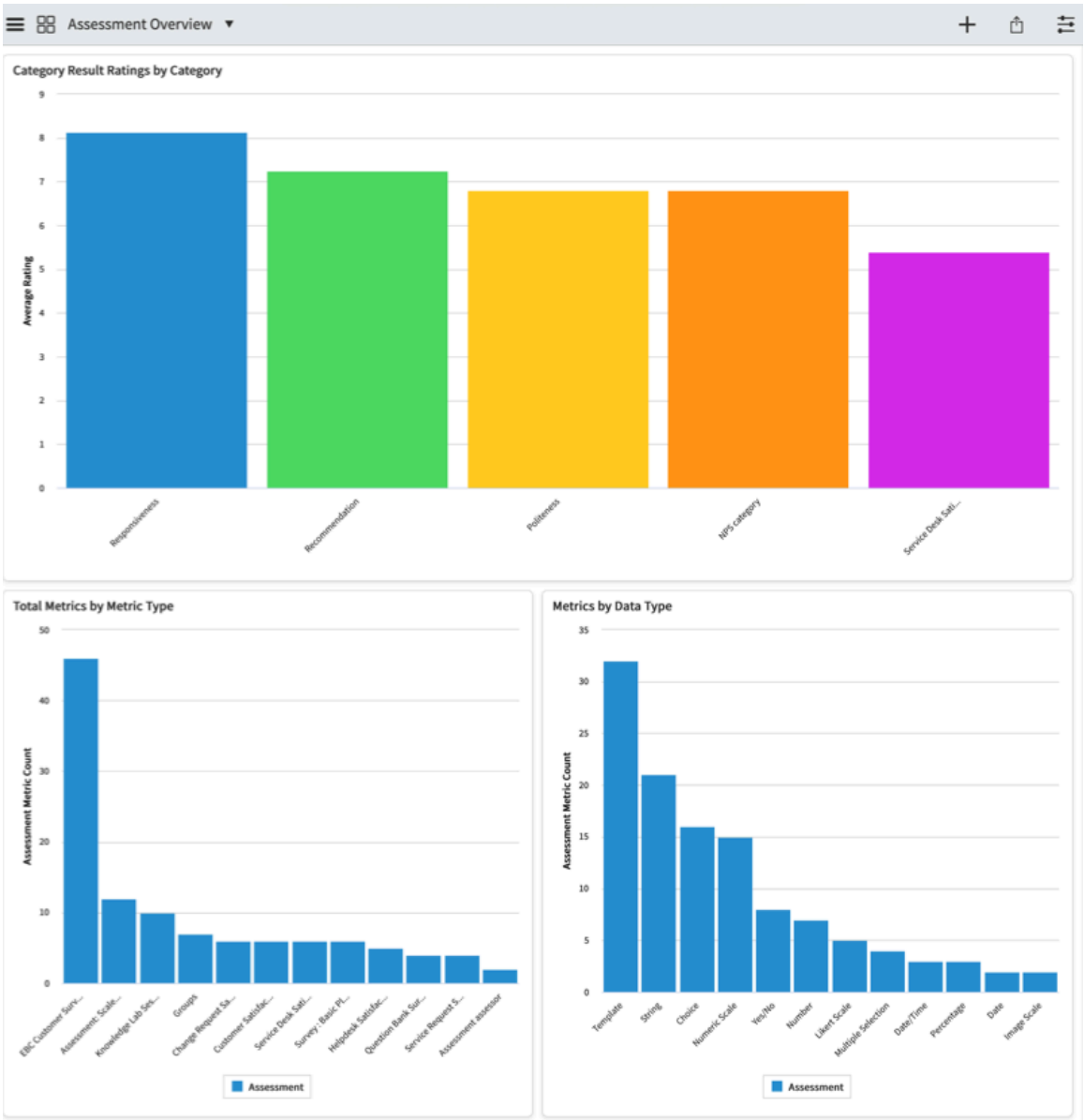
Assessment Overview dashboard



View assessment reports

Use the Assessment Overview dashboard to view your assessment reports.

Before you begin

Role required: assessment_admin or admin

About this task

The dashboard displays reports arranged in widgets. You can add new widgets to the dashboard.

Procedure

1. Navigate to **All** > **Assessments** > **Overview**.
2. Click the elements within the reports to view more information.

   For more information about working with dashboards, see Dashboards.

Assessment results calculation

For every assessment group, there are assessment results.

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Data calculated from an evaluation of one metric is classified as a metric result. Data calculated from the weighted average of all metric results in a category is classified as a category result. The system calculates some assessment results when the assessment is generated, and others when users complete questionnaires.

Related topics

- Generate a scheduled assessment manually
- Generate a vendor type assessment manually
- Assessment groups

View a bubble chart for assessments

Assessment administrators can view bubble charts to compare the relative standing of assessable records in three metric categories.

Before you begin
Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Admin** > **Bubble Charts**.
2. Click a **Name** to open the bubble chart record.
3. Under **Related Links**, click **View Bubble Chart**.

> **Note:**
> Demand managers and vendor managers can view bubble charts through the Demand Management and Vendor Performance applications. See Project Portfolio Suite for more information.

Bubble charts for assessments

A bubble chart is a dynamically updated graph that plots assessment results for multiple assessable records.

Assessment administrators can create and use bubble charts to compare the relative standing of assessable records in three metric categories. The X- and Y-axes each represent a different category. Assessable records are plotted on the chart as circular markers, or bubbles, which vary in size according to scores for the third category.

Create a bubble chart

Assessment administrators can create bubble charts to compare the relative standing of assessable records in three metric categories.

To create a bubble chart, navigate to **Assessments** > **Admin** > **Bubble Charts** and create a record (see table for field descriptions).

> **Note:**
> For color fields, either HTML color names or hexadecimal (hex) values are acceptable. For hex values, the # character is optional. Values are not case-sensitive. For example, all of the following values are valid: LightGray, lightgray, #D3D3D3, d3d3d3.

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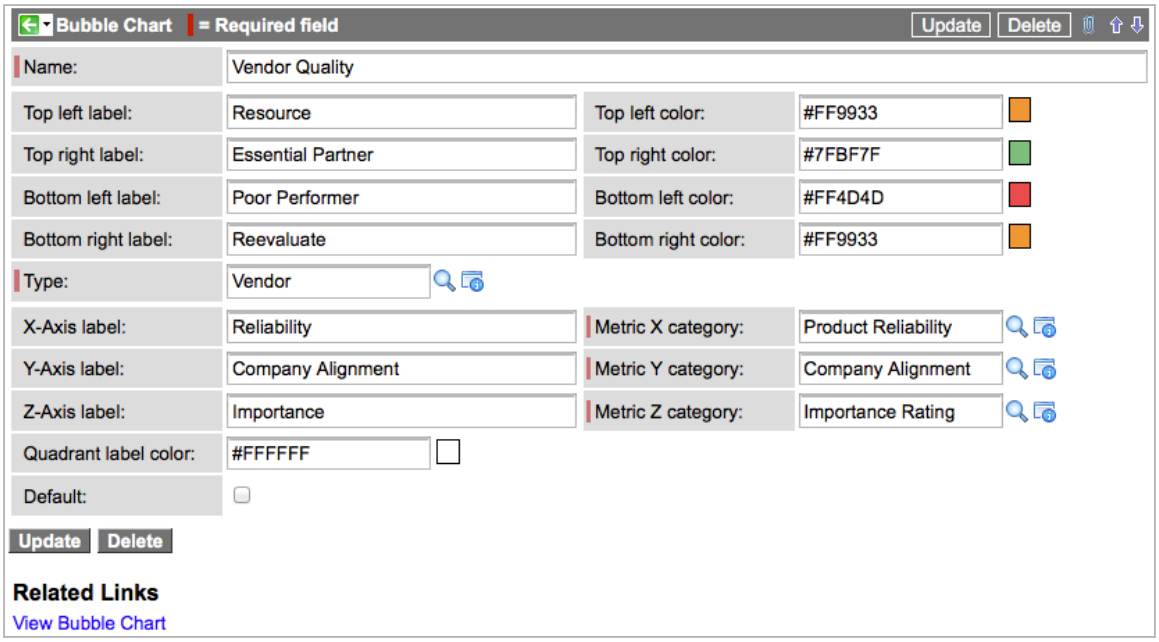
Bubble Chart form



Bubble Chart form fields

Field	Description
Name	Descriptive name for the bubble chart. **Bubble Chart** is appended to the name when you view the bubble chart.
• Top left label • Top right label • Bottom left label • Bottom right label	Label text for the top left, top right, bottom left, and bottom right quadrants, respectively. Choose labels that help interpret results. For example, a bubble chart that displays vendor assessment results might have the following quadrant labels, where vendors in the top right quadrant have the best scores: • **Top left label**: Resource • **Top right label**: Essential Partner • **Bottom left label**: Poor Performer • **Bottom right label**: Reevaluate
• Top left color • Top right color • Bottom left color • Bottom right color	Border colors for the top left, top right, bottom left, and bottom right quadrants, respectively. Bubbles are the color of the quadrant they are in.
Type	Metric type associated with this bubble chart. Only results for assessable records of the selected metric type are plotted on the bubble chart.

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Bubble Chart form fields (continued)

Field	Description
• X-Axis label • Y-Axis label • Z-Axis label	Label text for the X-, Y-, and Z-axis categories of the bubble chart. These labels appear along the X- and Y-axes, if applicable, and in bubble score summary windows. The metric category name is usually a good label. If these fields are left empty, the bubble chart automatically displays the selected category names as the labels.
• Metric X category • Metric Y category • Metric Z category	Metric category each axis represents. Results for the Z-axis category determine the size of each bubble. The Z-axis should generally represent the most important category out of the three.
Quadrant label color	Color of the label text for the quadrant borders.
Default	Check box that enables (selected) or disables (cleared) the bubble chart as the default. There can be only one default bubble chart per metric type.

Bubble chart components

The X- and Y-axes each represent a different metric category. Assessable records are plotted on the chart as circular markers, or bubbles, which vary in size according to scores for the third category.

The bubble chart page has these components:

- **Bubble Chart**
  - **X- and Y-axes**: Each axis represents a metric category.
  - **Bubbles**: Each labeled bubble represents an average of category result data for an assessable record. Point to a bubble to view an assessable record score summary. Click a bubble or bubble label to view the scorecard for the assessable record.
- **Source record list**: List of all records defined by the **Table** and **Condition** fields for the associated metric type. Note that the bubble chart only plots records for which there are assessment results. The assessment results are actually associated with the assessable records for each of the listed source records.

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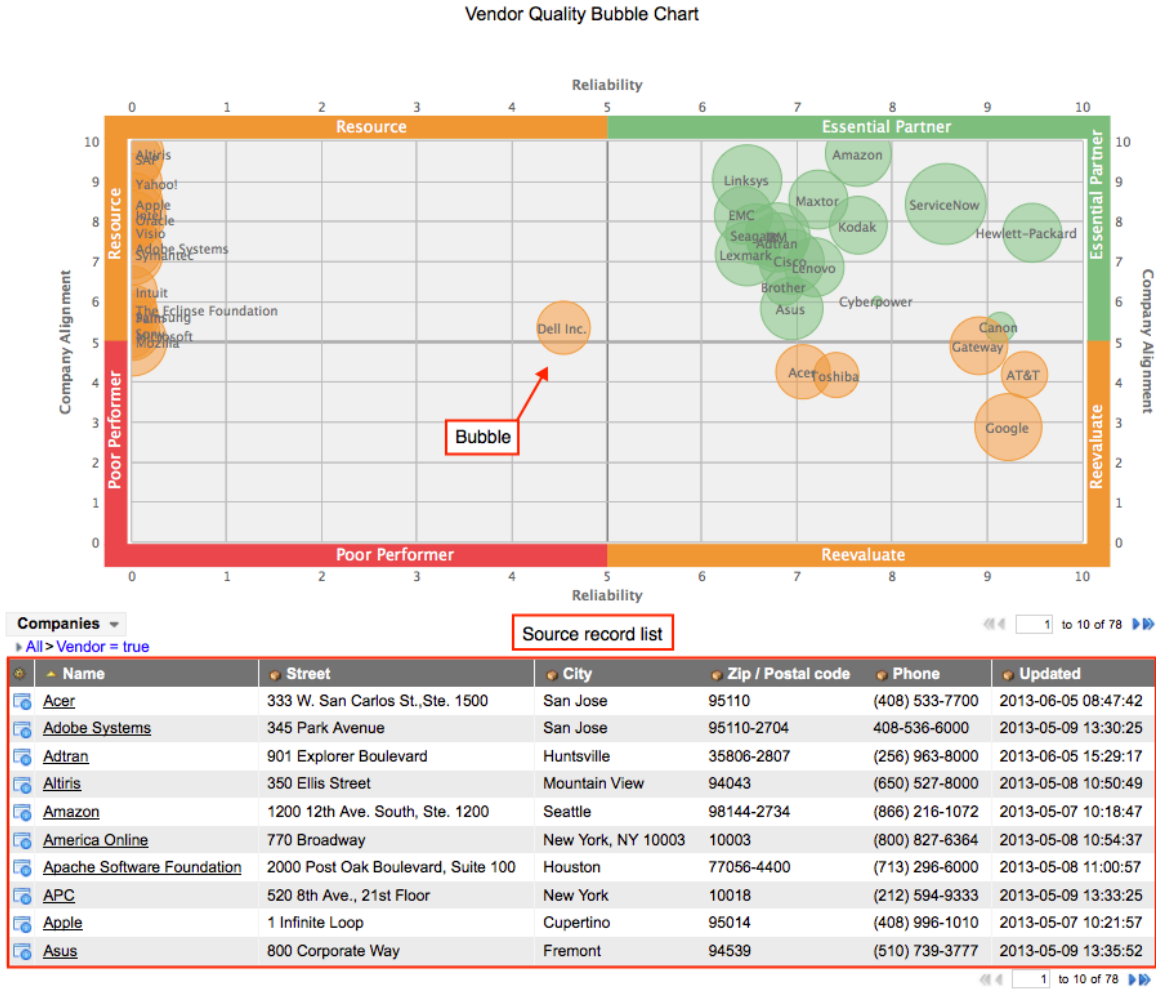
Bubble chart



Name	Street	City	Zip / Postal code	Phone	Updated
Acer	333 W. San Carlos St.,Ste. 1500	San Jose	95110	(408) 533-7700	2013-06-05 08:47:42
Adobe Systems	345 Park Avenue	San Jose	95110-2704	408-536-6000	2013-05-09 13:30:25
Adtran	901 Explorer Boulevard	Huntsville	35806-2807	(256) 963-8000	2013-06-05 15:29:17
Altiris	350 Ellis Street	Mountain View	94043	(650) 527-8000	2013-05-08 10:50:49
Amazon	1200 12th Ave. South, Ste. 1200	Seattle	98144-2734	(866) 216-1072	2013-05-07 10:18:47
America Online	770 Broadway	New York, NY 10003	10003	(800) 827-6364	2013-05-08 10:54:37
Apache Software Foundation	2000 Post Oak Boulevard, Suite 100	Houston	77056-4400	(713) 296-6000	2013-05-08 11:00:57
APC	520 8th Ave., 21st Floor	New York	10018	(212) 594-9333	2013-05-09 13:33:25
Apple	1 Infinite Loop	Cupertino	95014	(408) 996-1010	2013-05-07 10:21:57
Asus	800 Corporate Way	Fremont	94539	(510) 739-3777	2013-05-09 13:35:52

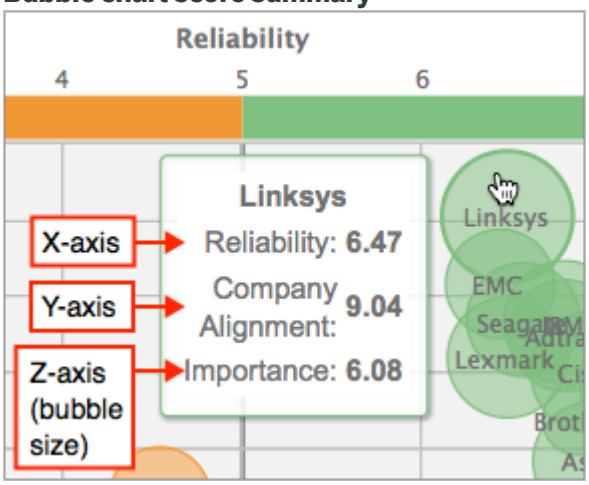
1 to 10 of 78

Assessable record score summaries

Point to a bubble to display a score summary for the assessable record the bubble represents.

The summary displays the assessable record's average score for each category in the following order: X-axis category, Y-axis category, Z-axis category. The scores are based on data from the last 12 months.

Bubble chart score summary



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View an assessment scorecard

The Assessments application prepares printable scorecards. A scorecard displays easy-to-interpret assessment results, in which the current calculated ratings for an assessable record are compared to previous ratings or to the ratings of other records.

Before you begin
Role required: assessment_admin or admin

About this task
Users can examine ratings over time, compare ratings for one assessable record with all assessable records in a table, or compare the ratings of two assessable records. All ratings are averages for the time range selected. The system dynamically updates a scorecard each time you view it, so the ratings reflect recently completed assessments and scripted metrics.

Administrators can display a scorecard for any table by creating a **Related Link** on assessable records. The system provides this link on the Company form by default when Vendor Performance is active.

The Vendor Performance application provides an enhanced scorecard view for vendors.

See Vendor Performance in . Project Portfolio Suite.

Procedure
1. Navigate to **All** > **Assessments** > **Assessable Records**.
2. Open a record.
3. Under **Related Links**, click **View Scorecard**.

Create a link to a scorecard

Users with the admin role can create UI actions that allow users to view scorecards from tables.

Before you begin
Role required: assessment_admin or admin

Procedure
1. Generate assessable records you want to evaluate.
   For example, you might create a metric type called **Project** to assess project management records.
2. Navigate to **System Definition** > **UI Actions**.
3. Open the View Scorecard record.
4. Right-click the header bar and select **Insert and Stay** from the context menu to create a duplicate record.
5. Change the **Table** name to the table on which you want the UI action to appear.
   For example, you might select Project [pm_project].

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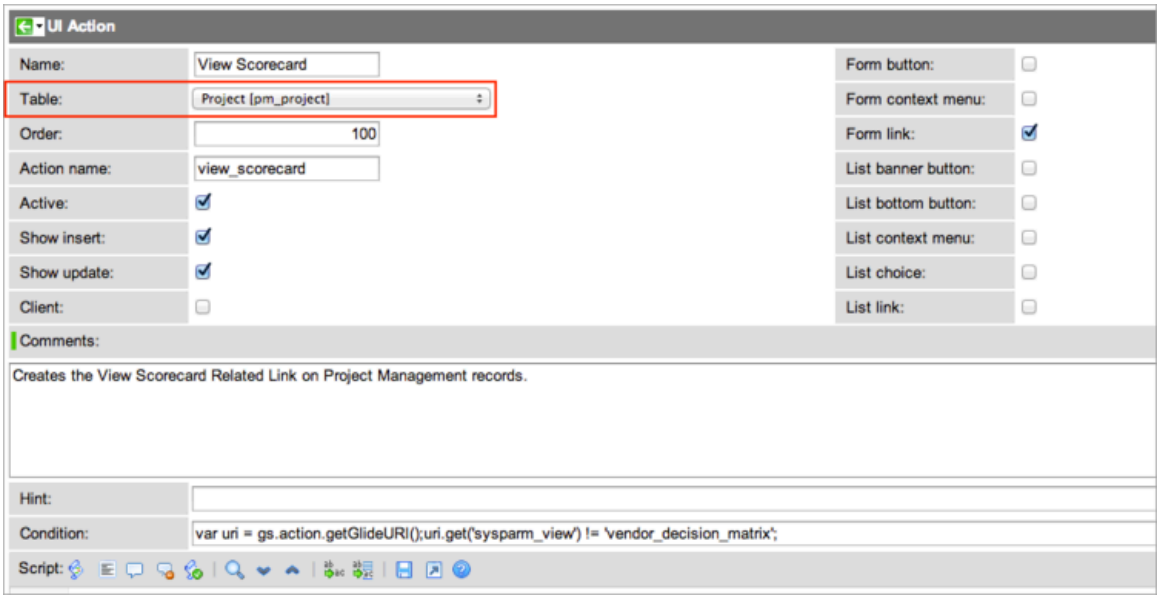

6. Do not edit the **Action name** field or the **Condition** script.
7. Save the record.
8. Navigate to the table on which you created the UI action and open an assessable record.
   a. In this example, navigate to **Project** > **Projects** > **All**.
   b. Open any record in the list.
   c. Click **View Scorecard** under **Related Links** to open the scorecard for that assessable record. The scorecard appears with the title in the form of **<table display name> Scorecard**. For example, a scorecard for an assessable record in the Project `[pm_project]` table is named **Project Scorecard**.

   Note:
   Content does not appear in the scorecard unless the associated assessable record has assessment results or related Live Feed conversations.

9. Insert a new **View Scorecard** UI action record for each table where you want the related link to appear.

Assessment scorecard averages

The Averages view compares the current ratings for an assessable record in each metric category with the average, minimum, and maximum values from all assessable records in the filter. All ratings are from assessments generated over the trailing twelve months (TTM).

Select a filter option to compare the current record against all assessable records in that filter. An assessment administrator configures these options in the **Filter field** field in the Assessment Metric Type form.

Rating variances are highlighted as follows:

- **Red**: Ratings are below average in this category. The **Diff** value displays a negative number.
- **Green**: Ratings are above average in this category. The **Diff** value displays a positive number.
- **White**: Ratings are average in this category. The **Diff** value is 0.0.

In the following example, the ratings of the current group are compared against other groups for which Don Goodliffe is the manager.

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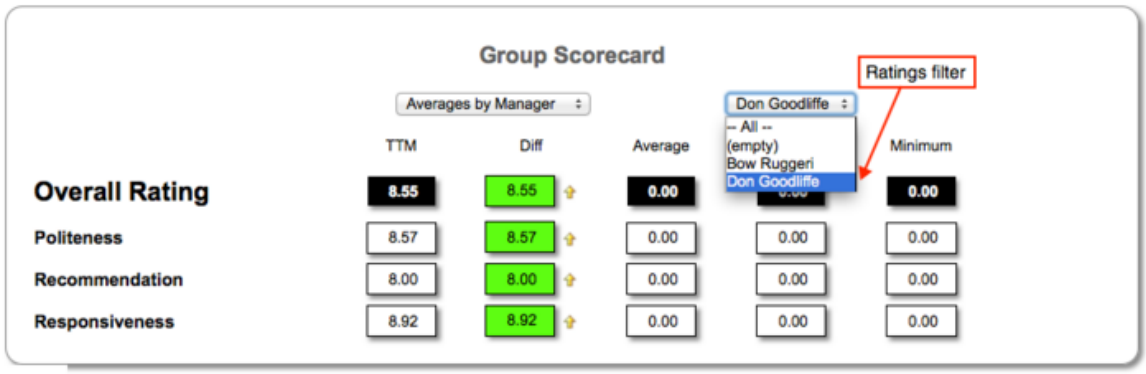
Group scorecard with ratings filter



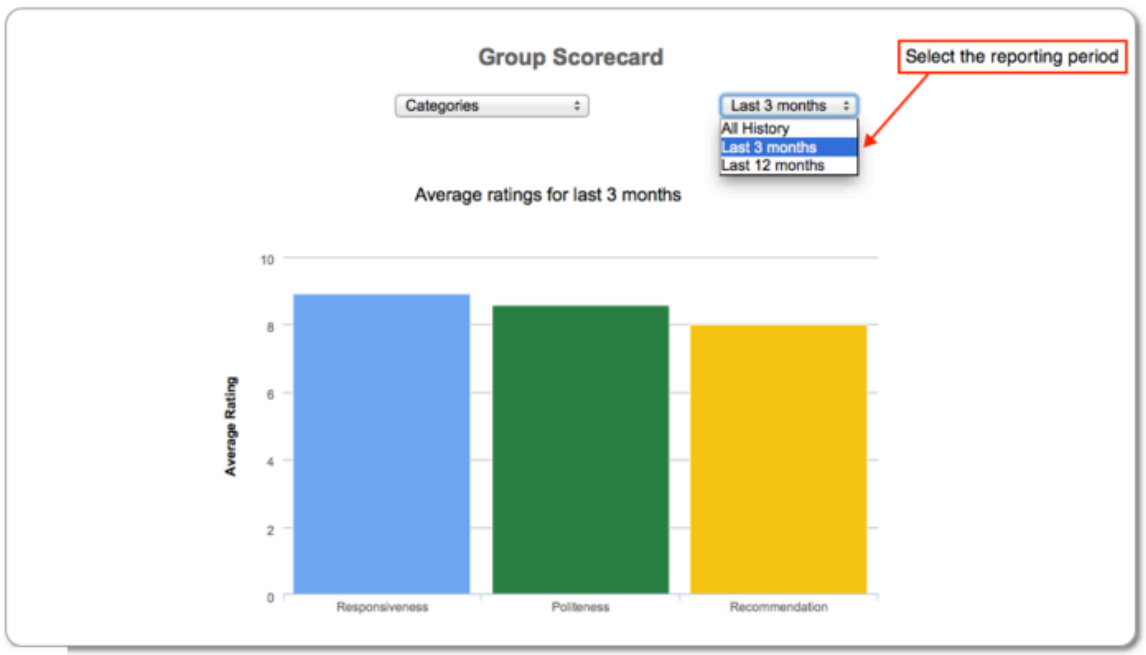
Assessment scorecard categories

The Categories view displays a bar chart showing the average ratings for each category in the selected time interval.

Select from these reporting periods:

- All History
- Last 3 Months
- Last 12 Months

Scorecard categories



Assessment scorecard category metrics

The Category Metrics view displays the weighted average results for each metric within a category. Use this view to learn how individual metrics affect the overall rating for the category.

Select a metric category from the choice list to display the chart.

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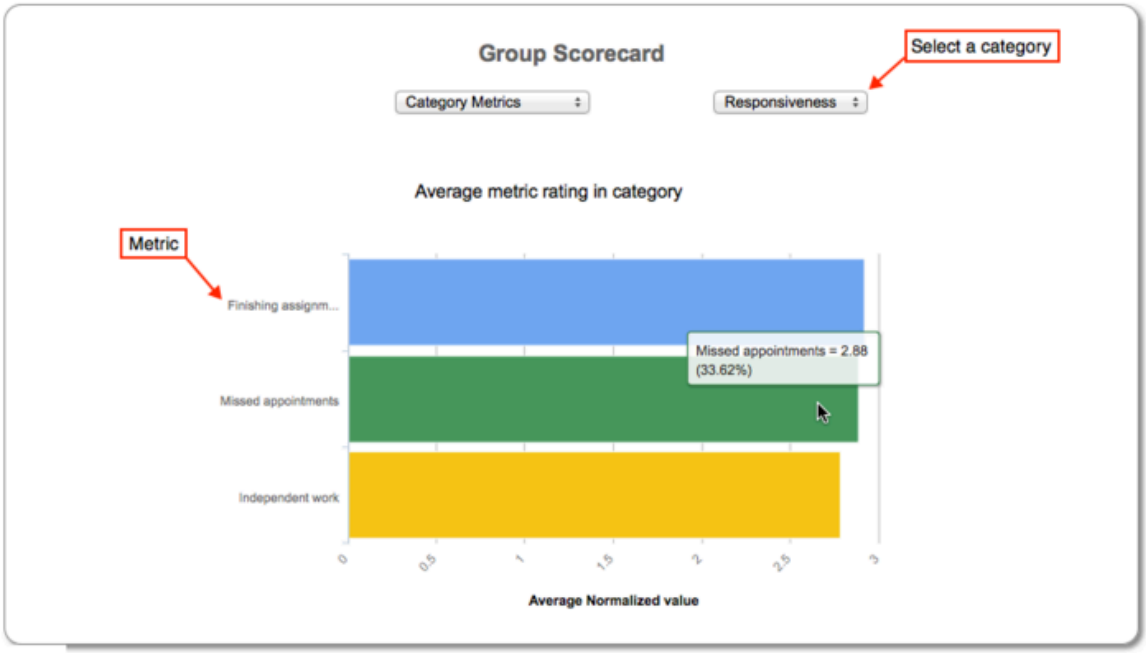
Scorecard category metrics



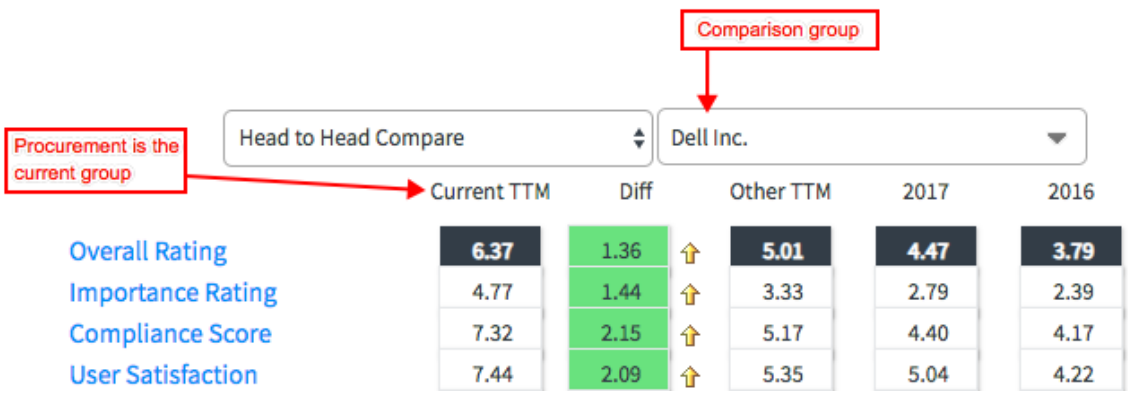
Assessment scorecard head-to-head compare view

The Head to Head Compare view allows you to compare the ratings of two assessable records of the same type. Select an assessable record from the choice list to compare against the current record's trailing twelve month (TTM) ratings.

Head to head compare

The Diff column displays the difference between each assessable record's most recent TTM ratings. By default, the system selects the first assessable record in the list when you open this view. The scorecard displays three years of ratings for the comparison record. All ratings are expressed as averages.

Scorecard head to head compare



Overall Rating

The Overall Rating is calculated as:

```
(sum of normalized values in category result) / (number of
 assessment groups)
```

In the following example, the calculation is

```
(2.13 + 2.86 + 3.79 + 1.43 + 2.39 + 3.7) / 2 = 8.15
```

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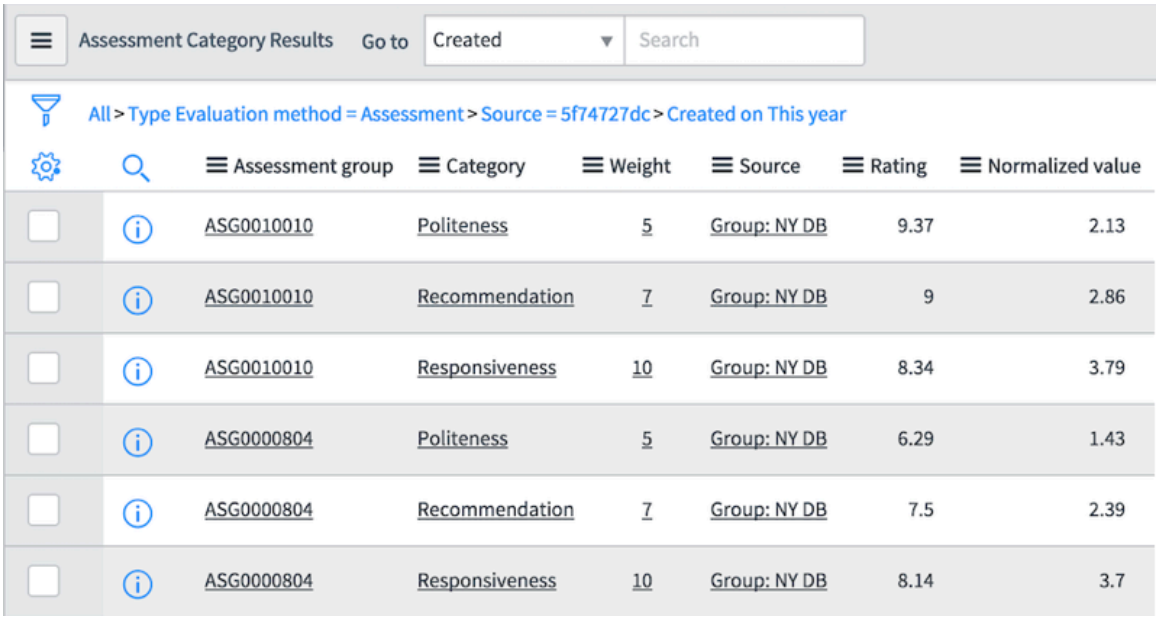
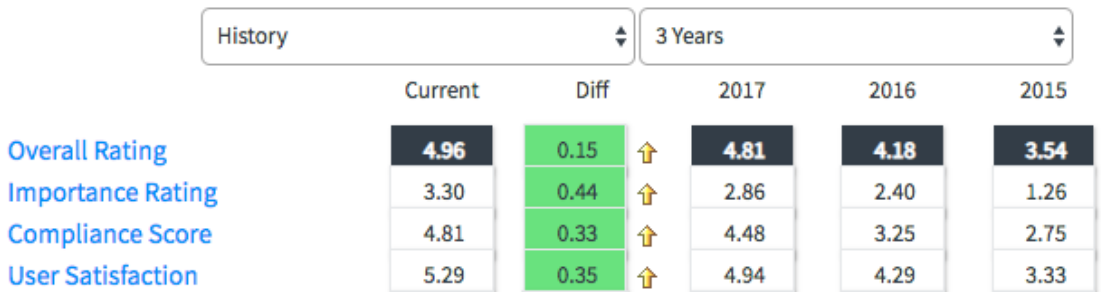
Normalized values



Assessment group	Category	Weight	Source	Rating	Normalized value
ASG0010010	Politeness	5	Group: NY DB	9.37	2.13
ASG0010010	Recommendation	7	Group: NY DB	9	2.86
ASG0010010	Responsiveness	10	Group: NY DB	8.34	3.79
ASG0000804	Politeness	5	Group: NY DB	6.29	1.43
ASG0000804	Recommendation	7	Group: NY DB	7.5	2.39
ASG0000804	Responsiveness	10	Group: NY DB	8.14	3.7

Overall Rating on the group scorecard



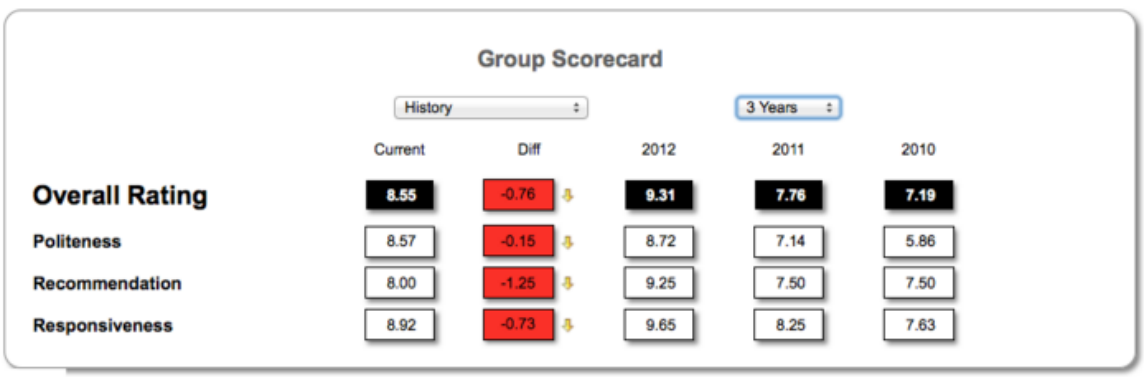
Assessment scorecard history

The History view compares the current ratings for each category with ratings from the previous three years or four quarters.

Ratings that have declined are highlighted in red and display negative numbers. Ratings that have improved are highlighted in green with positive numbers. Arrow icons beside the values in the **Diff** column indicate the trend of the current assessment against the previous assessment.

- **3 Years**: To calculate the current ratings, the system averages the ratings from the trailing twelve month (TTM) period. The **Diff** column shows the discrepancy between the current ratings and the previous calendar year's ratings.

Scorecard history - 3 years



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- **4 Quarters**: Quarterly assessments compare the average rating for each category in the current quarter against the average ratings from the previous four quarters. The **Diff** column shows the discrepancy between the current ratings and the previous quarter's ratings. The column labels count backward, by quarter from the current quarter. For example, if the current quarter is the **3rd** quarter of 2013, then the previous quarters appear as **2nd** [2013], **1st** [2013], **4th** [2012], and **3rd** [2012]. All four of the previous quarters appear, whether or not there was any data for those quarters.

Scorecard history - 4 quarters

Live feed view of assessable records

The Live Feed view displays Live Feed conversations that apply to the assessable record. Users can view the group feed, including tagged comments, and add comments of their own.

To configure a Live Feed view, an assessment administrator selects the **Live feed** check box on the Assessable Record form. Live feed is available on the scorecard even if there are no category results for the other views.

The Live Feed view provides these viewing options:

- **My Feed**: Displays the user's My Feed preferences.
- **Company**: Displays the user's company feed.
- **Groups**: Displays all available groups and gives the logged in user the option to leave or join a group. Select a group to display that group's conversations.
- **Tags**: Displays all the tags found in Live Feed comments. Click a tag to display the conversations containing that tag.

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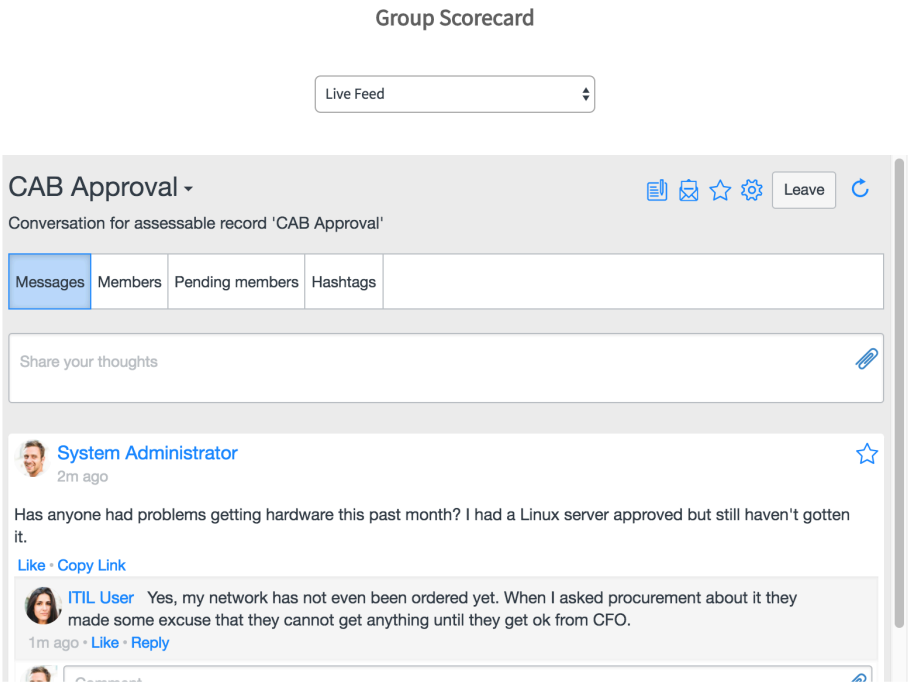
Live Feed group scorecard



Assessment scorecard ratings

The scorecard ratings section displays various ratings for the assessable record.

Select one of several views that present different ratings:

- Averages
- Categories
- Category Metrics
- Head to Head Compare
- History
- Live Feed

Some views display an overall rating column, which lists categories used to evaluate the assessable record. Only categories in which the assessable record has been evaluated appear on the scorecard. If the ratings section does not display any data, the assessable record or category results associated to the assessable record have been deleted.

Click a category to view the category record. Point to a category to display a line chart that shows the rating trend for that category.

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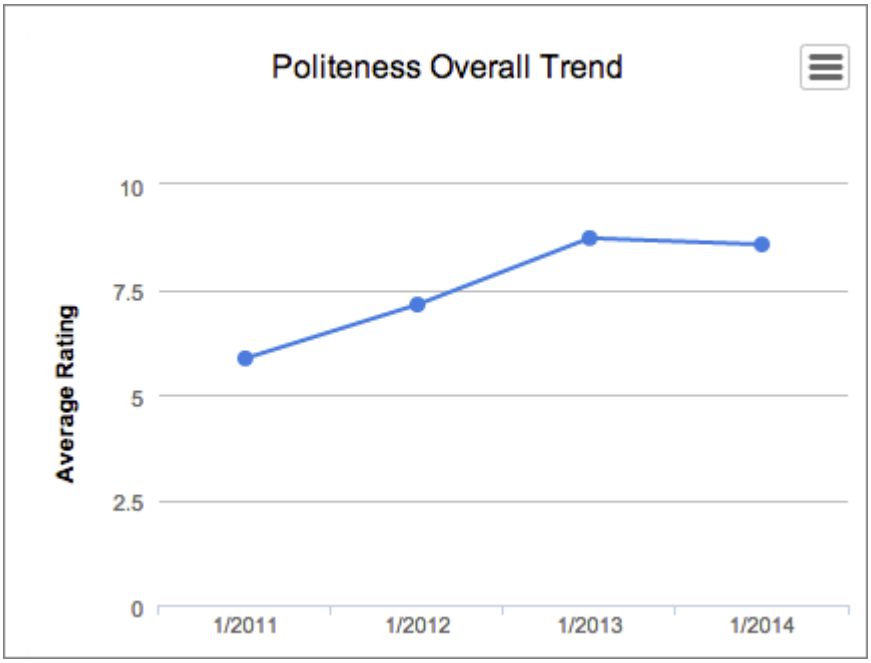
Vendor scorecard trend chart



Create a decision matrix

The name and labels on a decision matrix are closely linked to the categories you choose for the axes. For that reason, first select the metric type and define the X and Y axes before you fill in other fields on the Decision Matrix form.

Before you begin

Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Admin** > **Decision Matrixes**.
2. Click **New**.
3. Select the metric **Type** to plot results for.
4. Right-click the form header and select **Save**.
   The X Axis and Y Axis related lists appear.
5. Define which metric categories the axes represent.
   Each axis can represent a single category or multiple categories. You must specify at least one category per axis in order for the decision matrix to render properly. The available categories are limited to those associated to the metric type selected. To avoid confusion, always update the text for the axis and quadrant labels after editing or adding metric categories to an axis.

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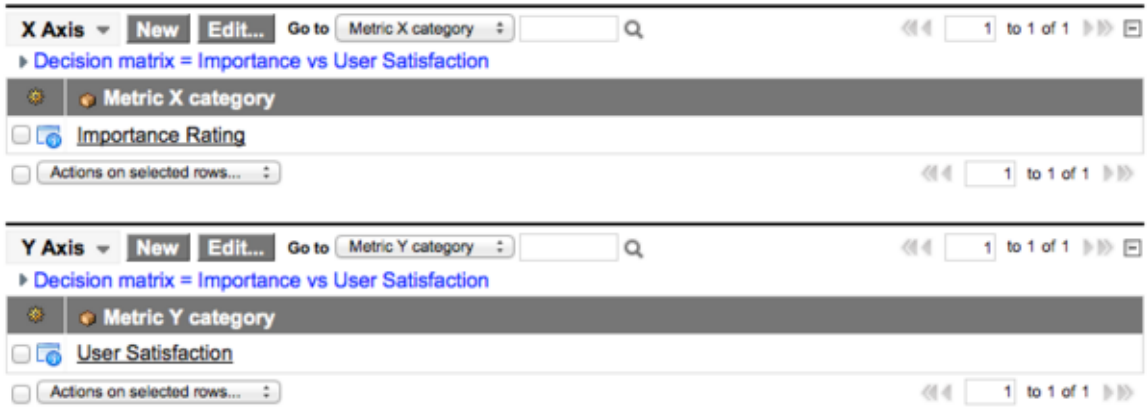
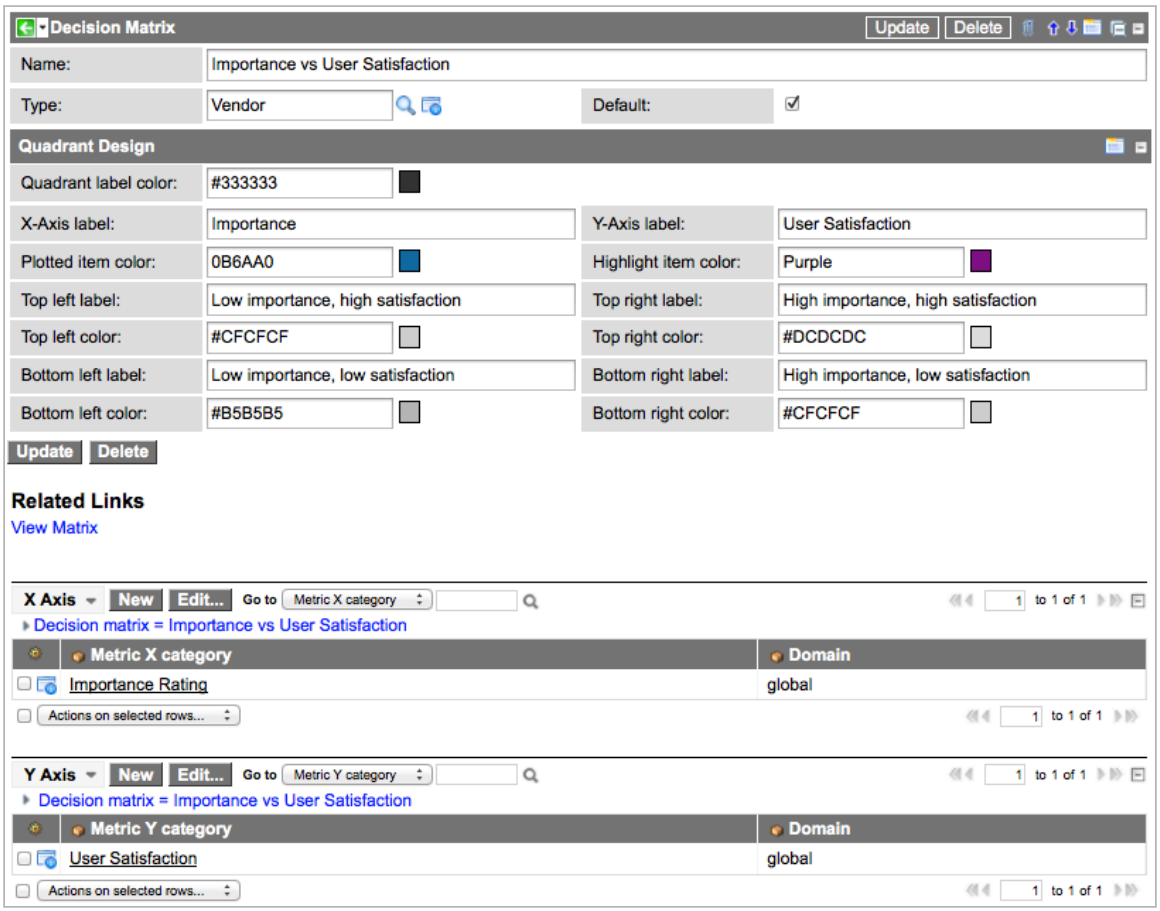
Decision matrix axes



6. Fill in the remaining fields on the Decision Matrix form and save the record.



Note:
For color fields, either HTML color names or hexidecimal (hex) values are acceptable. For hex values, the # character is optional. Values are not case-sensitive. For example, all of the following values are valid: LightGray, lightgray, #D3D3D3, d3d3d3.

Decision Matrix form

Field	Description
Name	Name of the decision matrix, which appears as the title on the decision matrix page. It is recommended to include the axis categories in the name. For example,

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Field	Description
	if you selected **Importance Rating** as the X-axis and **User Satisfaction** as the Y-axis, you might name the matrix **Importance vs. User Satisfaction**.
Type	Metric type associated with this decision matrix. Only results for assessable records of the selected metric type are plotted on the decision matrix.
Default	Determines whether or not this is the default decision matrix. The default decision matrix opens when you click **View Matrix** on a scorecard. Select the check box to set the matrix as the default decision matrix. The system prevents you from creating more than one default decision matrix per metric type. If there is already a default decision matrix for the type and you try to save a different matrix with the check box selected, an error message appears. The maximum values for the default decision matrix are controlled by the **Maximum number of items to show for a decision matrix field filter** property *(com.snc.assessment.decision_matrix_filter_max_entries)*, which has a default value of 1000.
Quadrant Design Section	
Quadrant label color	Color of the label text for the quadrants. Each quadrant label displays in the center of the quadrant. You can enter an HTML color name or hex value for this and the other color fields.
X-Axis label	Label text for the X-axis of the decision matrix. It is recommended to include the metric category name in the label text. For example, for an X-axis category of **Importance Rating**, the X-axis label is **Importance**.
Plotted item color	Color used to display plotted items.
Top left label	Label text for the top left quadrant. For an X-axis labeled **Importance** and Y-axis labeled **Support**, you might label the top left quadrant **Low importance, high support**.
Top left color	Fill color for the top left quadrant.
Bottom left label	Label text for the bottom left quadrant.
Bottom left color	Fill color for the bottom left quadrant.
Bottom left label	Label text for the bottom left quadrant.
Bottom left color	Fill color for the bottom left quadrant.
Y-Axis label	Label text for the Y-axis of the decision matrix.
Highlight item color	Color of highlighted plotted items. When you view a decision matrix from an assessable record's scorecard, the assessable record plotted item appears in the highlight color. Specify a highlight color that is different than the **Plotted item color**.

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Field	Description
Top right label	Label text for the top right quadrant.
Top right color	Fill color for the top right quadrant.
Bottom right label	Label text for the bottom right quadrant.
Bottom right color	Fill color for the bottom right quadrant.
Related Lists	
X Axis	Lists categories that define the X-axis of the decision matrix.
Y Axis	Lists categories that define the Y-axis of the decision matrix.

Decision matrixes

Assessment results obtained by questionnaires and scripted metrics can be mapped to decision matrixes.

Assessment administrators can view and create these dynamically updated graphs, which make it possible to compare assessable records by category. Decision matrixes display data from a trailing twelve month (TTM) period.

Note:
Assessment administrators can access decision matrixes through the Assessment application and vendor managers can access them through the Vendor Management Workspace application.

Decision matrix components

The decision matrix page has these components:

Component	Description
Options	
Filter	Select the subset of assessable records you want to view. The filter options available vary by metric type, based on the **Filter** field and **Filter condition** field settings for each type.

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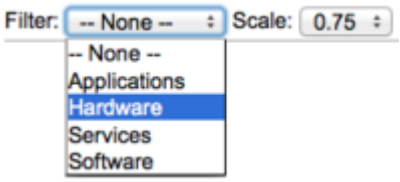
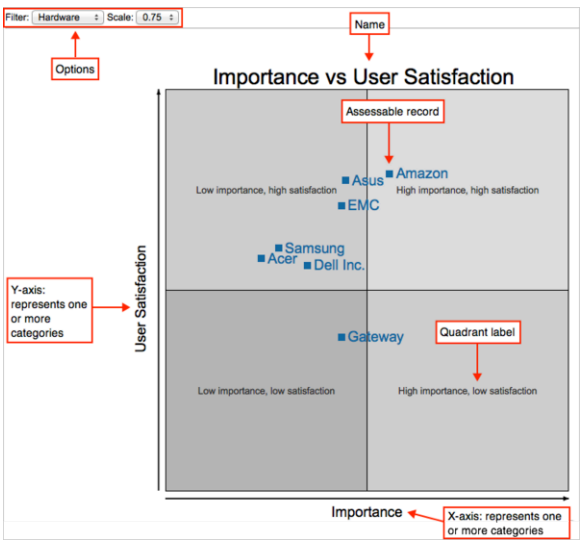
Component	Description
	Decision matrix components  The maximum values in the filter are controlled by the **Maximum number of items to show for a decision matrix field filter** property *(com.snc.assessment.decision_matrix_filter_max_entries)*, which has a default value of 1000.
Scale	Select the scale for the decision matrix. The greater the scale, the larger the decision matrix appears.
Decision matrix	
X- and Y-axes	Each axis represents one or more metric categories. If multiple categories are used for an axis, their respectiveweights determine the positioning of the plotted items.
Plotted items	The labeled points you see on a decision matrix, called plotted items, represent averages of category result data for assessable records. Point to a plotted item label to view a rating summary for that assessable record. Click a plotted item label to view the scorecard for the assessable record. **Vendor decision matrix** 

Plotted item rating summaries

If you point to a plotted item label on a decision matrix, a rating summary appears. The summary displays the assessable record's average ratings for each axis. If an axis represents one metric category, the ratings are calculated averages from results for that category. If an axis represents multiple categories, the ratings are calculated averages from weighted results for all of the categories.

The summary shows:

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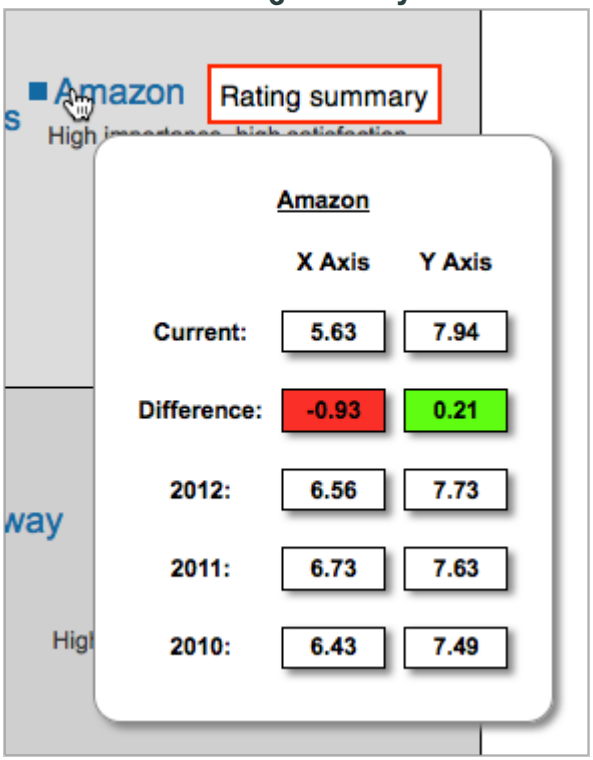
- Current rating
- Difference between the current rating and the rating from the previous year
- Ratings from each previous year, going back three years

Decision matrix rating summary



Take an assessment

Take the assessments assigned to you from the assessment and survey queue.

Before you begin

Role required: none

About this task

An assessment card displays the assessment name, state, due date, and associated incident number. Click the card to take the assessment when you're ready.

You must answer every required question, indicated by a red asterisk, before you can submit the assessment as complete. If you start to take an assessment but can't complete it, save your responses and return to it later. When you've answered all the questions and you're happy with the responses, submit the assessment.

Note:
The expired assessments and surveys no longer appear in the **My surveys** widget and the **My Assessments and Surveys list** page.

By default, you can't modify your answers to an assessment after submission. However, if the administrator has configured an assessment to allow retakes, you can edit your answers and resubmit the questionnaire. Completed assessments configured for retake remain in the queue until their due date and display Modify Assessment at the top of the card. Click the card to modify the assessment.

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Note:
If you don’t have access to the assessable record for which an assessment is created, the associated record number isn't displayed. You can still take the assessment.

Procedure

1. Navigate to **All** > **Self-Service** > **My Assessments & Surveys**.

   Note:
   Users with the assessment_admin role can display other users' assessments and surveys in addition to their own. Use the **Show all** and **Show assigned to me** related links to show and hide assessments and surveys. Click a card assigned to another user to open the associated metric type or survey definition.

2. On the assessment card, note the due date.

   Note:
   Depending on the configuration, you may receive email notifications to remind you of the due date.

3. Click the card to open the questionnaire.
   Assessment questionnaires are arranged in sections: first by record, then by category. Each record appears as a section title. Questions for the record appear underneath the record, grouped by category. Each category appears as a subsection underneath the record name.
   Click the collapse icon (⊟) or expand icon (⊞) to hide or show the questions in a category, or all the categories and questions for a record. Colored bars indicate the status of each question.
4. Answer each question to the best of your ability.
   Point to a question for more information.

   If you're unsure of how to respond to a question or if a question doesn't apply to a particular record, select **Not Applicable**, if available.

5. Read any assertions present at the end of the assessment and acknowledge with a signature, if required.

   A signature can require you to select a check box or authenticate your full name, which the system displays in a read-only field. You can't submit your answers to the assessment until you provide the required signature.

6. Save or submit the assessment.

   - **Save**: Saves your responses without submitting them. You can close the questionnaire and access it later from your queue.
   - **Submit**: Submits the completed assessment when you're finished.

7. If prompted, enter your user name and password to verify your full name signature.

   If all the questions are answered with valid values, a success message appears. If the system detects an unanswered required question or invalid response, the assessment isn't submitted, and a message appears at the top of the questionnaire explaining the error. Questions with problems are temporarily highlighted.

8. You can modify your responses to the assessment until its due date.
   To update your answers and resubmit an assessment that permits retakes, click the card to modify it.

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Related topics

- Metric types and assessable records
- Survey definitions

Assessments in Service Portal and the Now Mobile app

If you've installed Service Portal, you can use the My Assessments and Surveys widget in Service Portal. Users can view and take assessments in Service Portal. Service Portal also supports assessments for users on mobile devices that have the Now Mobile app installed. The My Assessments and Surveys widget is available by default on the Service Portal home page.

Assessments in Service Portal

To create an intuitive interface for your users, you can set up assessments in Service Portal. Activate Service Portal to view the My Assessments and Surveys widget, which appears on the Service Portal home page.

To learn more about activating Service Portal, see Activate Service Portal.

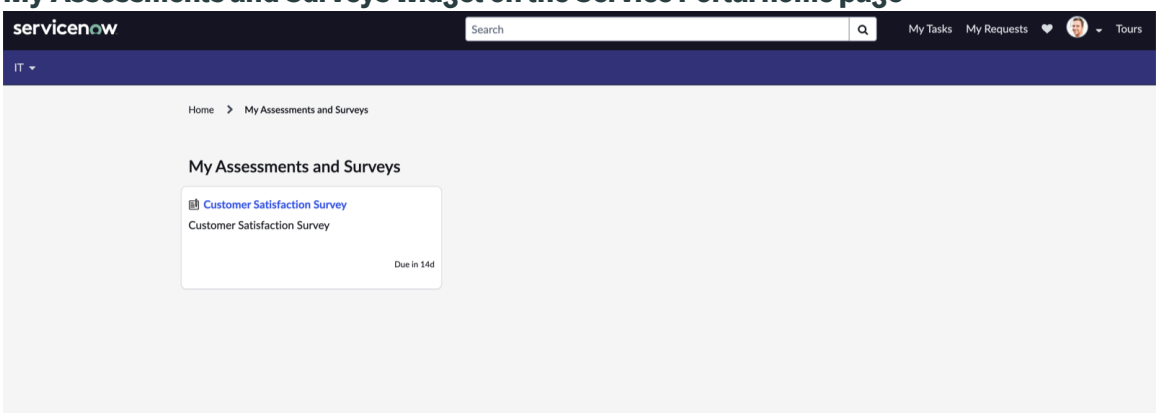
To learn more about configuring a widget, see configure widget instances.

To configure an Assessments and Surveys widget on a Service Portal home page, press the CTRL key, right-click the widget heading, and select **Instance Options**.

Instance options (properties) for the assessments and surveys widget on Service Portal

Property	Description
Max records	Maximum number of assessments to list in the widget on the Service Portal home page. Users can click the **View all** link to view all assessments. Default number of assessments: **5**
Title of the widget	Text that appears in the title bar of the survey widget. Default title: **My Assessments and Surveys**

My Assessments and Surveys widget on the Service Portal home page



Assessments in the Now Mobile app

Your users can view and take the assessments on mobile devices using the My Assessments and Surveys applet launcher that is available by default in the Now Mobile app.

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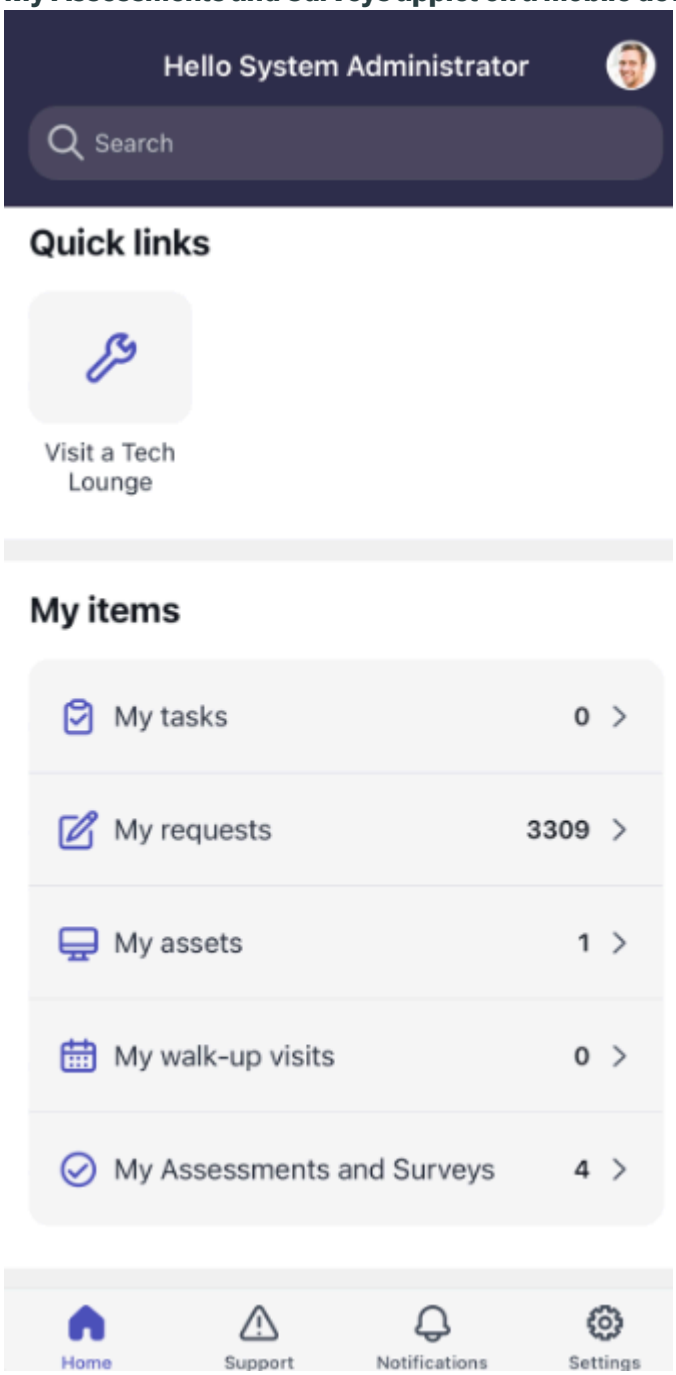
When you assign an assessment to a user, an email notification about taking the assessment is sent to the user. If users installed the Now Mobile app, a mobile push notification is also sent on mobile devices. Tapping the notification opens an introduction page for an assessment in the Mobile Employee Service Portal in the Now Mobile app. The page displays a **Get started** link. The introduction page and the **Get started** link are available only if the related settings are enabled. Users can tap the link to view and take the assessment. You can activate push notifications by setting the *glide.sg.universal_links.enabled* system property to **true**.

My Assessments and Surveys applet on a mobile device



Note:
In the Zurich release, you now see the assessments and surveys assigned in the card view instead of the item view. If you customize the styles of the legacy card item views in older versions of Assessments and Surveys, the card continues to appear in the item view even after you upgrade to Zurich. You can view the new card view in Zurich only if no customizations were made to the legacy cards.

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When users open an assessment either in Service Portal or the Now Mobile app, the assessment provides the following features:

- An assessment page shows breadcrumb navigation on the Service Portal. Users can click the links in the breadcrumb to navigate to previous pages or a home page. For example, clicking the **My Surveys** link in the breadcrumb navigates users to a page, which shows a list of all the assessments.
- When the assessment is in progress, the progress bar, available on each page of the assessment, shows the progress in percentage. The percentage of completion is based on the number of pages in the assessment. For example, suppose that there are three pages in the assessment. The third page shows 66% completion of the assessment. But giving a response to one of the questions on the third page opens a new question on a separate page, which is the fourth page. The fourth page shows the progress of the assessment as 75% completed, which affects overall progress and page indicators. Users can see the pagination - total number of pages - for the entire assessment as well as the current page that the users are on. To hide or show this progress bar, you can use the *sn_portal_surveys.sp_survey.show_progress_bar* property.
- Each user response is saved automatically when users move to the next page in the assessment. If users don't answer the required assessment questions before clicking **Next**, the page shows an error message at the top for all required and unanswered questions. This error message helps users find the exact location of the unanswered and required question. Any question that is not required and is not responded to before clicking **Next** is considered answered. The question is counted as completed.
- When the details of an assessment question contains more than four or five lines of text, the text after these lines disappears. In such cases, users can see the complete details by clicking the **Show more** link. Users can go back to the default behavior by clicking the **Show less** link.
- For a question that has the answer options of **Yes**, **No**, and **Not Applicable**, the **Not Applicable** option appears last in the list of options. The **Not Applicable** option can be configured while creating a question.
- Your users can take assessments for multiple incident records generated. For example, suppose that users have two incident records generated. The user can take an assessment for both the incident records generated using the same assessment instance.
- When the assessment users leave the assessment without submitting it, they can start the assessment later from the same page where they left off in the previous session.

Note:
For mobile users, the pagination is always by question for assessments.

Related topics

Activate Service Portal

Assessment questionnaires

In the assessment process, users complete assessment questionnaires on topics of interest to provide subjective data for future business decisions.

No special role is required to complete an assessment. You are eligible to complete assessments that are assigned to you. For example, you might be expected to evaluate vendors your organization works with, based on traits related to customer service. The system stores your responses so decision makers can compare the performance of the items you evaluate. You and your manager may receive email notifications as reminders of important assessment information.

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Related topics

- Assessment notifications
- Take an assessment

Metric types and assessable records

In the Assessments application, assessment administrators create and administer metric types and assessable records.

A metric type defines a set of records an organization wants to evaluate, such as vendors, projects, or employees. For each type, the system generates unique assessable records that link the type to records that need to be evaluated, such as the individual records for the vendors Amazon and Intel. There may be multiple assessable records for the same source record if the source record meets the criteria for more than one type. For example, you might want to evaluate a record on the Company table, such as Intel, as a vendor and as a manufacturer, with different categories and metrics.

For configuration suggestions, see Assessment administrator tasks.

Assessable records

An assessable record links a source record you want to evaluate, such as the company record for Amazon or the user record for a sales representative, to a metric type, such as vendors or employees.

You use assessments to evaluate the assessable record. The system generates assessable records from the source records that match the table and conditions set on the Assessment Metric Type form. You evaluate the assessable records with metric categories and metrics, which define traits and values to assess. For metric types with the **On demand** schedule type, you can generate on-demand assessments from the Assessable Record form. This method of assessment generation makes it easy to create and preview short questionnaires or to quickly obtain assessment results for specific assessable records.

You can set up an assessment description that includes information from multiple fields on an assessable record and is displayed on multiple lines. This set up provides the user who is taking the assessment with a more detailed and understandable description of the information being requested on the assessment questionnaire. Create a multi-line description using table titles, which can be defined to use one or more fields from the selected table.

Related topics

- Use update sets for surveys and assessments
- Metric types and assessable records
- View an assessable record

Delete an assessable record

When you delete an assessable record, the system deletes any stakeholders for the record.

Before you begin

Role required: assessment_admin or admin

About this task

Note:
If a source record is deleted, the system deletes the associated assessable record. To delete the source record, you must first delete all associated metric results and category results.

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Procedure

Delete the assessable record:

- To delete a single record, open the record and click **Delete**.
- To delete multiple records, use the Assessable Records list.

Related topics

Metric types and assessable records

View an assessable record

View the Assessable Record form to edit preferences and perform various actions.

Before you begin

Role required: assessment_admin or admin

Procedure

1. Navigate to **All** > **Assessments** > **Assessable Records**.
2. Open a record from the list.
   By default, the list displays only assessable records with **Active** metric types.
3. On the Assessable Record form, edit fields and perform other actions as necessary (see table).

Viewing Assessable Records

Field	Description
Name	[Read-Only] Assessable record name based on the Select a field as the table display value of the source record. The name appears on assessment questionnaires.
Source	[Read-Only] Source record the assessable record is linked to. The **Source** reflects the table name and source record display value. For example, if the **Name** field is the display value for the Company table, the assessable record for a company record named **Amazon** has the **Source** value **Company: Amazon**.
Live feed	Check box that, when selected, creates a Live Feed group for the assessable record, which appears on the scorecard. If you clear the check box after a Live Feed group has been created, the system deletes the Live Feed group and all its messages.
Type	[Read-Only] Metric type from which the assessable record was generated.
Decision matrix	Check box that, when selected, enables this assessable record's results data to appear on decision matrixes of the same metric type. Decision matrixes are graphs that plot the assessment results for multiple assessable records. If you clear the check box, the assessable record still appears on the default decision matrixes if you click the **View Matrix** related link on the assessable record's scorecard.
Live feed group	[Read-Only] Live feed group for this assessable record. When you select the **Live feed** check box and save the record, the system populates this field.
Related Links	
View Scorecard	Opens the scorecard for the assessable record.

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Field	Description
Related Lists	
Category	All metric categories associated with the assessable record. An assessable record must be associated to a category to be evaluated. Click **Edit** to add or remove category associations. Note that it is often more efficient to associate assessable records to categories using the Metric Category form.
Category users	All stakeholders who can take assessment questionnaires about this assessable record. Click **Edit** to create and delete stakeholders. For more information about this and other methods of creating stakeholders, see Stakeholders. This related list is available only when the associated metric type has the **Scheduled** schedule type.

Related topics

Metric types and assessable records

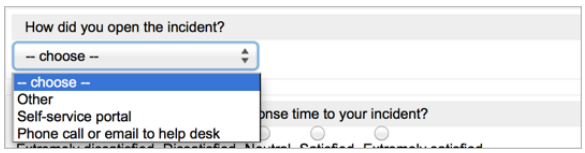
Assessments reference

Reference topics provide additional information about the forms, fields, and properties you use while working with assessments.

Data types for assessments

Metric data types have functions that depend on the method that you select.

Assessment data types

Data type	Compatible methods	Description
Attachment	Assessment	On questionnaires, users attach one or more files to a question.
Checkbox	Assessment	On questionnaires, users select a check box next to a statement or leave it cleared. **Check box** Set the **Scale definition** field to **High** if a selected check box equates to a good score.
Choice	Assessment	On questionnaires, users select a value from a list of custom answer options. Create a metric definition for each answer option. **Choice** 
Date	Assessment	On questionnaires, users select a date.

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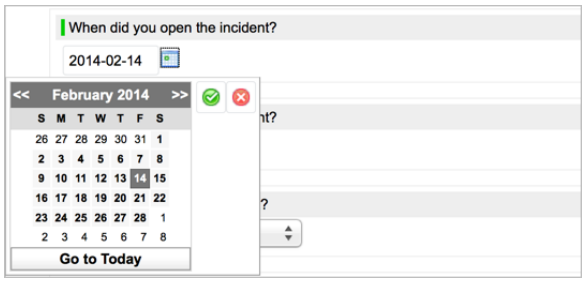
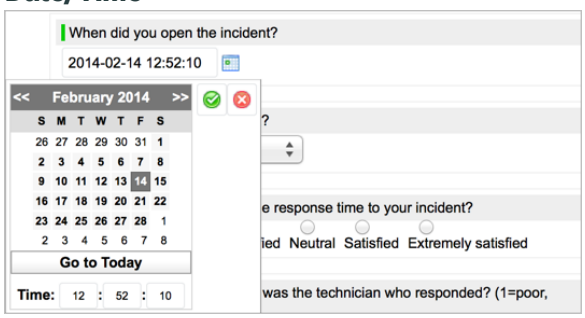
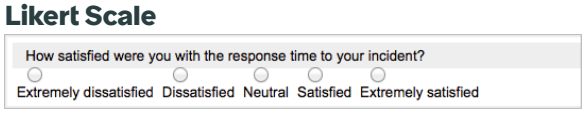
Assessment data types (continued)

Data type	Compatible methods	Description
		Date 
Date/Time	Assessment	On questionnaires, users select a date and time. **Date/Time** 
Duration	Script	When the script runs, the system populates the **Duration value** and **Scaled value** fields on the Metric Result form with the appropriate values from the *`actual_result`* and *`scaled_result`* variables in the metric script.
Likert Scale	Assessment	On questionnaires, users select a value from a custom scale of answer options. Create a metric definition for each answer option, which is represented by a radio button on the scale. A Likert scale metric that evaluates an application's ease of use might have the metric definitions **Easy**, **Average**, and **Difficult**. If you want to reuse a series of answer options for multiple metrics, create a metric template and use the Template data type instead of the Likert Scale data type. **Likert Scale** 
Number	Assessment, Script	**Assessment**: On questionnaires, users enter a number. **Number** **Script**: When the script runs, the system populates the **Actual value** and **Scaled value** fields on the Metric Result form

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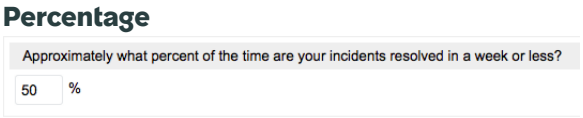
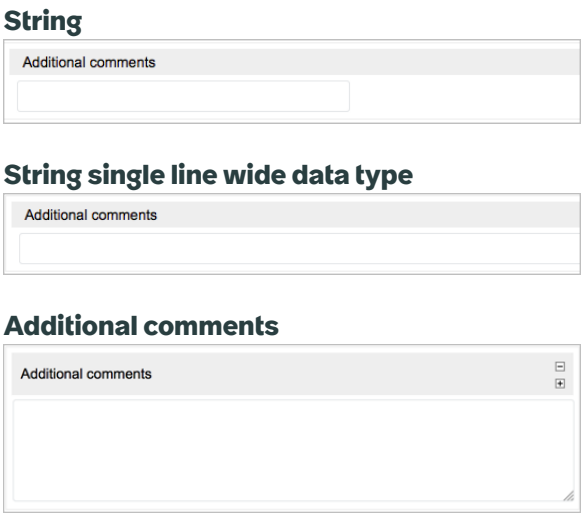
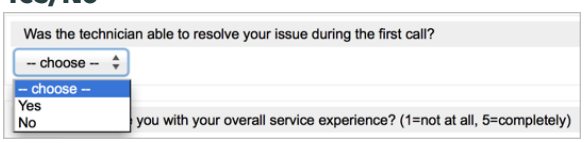
Assessment data types (continued)

Data type	Compatible methods	Description
		with the appropriate values from the *actual_result* and *scaled_result* variables in the metric script.
Percentage	Assessment, Script	**Assessment** On questionnaires, users enter a number.  **Script** When the script runs, the system populates the **Actual value** and **Scaled value** fields on the Metric Result form with the appropriate values from the *actual_result* and *scaled_result* variables in the metric script.
String	Assessment	On questionnaires, users enter text. The size of the string field depends on the String option you select: 
Template	Assessment	On questionnaires, users select a value from a predefined series of answer options. There must be at least one template defined to use this data type. For a template, there is a template definition for each answer option, which is represented by a radio button.
Yes/No	Assessment	On questionnaires, users select **Yes** or **No** from a list.  Set the **Scale definition** field to **High** if selecting **Yes** equates to a better score.

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Related topics

- Assessment metrics
- Create an assessment metric definition
- Update a metric minimum and maximum value to match a template

Assessment Metric form

Description of the field values for the Assessment Metric form.

Assessment Metric form

Field	Description
Name	Name of the assessment.
Assessment duration	Allowed duration to complete an assignment after its generation.
Live feed	Checkbox that automatically creates Live Feed groups for newly generated assessable records of this type.
Notify manager if overdue	Checkbox to send a notification to the manager when the assessment becomes overdue.
Scale factor	Scale value for all assessment results.
Pagination setting for Service Portal view	The setting on which the pagination is based for desktop or tablet view in Service Portal. • Category: default • Question: 1 question per page (automatic for mobile) • None: no pagination **Note:** This field is displayed only when Service Portal is installed.
Business rule	Business rule that is automatically created for assessable record generation.
Schedule type	Scheduled or on-demand assessment type.
Scheduled job	Scheduled job the system creates for this assessment definition when the schedule period is a repeating interval. The system sets the scheduled job to run according to the selected schedule period. • If you change the schedule period and save the survey definition, the system deletes the old scheduled job. • If you selected a recurring schedule period, a new scheduled job is created. For example, if you change the schedule period from **Daily** to **Weekly** and save the record: • The system deletes the daily scheduled job. • Creates a weekly one set to run a week from the current date. This field is visible to administrators only if the schedule period is **Daily**, **Weekly**, **Monthly**, or **Yearly**.

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Assessment Metric form (continued)

Field	Description
Evaluation method	Type of assessment.
Roles	Roles with read access for this metric type.
Active	Check box to enable the distribution of this assessment to recipients.
Owners	Owners of the assessment. You can add a user with the survey_creator, survey_admin, or assessment_admin role.
Description	Description of the assessment.
Conditions	
Table	Table that contains records to assess for this type.
Enforce condition	Checkbox to delete the existing assessable records of this type that do not meet the specified conditions.
Condition	Conditions that the assessable records of this type should meet.
Decision Matrix	
Filter field	Field on the Filter table to identify filter menu choices on decision matrices and scorecard averages for this type.
Filter condition	Conditions to filter results on decision matrices and scorecard averages for this type.
Default matrix filter	Default filter menu choice on decision matrix of this type.
Assessors	
User field	User field from the table specified in the **Conditions** tab. The assessment will be assigned to all users of this user field in the table. When you save the assessment and click **Generate Assessable Records**, an assessable record is created for each unique user of the user field. This is applicable for Scheduled and On-demand assessments. For an on-demand assessment, each assessor assesses all assessable records. For a scheduled assessment, each assessor assesses only the corresponding assessable record.
Related Links	
Generate Assessable Records	Creates assessable records for this metric type.
Show Benchmarks	Opens the Benchmarks Dashboard that provides visibility into your key performance indicators (KPIs) and trends.

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Assessment Metric form (continued)

Field	Description
	Note: • This related link is available only for survey_admin, assessment_admin and survey_reader with bm_viewer role. • You must opt in to Benchmarks to view the dashboard. • This is applicable only for a published survey.
Create Improvement Initiative	Opens the Improvement Initiative window to create an improvement initiative record that helps in improving the performance of the assessment. **Note:** • This related link is available only for the survey_admin and assessment_admin role. A survey_reader can only view the created improvement initiative records. • You should activate the Continual Improvement Management plugin (com.sn_cim).
Related Lists	
Metric Categories	All metric categories for this assessment.
Assessable Records	All assessable records for this assessment.
Improvement Initiatives	Displays improvement initiatives associated with the survey. **Note:** This related list is available only when there is at least one improvement initiative record.

Related topics

Configure an assessment

Metric Category form

Description of the field values for the Metric Category form.

Metric Category form

Field	Description
Name	Name of the metric category. The name appears on assessment questionnaires.
Type	[Required] Metric type this category is used for. Metrics in this category can be used to evaluate assessable records for the type you select. This field becomes read-only after you save the record.
Create stakeholders	Check box that enables (selected) or disables (cleared) automatic stakeholder creation for this category. When the check box is selected, the system makes

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Metric Category form (continued)

Field	Description
	all associated category users stakeholders for each assessable record associated to this category. This saves the time required to manually create stakeholders. For more information, see Create Stakeholders Automatically. Existing stakeholders are not impacted if you clear the check box.
Table	[Read-Only] Table that contains the records to evaluate with metrics in this category. The system automatically populates this field with the same table as the metric type selected. The table does not appear in the field until you save the form. This field is visible depending on whether a **Type** is selected.
Weight	[Required] Numerical value that represents the importance of this category relative to other categories. A greater value indicates greater importance. For more information, see weight categories and metrics. The default value is 10.
Scoring type	Scoring method for an attestation category. This field appears only when the metric type is an attestation with a **Scoring type** of **Percent**. Use this field to configure different scoring types for specific attestation categories. Possible selections are: • **Percent**: Attestation score as a weighted percentage of correct answers for scored questions. • **All or nothing**: All answers for attestation type questions must be correct or the score is zero for the entire category.
Total metrics	[Read-Only] Number of metrics associated to this category.
Filter	Filter conditions that assessable records must meet to be evaluated using metrics in this category. The filter operates on fields on the selected table. If you specify a filter condition, the system automatically associates matching assessable records to the category when you save the record. If you change the filter conditions, the system removes and creates assessable record associations as needed. The system also deletes stakeholders for assessable records it disassociates. The system does not remove assessable record associations created by users, even if the assessable records do not match the filter conditions. This field is visible only when a **Type** is selected.
Description	Descriptive information about the category that appears on assessment questionnaires.
Roles	Only those users with the specified roles can perform the assessment for this category. If no role is specified, then users with any role can perform the assessment for this category.

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Metric Category form (continued)

Field	Description
	Note: If the **Roles** property does not appear on the form, ask your admin to add the property.
Details	Text field containing an HTML editor. Use this field to present important details about this category to assessment recipients. Details can include formatted lists, images, videos, or links to external websites. You may need to configure the form to see this field.
Related Lists	
Assessment Metrics	All metrics associated to this category. There must be at least one metric associated to the category to use any assessments with the category.
Assessable records	All assessable records associated to this category. There must be at least one assessable record associated to the category to use any assessments with the category. This related list is hidden if the **Evaluation method** is **Attestation**. **Note:** Category users are automatically generated based on the user field is specified in the **Assessors** tab of the assessment after publishing the assessment.
Users	All users associated to this category. There must be at least one category user to create scheduled assessments using metrics in this category. If any user field is specified in the **Assessors** tab of the assessment, the corresponding users are automatically generated after publishing the assignment. This related list is available only when the associated metric type has schedule type set to **Scheduled**. Category users are not a part of the on-demand assessment process.

Related topics

Create a category for assessable records

Assessment Metric form for a category

Description of the field values for the Assessment Metric form. Use the fields when you create an assessment metric for a category.

Assessment Metric form

Field	Description
Name	Name of the metric.
Category	Metric category that the metric belongs to. The system automatically populates this category if you create a new metric from the Metric Category form.

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Assessment Metric form (continued)

Field	Description
	Note: You cannot change the category if the **Depends on** field is set or if another metric depends on this metric

Method	Determines how to use the metric.
	• **Assessment** : Non-scripted metric. Make the metric available as a question on an assessment questionnaire. The **Assessment** method is compatible with all data types except **Duration**.
	• **Script**: Scripted metric. Obtain values by writing a custom script. The **Script** method is compatible with the **Duration**, **Number**, and **Percentage** data types.
	• **Default answer from field**: This option appears only if you have selected an **Assessment Metric Type** that contains a table. The **General** tab adds two fields:
	  ○ **Default answer**: Select the default answer for the question. The list comes from the selected table.
	  ○ **Ask question**: Specifies when to ask the question: always or only if the default answer is empty.
	• **Default answer from script**: The **General** tab adds a field:
	Ask question: Specifies when to ask the question: always or only if the script does not contain a default answer. The script is defined on the **Field Type** tab.
	Note: If you select a **Data type** that is incompatible with the selected **Method**, the system automatically changes the **Method** to the correct value.

Weight	Numeric value that represents the importance of this metric relative to other metrics in the same category. By default, the weight is 10. For weighting suggestions, see Weight Metrics and Metric Categories. This field is visible and required unless the **Data type** is **Date**, **Date/Time**, or **String**. These data types are not included in results calculations.
Order	Numeric value that determines the order of the metric question on assessment questionnaires, relative to other metric questions in the same category. The metric with the smallest order value appears as the first question in the category section. By default, the order is 100. For more information about questionnaire layout, see Complete Assessment Questionnaires. **Note:** It does not matter which order value you use for metrics with the Script method, as they do not appear on questionnaires.
Active	Check box that determines whether this metric is used to gather assessment results. If a non-scripted metric (Assessment method) is inactive, the question does not appear on assessment questionnaires generated after the metric

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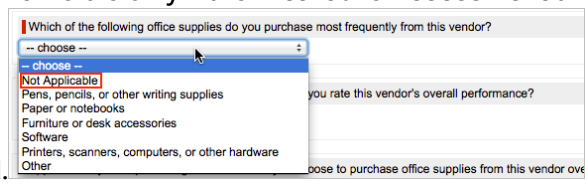
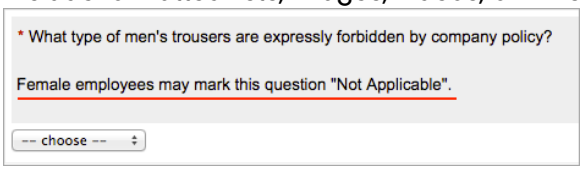
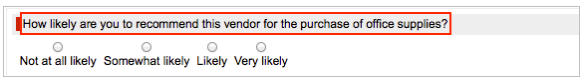
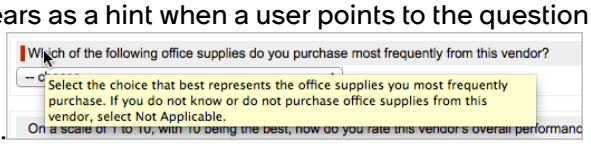
Assessment Metric form (continued)

Field	Description
	becomes inactive. If a scripted metric (Script method) is inactive, the script does not run.
Mandatory	Check box that makes the metric question mandatory (selected) or optional (cleared) on assessment questionnaires. Users cannot submit questionnaires until they provide valid responses to all mandatory questions, which display a red field status indicator. This field is visible only if the **Method** is **Assessment**, the **Depends on** field is empty, and the data type is not **Checkbox**.
Allow not applicable	Check box that determines whether to include a **Not Applicable** answer option for this metric question on assessment questionnaires. Users can select **Not Applicable** if they do not have sufficient information to respond to a question or if a question does not apply to a particular assessable record. User responses of **Not Applicable** are excluded from results calculations. This field is visible only if the **Method** is **Assessment** and certain data types are selected. 
Additional fields you can add by customizing the form	
Details	Text field containing an HTML editor. Use this field to present important details about this metric to assessment recipients. Details can include formatted lists, images, videos, or links to external websites. 
General Section	
Question	Text to use as the question on assessment questionnaires. Enter a clear, straightforward question that is easy to answer, such as **How likely are you to recommend this vendor for the purchase of office supplies?** 
Description	Information about the metric and what it evaluates. If the **Method** is **Assessment**, include details that help users understand how to answer the question. This text appears as a hint when a user points to the question text on the questionnaire. 

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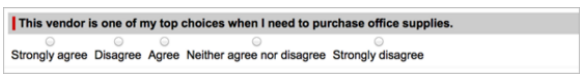
Assessment Metric form (continued)

Field	Description
Depends on	Setting used to make this metric a conditional question. Select an existing metric question from the list, which displays **Checkbox**, **Choice**, **Likert Scale**, **Template**, and **Yes/No** metrics of the same category as this metric. Then, use the **Displayed when** field to set the conditions that display this metric question on questionnaires. The system prevents the creation of recursive dependencies between metrics. For example, if Metric A depends on Metric B, Metric B cannot depend on Metric A. This field is visible only if the Method is Assessment.
Displayed when	Answer options for the selected **Depends on** metric question that, when chosen on questionnaires, display this metric question. This field is visible and required only if the **Depends on** field is set.
Field Type Section	
Data type	[Required] Format of the expected response data. The function of the data type depends on the selected **Method**. If the method is **Assessment**, the data type determines how users answer the corresponding question on questionnaires. If the method is **Script**, the data type determines how the system calculates assessment results. **Note:** If another metric depends on this metric, you cannot change the data type.
Randomize answers	Check box that determines whether to present the answer options for this metric question in a random order. The order of answer options can influence users, which creates biased results. Randomizing answer options can help prevent this bias. This field is visible only if a data type that requires metric definitions is selected. **Note:** Randomizing answer options for certain questions can make those questions confusing for the person answering. In general, only randomize answer options that do not follow a logical order. For example, the following question is confusing when randomization is enabled: 
Template	Metric template to use for the metric question. A metric template is a set of predefined answer options. This field is visible and required only if the **Data type** is **Template**. **Note:** If another metric depends on this metric, you cannot change the template.

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Assessment Metric form (continued)

Field	Description
Dependent plugin	Plugin that contains the tables queried in the script. The system executes the metric script only if the plugin is active. The default available values are **Asset Management**, **CMDB**, **Core**, **Cost Management**, **Procurement**, and **Software Asset Management**. If the **Method** is **Script**, select a plugin. This field is visible only if the **Method** is **Script**. **Note:** An administrator may need to add more Define an option for a choice list of plugins to the field.
Scale definition	Setting that determines whether lesser or greater numerical values equate to a good score in assessment result calculations. Select **Low** if lesser numerical values are better, such as for a metric that measures the number of incidents for a vendor. Select **High** if greater numerical values are better, such as for a metric that measures user satisfaction on a scale of one to five. The default value is **High**. This field is visible and required unless the **Data type** is **Date**, **Date/Time**, or **String**. The results for these data types are not included in results calculations. **Note:** For information about how to set the scale definition for data types that do not require you to set a numerical value, see Data Types.
Min	Lowest numerical value to be used as an answer option on assessments or as a scaled value in a scripted metric. This field is visible and required only if certain data types are selected. If the data type is **Choice** or **Likert Scale**, this field is read-only and is set automatically based on the smallest metric definition **Value**.
Max	Highest numerical value to be used as an answer option or scaled value. This field is visible and required only if certain data types are selected. If the data type is **Choice** or **Likert Scale**, this field is read-only and is set automatically based on the largest metric definition **Value**.
Script	Script that obtains the desired system information. This field is visible and required only if the **Method** is **Script**. **Note:** Script can now only be edited by Assessment Admins. Survey Creators no longer have the ability to edit the script. For more information about using this field, see Script methods.
Related List	

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Assessment Metric form (continued)

Field	Description
Assessment Metric Definitions	Lists all metric definitions, which appear as answer options for questions on assessment questionnaires. Click **New** to create a new metric definition. This related list is available only if the Data type is **Choice** or **Likert Scale**.

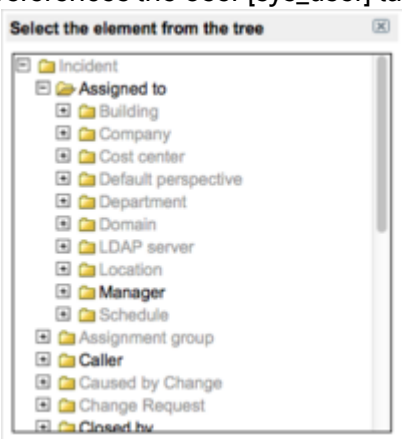
Related topics

Create an assessment metric for a category

Trigger Condition form for assessments

Description of the field values for the Trigger Condition form for assessments.

Trigger Condition form

Field	Description
Assessment	[Required] Metric type to generate assessment instances for. Triggered assessments only work if the metric type is set to the **On demand** schedule type.
Table	[Required] Table to run the trigger condition on. You can select only tables in the current application scope. The table must have a connection to the assessable records for the selected **Assessment**. For example, you might want to send a vendor assessment when incidents close that are related to vendors you assess. In this case, select the Incident [incident] table. After you select a table, ensure there is at least one option for the **Assessable Record Field**. If there is not, select a different table.
User field	[Required] Field that stores the users you want to send the assessment. You can select any field, on the selected **Table** or on a related table, that references the User [sys_user] table. Use the tree picker to select a field. 
Repeat Interval	Minimum period that must pass before the trigger condition can resend the assessment to the same user. For example, assume the repeat interval is set to 30 days. Even if the same user is eligible for multiple assessments from this trigger condition, the system can only send the user one assessment every 30 days.
Active	Check box that determines whether this trigger condition is active (selected).

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Trigger Condition form (continued)

Field	Description
Business rule	[Admin only] Business rule the system creates to monitor the selected table. When the condition is met, the business rule sends the assessment to the correct user. No configuration is necessary for this business rule.
Trigger randomly	Check box that determines whether to send the assessment to the appropriate user every time the condition is met (cleared) or only a percentage of the time (selected), as specified in the **Probability (%)** field.
Probability (%)	Probability out of 100 that the assessment will be sent each time the condition is met. For example, if the probability is set to 50, the system sends the assessment approximately 50% of the time the conditions are met, assuming there are no repeat interval restrictions. This field is visible and required only when the **Trigger randomly** check box is selected.
Assessable Record Field	[Required] Field on the selected **Table** that determines which assessable record will be the subject of the assessment. Only appropriate reference fields on the selected **Table** are available to select. If there are no **Assessable Record Field** options available, you must select a different **Table**. If the selected **Assessment** evaluates records on the Company `[core_company]` table and the selected **Table** is Incident, the only **Assessable Record Field** options are fields on the Incident table that reference the Company table. For example, **Company** or, if vendor ticketing is enabled, **Vendor**. If you select **Vendor**, the trigger condition sends an assessment about the **Vendor** for the incident, assuming there is an assessable record for the associated company. The assessment contains questions from all metric categories associated with the assessable record. **Note:** This field is not available if the selected **Assessment** is a metric type used for surveys. See Survey trigger conditions.
Related Field 1 – Related Field 4	Field that contains a value you want to store for reporting purposes. You can pick any reference field on the selected **Table**. When the trigger condition generates an assessment instance, the system stores the value from the triggering record. Select up to four fields. For example, if you select the Incident table, you might select **Caller** and **Vendor** as related fields. That stores the caller and vendor associated with the incident as **Related record 1** and **Related record 2** in the assessment instance record. To view these fields, configure the Assessment Instance form.
Description	Summary information to identify the trigger condition.
Condition	[Required] Condition builder that defines the criteria that must be true to send the assessment. For example, if you want to send an assessment whenever an incident closes, create the condition [State] [is] [Closed].

Related topics

Configure a trigger condition for a survey

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Domain separation and Assessments

Domain separation is supported for Assessments. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard

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

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

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

Related topics

Domain separation for service providers

Installed with Assessments and Surveys

Several types of components are installed with the activation of Assessments and Surveys.

- Demo data is available for Assessments and Surveys.
- ServiceNow® Vendor Performance offers an extra set of vendor assessment demo data.

Tables

Table	Description: Assessments	Description: Surveys
Assessable Record [asmt_assessable_record]	Stores all assessable records.	For system use only.
Assessment Category Result [asmt_category_result]	Stores all category results.	For system use only.
Assessment Category User [asmt_m2m_category_user]	Stores associations between users and metric categories that they can evaluate. A user that is associated to a category is a category user.	Stores associations between users and surveys. A user that is associated to a survey is a survey user and is automatically associated to all the survey's categories.
Assessment Group [asmt_assessment]	Stores all assessment groups.	For system use only.
Assessment Instance	Stores all assessment instances.	Stores all survey instances.

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Table	Description: Assessments	Description: Surveys
[asmt_assessment_instance]		
Assessment Instance Question [asmt_assessment_instance_question]	Stores all assessment instance questions, each of which represents one question on one assessment instance.	Stores all survey instance questions, each of which represents one question on one survey instance.
Assessment Metric [asmt_metric]	Stores all metrics.	Stores all survey questions.
Assessment Metric Definition [asmt_metric_definition]	Stores all metric definitions.	Stores all answer options for survey questions.
Assessment Metric Template [asmt_template]	Stores all metric templates.	Stores all question templates.
Assessment Metric Type [asmt_metric_type]	Stores all metric types.	Stores all survey definitions.
Assessment Stakeholders [asmt_m2m_stakeholder]	Stores associations between assessable records and category users. A category user that is associated to an assessable record is a stakeholder.	Not used for surveys.
Assessment Template Definition [asmt_template_definition]	Stores all metric template definitions.	Stores all question template definitions.
Assessment X Category Matrix [asmt_m2m_xcategory_matrix]	Users can specify metric categories as the X axis of a decision matrix.	Not used for surveys.
Assessment Y Category Matrix [asmt_m2m_ycategory_matrix]	Users can specify metric categories as the Y axis of a decision matrix.	Not used for surveys.
Bubble Chart [asmt_bubble_chart]	Stores all bubble chart definitions.	Not used for surveys.
Category Assessable Records [asmt_m2m_category_assessment]	Stores associations between assessable records and metric categories.	For system use only.
Decision Matrix [asmt_decision_matrix]	Stores all decision matrixes.	Not used for surveys.

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Table	Description: Assessments	Description: Surveys
Metric Category [asmt_metric_category]	Stores all metric categories.	Stores all survey categories.
Metric Result [asmt_metric_result]	Stores all metric results.	Stores all survey responses.
Signature [asmt_signature]	Stores all signature records for assessments and [[Attestations|GRC attestations]].	Stores all signature records forSurveys.
Trigger Condition [asmt_condition]	Stores all assessment trigger conditions.	Stores all survey trigger conditions.

Properties

You can configure various properties to customize the appearance of Assessments and Surveys questionnaires, require authentication for user signatures, open surveys in the Service Portal view from emails, and limit the number of items shown in a decision matrix field filter.

Assessments and Surveys installs the following properties. You can find these properties by navigating to the following locations:

- **All** > **Assessments** > **Administration** > **Assessment Properties**
- **All** > **Survey** > **Administration** > **Properties**

Important:
You can customize the css.assessment.question.header.background.color, assessment.caption.background.color, and the css.assessment.caption.font.color fields only if Next Experience is turned off.

Property	Description
sn_portal_surveys.sp_survey.email_redirection	When this property is enabled, users can use a link in an email to open a survey or assessment in Service Portal. • Type: **Yes** or **No** • Default value: **Yes**
com.snc.assessment.signature_authentication	When this property is enabled, an authentication is required by user signature. When **Yes** is selected, this property requires credentials for a full name signature. • Type: **Yes** or **No** • Default value: **Yes**

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Property	Description
	For more information about working with signatures, see Signatures.
com.snc.assessment.collect.stats	List of Assessments for which Recent Sent & Recent Completed stats must be collected in an asmt_assessment_stat table. Comma-separated list of eligible Assessment Metric Type Sys IDs.
css.assessment.question.header.background.color	Background color of question headers on assessment and survey questionnaires. • Type: **Color** • Default value: **#767676**
sn_portal_surveys.sp_survey.show_progress_bar	Shows or hides a progress bar on the survey pages on Service Portal. • Type: **Yes** or **No** • Default value: **Yes** **Note:** If the Pagination setting is set to **None**, the survey is displayed in a single page, and no progress bar is shown.
show_lang_picker_for_publicsurveys	Enable or disable whether to show language picker when a public survey is taken. • Type: **Yes** or **No** • Default value: **Yes**
css.assessment.caption.background.color	Sets the background color of the caption on assessment and survey questionnaires. • Type: Color • Default value: **#eee**
com.snc.assessment.decision_matrix_filter_max_entries	Maximum number of items to show for a decision matrix field filter. • Type: integer • Default value: **1000**
css.assessment.caption.font.color	Sets the font color of the caption text on assessment and survey questionnaires.

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Property	Description
	• Type: color • Default value: **#ffffff**

For more information about customizing the appearance of a survey, see Customize the appearance of a survey.

User roles

Role title [name]	Description	Contains roles
assessment administrator [assessment_admin]	Can administer the Assessments application. Can access all the modules of the Assessments application. **Note:** The assessment_admin role is contained by the itil_admin role. This role is also contained by the survey_admin role.	None

Script includes

Name	Description
AssessmentUtils	Core code for assessment functionality.
AssessmentUtilsAJAX	AJAX-based code for displaying scorecard data.
MigrateSurveyToAssessment	Code for migrating legacy surveys to assessment surveys.
RatingUtilsAJAX	Reserved for future use.
SurveyUtils	Core code for survey functionality.

Client scripts

Name	Table	Description
Calculate Assessable Record Field choice list	Trigger Condition [asmt_condition]	Limits the Assessable Record Field choices to those choices that are compatible with the selected assessment.
Check survey schedule period	Trigger Condition [asmt_condition]	Checks the selected survey definition's Schedule period. If Schedule period is set to Only Once, this client script displays a warning message that each user can only take the selected survey once.
Clear display_when when	Assessment Metric [asmt_metric]	Shows the **Display when** field when the **Depends on** field is set. Clears the **Display when** field when the **Depends**

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Name	Table	Description
depends changed		**on** field changes and the options must change.
Conditionally Set Type for Surveys	Group [sys_user_group]	Sets the user group Type to survey if you create a new group from the User Groups module.
Data type -- Hide choices for surveys	Assessment Metric [asmt_metric]	Ensures only Data type options that are valid for surveys are available on the Survey Question form.
Data type -- Show/ Hide Not Applicable	Assessment Metric [asmt_metric]	Hides the **Allow not applicable** field and sets its value to **false** if the metric method is Assessment and the data type is **Percentage**, **Checkbox**, **Date**, **Date/Time**, **Number**, or **String**.
Data type defaults to String for surveys	Assessment Metric [asmt_metric]	Sets the default **Data type** field value to **String** on the Survey Question form.
Fetch Min/ Max	Assessment Metric [asmt_metric]	Updates the **Min** and **Max** fields to match the least and greatest metric template definition values if an assessment administrator selects or changes the Template value.
Hide Assessable Record Field	Trigger Condition [asmt_condition]	Hides the **Assessable Record** field unless the evaluation method of the metric type selected in the **Assessment** field is **Assessment**.
Hide Survey Instance Trigger ID if empty	Assessment Instance [asmt_assessment_instance]	Hides the **Trigger ID** field and makes it read-only unless it contains a value.
Hide user lists	Assessable Record [asmt_assessable_record]	Hides the **Category users** related list if the associated metric type schedule type is **On demand**.
Hide user related lists	Metric Category [asmt_metric_category]	Hides the User related list if the associated metric schedule type is **On demand** and the **Evaluation method** isn't **Survey**.
Hide value or String value	Assessment Instance Question [asmt_assessment_instance_question]	Hides the **Value** field and shows the **String value** field if the associated metric data type is **Date**, **Date/Time**, or **String**. Does the opposite if the data type is anything or else.
Live feed deletion warning	Assessable Record [asmt_assessable_record]	Displays a warning message if an assessment administrator clears the **Live feed** check box.
Method -- Show/	Assessment Metric	Hides the **Mandatory** and **Allow not applicable** fields and sets both values to **false** if the metric method

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Name	Table	Description
Hide Not applicable	[asmt_metric]	is Script. Shows the **Mandatory** field if the metric method is Assessment. Shows the **Allow not applicable** field if the method is Assessment, except when the data type is **Percentage**, **Checkbox**, **Date**, **Date/Time**, **Number**, or **String**.
Min/Max Control	Assessment Metric [asmt_metric]	Makes the **Min** and **Max** fields mandatory except when the data type is **Template**.
Min/Max Read-only	Assessment Metric [asmt_metric]	Makes the **Min** and **Max** fields read-only when the data type is **Choice** or **Likert Scale**.
Populate Groups	Assessment Metric Type [asmt_metric_type]	Populates the available values for the **Filter** field with fields from the selected metric type table.
Read only Type	Metric Category [asmt_metric_category]	Makes the **Type** field read-only when it contains a value.
Reload Decision Matrix Filter Columns	Assessment Metric Type [asmt_metric_type]	Populates the available choices for the **Default matrix** filter as appropriate if the **Filter** field value changes.
Reload default filters	Assessment Metric Type [asmt_metric_type]	Populates the available choices for the **Default filter** as appropriate if the **Display all filters** value changes.
Set scale factor	Assessment Metric Type [asmt_metric_type]	Reserved for future use.
Set table field	Metric Category [asmt_metric_category]	Sets the category Table value to that of the metric type.
Show and Hide Scheduled Job	Assessment Metric Type [asmt_metric_type]	Hides the **Scheduled job** field if the Schedule type is **On demand** and shows the **Scheduled job** field if the Schedule type is **Scheduled**.
Show and Hide Scheduled Job Survey View	Assessment Metric Type [asmt_metric_type]	Shows the **Scheduled job** field on the Survey Definition form if the Schedule period is **Daily**, **Weekly**, **Monthly**, or **Yearly**.
Toggle Metric Definitions (Load)	Assessment Metric [asmt_metric]	Displays the Assessment Metric Definitions related list if the data type is **Choice** or **Likert Scale**.
Toggle Metric Definitions (Update)	Assessment Metric [asmt_metric]	Displays the Assessment Metric Definitions related list if the data type is **Choice** or **Likert Scale**. Sets the

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Name	Table	Description
		Method field to the appropriate value if the data type is compatible with one method only.
Update Min And Max Default Values	Assessment Metric [asmt_metric]	Sets reasonable default values for the **Min** and **Max** fields, based on the data type.
Validate Probability	Survey Trigger Condition [asmt_condition]	Ensures that the **Probability (%)** value is a whole number between **1** and **100**.
Verify Max	Assessment Metric [asmt_metric]	Verifies that the **Max** value is greater than the **Min** value and greater than or equal to zero if the metric method is Assessment.
Verify Min	Assessment Metric [asmt_metric]	Verifies that the **Min** value is less than the **Max** value and greater than or equal to zero if the metric method is Assessment.
Verify Value	Assessment Metric Definition [asmt_metric_definition]	Verifies that the Value is greater than or equal to zero.
Verify Value	Assessment Template Definition [asmt_template_definition]	Verifies that the Value is greater than or equal to zero.

Business rules

Business rules for Assessments

Name	Table	Description
Assessable domain matches type	Assessable Record [asmt_assessable_record]	Ensures that all new assessable records are in the same domain as the metric type. This is a special requirement of assessment domain separation, that all records must be in the same domain.
Auto stakeholder creation	Assessment Category User [asmt_m2m_category_user]	Assigns new category users as stakeholders automatically for assessable records if the associated category has the **Create stakeholders** option selected.
Auto stakeholder creation	Category Assessable Records [asmt_m2m_category_assessment]	Creates stakeholders from all of a category's category users automatically for new assessable records if:

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Business rules for Assessments (continued)

Name	Table	Description
		• The **Create stakeholders** option is selected for the metric category. • The same metric category is associated to the new assessable record.
Auto stakeholder creation	Metric Category [asmt_metric_category]	Assigns all of a category's category users as stakeholders for each assessable record associated to the category when the **Create stakeholders** option is selected for the category.
Calculate category max weight	Assessment Metric [asmt_metric]	Calculates the sum of all metric weights in a category.
Cancel notification workflow	Assessment Instance [asmt_assessment_instance]	Cancels the workflow that generates assessment email notifications when an assessment instance is deleted or changes the state to **Complete** or **Canceled**.
Category domain matches type	Metric Category [asmt_metric_category]	Ensures that all new categories are in the same domain as the metric type. This is a special requirement of assessment domain separation, that all records must be in the same domain.
Check Live Feed Groups	Assessable Record [asmt_assessable_record]	Selects the **Live feed** option if a Live Feed group is associated with the source record. If the **Live feed** option is selected and no Live Feed group is associated with the source record, this business rule clears the check box.
Check only one default	Bubble Chart [asmt_bubble_chart]	Ensures that there is only one default bubble chart for a metric type.
Check only one default	Decision Matrix [asmt_decision_matrix]	Ensures that there is only one default decision matrix for a metric type.
Create actual results	Assessment Instance [asmt_assessment_instance]	Generates assessment and category results from the user responses if a user completes an assessment.

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Business rules for Assessments (continued)

Name	Table	Description
Create Business Rule on Remote table	Assessment Metric Type [asmt_metric_type]	Generates the following business rules if an assessment administrator creates or updates a metric type: • Business rule called Auto business rule for Assessments, which monitors the Table selected for the metric type. When someone adds a record that meets the metric type conditions, this business rule generates an assessable record. If someone changes the metric type's Table or conditions, the Create Business Rule on Remote table business rule updates the automatic business rule script to reflect the changes. • Business rule called Auto deletion rule for Assessments, which prevents users from deleting a record on the metric type's Table if the record is associated to metric or category results. If the record has no associated results and a user deletes it, this business rule deletes any associated assessable records. The Create Business Rule on Remote table business rule generates automatic business rules only for metric types with Evaluation method set to Assessment.
Create Scheduled Job	Assessment Metric Type [asmt_metric_type]	Assessments: Generates a scheduled job for the creation of assessment components if either of these conditions is met: • Someone creates a new metric type with the schedule type set to **Scheduled**. • The schedule type changes from **On demand** to **Scheduled**. Surveys: Generates a scheduled job for the creation of survey components if the schedule period

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Business rules for Assessments (continued)

Name	Table	Description
		for a survey definition is set to Daily, Weekly, Monthly, or Yearly.
Create Survey Records	Assessment Metric Type [asmt_metric_type]	Generates various records and populates certain fields on those records when someone creates a new survey definition, which is a metric type with Evaluation method set to Survey. More specifically, this business rule generates a survey category and assessable record, both associated to the survey definition.
Create UI Action on Remote table	Assessment Metric Type [asmt_metric_type]	Reserved for future use.
decision_matrix_axis	Global [global]	Limits available categories for X- and Y-axes to those that belong to the type if there is a metric type specified on the Decision Matrix form.
Delete Live Feed Group	Assessable Record [asmt_assessable_record]	Deletes the assessable record's Live Feed group, if there is one, when an assessment administrator deletes an assessable record.
delete related users	Category Assessable Records [asmt_m2m_category_assessment]	Deletes any stakeholders for the assessable record and category when an assessment administrator disassociates a category from an assessable record.
Do not allow category to change	Assessment Metric [asmt_metric]	Prevents the **Category** field from being changed if there are any conditional question dependencies related to the current record.
Do not allow datatype to change	Assessment Metric [asmt_metric]	Prevents the **Data type** and **Template** fields from being changed if there are any conditional questions that depend on the current record.
Ensure Types Match	Assessment Metric [asmt_metric]	Sets the type of a metric to the type of the associated category.
Ensure types match	Assessment Stakeholders [asmt_m2m_stakeholder]	Ensures that users can only create a stakeholder from a category user and assessable record of the same type.

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Business rules for Assessments (continued)

Name	Table	Description
Ensure types match	Category Assessable Records [asmt_m2m_category_assessment]	Prevents users from associating categories of one type to an assessable record of a different type.
Evaluate filters	Assessable Record [asmt_assessable_record]	Performs the following after the system generates a new assessable record: • Checks all filter conditions for categories in the type. • Automatically associates the new assessable record to all categories for which it meets the category filter conditions.
Generate assessment trigger condition	Trigger Condition [asmt_condition]	Generates a business rule that the survey or assessment trigger condition uses to send surveys or assessments.
getStakeholders	Global [global]	Ensures that only category users for categories associated with the assessable record are available on the Assessable Record form when users edit the Category users related list.
Link assessable record and category	Metric Category [asmt_metric_category]	Sets these hidden fields as follows for a newly created survey category: • Table: Assessment Metric Type [asmt_metric_type] • Filter: <sys_id of the survey definition the new survey category is associated with>
Live Feed Group	Assessable Record [asmt_assessable_record]	Creates a Live Feed group for the assessable record, if one doesn't exist, when the record is saved with the **Live feed** option selected. If the check box is then cleared and the record saved, this business rule deletes an existing Live Feed group.
Metric domain matches category	Assessment Metric [asmt_metric]	Ensures that all new metrics are in the same domain as the category to which they belong. This rule is a special requirement of assessment domain separation, that all records must be in the same domain.

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Business rules for Assessments (continued)

Name	Table	Description
Notify assessment user	Assessment Instance [asmt_assessment_instance]	Starts a workflow that sends an email notification to the assigned user when an assessment instance changes to the **Ready** state or the user to which it is assigned changes. The workflow generates other assessment email notifications at later stages.
Prevent recursive dependencies	Assessment Metric [asmt_metric]	Prevents the **Depends on** field from being set in a way that creates a recursive conditional question dependency.
Publish Survey	Assessment Metric Type [asmt_metric_type]	Generates survey instances and assigns them to the associated survey users when the survey definition state changes from **Draft** to **Published**.
Remove auto create Business Rules	Assessment Metric Type [asmt_metric_type]	Deletes the automatically created business rule for a metric type when an assessment administrator deletes that metric type.
Remove auto create UI actions	Assessment Metric Type [asmt_metric_type]	Reserved for future use.
Remove auto created business rule	Survey Trigger Condition [asmt_condition]	Deletes the automatically created business rule when someone deletes the survey trigger condition.
Remove Scheduled Job	Assessment Metric Type [asmt_metric_type]	Assessments: Deletes the scheduled job for a metric type if either of these conditions is met: • Someone deletes the metric type. • Someone changes the schedule type from **Scheduled** to **On demand**. Surveys: Deletes the scheduled job for a survey definition if the schedule period is set to Only Once or No Limit.
Reset Min/Max for metric	Assessment Metric Definition [asmt_metric_definition]	Updates the **Min** and **Max** fields for metrics and survey questions based on the metric definition value.

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Business rules for Assessments (continued)

Name	Table	Description
Set Domain for M2M Cat Assessable Recs	Category Assessable Records [asmt_m2m_category_assessment]	Ensures that assessable records are only associated to categories in the same domain. This rule is a special requirement of assessment domain separation, that all records must be in the same domain.
Set Domain for M2M Category Users	Assessment Category User [asmt_m2m_category_user]	Ensures that users are only linked to categories in the same domain. This is a special requirement of assessment domain separation, that all records must be in the same domain.
Set Domain for M2M Stakeholders	Assessment Stakeholders [asmt_m2m_stakeholder]	Ensures that assessable records are only linked to category users in the same domain. This is a special requirement of assessment domain separation, that all records must be in the same domain.
Set scratchpad fields	Assessment Metric Type [asmt_metric_type]	Caches field values for use by other scripts that run on the Assessment Metric Type form.
Store view type	Metric Category [asmt_metric_category]	Ensures that the **Type** field only allows users to select metric types used for assessments.
Synchronize category survey users	Assessment Category User [asmt_m2m_category_user]	Ensures that the same users are associated with all of a survey's categories.
Synchronize survey users and stakeholder.	Metric Category [asmt_metric_category]	Adds all users associated with a survey's existing categories to any newly created category for that survey.
Update Category Count	Assessment Metric [asmt_metric]	Updates the value in the **Total metrics** field on the Metric Category form when metrics are added to and deleted from the category.
Update records that match filter	Metric Category [asmt_metric_category]	Automatically performs these tasks when an assessment administrator edits the **Filter** field: • Associates the category to assessable records that meet the filter conditions. • Disassociates the category from assessable records that don't meet the filter conditions.

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Business rules for Assessments (continued)

Name	Table	Description
		The Assessable records related list reflects these changes when the record is saved.
Update scheduled job on schedule change	Assessment Metric Type [asmt_metric_type]	Updates the survey creation scheduled job to reflect schedule period changes.
Validate mandatory and not applicable	Assessment Metric [asmt_metric]	Sets the **Mandatory** and **Allow not applicable** fields to **false** if the metric method is Script. If the metric data type is Percentage, the business rule sets the **Allow not applicable** field to **false**.
Verify min/max	Assessment Metric [asmt_metric]	Ensures that the Min is greater than or equal to zero and less than the Max. Sets the Min to 0 and the Max to 1 if the data type is **Checkbox** or **Yes/No**.
Verify value	Assessment Template Definition [asmt_template_definition]	Ensures that the metric template definition Value is: • Greater than or equal to zero. • Different from the Value for all other metric template definitions related to the template.
Verify value	Assessment Metric Definition [asmt_metric_definition]	Ensures that users can only enter a metric definition Value greater than or equal to zero. Ensures that the metric definition value is different from the Value for all other metric definitions related to the metric.

Quick start tests for Assessments and Surveys

Validate that Assessments and Surveys still works after you make any configuration change such as apply an upgrade or develop an application. Copy and customize these quick start tests to pass when using your instance-specific data.

Assessments and Surveys quick start tests require activating the Automated Test Framework for Survey plugin (com.glide.automated_testing_impl. Survey).

Note:
In the Zurich release, all the buttons on the assessments or surveys cards have been removed. To run the Automated Test Framework tests successfully, the **Click the Take Survey button** step must be replaced with **Click the Survey card** for all tests that have this step.

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Test Suite for Survey

Name	Description	Release version
Survey: Basic Platform Based Test	Create a survey using Platform UI actions.	Madrid
Survey: Platform test for Dynamic Validation	Validate a survey dynamically.	Madrid
Survey: Clone Action	Clone a survey and validate the records of the original survey and the cloned survey.	New York
Survey: Question Bank Flow	Verify the addition of a question bank to a survey.	New York
Survey: Survey Creator Work Flow	Survey creator can create a survey and assign to the user who can take the survey and submit it.	New York
Assessment: Assign assessment to assessor	Assign an assessment to an assessor and verify that the instance is created for the assessor.	Orlando
Assessment: Create assessment as survey creator	Create an assignment as a survey creator.	Orlando
Assessment: Scale and Template support	Create, publish, and assign the assessment. Then take the assessment.	Rome
Assessment: Basic test flow	Verify the basic flow of an assessment.	Orlando

Related topics

Quick start tests

Quizzes

Quizzes are questionnaires that you can assign to one or more users to assess their knowledge of any subject. The quiz functionality is built on the assessment engine and provides many of the same features as assessments and surveys.

Each question is scored, and the overall score indicates the percentage of questions the user answered correctly. A quiz may have categories of questions that are assigned only to some users. You can assign weighting values to individual questions or categories of questions that make them more or less important when calculating the overall score. Quizzes require activation by a system administrator.

- An administrator can create a quiz for any purpose and assign it to a single user or multiple users.
- A quiz can contain one or more categories of questions. Each category can be assigned to users who answer only the questions in that category.
- The system can send email notifications to these users:

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- *Recipients*: The recipient can receive notification of an assigned quiz, a quiz whose allowed duration is at 50%, and a quiz that is overdue.
- *Recipient's manager*: The recipient's manager can receive notification when a quiz is overdue.
- *Quiz manager*: The quiz manager can receive notification of an overdue quiz that is assigned to them.

- Quizzes can contain questions that are scored or not scored. Unscored questions assess opinions or involve dates and are not counted in the final score. Scored questions specify correct answers and are scored either as 0% or 100%. You can apply a weighting scale to scored questions to establish their relative importance. You can designate questions with these data types as scored questions:
  - Checkbox
  - Choice
  - Duration
  - Likert Scale
  - Numeric Scale
  - Template
  - Yes/No
- A quiz question can be dependent on the response to any scored question. For example, you can create a dependent question requesting additional information that appears only if a recipient answers *No* to a specific question.

Important terms

The quiz application involves several terms.

Terms used in quiz application

Quizzes	A quiz contains information such as duration, state, and notification controls and lists the existing categories. Text fields on the quiz form allow an administrator to create introductory content and end notes that are displayed to the recipient.
Categories	A quiz category represents a theme for quiz questions. Each category contains one or more questions and names the recipients for the questions in that category. By default, the system creates one category with the same name as the quiz. You can create additional categories as needed. Categories can be weighted higher or lower to determine the importance of that category in the overall score.
Questions	A quiz question is a question configured for a category and sent only to the users for that category. Questions have a wide variety of data types and can be individually weighted higher or lower. Questions may be scored or unscored.
Category user	A category user is the recipient of questions for a specific category. You can select different users to answer the questions for each category.
Templates	A template is a question data type that provides reusable rating scales for answers to questions. For example, the answer template named Satisfaction contains a satisfaction scale ranging from Very Satisfied to Very Dissatisfied.

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Quiz roles

The Quizzes application uses these roles. No role is required to take quizzes that are assigned to you.

Quiz roles

Role Title [Name]	Role Description
assessment administrator [assessment_admin]	Can administer the Assessments application and all quiz records. Can access all the modules of the Assessments application. **Note:** The itil_admin role and the survey_admin role contain the assessment_admin role
Administrator [admin]	Can access all aspects of the assessment and survey processes. Only administrators can modify survey notifications, create survey modules, and import surveys.

Related topics

Assessment metrics

Using Quizzes

You can use quizzes.

Set up and administer quizzes

Set up and administer quizzes.

Before you begin
Role required: assessment_admin or admin

Procedure

1. **Optional:** Create reusable question templates for quizzes.
2. Create the quiz using the Quiz Designer or with forms accessed from the navigation menu.

   The quiz record includes specifics such as duration, notification preferences, a questionnaire introduction, and ending notes displayed to recipients.
3. Edit the default category or create additional categories as needed.
   The system creates a category with the same name as the quiz.
4. Define users for each category.

   These are the recipients who answer the questions in a category. You can define different users for each category.
5. Create the questions for each category.
6. Create the answers for each question and determine if the questions are scored.

   You can create unique answers or select preconfigured answers from a template.

What to do next
Publish and distribute the quiz. You can send the quiz to a single user or all users in each category.

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Review the results from the submitted quizzes in reports and scorecards.

Related topics

- Create a quiz
- Metric templates

Data types for quizzes

You need to choose a data type for each quiz question. Various data types helps you collect and analyze different kinds of data.

Available data types

Data type	Description
Attachment	Question with a Manage Attachments icon that allows users to attach one or more files.
Boolean	Question with a check box or a **Yes/No** list for user responses.
Choice	List of predefined options. For more information, see the definition for **Choices** in the Create quiz questions topic. Multiple correct answers are supported.
Date	Date field.
Date/Time	Time and date field.
Number	Number field with predefined minimum and maximum values. The default is 1-10.
Percentage	Percentage field with a prescribed range.
Scale	Predefined Likert scale. Answer options appear as radio buttons. Multiple correct answers are supported.
Image Scale	Predefined set of images. Five emojis similar to the Likert scale (very dissatisfied to very satisfied) are provided. However, you can upload additional images in JPG, PNG, or GIF format. Multiple correct answers are supported.
Numeric scale	Selectable number scale. The default is 1-5. Answer options appear as radio buttons. Multiple correct answers are supported.
String	Single or multi-line text field.
Template	Choice list of templates that provide a predefined scale of options. For details, see Configure a template question. Multiple correct answers are supported.
Reference	Choice list of fields from a specified reference table. This data type does not support reference qualifiers.

Related topics

- Create quizzes with forms
- Create a quiz
- Change the order of an answer

Activate the quiz designer

Administrators can activate the Quiz Designer plugin.

Before you begin

Role required: assessment_admin or admin

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Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

View quiz reports

Use the Quiz Overview dashboard to view various reports on data such as Quizzes by State, Questions by Data Type, and Number of Correct Answers.

Before you begin
Role required: assessment_admin or admin

About this task
You can view the Quiz Overview dashboard to refresh the view and add new widgets.

Procedure

1. Navigate to **All** > **Quizzes** > **Overview**.
2. Click the elements within the reports to view more information.

   The Quiz Overview dashboard displays the following reports.

Quiz Overview dashboard reports

Report	Table
Quizzes by State	Assessment Instances [asmt_assessment_instance]
Total Questions by Quiz	Assessment Metrics [asmt_metric]
Questions by Data Type	Assessment Metrics [asmt_metric]
Correct Answers by Assigned User	Metric Results [asmt_metric_result]
Number of Correct Answers	Metric Results [asmt_metric_result]
Incorrect Answers by Assigned User	Metric Results [asmt_metric_result]
Number of Incorrect Answers	Metric Results [asmt_metric_result]

For more information about working with dashboards, see Dashboards.

Quiz designer

The quiz designer provides a single interface that users with the assessment_admin role can use to create, edit, and distribute quizzes.

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You can also use it to edit existing quizzes and change scoring parameters.

Alternatively, you can use the modules of the assessment engine to create and edit the records that make up a quiz. All quiz records are stored in assessment tables and displayed in Quiz views of those tables. For details, see Create quizzes with forms.

Tools on the Quiz Designer

The quiz designer includes a design canvas, a header bar, and many controls that you can use to create quizzes.

To open the quiz designer, navigate to **Quizzes** > **Quiz Designer**.

The designer contains the following elements:

- **Controls** tab
- **Questions** tab
- **Categories** tab
- **Header** bar
- Design canvas

Controls tab

Controls for the supported question data types are available in the Controls palette. Drag and drop a control onto the designer canvas to create a question of that type.

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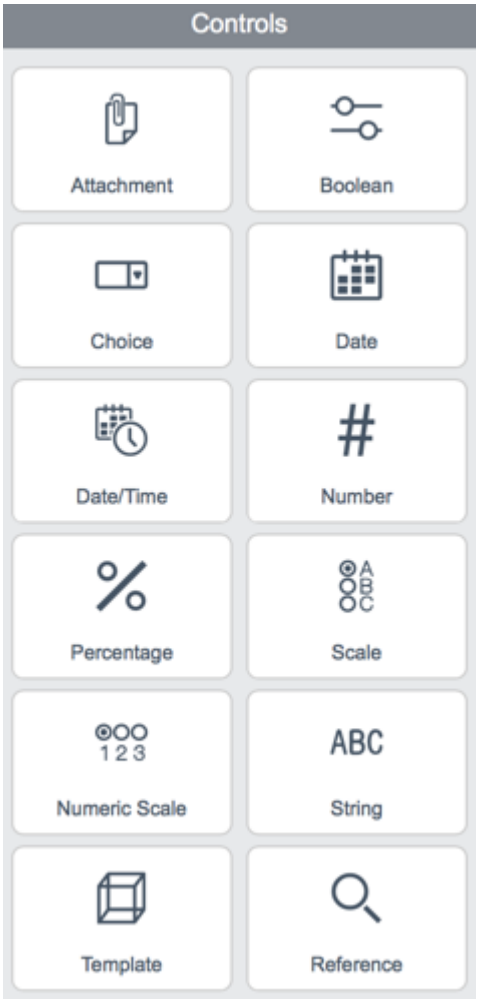
Question controls



Question controls

Data type	Description	Scored
Attachment	Question with a Manage Attachments icon that allows users to attach one or more files.	Y
Boolean	Question with a check box or a **Yes/No** list for user responses.	
Choice	List of predefined options. For more information, see the definition for **Choices** Create quiz questions. Multiple correct answers are supported.	Y
Date	Date field.	N
Date/Time	Date and time field.	N
Number	Number field with predefined minimum and maximum values. The default is 1-10.	N
Percentage	Percentage field with a prescribed range.	N
Scale	Predefined Likert scale. Answer options appear as radio buttons. Multiple correct answers are supported.	Y
Numeric Scale	Selectable number scale. The default is 1-5. Answer options appear as radio buttons. Multiple correct answers are supported.	Y
Image Scale	Predefined set of images. Five emojis similar to the Likert scale (very dissatisfied to very satisfied) are provided. However, you can upload	Y

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Question controls (continued)

Data type	Description	Scored
	additional images in JPG, PNG, or GIF format. Multiple correct answers are supported.	
String	Single or multiline text field.	N
Template	Choice list of templates that provide a predefined scale of options. For details, see Configure a template question. Multiple correct answers are supported.	Y
Reference	Choice list of fields from a specified reference table. This data type does not support reference qualifiers.	

Questions tab

This tab displays all metrics added to the question bank for quizzes. Use the **Filter** field to search for questions. Each metric is displayed with its name and type.

Categories tab

This tab displays all metric categories added to the question bank for quizzes. All metrics in the question bank are group under the corresponding metric category. Use the **Filter** field to search for categories or questions.

Header Bar

The header bar contains tabs that display different views and a menu of various functions.

Click one of the following tabs to change the view in the canvas:

- **Design**: Add categories and questions, and configure the properties of each. This is the default view of the canvas when you open the designer.
- **Configuration**: Create introductions and end notes for quizzes, and select a signature.
- **Availability**: Select the recipients for each category in the quiz.

Point to the menu icon ( ) in the in the upper right of the quiz designer to select the following options:

- **Save**: Saves the current quiz.
- **Preview**: Displays a preview of the quiz as it appears to the recipients.
- **Publish**: Distributes the quiz to the selected recipients.
- **Save and Publish**: Saves and distributes the quiz in one step.
- **New Quiz**: Opens a fresh canvas for a new quiz.
- **Load Quiz**: Opens a list of existing quizzes that you can select and edit.
- **Copy Quiz**: Creates a copy of the quiz.

The availability of each option depends on the status of the quiz that is opened in the quiz designer.

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Design Canvas

New quizzes open in the **Design** view. The quiz **Name** field appears above first category in the canvas. A blank question field appears in the category container.

Related topics

- View an assessment category result
- View a quiz scorecard
- Create a quiz
- Edit a quiz

Create a quiz

When you create a quiz, you can create one or more categories and then add questions to each category.

Before you begin

Role required: assessment_admin or admin

About this task

Each category can be assigned to a different user or the same users. You can also customize each question and make it dependent on the response to another question.

Procedure

Create a quiz using these procedures.

Create quiz categories

Create quiz categories, which represent a theme for evaluating a specific element of the quiz topic and contain questions pertaining to that theme.

Before you begin

Role required: assessment_admin or admin

About this task

When you create a quiz, the system creates a default category using the name of the quiz. You can use this category, modify it, or create additional categories as needed. To have any results, a category must contain scored questions.

Procedure

1. Navigate either **Quizzes** > **Quiz Designer** or **Quizzes** > **Quizzes** and click **Quiz Designer** in the list header.
2. Enter the name of the quiz in the **Name** field.
   The system uses this name as the name of the quiz and the first category.
3. Configure the category.
   a. Click the gear icon in its title bar.
   b. In the **Properties** dialog box, set or modify the properties.

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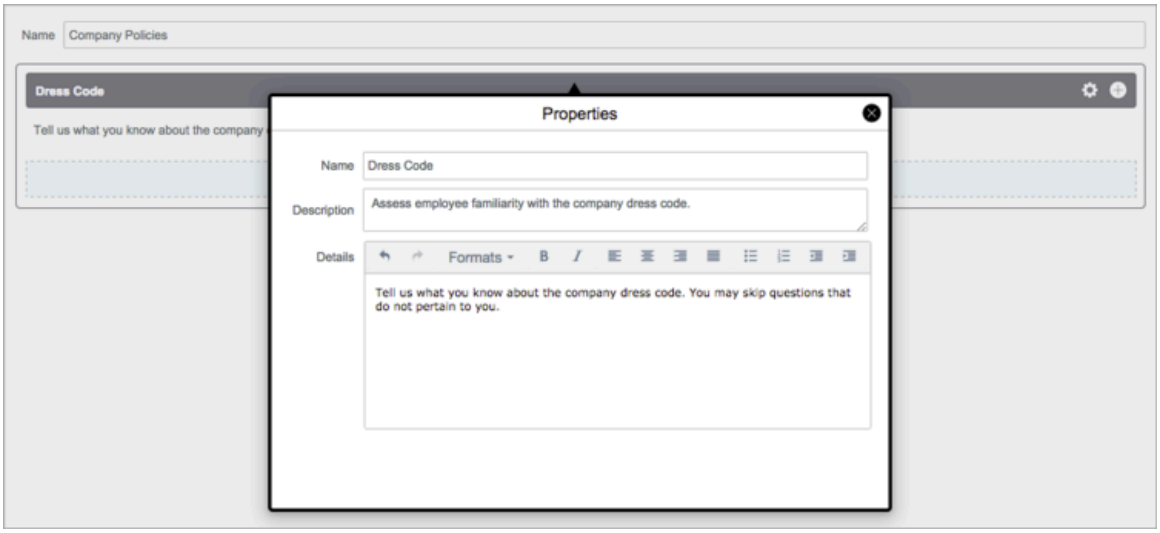
You can change the name of the category, add a description for it, and enter text in the **Details** field that introduces or explains the category to the recipients. The system updates the category as you type.

c. Click the X icon to close the category properties dialog box and save your settings.



4. **Optional:** Add a new category by clicking the **+** icon in the title bar of an existing category.

Related topics

Quiz designer

Create a quiz

Create quiz questions

Create multiple questions for each category. Each question can be associated with only one category.

Before you begin

Role required: assessment_admin or admin

About this task

The data type that you select for each question determines how it can be answered by quiz recipients.

You can designate questions to be scored. Only scored questions are shown in the quiz results and considered when calculating the category results. You must also specify a correct answer for scored questions.

Note:

To designate a question as scored, you must use Assessment forms. For instructions, see Configure a scored question.

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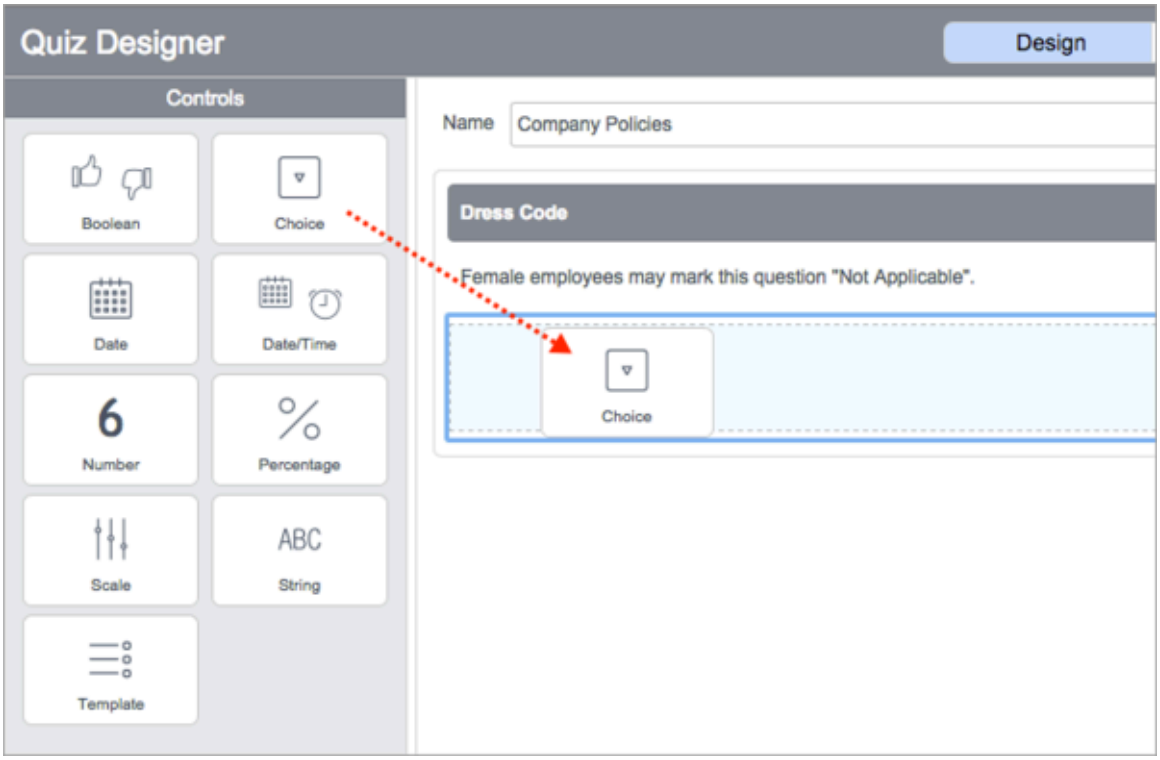
Procedure

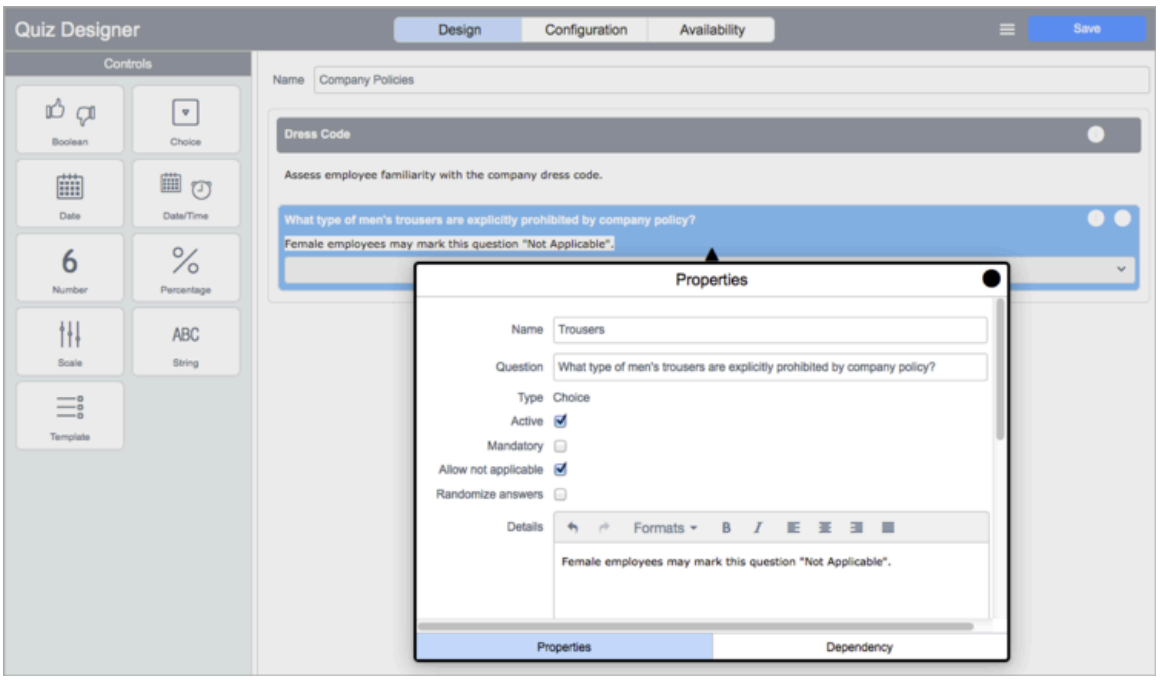
1. In the Design view, drag a data type icon from the Controls palette and drop it into a category container.



2. Configure the question.

Note:
To add a question with the same data type as an existing question in the category, select the **+** in the title bar of the existing question.

a. Select in the gear icon in its title bar.



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b. On the Properties form, fill in the fields.
For a description of the field values, see Question Properties form.

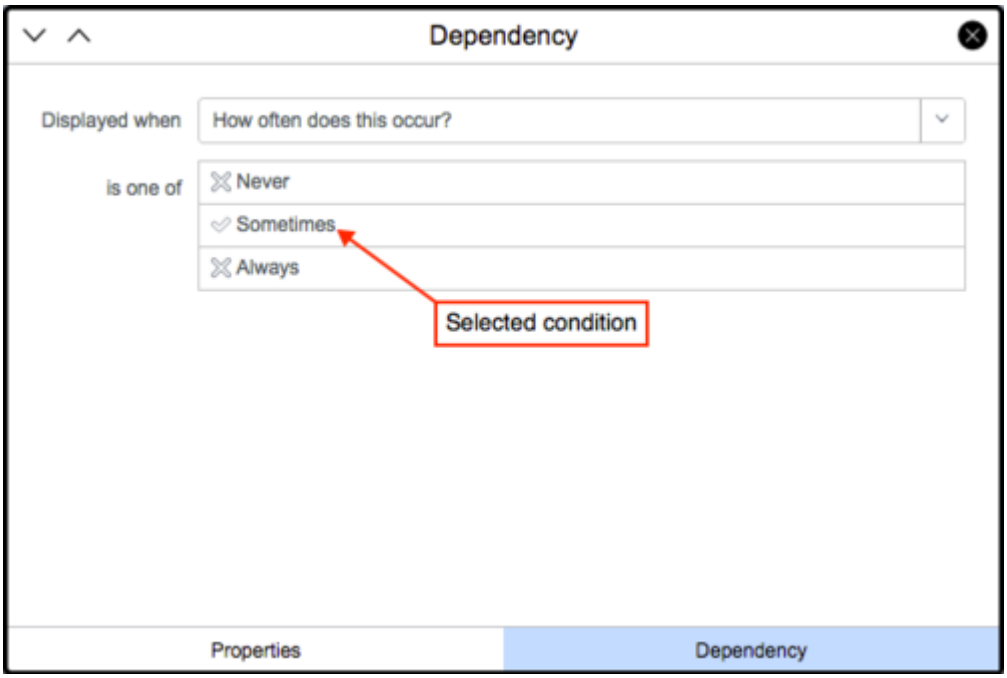
c. Create any special conditions that must be met for a question to appear on the quiz by selecting the **Dependency** tab and filling in the fields.

Dependent questions appear on the quiz when a recipient selects a specific answer or combination of answers to another question in the same category.

d. Select a question in the Displayed when field.
The system selects the appropriate operator and displays the possible answers for the selected question.

e. Select the answers that satisfy the condition.

Selected answers are indicated by a check mark.



f. Select **X** to close the question properties dialog box and save your settings.

3. **Optional:** Drag questions to change their order within a category or move them between categories.
4. **Optional:** Delete a question by selecting the X in its title bar.

Configure a template question

You can configure template questions when designing quizzes.

Before you begin
Role required: assessment_admin or admin

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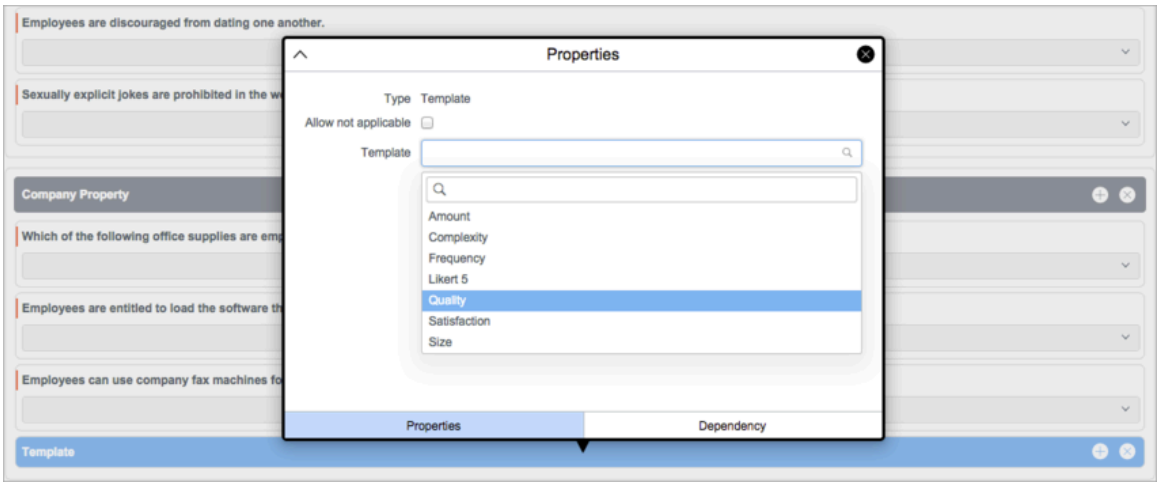
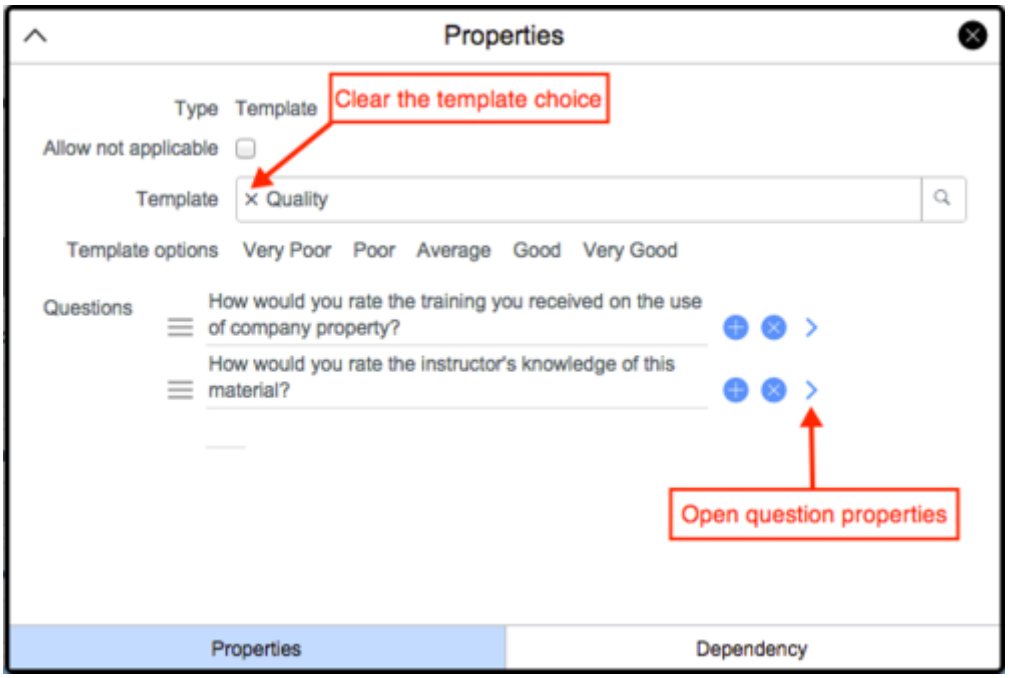
Procedure

1. Drag the **Template** data type icon into a category container.
2. Click the gear icon in the question title bar to open the template properties dialog box.
3. Select a predefined scale from the list.



Question entry fields appear for that template.

4. Enter one or more questions that are appropriate for the template.



5. Click the arrow to the right of a question to configure its properties.

   You must provide a name for each question.

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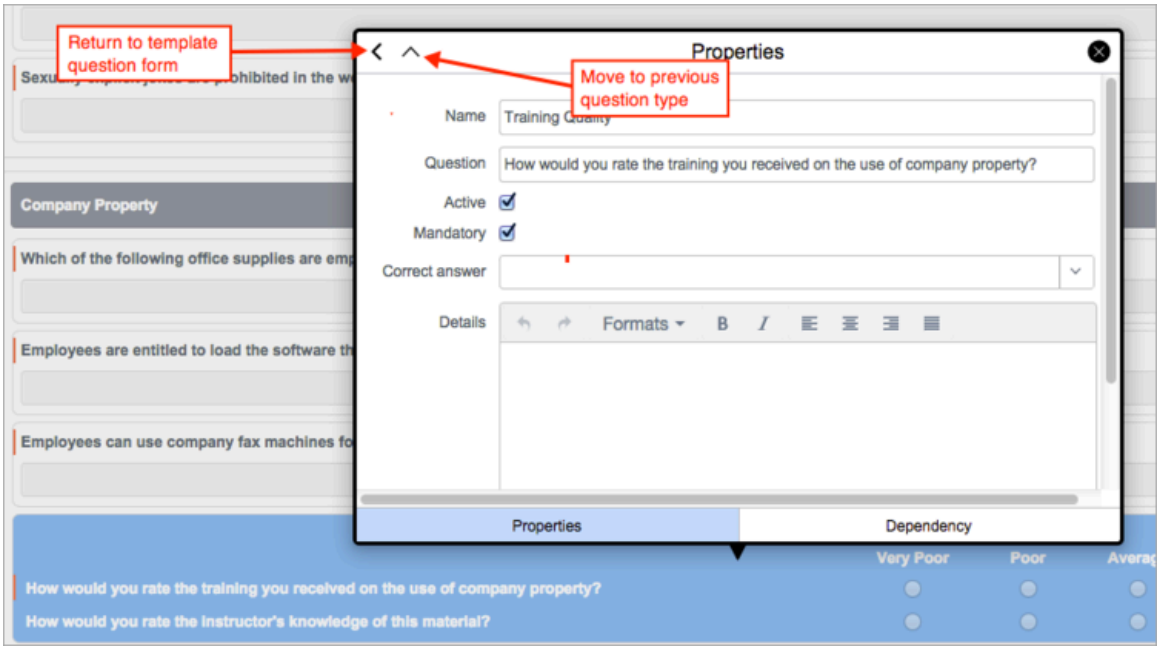

6. Click the up or down arrow to move between questions, or click the back arrow to return to the template properties dialog box.
7. Configure the properties for the remaining questions.
8. Click the **X** icon to close the template properties dialog box and save your settings.

Related topics

Quiz designer

Create a quiz

Configure a scored question

Only scored questions are considered when calculating category and quiz results.

Before you begin

Role required: assessment_admin or admin

About this task

A question must have a correct answer specified to be scored. Only results for scored questions are displayed in the quiz scorecard.

Procedure

1. Navigate to **All** > **Quizzes** > **Quizzes**.
2. Open the quiz containing the questions you want to mark as scored.
3. In the **Metric Categories** related list on the **Assessment Metric Type** form, select the category for the questions you want to mark as scored.
4. In the **Assessment Metrics** related list on the **Metric Category** form, select a question from the list.
5. In the **Question Type** section of the **Assessment Metric** form, select the **Scored** check box.

   This check box is not available if the question's data type is not supported for scoring.
6. Select the **Correct answer** for the question.

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Note:
Multiple correct answers are supported for a few data types. See Data types for quizzes.

7. Click **Update**.
8. Repeat the process for all the questions in the category that you want the system to score.
9. Return to the list of metric categories, select another category, and configure scoring for the appropriate questions in that category.

Configure a quiz

You can configure an entire quiz.

Before you begin

Role required: assessment_admin, survey_creator, or admin

About this task

The values you enter and select on this page are applied to the entire quiz.

Procedure

In the quiz designer, click **Configuration** and then fill in the fields as described in the table.

Quiz designer configuration

Field	Description
Active	Check box for enabling the distribution of this quiz to recipients.
Description	Description of this configuration or the quiz to which it is attached.
Introduction	Introductory content to display on quizzes. You can add a welcome message or background information about the quiz.
Owners	Owners of the quiz. You can add a user with the survey_creator, survey_admin, or assessment_admin role.
Signature	[Optional] Acknowledgement by a quiz recipient of requirements, admonitions, or expectations related to a quiz.
Return URL	Destination address of a web page that is presented to users after they submit a completed quiz. When a return URL is configured, the **End note** content does not appear.
End note	Content that is displayed to recipients after they submit a completed quiz. You can add a thank you message, follow-up instructions, or other applicable information. End notes are not displayed if a **Return URL** is specified.
Duration	Amount of time that recipients are given to complete this quiz, starting from the time that the quiz is generated. The default duration is 14 days.
Manager	Assessment manager for this quiz. These users are only responsible for managing the quiz process and not the results. The system notifies the manager when submissions for this quiz are past due.
Notify manager if overdue	Check box for sending email notifications to a recipient's manager when that user fails to submit an assigned quiz before the due date.
Related Links	

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Field	Description
Show Benchmarks	Opens the Benchmarks Dashboard that provides visibility into your key performance indicators (KPIs) and trends. **Note:** • This related link is available only for survey_admin, assessment_admin and survey_reader with bm_viewer role. • You must opt in to Benchmarks to view the dashboard. • This is applicable only for a published quiz.

Select a quiz recipient

When the system distributes a quiz, it sends email notifications to the category users and their managers.

Before you begin
Role required: assessment_admin or admin

About this task
A category can have one or more assigned users, and the same user can be assigned to more than one category.

The system also creates a link to the quiz in the recipients' **My Assessments & Surveys** portal. Users can only answer questions in the categories that they are assigned to.

Procedure

To select the recipients for each quiz category, click **Availability** and then fill in the fields as described in the table.

Select recipients

Field	Description
Select category	Category for which the selected users are recipients.
Add users	Users selected as recipients for this category. The choice list shows all users in the system.

Related topics

Quiz designer

Publish a quiz

When you publish a quiz, the system sends email notifications to the recipients and to their managers. A card in each recipient's **My Assessments & Surveys** portal displays a link to the quiz.

Before you begin
Role required: assessment_admin or admin

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Procedure

1. If you want to see the quiz as the recipients will see it, point to the menu icon in the upper right of the quiz designer and click **Preview**.
2. When you are satisfied with the quiz, click **Save and Publish** or **Publish** to distribute it.

Related topics

Quiz designer

Copy a quiz

Create a copy of a quiz with at least one category to reduce the effort of creating another quiz with similar data.

Before you begin
Role required: assessment_admin or admin

About this task
All associated questions (type), configurations, categories, metrics, domain separation rules, and role-based categories are copied. Assigned users, category users, instances, and trigger conditions are not copied.

Procedure

1. Navigate to **All** > **Quizzes** > **Quizzes**.
2. Select a quiz.
3. Perform any of the following steps.

Edit a quiz

You can update a quiz after the quiz has been distributed.

Before you begin
Role required: assessment_admin or admin

About this task
You can only edit a quiz that has the same application scope as that of your current session.

- Questions that you add are available only on quizzes that are distributed after the update.
- Before a quiz is submitted or during the retake period:
  - Changes to existing questions are immediately available to users. This includes changes to the answers, such as additional choices or changes to the data type.
  - Deleted questions are deleted from distributed quizzes in users' queues.

Procedure

Open the quiz: Group the Service Details form with one of the following options.

Related topics

Quiz designer

Configure a scored question

Only scored questions are considered when calculating category and quiz results.

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Before you begin
Role required: assessment_admin or admin

About this task
A question must have a correct answer specified to be scored. Only results for scored questions are displayed in the quiz scorecard.

Procedure
1. Navigate to **All** > **Quizzes** > **Quizzes**.
2. Open the quiz containing the questions you want to mark as scored.
3. In the **Metric Categories** related list on the **Assessment Metric Type** form, select the category for the questions you want to mark as scored.
4. In the **Assessment Metrics** related list on the **Metric Category** form, select a question from the list.
5. In the **Question Type** section of the **Assessment Metric** form, select the **Scored** check box.

   This check box is not available if the question's data type is not supported for scoring.
6. Select the **Correct answer** for the question.

   Note:
   Multiple correct answers are supported for a few data types. See Data types for quizzes.
7. Click **Update**.
8. Repeat the process for all the questions in the category that you want the system to score.
9. Return to the list of metric categories, select another category, and configure scoring for the appropriate questions in that category.

Configure a template question

You can configure template questions when designing quizzes.

Before you begin
Role required: assessment_admin or admin

Procedure
1. Drag the **Template** data type icon into a category container.
2. Click the gear icon in the question title bar to open the template properties dialog box.
3. Select a predefined scale from the list.

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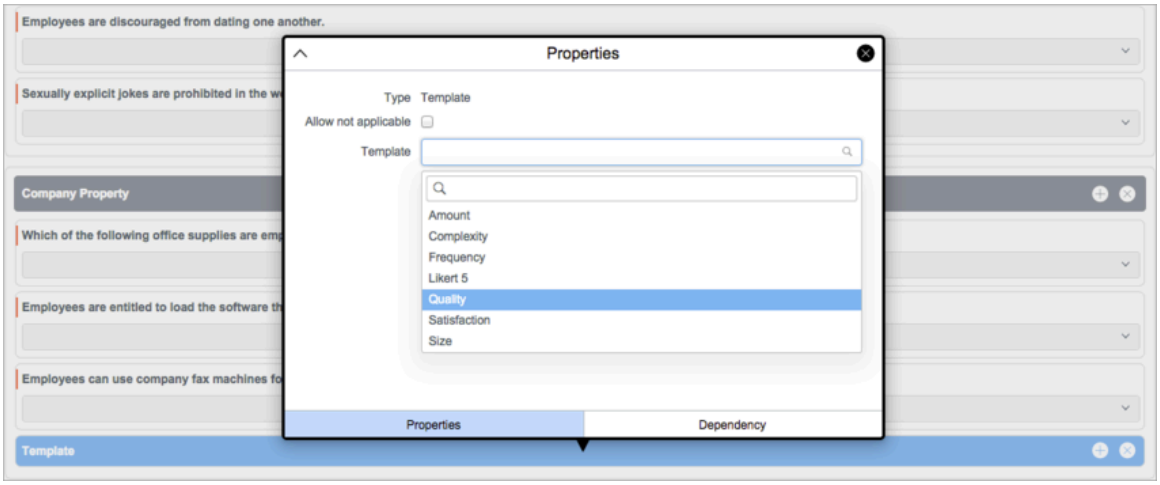
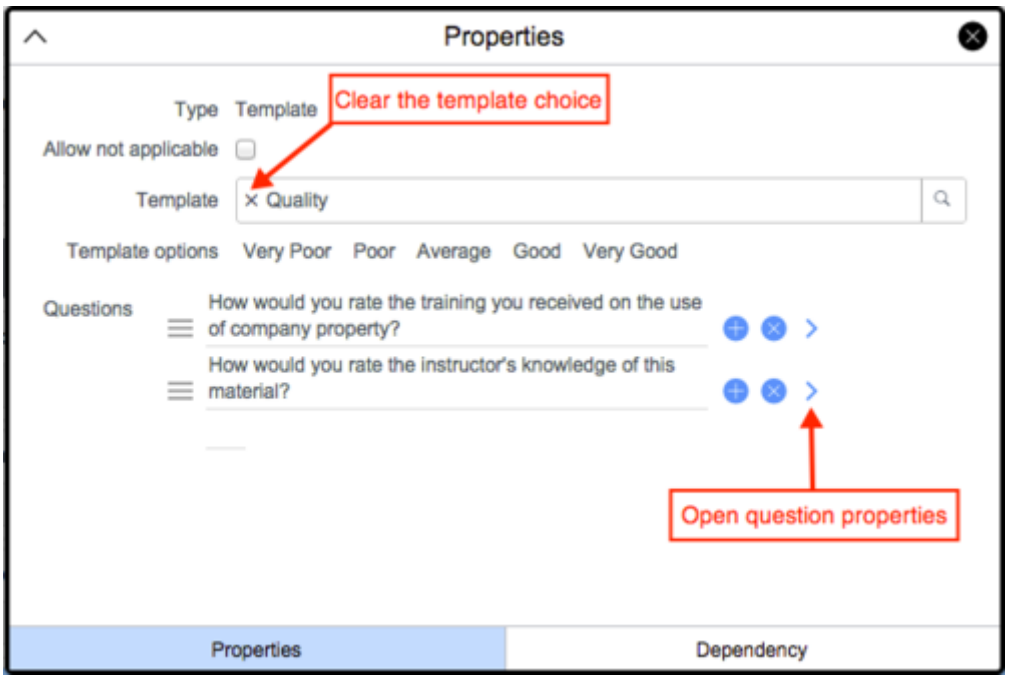


Question entry fields appear for that template.

4. Enter one or more questions that are appropriate for the template.



5. Click the arrow to the right of a question to configure its properties.

You must provide a name for each question.

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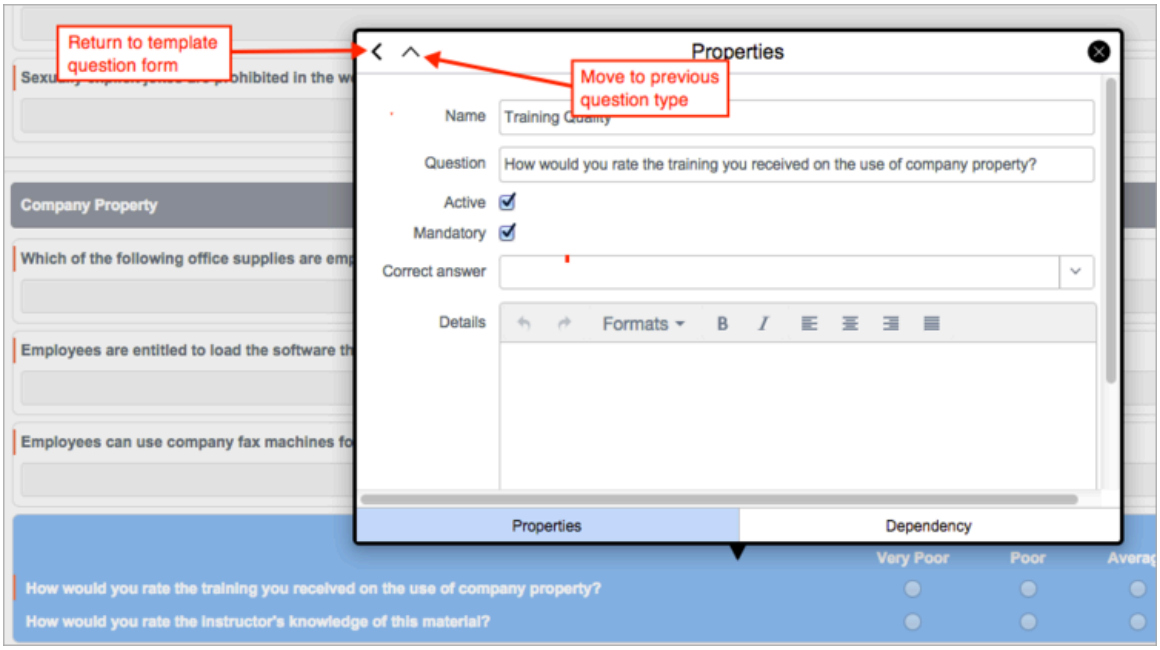

6. Click the up or down arrow to move between questions, or click the back arrow to return to the template properties dialog box.
7. Configure the properties for the remaining questions.
8. Click the **X** icon to close the template properties dialog box and save your settings.

Related topics

Quiz designer

Create a quiz

Enable a quiz retake

You can configure a quiz to allow recipients to resubmit their answers as many times as they like, until the quiz's due date.

Before you begin

Role required: assessment_admin or admin

About this task

Results are not calculated until the quiz's configured duration has elapsed. The card in the user's queue remains visible until the quiz's due date and displays a button to allow retakes.

Procedure

1. Navigate to **All** > **Assessments** > **Metric Definition** > **Types**.
2. Remove the **Evaluation method = Assessment** filter condition so you can see all the records in the list.
3. Open the quiz.
4. In the Assessment Metric Type form, select the **Allow retake** check box and save the record.

Related topics

Quiz designer

Publish a quiz

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View a quiz result

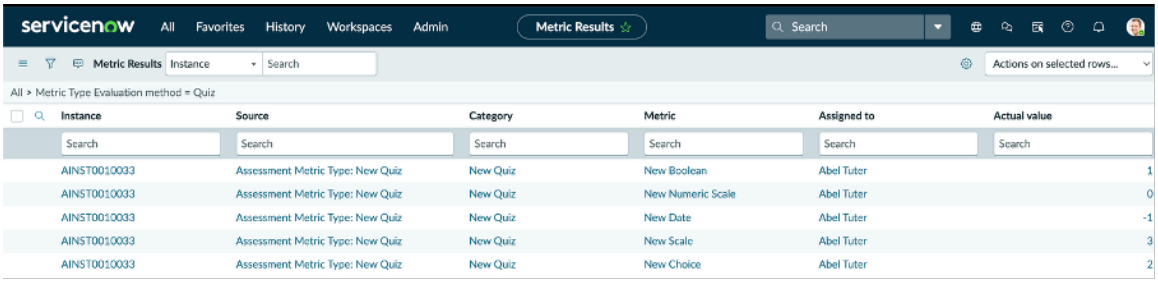
You can view quiz results for each question and category, or view the quiz scorecard for a detailed breakdown.

Before you begin
Role required: assessment_admin or admin

About this task
Quiz results are stored in the Metric Result [asmt_metric_result] table and display recipients' answers to each question in a category.

Procedure

Navigate to **All** > **Quizzes** > **Quiz Results**.



Related topics

Quiz designer

Publish a quiz

View a quiz designer scorecard

The quiz scorecard opens in the Category Results view.

Before you begin
Role required: none

About this task
For detailed information about scorecards, see Quiz Scorecards.

Procedure

1. Navigate to **All** > **Quizzes** > **Quizzes**.
2. Open the quiz whose results you want to view.
3. Under **Related Links**, select **View Scorecard**.

   The scorecard for the selected quiz opens in the Category Results view.

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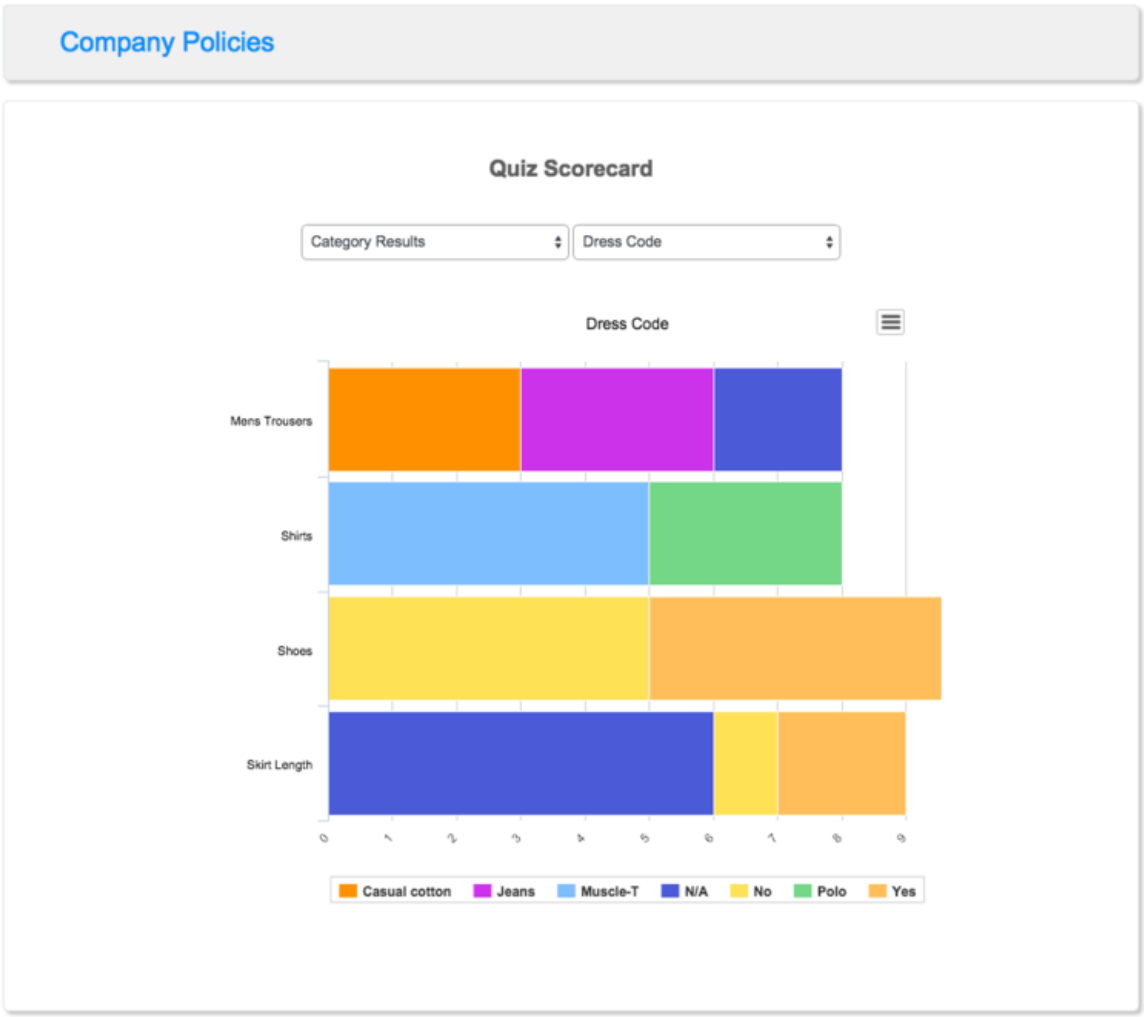
4. Select a category to view from the choice list above the chart.



Related topics

Quiz designer

View a quiz scorecard

View scorecards for a quiz record.

Before you begin

Role required: assessment_admin or admin

About this task

For detailed information about scorecards, see Quiz scorecards.

Procedure

1. Navigate to **All** > **Quizzes** > **Quizzes**.
2. Open a quiz record.
3. Select the **View Scorecard** related link.

Note:
The scorecard link is hidden if there are no quiz results to report.

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The scorecard contains a header that displays the name of the quiz and a section that displays results or a comparison of ratings.

4. Determine the information you want to view.
   The available views are:
   - Category Results
   - Question Results
   - Average Ratings
   - History

View an assessment category result

Category results contain values that represent an evaluated record's performance in a specific metric category. Each category result record stores data from one assessment group. Category result values are calculated based on category and metric weights and from metric result values for the same category.

Before you begin

Role required: assessment_admin or admin

About this task

Note:
The system does not include metric results from certain responses in category result calculations. To compensate, the system adjusts the weight of the other normalized metric result values within the same category.

Procedure

1. Navigate to **All** > **Assessments** > **Results** > **Category Results**.
2. Click the reference icon next to an assessment group number to open the category result record.
3. View the Assessment Category Result form.
   All fields on the form are read-only.

Assessment Category Result form

Field	Description
Category	Name of the metric category that the category result values apply to.
Rating	Rating is used on scorecards and decision matrixes. Rating is updated dynamically as users complete assessments. Rating is calculated as: `(Sum of all normalized values that share a particular assessment group, category, and assessable record) / (Number of assessment instances for the assessment group)` For example: In the Assessment Category Results table example, the assessment group **ASG0000801** with category **Politeness** from group **NY DB** (the assessable record) has a **Rating** value **8.86**. On the associated Metric Results table, you can see that there are **4** instances of this group: **AINST0000801**, **AINST0000802**, **AINST0000803**, and**AINST0000804**.

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Field	Description
	The system calculated the rating using `(5.14+5.14+1.43+5.71+5.14+4.29+4.29+4.29) / 4 = 8.86`
Assessment group	Assessment group to which the category result is associated. The category result **Rating** and **Normalized value** are calculated from metric results in this assessment group only.
Normalized value	Calculated value that measures the **Rating** relative to the weights of categories used to assess the record evaluated. The normalized value is calculated as follows: Normalized value = Rating x (Associated category weight / Sum of weights of all categories the source record has category results for in this assessment group) Example: A source record has four associated category results in assessment group ASG0000907, one for each of these categories: ○ Importance Rating (weight = 10) ○ Product Reliability (weight = 9) ○ Company Alignment (weight = 9) ○ Compliance Score (weight = 9) If this source record's category result for Product Reliability has a Rating of 7.81, the normalized value calculation is: 7.81 x [9 / (10+9+9+9)] = 1.9
Weight	Weight of the associated category. You may need to configure the form to see this field.
Source	Record evaluated as the assessment subject. You may need to configure the form to see this field.

Related topics

Assessment results

Configuring the form layout

View a metric result

Quiz scorecards

The Quizzes application prepares printable scorecards.

A scorecard analyzes category and question responses and compares current ratings with previous ratings. You can examine ratings over time, compare question ratings, or compare the ratings of all categories. All ratings are averages for the time range selected.

The system dynamically updates a scorecard each time you view it, so the ratings reflect recently completed quizzes.

Category results

The Category Results view is a stacked bar chart of responses to all questions in a category.

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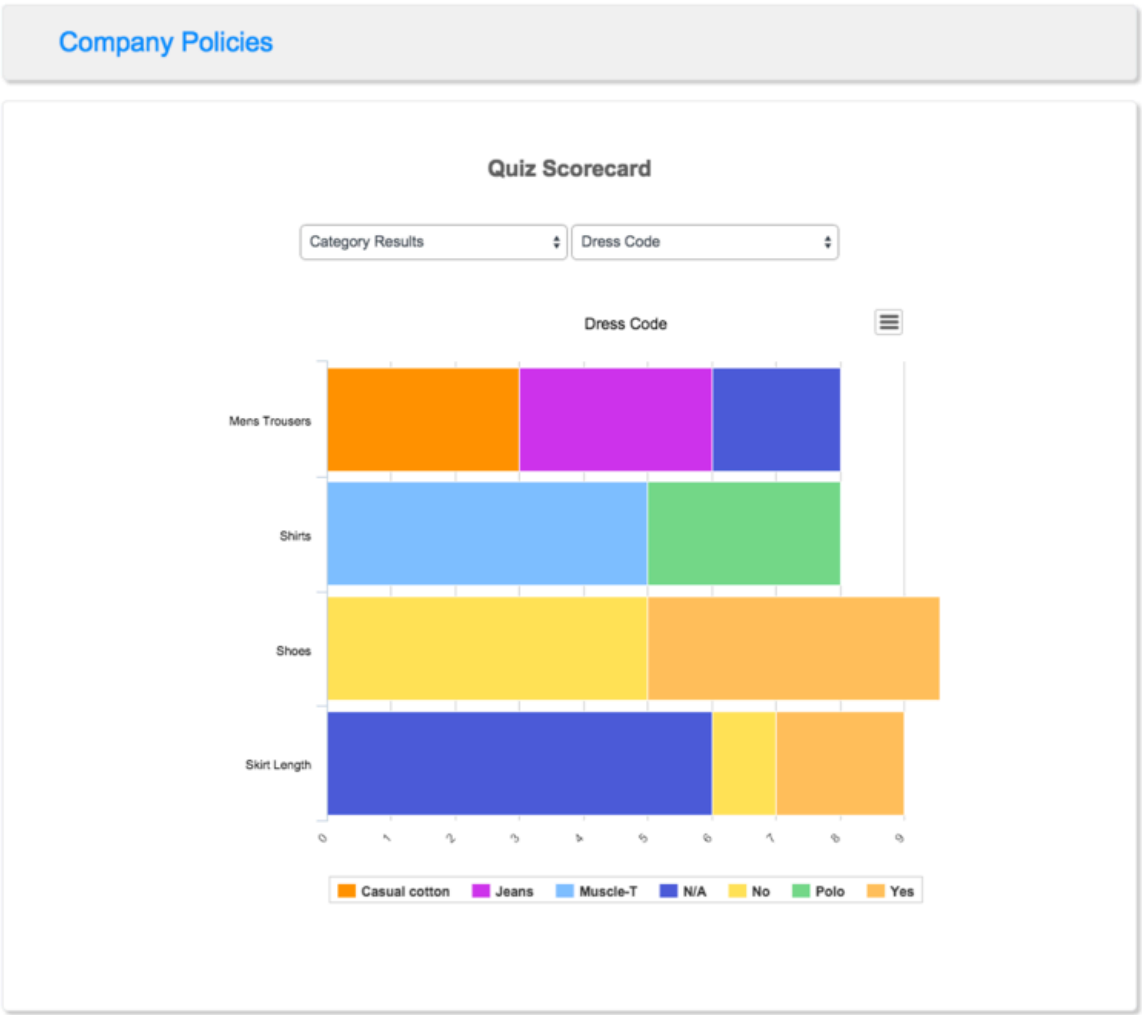
Select the category to display from the choice list above the chart. Category results are only calculated for scored questions

This view displays responses that use the following data types:

- Checkbox
- Choice
- Likert Scale
- Number
- Template
- Yes/No

Note:
The **Checkbox** and **Yes/No** data types are combined into the **Boolean** data type in the Quiz designer.

Quiz category results



To view details about a specific response to a question, point to the colored segment representing a specific response. The chart displays the count for those responses and the percentage it represents of the total responses to that question.

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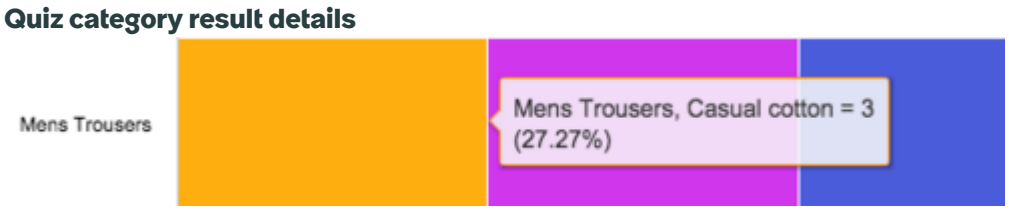

Question results

The Question Results view shows the results for all questions in a quiz.

Select a question by name from the choice list to display the results in a pie chart or a bar chart, based on the data type.

Pie chart

The pie chart shows question results for these data types:

- Checkbox
- Choice
- Likert Scale
- Number
- Template
- Yes/No

Note:
The **Checkbox** and **Yes/No** data types are combined into the **Boolean** data type in the Quiz designer

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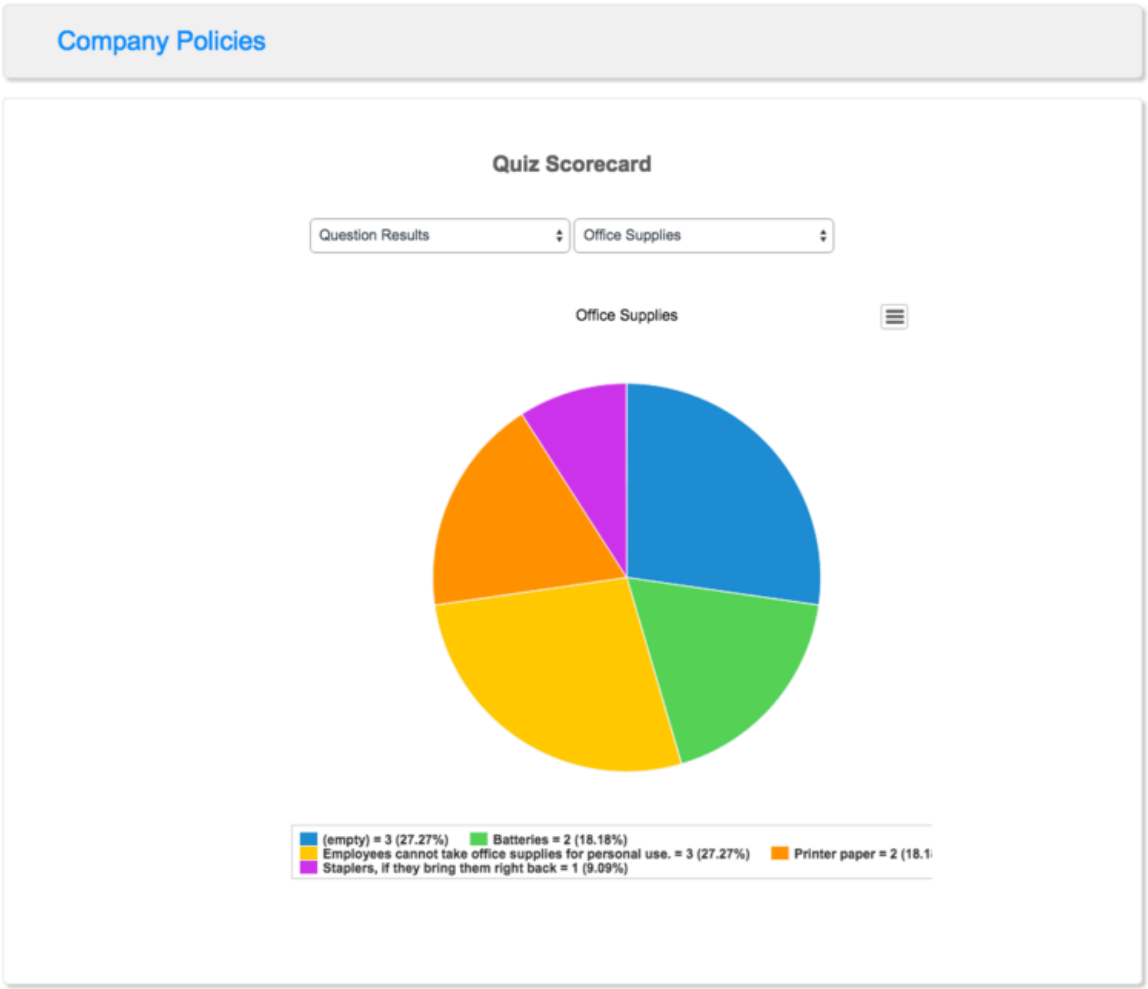
Quiz scorecard question results - pie chart



Bar chart

A bar chart appears when question results use this data type:

Percentage

By default, all results for percentage questions use a report range of 20% segments. To configure a report range, navigate to **Reports** > **Administration** > **Report Ranges**.

Average ratings

The Average Ratings view displays a bar chart of the weighted average rating for each question in a category.

Use this view to learn how individual questions affect the overall rating for the category. Select a category from the second choice list above the chart. Ratings are only calculated for scored questions

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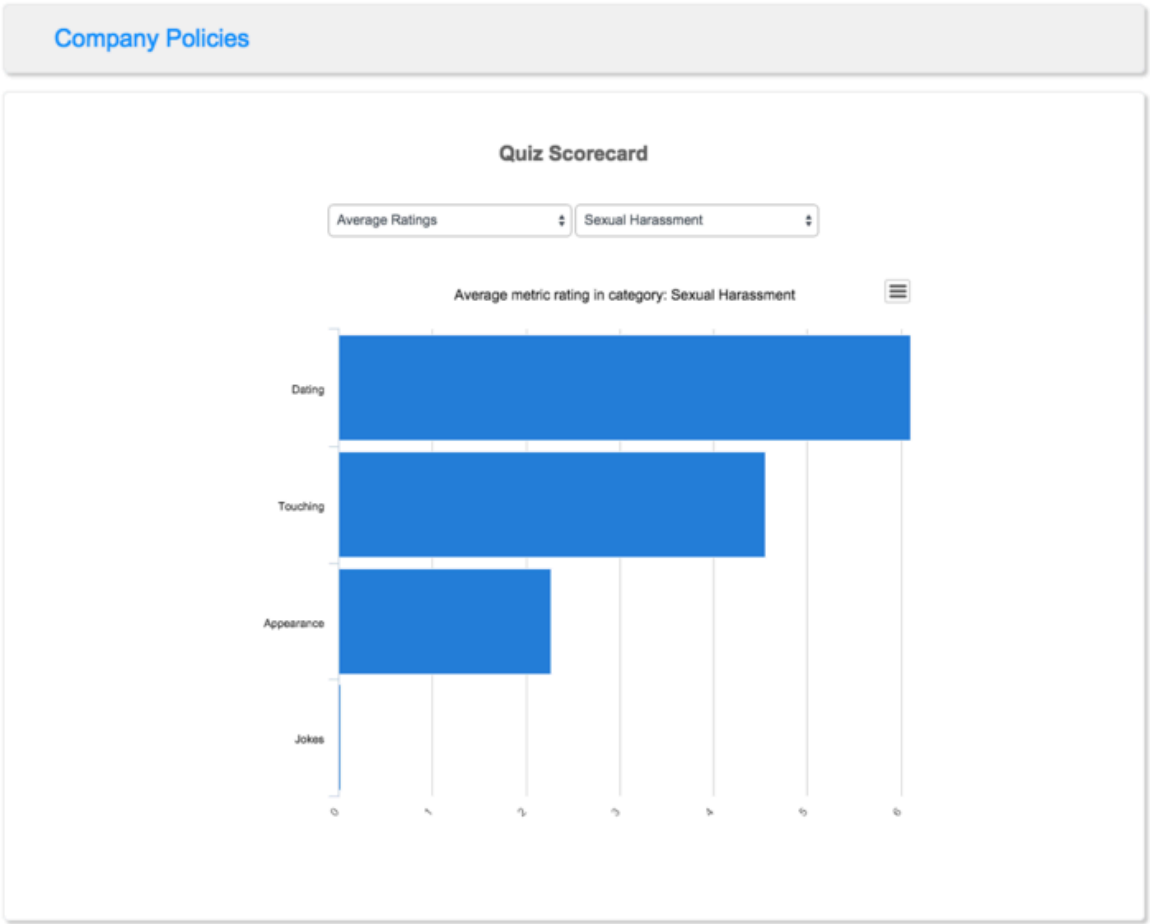
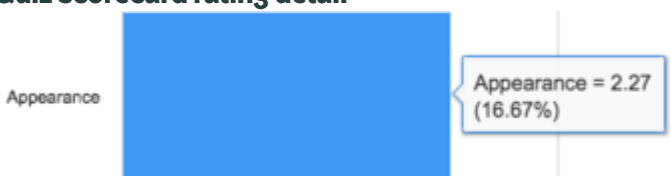
Average Ratings view



To view the effect of each question's ratings on the entire category's ratings, point to the colored bar. The pop-up box shows the percentage of the total ratings represented by each individual question's weighted average.

Quiz scorecard rating detail



Scorecard history

The History view compares the current ratings for the categories and their questions with ratings from the previous three years or four quarters..

Ratings that have declined are highlighted in red and display negative numbers. Ratings that have improved are highlighted in green with positive numbers. Arrow icons beside the values in the **Diff** column indicate the trend of the current ratings against the previous ratings. Ratings are only calculated for scored questions questions.

Point to a category to display a line chart that shows the rating trend for that category. Click a category to view the Metric Category form containing the questions.

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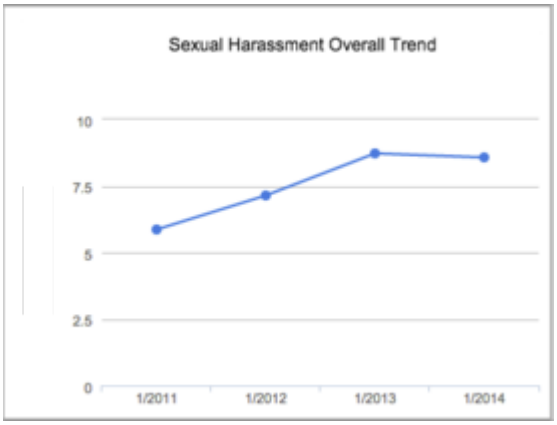
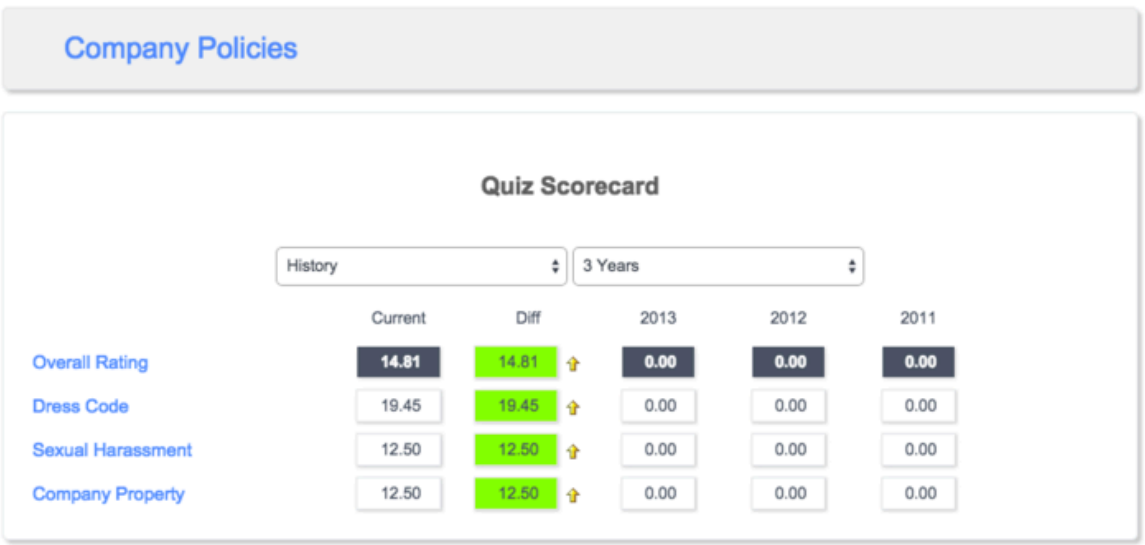
Scorecard trend chart



3 Years: To calculate the current ratings, the system averages the ratings from the trailing twelve month (TTM) period. The **Diff** column shows the discrepancy between the current ratings and the previous calendar year's ratings.

Scorecard history - 3 years



4 Quarters: Quarterly quizzes compare the average rating for each question and category in the current quarter against the average ratings from the previous four quarters. The **Diff** column shows the discrepancy between the current ratings and the previous quarter's ratings. The column labels count backward, by quarter from the current quarter. For example, if the current quarter is the 3rd quarter of 2013, then the previous quarters appear as 2nd [2013], 1st [2013], 4th [2012], and 3rd [2012]. All four of the previous quarters appear, whether or not there was any data for those quarters.

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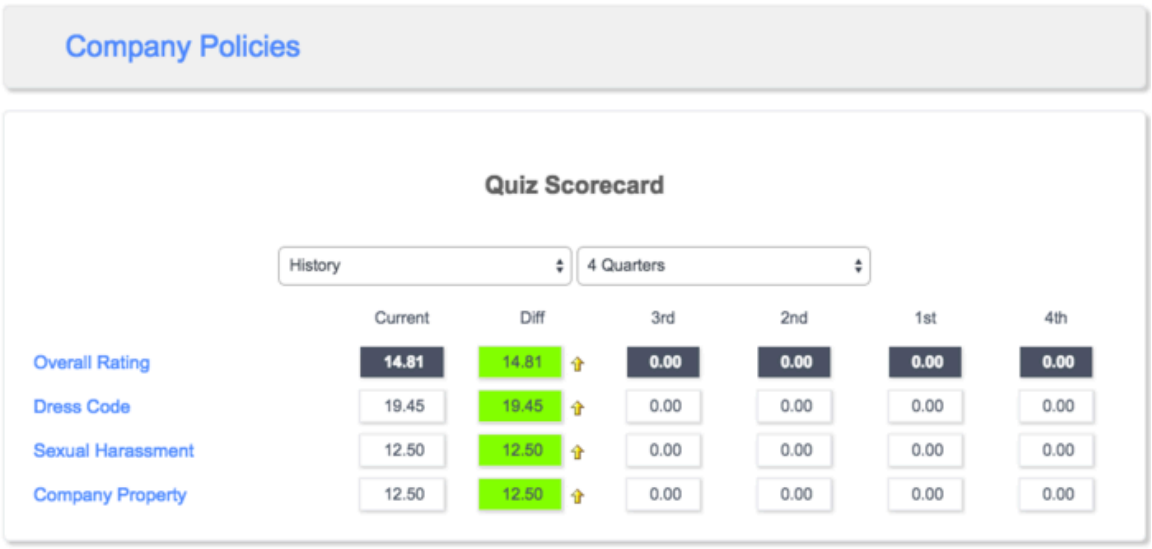
Scorecard history - 4 quarters



Modify the weight of a category

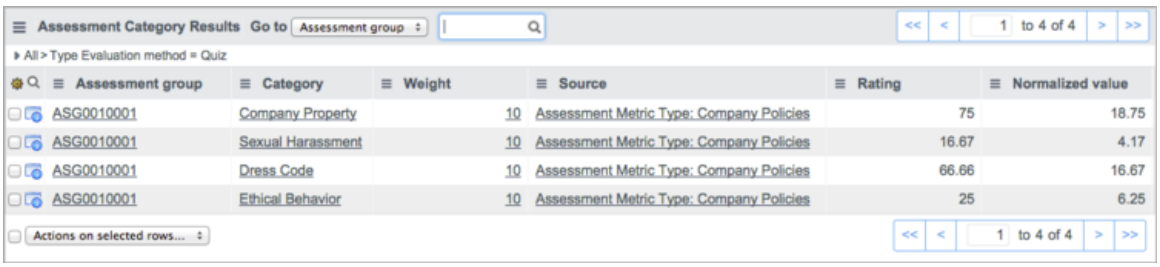
View category results stored in the Assessment Category Result [asmt_category_result] table, which display the overall ratings for each category based on the weighted value for each scored question, and edit the default Weight value.

Before you begin

Role required: none

Procedure

1. Navigate to **Quizzes** > **Category Results**.



   The system calculates results from the weight configured for each category. Weights are set to a value of 10 by default but can be changed.

2. Navigate to**Quizzes** > **Categories**, and select a category from the list.
3. In the Metric Category form, edit the default value in the **Weight** field.
4. Click **Update**.

> **Note:**
> You can also edit the weight of a question in the Quiz view of the Assessment Metric form.

Related topics

Quiz designer

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Take a quiz

All available quizzes assigned to you appear in your personal assessment and survey queue. When you submit a quiz, the system stores your responses. If a quiz allows retakes, you can resubmit it as many times as you like until its due date.

Before you begin

Role required: none

About this task

No special role is required to complete a quiz, but you must be logged in and the quiz must be assigned to you.

If configured to send email, the system sends you a notification when a quiz is assigned to you. The message contains a link to the quiz and instructions for viewing the assessment and survey queue.

Each quiz assigned to you appears in your assessment and survey queue as a card that contains information about the quiz, including a launch button. Overdue quizzes are marked with a red icon and red due date.

You must answer every required question, indicated by a red star, before you can submit the quiz. If you start to take a quiz but cannot complete it, save your responses and return to it later. When you have answered all the questions and are satisfied with the responses, submit the quiz.

By default, you cannot modify your answers to a quiz after submission. However, if the administrator has configured this quiz to allow retakes, the quiz remains in your queue after you finish it and the card shows a Modify Quiz button. You can retake the quiz as many times as you like before the due date.

Procedure

1. Navigate to **All** > **Self-Service** > **My Assessments & Surveys**.
2. Click **Take Quiz** on a quiz card to open the questionnaire.
   If there is more than one quiz category, you can click the collapse or expand icon to hide or show the questions in the category.
3. Answer each question to the best of your ability.
   If you are unsure of how to respond to a question or if a question does not apply to you, select Not Applicable if that choice is available.
4. Click **Save** at any time to save your responses without submitting them.
   You can reopen the quiz from your queue when you are ready to work on it again.
5. When you are ready to submit the completed quiz, read any assertions that require your attention.
6. If present, select the check box to acknowledge the assertion.

   Note:
   If your full name is displayed, you are required to provide authentication to acknowledge the assertion after you submit the quiz.

7. Click **Submit**.
8. If prompted, enter your user name and password to verify your signature.
   If you provided valid answers for all mandatory questions, a success message appears, displaying any end note that was configured. If the quiz allows retakes, the card remains in your queue with a **Modify Quiz** button after submission. If retakes are not permitted, the card disappears from your queue.

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9. If the system displays an error message indicating that a question has an invalid response or must still be answered, correct the error and resubmit the quiz.
10. **Optional:** Edit your answers and resubmit a quiz that permits retakes by clicking **Modify Quiz**. You can modify your responses to the quiz until its due date.

View a quiz instance

View an instance to verify that quiz instances were created, to check the state of a quiz instance, or to reassign a quiz instance. A quiz instance represents one questionnaire assigned to one user.

Before you begin

Role required: admin or assessment_admin

Procedure

1. Navigate to **All** > **Quizzes** > **Quiz Instances**.
   The following submodules are available based on the state of the instances:
   - **Ready to take**: Displays quiz instances that the user can take. By default, these instances are sorted in ascending order by the **Number** field.
   - **In progress**: Displays quiz instances that are in progress. By default, these instances are sorted in ascending order by the **Number** field.
   - **Completed**: Displays quiz instances that are complete. By default, these instances are sorted in descending order by the **Taken on** field.
   - **Cancelled**: Displays quiz instances that are canceled. By default, these instances are sorted in ascending order by the **Number** field.
   - **All**: Displays quiz instances in all states. By default, these instances are sorted in ascending order by the **Number** field.
2. From the required submodule, click a quiz instance.

   By default, the fields listed in the following table are displayed for all submodules other than the **Completed** submodule.

   Note:
   When you select an instance in the **Completed** submodule, you are redirected to the User's Response page.

3. In the form, fill the fields.

Quiz instance form

Field	Description
Number	Automatically generated record number.
Metric type	Metric type of this quiz.
Due Date	Date by which the quiz instance should be completed. The system populates the due date based on the **Assessment duration** of the associated quiz definition, which is set to 14 days by default. The quiz due date is not enforced in the base system. If you want to enforce the due date, consider using a workflow or other mechanism to send survey recipients reminders when a survey is overdue.

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Field	Description
State	State of the quiz.
Assigned to	User that the quiz instance is assigned to. This field becomes read-only when the state is **In progress**, **Complete**, or **Canceled**.
Domain	Domain associated with the instance.
Related Link	
View User's Response	Shows a read-only version of the survey responses completed by the user.
Related List	
Assessment Instance Questions	All instance question records that store user response values for each question on the quiz questionnaire. The following columns are relevant to quiz: ○ **Category**: Displays the quiz categories the questions belong to. ○ **Metric**: Displays the quiz questions.

Related topics

Event scheduling

Add a metric category and metric in the question bank for quizzes

Reuse the question categories (metric categories) and questions (metrics) added in the question bank for quizzes. You can add metric categories or metrics from the question bank to a quiz, or from the quiz to a question bank.

Before you begin

Role required: admin or assessment_admin

Procedure

1. Navigate to **All** > **Quizzes** > **Question Bank**.
2. Click **New**.
3. In the Metric Category form, fill the fields.

Metric Category fields

Field	Description
Name	Name of the metric category.
Description	Description of the metric category.
Total metrics	Total number of metrics in the metric category. This number is automatically updated when you add or delete metrics from the category.

4. Right-click on the title bar and click **Save**.
5. In the Assessment Metrics related list, click **New**.
6. In the Assessment Metric form, fill the fields.
7. Click **Submit**.

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Configure metric categories or metrics for a quiz using the question bank

Reuse question categories (metric categories) and questions (metrics) from the **Question Bank** module while creating or updating a quiz.

Before you begin

Role required: admin or assessment_admin

Procedure

1. Navigate to **All** > **Quizzes** > **Quizzes**.
2. Open a quiz definition.
3. **Optional:** To add metric categories to a quiz from the question bank in Platform, perform the following steps.
   a. In the Metric Categories related list, click **New Category from Bank**.
   The New Category from Bank dialog box is displayed with a list of all metric categories added in the question bank.
   b. Select the required categories and click **Add Selected**.
   A copy of the metric category and the corresponding metric definitions is created in the Metric Categories related list.
4. **Optional:** To add metrics to a quiz from the question bank in Platform, perform the following steps.
   a. In the Metric Categories related list, open a metric category definition.
   b. In the Assessment Metrics related list, click **New Metric from Bank**.
   The New Metric from Bank dialog box is displayed with a list of questions available in the question bank.
   c. Select the required metrics and click **Add Selected**.
   A copy of the metric and the corresponding metric definitions is created in the Assessment Metrics related list of the category.
5. **Optional:** To add a metric category to the question bank from a quiz in Platform, perform the following steps.
   a. In the Metric Categories related list, open a metric category definition.
   b. Click **Add to Question Bank**.
   A copy of the category is created along with its metrics and metric definitions in the question bank.
6. **Optional:** To add a metric to the question bank from a quiz in Platform, perform the following steps.
   a. In the Metric Categories related list, open a metric category definition.
   b. In the Assessment Metrics related list, open the required metric definition.
   c. Click **Add to Question Bank**.

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The Add to Question Bank dialog box is displayed.

d. In the **Choose a question bank to add this question/metric** field, select a metric category that you want to add this metric to, and click **OK**.
A copy of the metric and the corresponding metric definitions is created for the selected category in the question bank.

7. **Optional:** To add a metric category or metric to a quiz from the question bank in Quiz Designer, perform the following steps.
   a. Open the quiz in Quiz Designer.
   b. **Optional:** To add a metric category from the question bank, from the **Categories** tab in the left panel, drag the required category banner and drop in the **Design** tab.
   c. **Optional:** To add a metric from the question bank, drag and drop the required metric from the **Questions** tab or the **Categories** tab.

Note:

- When you drag and drop a metric category, all dependencies within the category are also added to the quiz.
- From the **Categories** tab, you can drag and drop an individual metric within a metric category.
- When you drag and drop a parent metric, all dependent questions are also added to the metric category.
- When you drag and drop a child metric, only the child question is added to the metric category.

Create quizzes with forms

As an alternative to the Quiz Designer, you can create a complete quiz using records in the Assessment application.

All the elements of a quiz, the categories, questions, and answers, are stored in tables used by the assessment engine and are displayed in **quiz views** of these tables. Users creating quizzes in the Assessment application must have the assessment_admin role.

Create a quiz using assessment forms by following the procedures in the order shown here:

- Create the quiz.
- Set up the categories.
- Create the questions for the quiz.
- Create the answers for the questions.
- Distribute the quizzes to recipients.

Note:
The recommended method of creating and editing quizzes is to use the quiz designer, which provides a single, intuitive interface for creating and editing quizzes quickly. If you determine that you need to add specific features to your quiz not offered through the quiz designer, you can do so by using some of the specific procedures described here.

Related topics

Create a quiz

Create a category for assessable records

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Set up a category

A category represents a theme for evaluating a specific element of the quiz topic and contains questions pertaining to that theme.

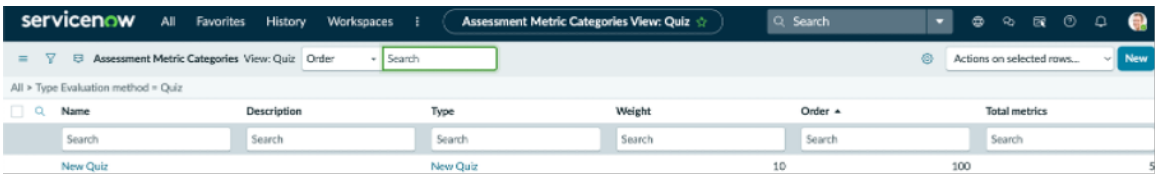
Before you begin
Role required: none

About this task
When you create a quiz, the system creates a default category with the name of the quiz. You can use this category, modify it, or create additional categories as needed. Categories are records in the **Quiz view** of the Metric Category table.

Categories have weighting values that contribute to the overall score for the quiz. By default, all categories are given a weighting value of 10. You can assign any weight to your categories. To have any results, a category must contain scored questions.

Procedure

You can create a new category or edit an existing one from the **Metric Categories** related list of a quiz record.



Related topics

- Create quizzes with forms
- Create a quiz
- Select a user for a category
- Data types for quizzes
- Change the order of an answer
- Distribute a quiz
- Modify a published quiz

Select a user for a category

Category users are the recipients of the questions for each category.

Before you begin
Role required: none

About this task
A category can have one or more assigned users, and the same user can be assigned to more than one category. When the system distributes a quiz, it sends an email notification, if configured, to the category users and creates a link to the appropriate questionnaire in their assessments and surveys portal. Users can only answer questions attached to their assigned categories.

Procedure

To select users for a category, select the **Users** related list in a category record, and click **Edit**.

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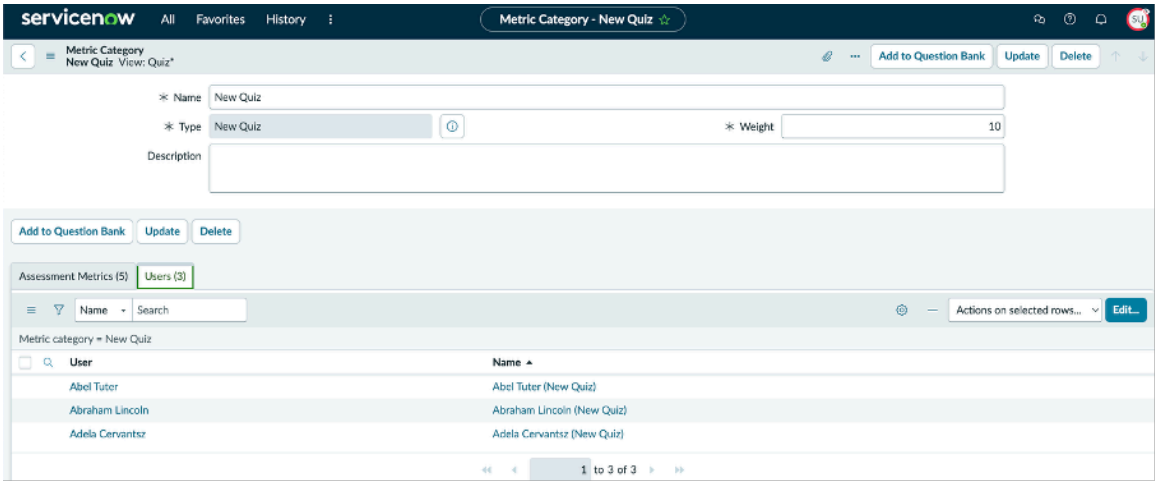

Related topics

- Create quizzes with forms
- Create a quiz
- Set up a category
- Data types for quizzes
- Change the order of an answer
- Distribute a quiz
- Modify a published quiz

Create questions

Create quiz questions. A category can have multiple questions associated with it.

Before you begin

Role required: none

About this task

Each question can only be associated with one category. Each question has an answer data type that determines how recipients answer the question. Questions are records in the Quiz view of the Assessment Metric table.

Procedure

1. Open a category record.
2. Create a question record in one of the following ways:
   - By accessing the Assessment Metrics related list and selecting **New**.
   - Navigate to **Quiz Management** > **Questions** and select **New**.

> **Warning:**
> When you create a **Choice**or **Likert Scale** question, you must reopen the Assessment Metric form after you submit it to create answers. If you distribute a questionnaire without creating the answers for questions with these data types, recipients are unable to answer the questions. If the questions are mandatory, the recipients are unable to submit their questionnaires.

On the form, fill in the fields.

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Field	Description
Name	[Required] Name of the question.
Category	[Required] Category the question belongs to. The system populates this category if you create a new question from the Metric Category form. **Note:** You cannot change the category if the **Depends on** field is set or if another metric depends on this metric.
Method	Setting that determines how to use the question. ○ **Assessment**: Makes the question available on a quiz distributed to users. The **Assessment** method is compatible with all data types except **Duration**. ○ **Script**: Queries the database without user participation. Scripted questions are of limited value for quizzes, because they do not assess a user's knowledge of a topic. **Note:** If you select a **Data type** that is incompatible with the selected **Method**, the system automatically changes the **Method** to the correct value.
Weight	Numeric value that represents the importance of this question relative to other questions in the same category. By default, the weight is 10. For weighting suggestions, see weight categories and metrics. This field is available and required unless the **Data type** is **Date**, **Date/Time**, or **String**. These data types are not included in results calculations.
Order	[Required] Numeric value that determines the order of the question in the category. The question with the smallest order value appears as the first question in the category's section. By default, the order is 100. **Note:** It does not matter which order value you use for metrics with the **Script** method, because they do not appear on questionnaires.
Active	Check box that determines whether this question appears on quizzes. If a question is inactive, it does not appear on quizzes generated after the question becomes inactive.
Mandatory	Check box for requiring users to answer the question. Users cannot submit questionnaires until they provide valid responses to all mandatory questions, which are denoted by a red field status indicator. This field is available only if the **Method** is **Assessment**, the **Depends**on field is empty, and the **Data type** is not **Checkbox**.
Allow not applicable	Check box for including **Not Applicable** as a possible answer for this question. Users can select **Not Applicable** if they do not have sufficient information to respond to a question. User responses of **Not Applicable** are excluded from results.
Question	

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Field	Description
Question	The question that is displayed in quizzes. Enter a clear, straightforward question that is easy to understand.
Details	Information about the question and what it evaluates. Include details that help users understand how to answer the question or when you need HTML enhanced details for your question. You can create HTML text in this field with the WYSIWYG editor, such as embedding links and images.
Depends on	An existing question that this question is dependent on. You can select **Checkbox**,**Choice**, **Likert Scale**, **Template**, and **Yes/No** questions from the same category as this question. Then use the Displayed when field to set the conditions for displaying this question. The system prevents the creation of recursive dependencies between questions. For example, if Question A depends on Question B, Question B cannot depend on Question A.
Question Type	
Data type	[Required] Format of the expected response data. See the table of **data types** for details. **Note:** You cannot change the data type if another question depends on this question
Randomize answers	Check box for displaying the possible answers for this question in a random order whenever the question appears. Answer preference is sometimes influenced by the order in which answer options appear, which can result in biased results. Randomizing answer options can help prevent this bias. This check box is available only if the **Data type** is **Choice** or **Likert** Scale. **Note:** Randomizing answer options for certain questions may make those questions confusing for users. In general, only randomize answer options that do not follow a logical order.
Scale definition	Setting that determines whether lesser or greater numerical values equate to a good score in quiz result calculations. Select **Low** if lesser numerical values are better. Select **High** if greater numerical values are better. The default value is**High**. This field is available and required unless the **Data type** is **Date**, **Date/Time**, or **String**. The results for these data types are not included in results calculations. When the Scored check box is selected, the scale value is set to **High** and the field is hidden. **Note:** For information about how to set the scale definition for data types that do not require you to set a numerical value, see Data types for assessments.
Min	Lowest numerical value that can be used as an answer option. This field is available and required only if **Data type** is **Number**, **Duration**, or **Percentage**.
Max	Highest numerical value that can be used as an answer option or scaled value. This field is available and required if **Data type** is **Number**, **Duration**, or **Percentage**.

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Field	Description
String option	Setting for the appearance of a string field in a question. This field is available when the question type is **String**. The string options are: ○ **Single line**: Single line text field 40 characters in length that allows strings of any length. ○ **String line wide**: Full page width text field that allows a single line entry of any length. ○ **Multiline**: Full page width multiline text field that allows word wrap and returns.
Scored	Check box for using answers in scoring the category results and showing them in the quiz results. Scored questions are available for these data types: ○ Choice ○ Likert Scale ○ Template ○ Checkbox ○ Yes/No Selecting this check box hides the **Scale definition** field and sets the value in that field to **High**.
Correct answer	[Required] Desired answer to a scored question. This field is available when the **Scored** check box is selected. Multiple correct answers are supported for a few data types. See Data types for quizzes.
Template	Answer template to use with this question. This field is available when the **Data type** is **Template**.
Related List	
Assessment Metric Definitions	List of options for this question. This related list is available only if the **Data type** is **Choice** or **Likert Scale**.

Related topics

- Assessment metrics
- Create quizzes with forms
- Create a quiz
- Set up a category
- Select a user for a category
- Data types for quizzes
- Create questions

Create answers for questions

Create answer options for questions with the Choice or Likert Scale data type.

Before you begin

Role required: none

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About this task

When you create a question with one of these data types, the Assessment Metric Definitions related list appears. Each metric definition appears as one answer option for a question on a quiz. For example, the question **What type of men's trousers are not permitted by company policy?** might have these three answers configured as metric definitions: **Slacks**, **Jeans**, and **Casual cotton**.

Procedure

1. Open the question record you want to edit.
2. Click **New** in the **Assessment Metric Definitions** related list.
3. Set the order in which the answers appear in the quiz by providing a hierarchical number in the **Value** field.

Related topics

- Create quizzes with forms
- Create a quiz
- Set up a category
- Select a user for a category
- Data types for quizzes
- Change the order of an answer
- Distribute a quiz
- Modify a published quiz

Distribute a quiz

When you finish configuring the answers for the quiz questions, you are ready to distribute the quiz.

Before you begin

Role required: none

About this task

You can send the quiz to all the category users configured for the quiz or to a single category user.

Procedure

1. Navigate to **All** > **Quiz Management** > **Quizzes**.
2. Open the quiz record, and click **Publish**.
   The quiz is placed in the Published state, and it is sent to all its category users.
3. **Optional:** Edit the published quiz.
   See Modifying Published Quizzes to learn how various modifications affect the quiz contents.
4. **Optional:** Resend a quiz to either on category user or all category users.
   - Send the quiz to one category user by clicking **Assign Quiz**.
   - Send the quiz to all of its category users by clicking **Send Quizzes**.

Note:
These buttons are hidden if there are no category users defined for the quiz.

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Related topics

Create a quiz

Modify a published quiz

Modify a published quiz

Post changes to existing questions immediately. Make new questions available to users who have not started the quiz.

Before you begin

Role required: none

Procedure

You can edit a quiz even after it has been distributed, with these results:

- Added questions are available only on quizzes that are distributed after this change.
- Changes to existing questions are immediately available to users before the quiz is submitted or during the retake period. This includes changes to the answers, such as additional choices or changes to the data type.
- Deleted questions are also deleted from the distributed quizzes in users' queues.

Related topics

Create a quiz

Change the order of an answer

Quizzes reference

Reference topics provide additional information about the forms, fields, and properties you use while working with quizzes.

Quiz scorecards

The Quizzes application prepares printable scorecards.

A scorecard analyzes category and question responses and compares current ratings with previous ratings. You can examine ratings over time, compare question ratings, or compare the ratings of all categories. All ratings are averages for the time range selected.

The system dynamically updates a scorecard each time you view it, so the ratings reflect recently completed quizzes.

Category results

The Category Results view is a stacked bar chart of responses to all questions in a category.

Select the category to display from the choice list above the chart. Category results are only calculated for scored questions

This view displays responses that use the following data types:

- Checkbox
- Choice
- Likert Scale
- Number

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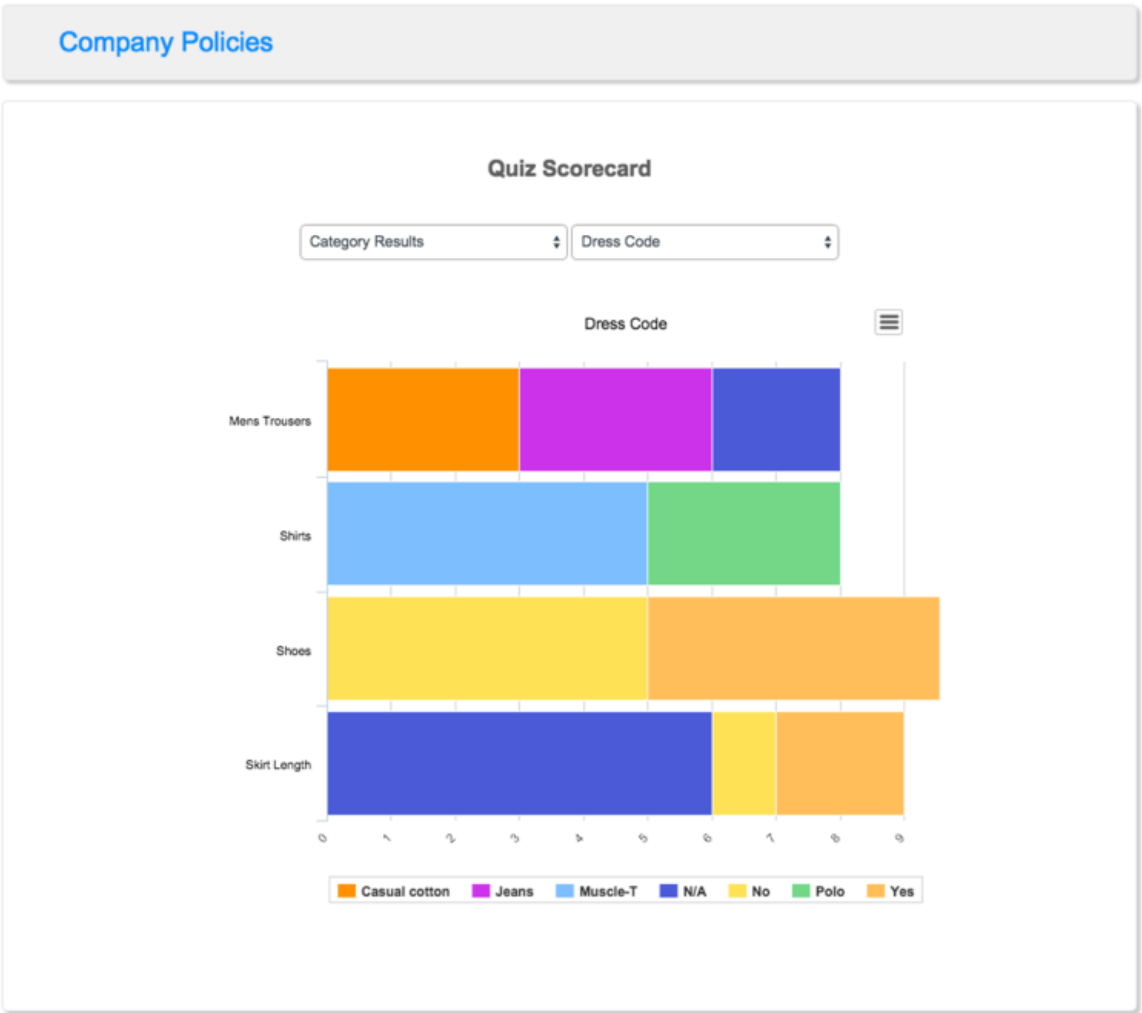
- Template
- Yes/No

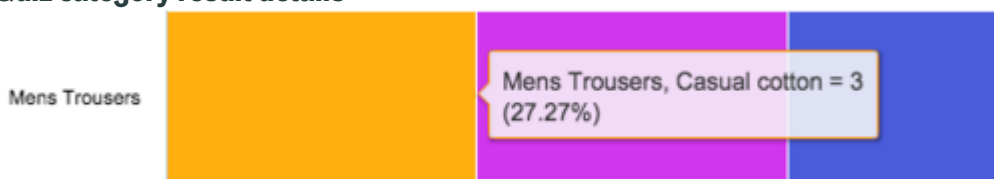
Note:
The **Checkbox** and **Yes/No** data types are combined into the **Boolean** data type in the Quiz designer.

Quiz category results



To view details about a specific response to a question, point to the colored segment representing a specific response. The chart displays the count for those responses and the percentage it represents of the total responses to that question.

Quiz category result details



Question results

The Question Results view shows the results for all questions in a quiz.

Select a question by name from the choice list to display the results in a pie chart or a bar chart, based on the data type.

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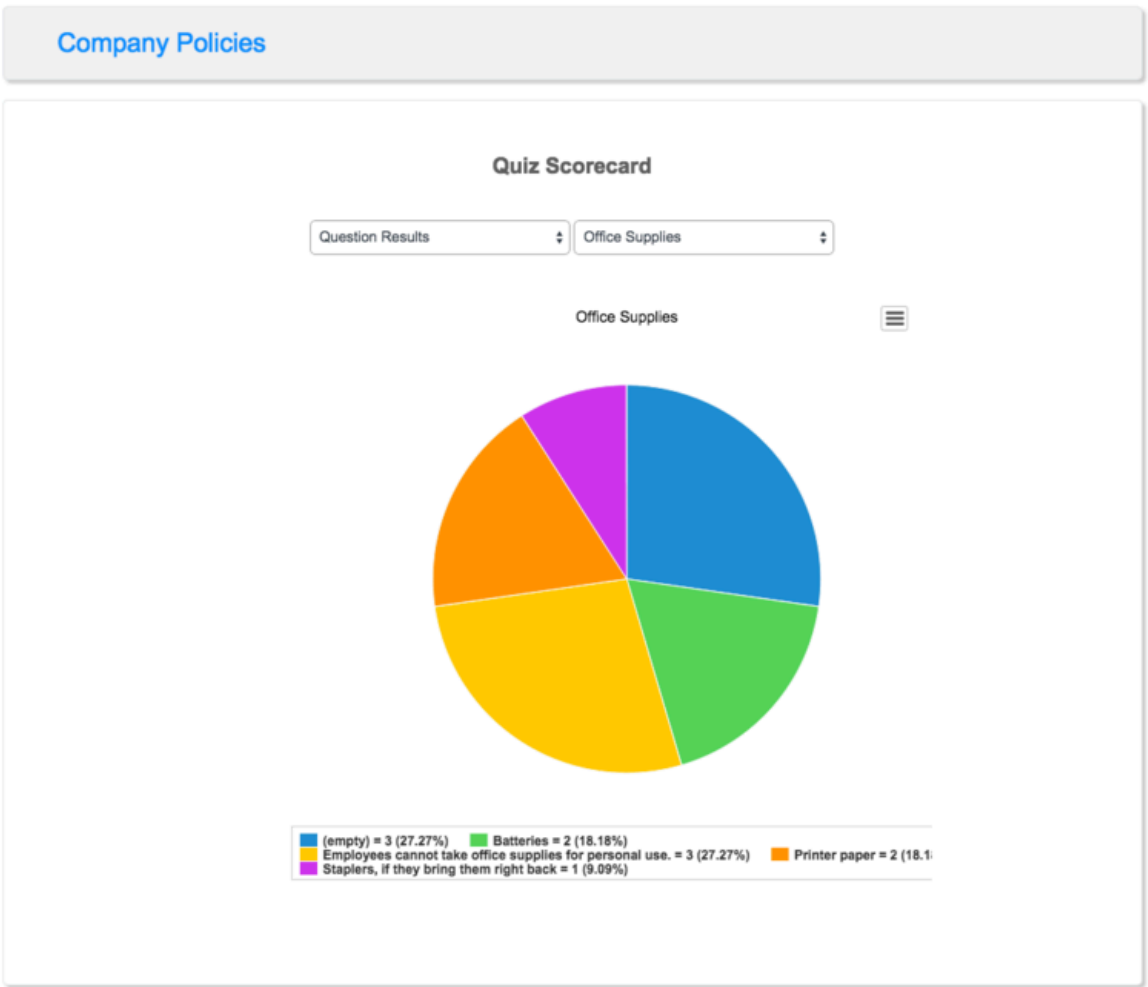
Pie chart

The pie chart shows question results for these data types:

- Checkbox
- Choice
- Likert Scale
- Number
- Template
- Yes/No

Note:
The **Checkbox** and **Yes/No** data types are combined into the **Boolean** data type in the Quiz designer

Quiz scorecard question results - pie chart



Bar chart

A bar chart appears when question results use this data type:

Percentage

By default, all results for percentage questions use a report range of 20% segments. To configure a report range, navigate to **Reports** > **Administration** > **Report Ranges**.

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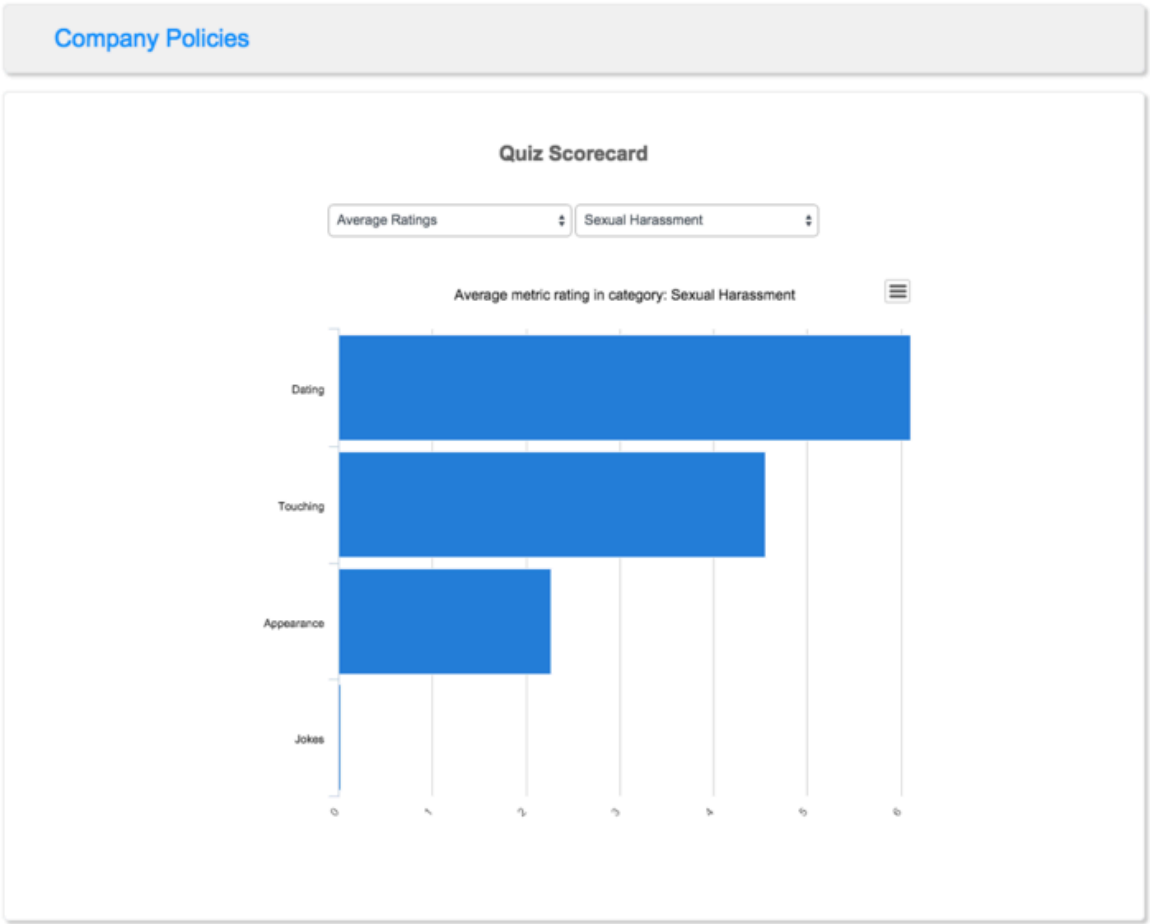
Average ratings

The Average Ratings view displays a bar chart of the weighted average rating for each question in a category.

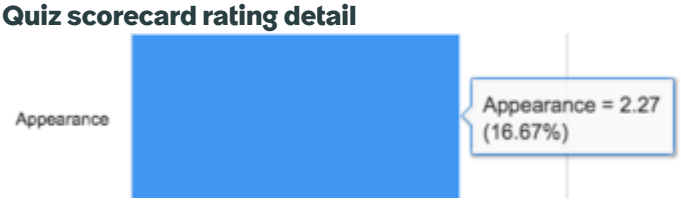
Use this view to learn how individual questions affect the overall rating for the category. Select a category from the second choice list above the chart. Ratings are only calculated for scored questions

Average Ratings view



To view the effect of each question's ratings on the entire category's ratings, point to the colored bar. The pop-up box shows the percentage of the total ratings represented by each individual question's weighted average.

Quiz scorecard rating detail



Question Properties form

Description of the field values for the Question Properties form.

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Question Properties form

Field	Description
Name	[Required] Name of the question. Create a concise and easily recognizable name for your question. The system uses this value to identify the question in Assessment Metric lists and in scorecard charts.
Question	Text to display as the question on quizzes. Enter a clear, straightforward question that is easy to understand.
Type	[Read-only] Data type selected for this question. See the table in Controls for possible data types.
Active	Check box that determines whether this question is available on a quiz. If a question is marked inactive, it does not appear on quizzes generated after the question becomes inactive.
Boolean option	Whether a check box or a **Yes/No** list appears as the option for the Boolean question.
Mandatory	Check box for requiring users to answer the question. Users cannot submit quizzes until they answer all mandatory questions, which are denoted by a red Introduction_to_Fields#Field_Status_Indicator" --> field status indicator. This field is available when the question does not have a dependency and the question Controls is not **Boolean** with a check box option.
String option	Setting for the appearance of a string field in a question. This field is available when the question type is **String**. The string options are: • **Single line**: Single line text field 40 characters in length that allows strings of any length. • **String line wide**: Full page width text field that allows a single line entry of any length. • **Multiline**: Full page width multi-line text field that allows word wrap and returns.
Min	Lowest positive whole number that users can enter or select to answer the question. This field is available when the question type is **Number**, **Percentage**, or **Numeric Scale**.
Max	Highest positive whole number that users can enter or select to answer the question. This field is available when the question type is **Number**, **Percentage**, or **Numeric Scale**.
Allow not applicable	Check box for including **Not Applicable** as an option for this question. Users can select **Not Applicable** if they do not have sufficient information to respond to a question. User responses of **Not Applicable** are excluded from results calculations. This field is available when the question does not have a dependency and the question data type is not **Boolean** with a check box option.
Randomize answers	Check box for displaying answer options in a random order whenever the question appears in a quiz. Answer preference is sometimes influenced by the order in which options appear, which can result in biased results. Randomizing options can help prevent this bias. Randomizing options for certain questions may make those questions confusing for users. In general, only randomize options that do not follow a logical order.

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Question Properties form (continued)

Field	Description
Details	Information about the question that is displayed on the quiz. Include details that help users understand how to answer the question. You can also enter HTML text in this field with the WYSIWYG editor. For example, include HTML to embed links and images.
Correct answer	Answer option that you want to be selected by users. When you specify a correct answer for a question, the system scores the question. This field is available for all data types except **Date**, **Date/Time**, and **String**. Multiple correct answers are supported for a few data types. See data types.
Choices	Options for a question with a data type of **Choice** or **Scale**. The system automatically adds text and values that you can edit for each option. Click the **+** icon to add an option, or click the **X** icon to delete an option. By default, the system arranges options in the order established by their values. To change the order, drag and drop the options.
Dependency	
Displayed when	Condition builder that hides or displays the question depending on the answer to another question in the same category. Select an existing question from the list with a data type of **Boolean**, **Choice**, **Scale**, or **Template**. Create the condition that must exist for recipients to see the dependent question, using the **is** or **is one of** operator. The system prevents recursive dependencies between questions. For example, if Question A depends on Question B, Question B cannot depend on Question A.

Related topics

Create quiz questions

Quiz reports

Quizzes provide several global reports so that assessment administrators can view important statistics.

You can share these reports with specific users or groups and change the display options.

For detailed field information and reporting options, click the link for the chart **Type**. To sort a column in ascending or descending order, click the arrow in the column heading

Quiz reports

Type	Description
Quizzes by State	State of distributed quizzes. This chart displays the percentage of distributed quizzes that are ready to take, in progress, complete, or canceled. • **Type**: Pie Chart • **Table**: Assessment Instance [asmt_assessment_instance]
Total Questions by Quiz	Total number of questions for all categories in each quiz.

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Quiz reports (continued)

Type	Description
	• **Type**: Bar Chart • **Table**: Assessment Metric [asmt_metric]
Questions by Data Type	Total number of questions in all quizzes by data type. • **Type**: Bar Chart • **Table**: Assessment Metric [asmt_metric]
Correct Answers by Assigned User	Total number of scored questions answered correctly by each assigned user. • **Type**: Bar Chart • **Table**: Metric Results [asmt_metric_result]
Number of Correct Answers	Total number of correct answers for each scored question. • **Type**: Bar Chart • **Table**: Metric Results [asmt_metric_result]
Incorrect Answers by Assigned User	Total number of scored questions answered incorrectly by each assigned user. • **Type**: Bar Chart • **Table**: Metric Results [asmt_metric_result]
Number of Incorrect Answers	Total number of incorrect answers for each scored question. • **Type**: Bar Chart • **Table**: Metric Results [asmt_metric_result]

Classic approvals

Classic approvals are a legacy process to require authorization on tasks before the work is done. In earlier releases, you could create approval records to define approval tasks and associate users or groups to approve or reject them.

Administrators can define classic approval logic by navigating to **All** > **System Policy** > **Rules** > **Approvals**.

Important:
Classic approval rules have been replaced by the Workflow Studio Ask for Approval action. Use Workflow Studio to create workflow-driven approval logic that is easier to maintain and provides better reporting information.

Administrators can see all approval requests by navigating to **All** > **Self-Service** > **My Approvals** and removing the list filter.

An approval record consists of these fields:

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Approval record components

Field	Input value
Approver	A reference to the user who is responsible for approving the related record.
State	Choices are: • Not Yet Requested (This state indicates that you are not yet asking your approvers to approve this request. Until you set the status to **Requested** they will receive no email notifications about the request.) • Requested • Approved • Rejected
Approving	A document_id reference field to the record being approved, on any table.
Comments	A journal field for storing comments regarding the approval.
Approval Summarizer	A Create a formatter and add it to a form that displays key fields relevant to the approval from the referenced document. This summarizer will not display if there is no record referenced.

Approval engines

The differences in the way that companies handle their approvals, as well as the differences between approvals for the various applications (such as Service Catalog Requests and Change Management), calls for supporting flexibility in setting up approvals within applications.

Important:
Classic approval rules have been replaced by the Workflow Studio Ask for Approval action. Use Workflow Studio to create workflow-driven approval logic that is easier to maintain and provides better reporting information.

This flexibility is provided through the selection of an "approval engine" that is used to manage the approvals for each of the Task tables (that is, all tables that extend the Task table).

There are three different approval engine options available for each Task table.

Approval engine options

Option	Description
Approval Rules	A simple set of rules that are evaluated until one matches for the Task table. The matching approval rule is used to create the users that are to approve the task. Set up approval rules by navigating to **System Policy** > **Approvals**.
Process Guides	A sequence of approval steps over which you may control how approvals and rejections are handled. This option is deprecated and should not be used.
Turn off Engines	Turn off both approval engines for this Task table. This option should be selected and is made read-only when a workflow is used to manage the approval process for the table. **Note:** Not turning off the approval engines might have a performance or behavioral impact on your instance.

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Set up an approval engine

To manage the approvals for each of the Task tables in the system, set up an approval engine.

Important:
Classic approval rules have been replaced by the Workflow Studio Ask for Approval action. Use Workflow Studio to create workflow-driven approval logic that is easier to maintain and provides better reporting information.

Before you begin

Role required: none

Procedure

1. Navigate to **All** > **System Properties** > **Approval Engines**.

   The following page appears with the **Approval Engine** option for each Task table in the system. If the **Approval Engine** option is greyed out and shows **Turn engines off**, read the **Notes** in the same row. The most common reason an approval engine is turned off is that a workflow is managing the approvals on the table. Having the approval engine turned off prevents conflicts with the workflow that could cause a range of issues. If you want to use an approval engine on the table, set the workflow to inactive.

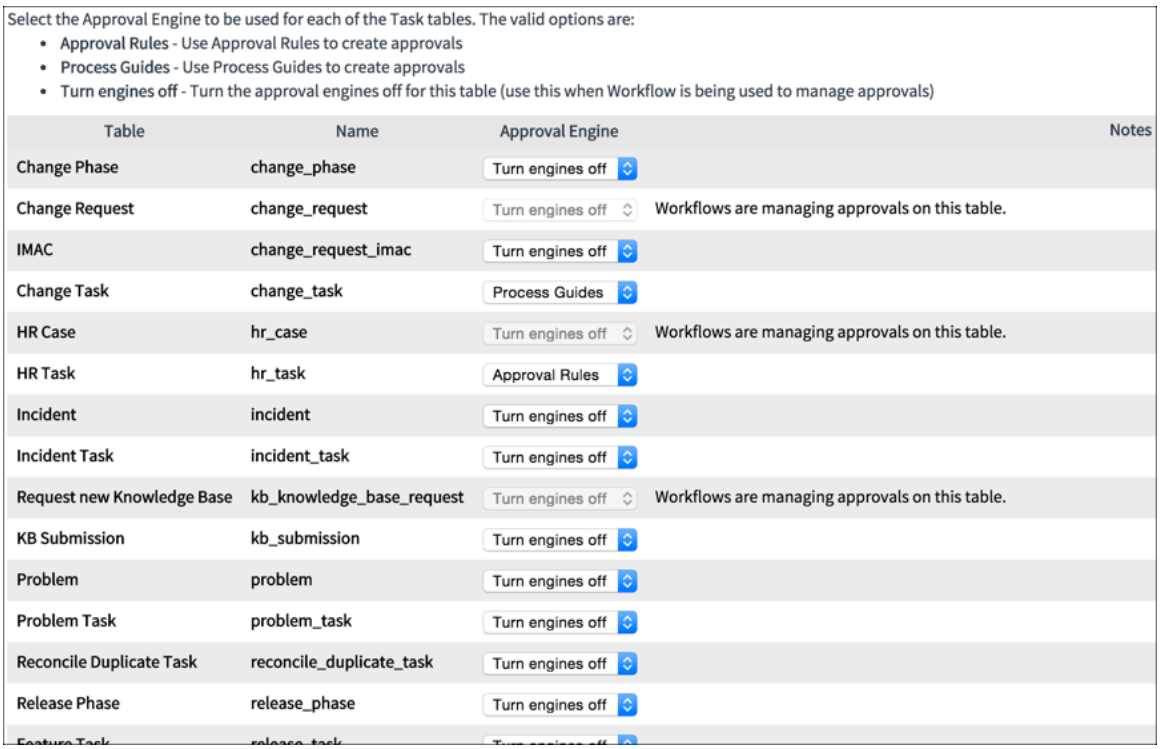
Select the Approval Engine to be used for each of the Task tables. The valid options are:
- Approval Rules - Use Approval Rules to create approvals
- Process Guides - Use Process Guides to create approvals
- Turn engines off - Turn the approval engines off for this table (use this when Workflow is being used to manage approvals)

Table	Name	Approval Engine	Notes
Change Phase	change_phase	Turn engines off	
Change Request	change_request	Turn engines off	Workflows are managing approvals on this table.
IMAC	change_request_imac	Turn engines off	
Change Task	change_task	Process Guides	
HR Case	hr_case	Turn engines off	Workflows are managing approvals on this table.
HR Task	hr_task	Approval Rules	
Incident	incident	Turn engines off	
Incident Task	incident_task	Turn engines off	
Request new Knowledge Base	kb_knowledge_base_request	Turn engines off	Workflows are managing approvals on this table.
KB Submission	kb_submission	Turn engines off	
Problem	problem	Turn engines off	
Problem Task	problem_task	Turn engines off	
Reconcile Duplicate Task	reconcile_duplicate_task	Turn engines off	
Release Phase	release_phase	Turn engines off	

2. Select the approval engine option for each Task table from the choice list.
3. Click **Save**.
   These preferences are saved as system properties that are named *glide.approval_engine.<table_name>*.

Approval rules

Many organizations rely on an approval process to ensure that requests are reasonable and fit an organization's budget.

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Important:
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The service catalog can use these classes of approvals:

- Gating approvals: Must occur before a request can be initiated. For example, allow a manager to reject an employee's request for a company car. To learn more about gating approvals, see Gating approvals.
- Process approvals: Take place within an execution plan process that has been initiated. For example, allow the security group to reject a request for access to SSN even though the employee's manager approved it. To learn more about process approvals, see Process approvals.

Note:
To enable approval processes to operate smoothly, make sure that the appropriate users have the correct role, and that the role grants access to the necessary tables for users in all the relevant departments and domains.

Set automatic approval rules

Approval rules can automatically set the approval state to something other than *Not yet requested*. As a result, an approval rule can create a set of approvers. You can also start the approval process by setting the approval state to **Requested**.

Important:
Classic approval rules have been replaced by the Workflow Studio Ask for Approval action. Use Workflow Studio to create workflow-driven approval logic that is easier to maintain and provides better reporting information.

Prerequisites

Role required: admin

Approval rules have two new fields:

- **Run rule before**: If true, the approval rule runs before the record is inserted/updated.
- **Set State**: If this rule applies, then the task record's approval state is automatically set to this value.

Note:
The **Set State** field only behaves as expected if the **Run rule before** check box is enabled.

- In the example below, this rule automatically sets the state of the task to *Approved* thereby auto-approving the task.

Approval Rules fields

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Gating approvals

A gating approval acts as a gate through which a request must pass before it can start.

Until all gating approvals are met, no notifications go out, no tasks get sent to technicians, and nobody starts working on the request in question.

Generate gating approvals with:

Gating approvals

Title	Description
Approval rules	Can apply to the service catalog as well as any other task table.
Item-based approvals	Flag specific catalog items as requiring specific approvals. Any requests for these items automatically require these approvals.

Related topics

Set up a gating approval via an approval rule

Set up a gating approval based on the item being ordered

Set up a gating approval via an approval rule

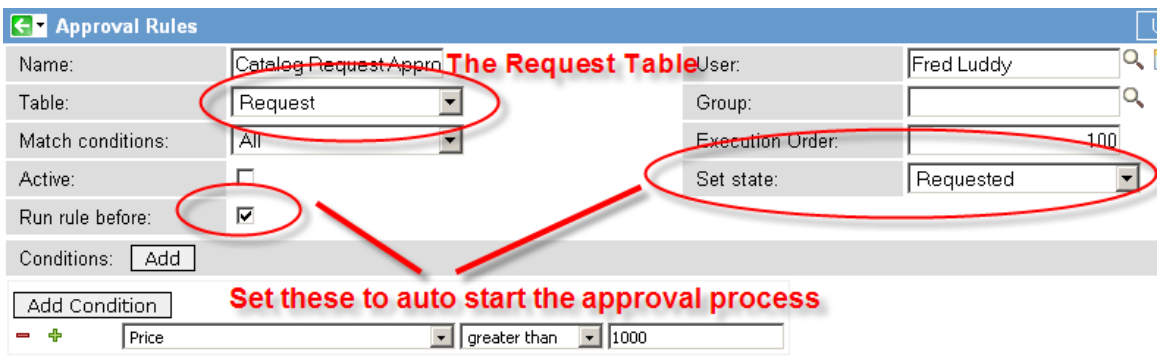
You can set up a gating approval via an approval rule.

Important:
Classic approval rules have been replaced by the Workflow Studio Ask for Approval action. Use Workflow Studio to create workflow-driven approval logic that is easier to maintain and provides better reporting information.

Before you begin
Role required: admin

Procedure

1. From the left navigation pane, select **System Policy** > **Approval Rules**.
2. Click **New**.



Approval rules

Field	Description
Name	Name of this rule.

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Field	Description
Table	Task table to which this rule applies. For most service catalog approvals, select **Request**. **Note:** The list shows only tables and database views that are Application scope as the approval rule.
Active	Indicator of whether the rule is active (defaults to true).
Run Rule Before	Indicator of whether the rule runs before or after the request record is saved. For most approvals, select this check box.
User	User who must approve this request (can be empty).
Group	Group that must approve this request (can be empty).
Set State	Value of the approval field on the task in after this rule runs. In most cases, select **Requested**.
Condition	Condition under which the rule applies.
Script	An optional server script to programmatically specify who the approver should be. For example, for the one-line script `current.requested_for.manager`, ServiceNow checks the requested_for reference field on the current record. It then locates the manager field on the referenced record and assigns that person as the approver. For other examples, see the Script field on approval rules provided by ServiceNow.

Notes and limitations:

a. You can have as many rules as you want on a given table. If more than one rule applies, you will get more than one approver.

b. You can't get duplicate approvers, for example, if two rules both want Fred Luddy to approve a particular request, the system will only create one approval entry for him.

c. By default all requests start out in a **Not yet requested** approval state. Approval notifications will not go out until the request's approval state is set to **Requested**. You can do that manually, or you can do it in script, but the easiest way to do it is to use the **Set State** field to automatically set the request to **Requested**.

Set up a gating approval based on the item being ordered

In addition to adding approvals via approval rules, you can also add approvals based on what kind of item is being ordered.

Important:
Classic approval rules have been replaced by the Workflow Studio Ask for Approval action. Use Workflow Studio to create workflow-driven approval logic that is easier to maintain and provides better reporting information.

In addition to adding approvals via approval rules, you can also add approvals based on what kind of item is being ordered. We can, for example, specify that all Blackberrys need to be approved by David Loo.

To do so, navigate to the item in question and scroll to the related list of required approvers. There are two lists:

- **Approved By Group**: A list of groups that have to approve requests for this item
- **Approved By**: A list of users who have to approve requests for this item

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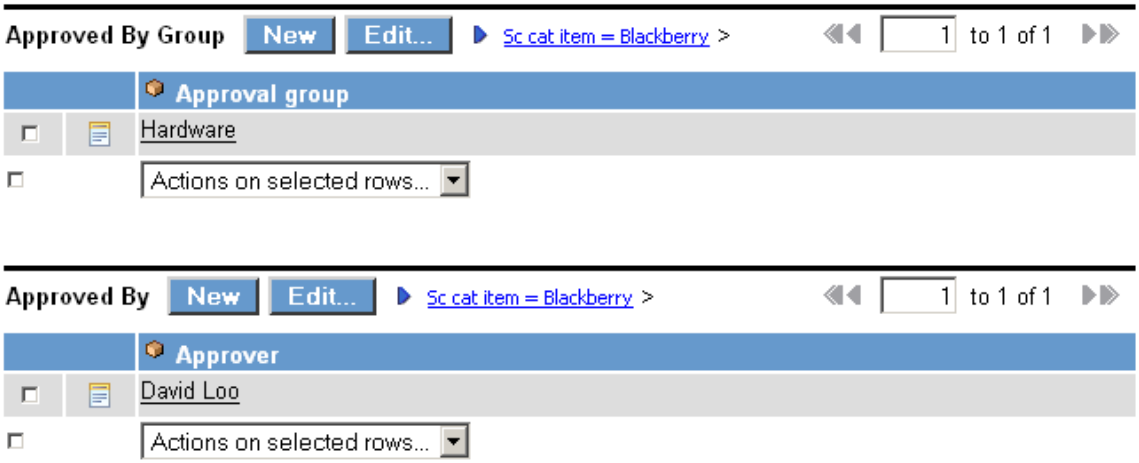
Approve list



In the example above, this request must be approved by all members of the Hardware group and by David Loo.

Notes and limitations:

1. As with approval rules, you are protected against duplicate entries. Thus if a person is a member of the hardware group, as well as being a standalone approver, the person will only get one approval request.
2. Item-based approved work in addition to rather than instead of approval rules so you can (and probably will) use both.

Process approvals

Once a request has passed its gating approvals, any relevant execution plans are initiated.

> **Important:**
> Classic approval rules have been replaced by the Workflow Studio Ask for Approval action. Use Workflow Studio to create workflow-driven approval logic that is easier to maintain and provides better reporting information.

Those plans, in turn, create a sequence of required tasks. You can add an approval step to an execution plan, which is configured to occur at the appropriate point.

From the left navigation pane, select **Service Catalog** > **Execution Plans**, and then select the plan to which to add an approval step. Then click the **New Approval** button.

The Approval Task screen appears. Just like a regular Service Catalog execution task, an approval execution task has:

- **Name**: The name of this task
- **Order**: Sequence of this task within the plan
- **SLA**: SLA to which this task applies
- **Delivery Time**: Time allowed for the completion of this task

After you create the task, right click the title bar and select **Save**. Two related lists appear at the bottom of the screen:

- **Approved By Group**: A list of groups that must approve the request before this task is complete
- **Approved By**: A list of users who must approve the request before this task is complete

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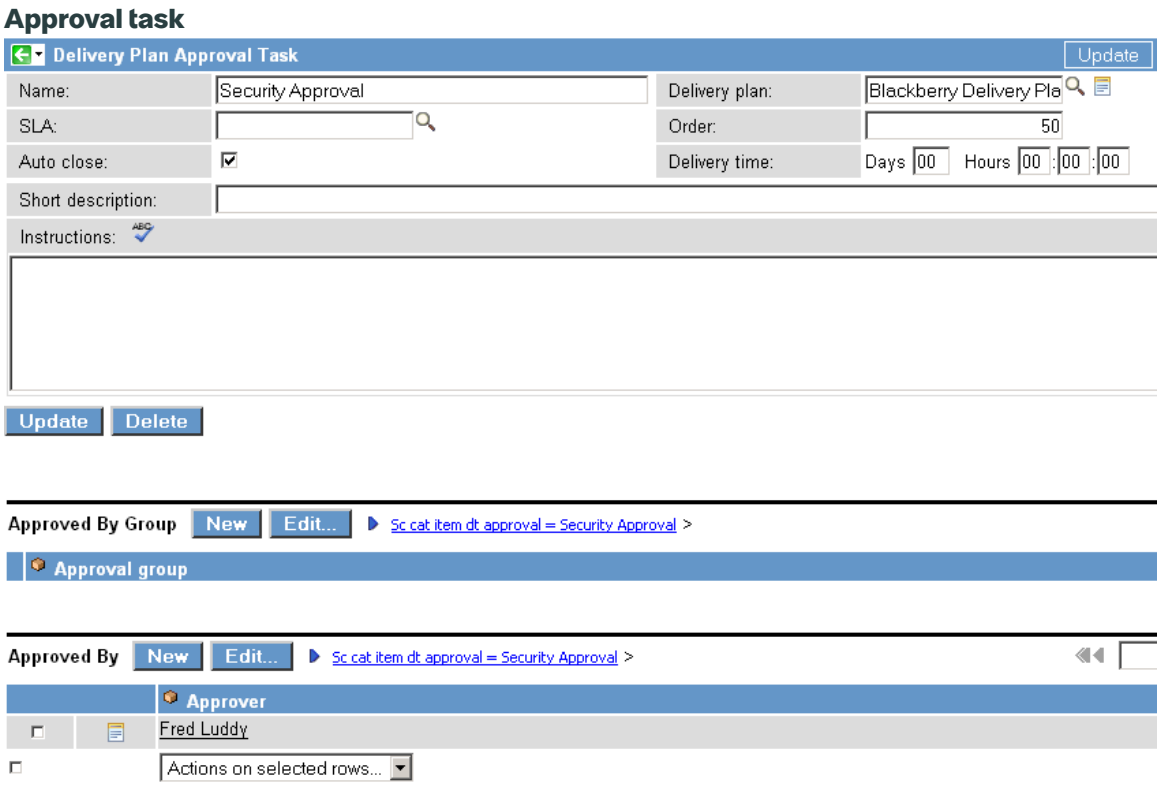

In the example above, this security approval task must be approved by Fred Luddy.

Note:
When an in-process approval is rejected, that particular line item is canceled as well, but the request itself isn't necessarily canceled. Thus if one ordered a blackberry and a laptop, and the blackberry was rejected, the laptop request would continue being processed.

Approve with a process guide

Process guides work similarly to approval rules in that their execution is controlled via a condition.

Important:
Classic approval rules have been replaced by the Workflow Studio Ask for Approval action. Use Workflow Studio to create workflow-driven approval logic that is easier to maintain and provides better reporting information.

Before you begin

Role required: none

About this task

The default version of approval tasks allows you to specify that the approval in question be approved by:

1. One or more specific people
2. One or more groups of people

You can optionally use Process Guides instead of approval tasks. Process guides are more flexible in that they allow for:

1. "Any of" or "All of" approvals
2. Sequenced approvals

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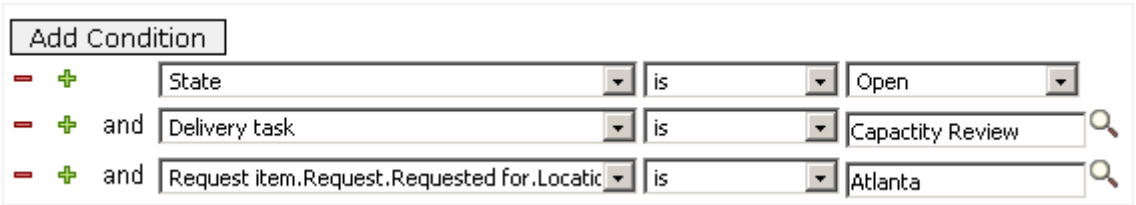
You can link a process guide to a execution task.

Procedure

1. From the left navigation pane, select **System Policy** > **Process Guides**.
2. Create a new guide.
3. Set the table to **Catalog task**.
4. Fill in a condition under which this guide should attach.

   Example #1: Apply to all "Capacity Review" tasks.

   Example #2: Apply to all "Capacity Review" tasks where there requester is in Atlanta.



   Process guide tips and tricks:

   a. All catalog tasks are generated when a request is first submitted, but tasks which aren't active yet have a state of "pending". So if you do not want to send out approval requests until a task has actually started, add "state=open" as part of your condition.

   b. There is a "Default" process guide in the system for catalog tasks with a sequence number of 10,000. It behaves exactly the same way the old, pre-process guide code did in regards to approvals. Approvals are based on the execution of task-related lists.

Schematic of a hypothetical approval process

In the diagram below of a hypothetical approval process, the gating approval is color coded blue and an in-process approval is orange.

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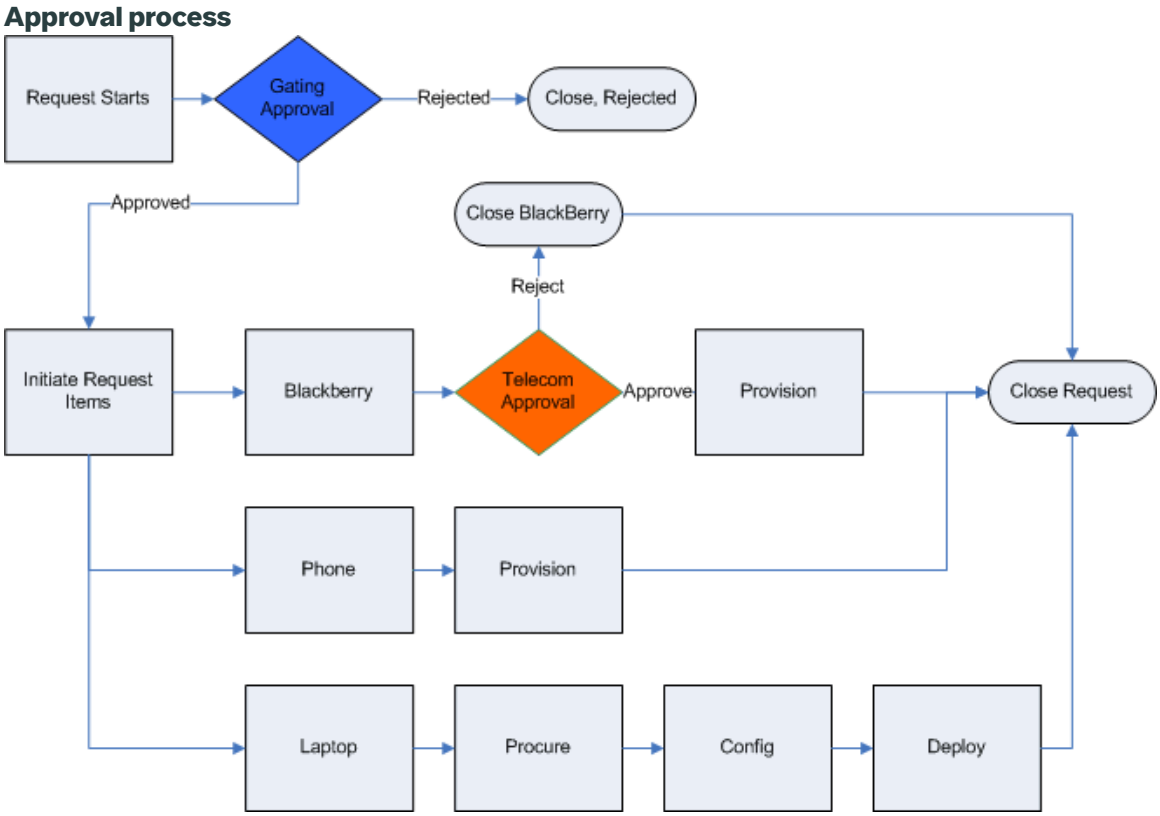
Approval process



Approval summarizer formatter

The approval summarizer formatter creates the summary at the bottom of an approval form.

The approval summarizer displays full information for the record used to request approval.

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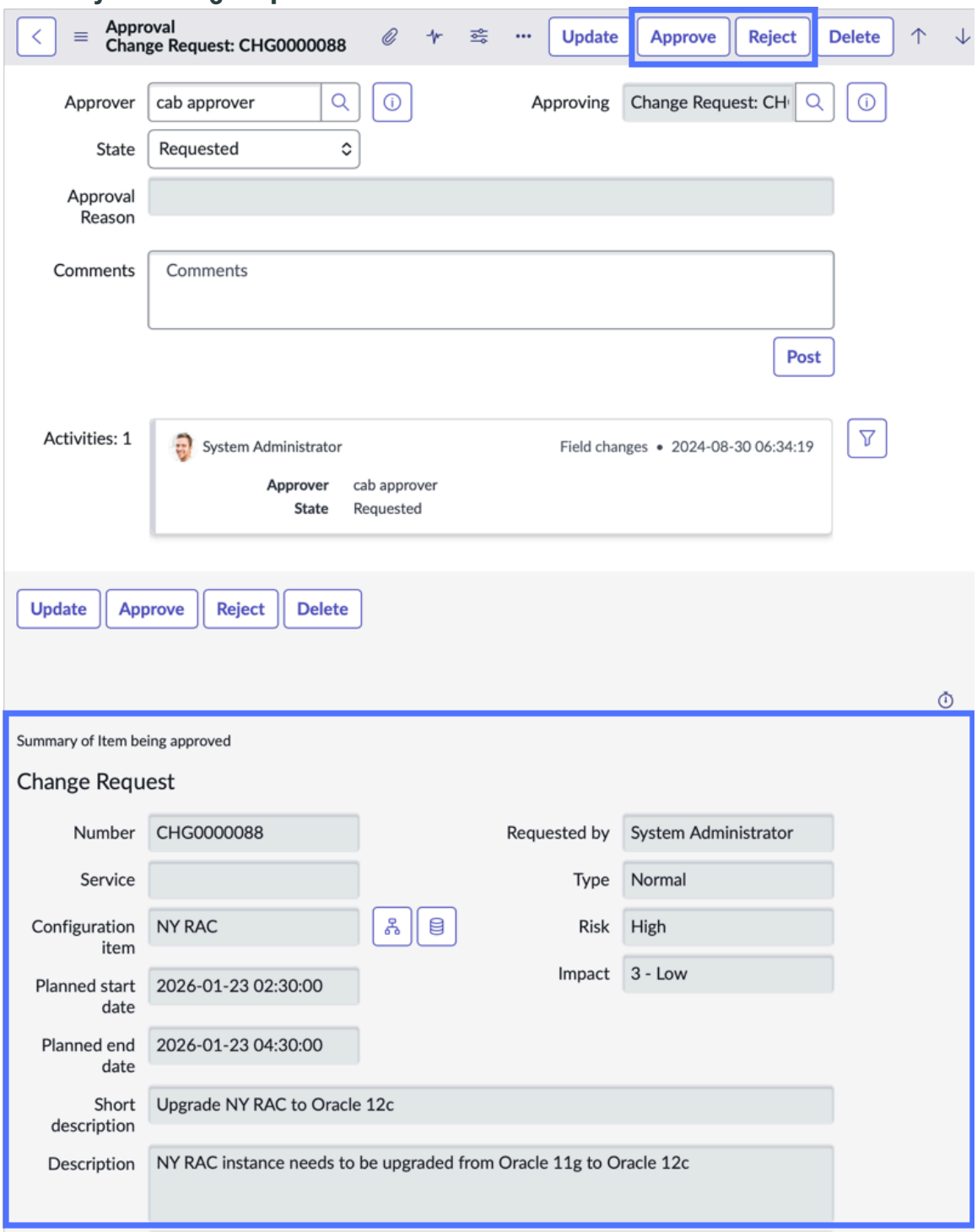
Summary of a change request



The **Reject** button allows the approver to deny one or more requested items in a multi-item request, before approving the overall request. If a requested item is denied, the workflow for that item never starts. The approver can then choose to **Accept** the item.

Note:
When the overall request is approved, you must ensure this **Reject** button is hidden. If this button is used after request approval, the requested item workflow is canceled, leaving the stage in an inconsistent state. Similarly, the **Accept** button on requested items should only appear before the overall request is approved or rejected.

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Related topics

Using formatters

Summarizers

Approval summarizers are stored in the Macro [sys_ui_macro] table.

From the left navigation pane, select **System UI** > **UI Macros**. Summarizers use a naming convention of approval_summarizer_ + '<table_name> (for example, approval_summarizer_change_request is the summarizer for change requests, while approval_summarizer_sc_request is the summarizer for service catalog requests).

Each summarizer is written in Jelly script, which is used to define internal forms. The script is stored in the large XML field at the bottom of the UI Macro form.

Change an approval summarizer

You can modify existing approval summaries to include additional information.

Before you begin
Role required: none

About this task
These are advanced customizations that might not be appropriate for all implementations, and require creating a custom form.

Procedure

1. Navigate to **All** > **System UI** > **UI Macros**.
2. Open the summarizer you want to change.
3. Copy the script to another location before editing, in case you need to revert it.
4. Modify the script.
5. Click **Update**.

Create a new custom approval summarizer

After you add a new table that has approvals to an instance, you can add a custom activity formatter by creating a new UI macro and then add it to the appropriate form.

Before you begin
Role required: admin

About this task
approval_summarizer can only be used on approval forms in the global scope.

Procedure

1. Navigate to **All** > **System UI** > **UI Macros**
2. Click **New**.
3. Give the macro a name that follows the summarizer naming convention: `approval_summarizer_<tablename>`
4. Complete the rest of the form and click **Submit**.
5. Create a formatter and add it to a form and add it to the appropriate form.
   To learn more about activity formatters, see Activity formatter.

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Approval with e-signature

Approve or reject an approval record by re-entering your login credentials. See the history of an approval from its activity stream or its audit history.

Support for Title 21 Code of Federal Regulations (CFR) Part 11

The Approval with e-signature plug-in is validated for Title 21 CFR Part 11 electronic signature requirements. This plug-in is required for compliance to 21 CFR Part 11.

Each time someone approves a record, the system stores this information.

- The printed name of the signer
- The date and time when the signature was made
- The meaning of the signature (approval or rejection)

This information is stored as part of the activity stream and audit history of the record.

Approval tables

By default, Approval with e-signature supports these tables.

- Change Request [change_request]
- Standard Change Proposal [std_change_proposal]

When you add an approval table, any approval for the table needs an e-signature authorization. See Select an approval table to add or remove a table from supporting Approval with e-signature.

Approver Authentication dialog

Approvers must enter their user credentials to change the approval state. If the credentials fail, then the approval remains unchanged. The system checks the user credentials against local user records or an active single sign-on integration.

Approval History

Each Approval [sysapprover_approver] record has an activity stream that tracks changes to it. Approvals made by e-signature are stored as field changes.

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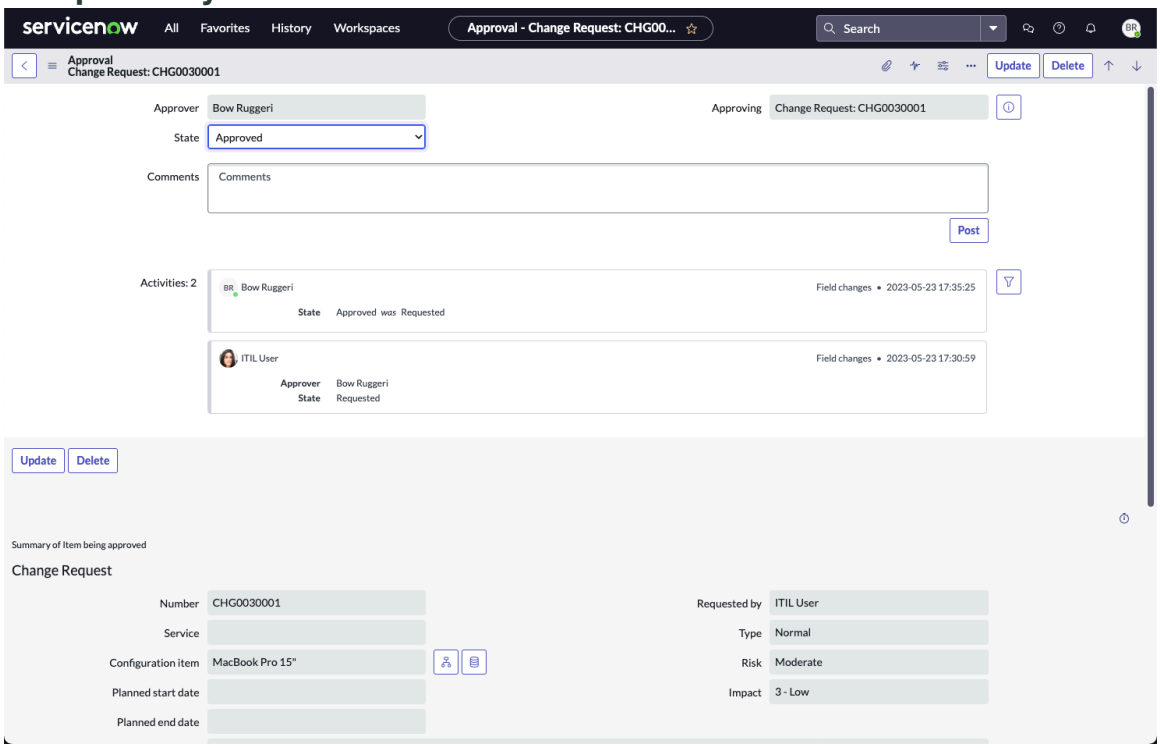
Example activity stream



Available approval options

The Change Request [change_request] table provides these approval options.

List options

The Change Request table provides context menu options to approve or reject records. When someone selects either the Approve or Reject context menu option, the system displays the Approver Authentication confirmation dialog.

UI actions

The Change Request form provides UI actions to approve or reject a record. When someone selects either the Approve or Reject UI action, the system displays the Approver Authentication confirmation dialog.

Change record state

The Change Request table provides a State field to approve or reject a record. When someone selects either the Approved or Rejected state, the system displays the Approver Authentication confirmation dialog.

User credential sources

Approval with e-signature supports these types of user credential sources.

- A set of local User [sys_user] records.
- A remote identity provider service accessed by the Multi-Provider Single Sign-On (SSO) integration.

User credentials must be set up before enabling Approvals with e-signature. See Creating users to create local User records.

See Multi-Provider single sign-on (SSO) to create an integration to a Security Assertion Markup Language (SAML) 2.0 identity provider.

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Activate Approval with e-Signature plugin

The Approval with e-Signature plugin (com.glide.e_signature_approvals) allows users to approve requests by re-entering their login credentials.

Before you begin

Role required: admin

Note:
You must install the Code Signing Signatures (`com.glide.code_signing.signatures`) to install the E-signature plugin.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

De-activate e-signatures

Use this procedure to de-activate e-signatures.

Although plugins cannot be removed, e-signatures can be disabled.

1. Navigate to **System Definition** > **E-Signature Registry**.
2. Set **Enabled** to **False** on any tables where e-signatures are no longer required.

Select an approval table

By default, activating the Approval with E-signature plugin enables e-signature for all tables for which an approval exists.

Before you begin

Role required: admin

About this task

E-signature approvals can also be enabled on a table-by-table basis.

Procedure

1. Navigate to **All** > **System Definition** > **e-Signature Registry**.
2. Select **New**.
3. In **Table name**, use the drop-down list to select a specific table.

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Table Descriptions

Field	Input Value
Table	Table that requires e-signatures for approvals.
Enabled	Option to require e-signature for approvals. Clear this option to remove the e-signature requirement.

4. Select **Submit**.

Set up an approval from a local database

Enable users to authorize e-signature approvals using local database credentials.

Before you begin
Role required: none

Procedure

1. Activate the **Approval with e-signatures** plugin.
2. Create user records for approval users.

Use Multi-Provider SSO to set up an SSO approval for a SAML 2.0 authentication

An SSO approval with e-signature requires configuration on the SAML IdP and the ServiceNow instance.

Before you begin
Role required: admin

About this task
The SAML IdP must support and honor the forceAuthn attribute in SAML assertion requests. E-signature doesn't function without this IdP setting. Set up an approval with e-signature using credentials from a SAML 2.0 authentication.

Procedure

1. Activate or upgrade to SAML 2.0 with the Activate Multi-Provider SSO plugin.
2. Activate the Approval with E-Signature plugin.
3. Navigate to **Multi-Provider SSO** > **Identity Providers** and verify your 2.0 SAML IdP configuration Advanced tab shows the **Force AuthnRequest** attribute checked.
   Your SAML 2.0 IdP must support the **Force AuthnRequest** attribute, or e-signature isn't supported.
4. On the eSignature Approval tab, enter the following e-signature SAML properties.

Option	Description
Assertion Consumer URL for eSignature authentication	This property defaults to the appropriate URL. To configure this property, select the lock icon to make this field editable. After edits, select the icon to lock the field.
Assertion Consumer Index for eSignature authentication	If your Service Provider has more than one URL set for the AssertionConsumerURL, you

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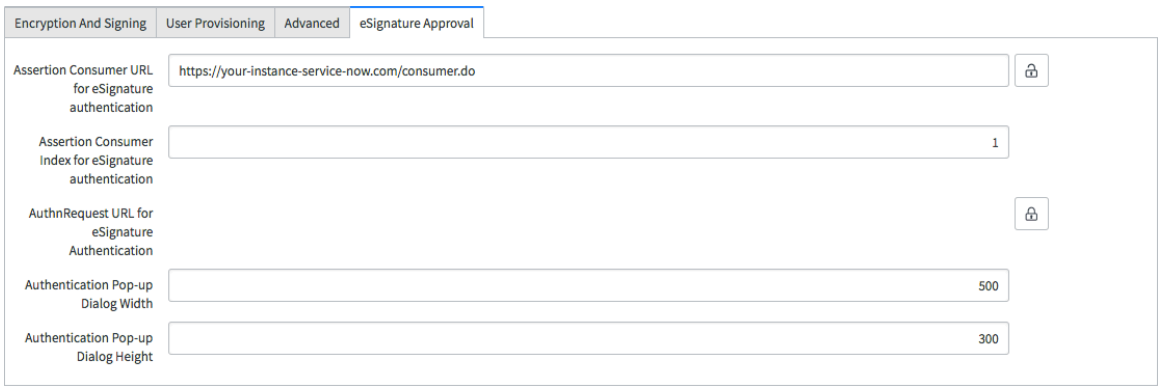
Option	Description
	can set the index to use for eSignature, start ing with index 1 or more.
AuthnRequest URL for eSignature Authenti cation	You can enter the URL that points to the SAML 2.0 IdP AuthnRequest URL for eSigna ture authentication. If the URL is the same as the Assertion Consumer URL, you can leave this setting empty.
Authentication pop-up Dialog Width	When a user approves a request using eSig nature, a dialog opens and a user can enter credentials. This setting controls the width of that dialog box. The default is 500.
Authentication pop-up Dialog Height	When a user approves a request using eSig nature, a dialog opens and a user can enter credentials. This setting controls the height of that dialog box. The default is 300.



5. Select the **Generate Metadata** button underneath the tabs to regenerate the service provider metadata.
6. Copy the service provider metadata, and update it on the SAML IdP.

Installed with approval with e-signature

Installing approval with e-signature installs certain properties.

- Module - E-Signature Registry
- UI Action - Approve (on table sysapproval_approver, with no action name)
- UI Action - Approve (on table sysapproval_approver, with no action name)
- UI Action - Approve (on table sysapproval_approver, with the action name authenticated_list_approval)
- UI Page - form_login_validate_dialog
- UI Page - login_validate_dialog
- UI page: saml2_esignature_login, the re-authentication page that appears when an approver tries to approve a request.
- Properties: see E-signature SAML properties
- Client Script - Authenticate Approver
- Script Include - User

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- Script Include - UserAuthentication
- Processor: eSigSaml2AssertionConsumer

Installing the plugin also disables the two out-of-the-box Approve UI Actions on the `sysapproval_approver` table.

Approval status

The approval status of a change request is determined by looking at the current status of all the approvers.

If any approver has rejected the change, the approval status will be Rejected. If all approvers have approved the change, the approval status will be Approved. If all approvers are in the Not Requested status or if there are no approvers, the change status will be Not Requested, otherwise the status will be Requested.

For added flexibility when creating approvals, including the ability to set up an "one of" approval where only one person of a group of approvers needs to approve, consider using Workflows .

Related topics

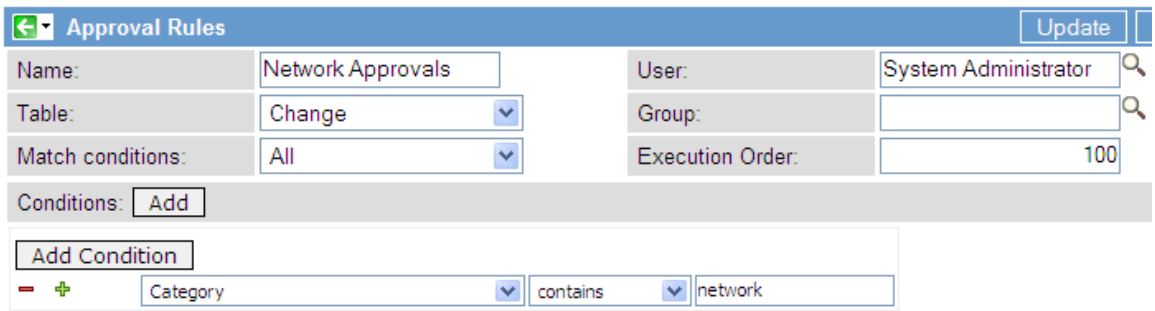
Classic approvals

Generate an approval using approval rules

The system can automatically generate an approval request to individuals or groups when specific criteria are met. The automatic generation of approval requests is driven using the System Policy feature.

In the sample below, a change opened in the category **network** is assigned to the System Administrator:

Approval Rules



When an approver is automatically added based on approval rules, the status of the approval automatically defaults to "Requested".

Related topics

Classic approvals

Generate approvals using the approvers related list

It is possible to manually add approvers to a request.

Additional approvers can be added by clicking the **Edit** button in the Approvers section near the bottom of a request. When an approver is added manually, the status for that approver defaults to **Not Yet Requested**. When the status of the approver changes to **Requested**, the approver is sent an email requesting approval action.

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Related topics

Classic approvals

Generate approvals using Workflow flows

Workflow Studio flows are a powerful and flexible method of generating approvals. Use workflow flows to create group approvals and user approvals.

A variety of variables are available to fine-tune the approval process, including the actions that occur when approval or rejection take place. When a Workflow Studio flow generates an approval record, the system populates the **Flow** field on the approval record with a reference to the flow and the Ask for Approval action. Do not use this field when creating business logic. For more information, see .

Note:
Conflicts can arise when the approval process for a table is managed by both the Workflow Studio engine and the approval engine. In general, if there is a Workflow Studio flow that manages the approval process for a table, the approval engine should be turned off for that table.

Related topics

Classic approvals

Multiple approvers

With multiple approvers, all approvers must authorize the request before the status will change to "Approved".

Should any approver reject the request, the status will immediately be set to "Rejected".

Related topics

Classic approvals

Receive notifications

Individuals who are designated approvers automatically receive approval notifications, including approval status updates.

Approval notifications will be sent at the following times:

- When an individual is assigned as an approver either automatically or manually. If a group is chosen, then all members of the group will be sent an email. By default, the email an approver receives will contain a "mailto" link that will allow the approver to either approve or reject the request directly from their email system.
- When the request reaches approved status, the person assigned to the request will receive an email indicating it has been approved.

The details contained in the emails and the points at which they are sent can be tailored using **System Definition** > **Business Rules** and **System Policy**.

Note for Blackberry users: In order to see the "mailto" links mentioned above to approve or reject a request (i.e. 'Click here to approve CHG55555' or 'Click here to reject CHG55555'), your Blackberry device must be using version 4.5 of their software which supports HTML emails. If your Blackberry device is using an earlier version, you will not be able to view or use the "mailto" links. However, as a workaround, users can reply to the email and add the statements `state:approved` or `state:rejected` within the body of the email before sending it to force the automatic approval/rejection functionality.

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If you create an appropriate Inbound Email Action, you can let approvers respond to approval email notifications with a simple "yes" or "no" answer.

Embed an approval request within the Outlook email client

Embed an interactive approval request for service catalog requests in the email notification sent to a user. The user can accept or reject the approval request from the email client.

Before you begin

Role required: admin
The Outlook Actionable Messages plugin (com.sn_ms_oam) should be activated.

Note:

- The Outlook Actionable Messages (OAM) feature is not supported in all Microsoft mail products and versions. To verify whether your version of Outlook supports OAM, refer to the Microsoft documentation.
- Actionable messages are supported only for emails sent from the @service-now.com email address. If you are sending an email from a customized email address, you should register as a new service in the Microsoft website setting the scope as **Organization**. Specify the provider ID value in the *sn_ms_oam.outlookactionable.originator* property.
- Actionable messages are based on the Sender Policy Framework (SPF)/DomainKeys Identified Mail (DKIM) validation for the email sender verification. If an email recipient receives email via an external provider, emails may not be rendered as adaptive cards.
- You cannot customize the default actionable message templates.

Procedure

1. Navigate to **All** > **System Notification** > **Email** > **Notifications**.
2. For the approval notification that requires user approval, in the **What it will contain** tab, add the following script in the **Message** field in addition to the existing information, or to the **Message** field in the configured email template if applicable.

   ```
   ${mail_script:include_approval_actionable}
   ```

   For example, for the Catalog Approval Request and Approval Request notifications, you can include the script in `request.itil.approve.role` and `change.itil.approve.role` email templates.

   This script includes the Outlook actionable message in the email notification sent to the user for approvals.
3. Click **Update**.

Dynamic approval forms

When you are looking at an approval request, the form has a context-appropriate summary of the item to be approved.

Important:
Classic approval rules have been replaced by the Workflow Studio Ask for Approval action. Use Workflow Studio to create workflow-driven approval logic that is easier to maintain and provides better reporting information.

For example, if you're looking at a Change Management approval request, you will see details from the relevant change request. For a Service Catalog approval request, you will get details of the request.

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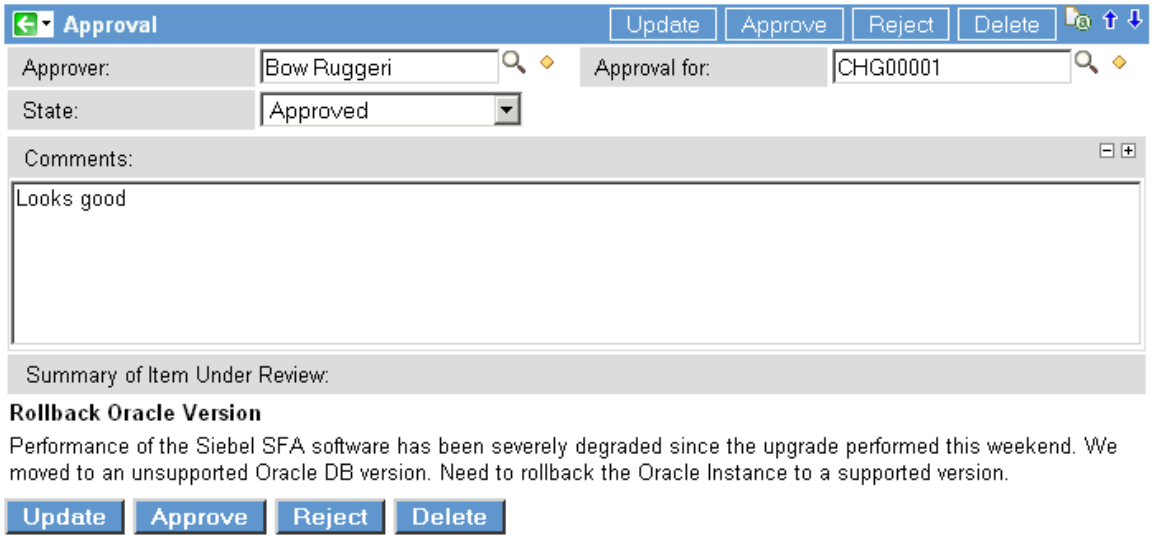
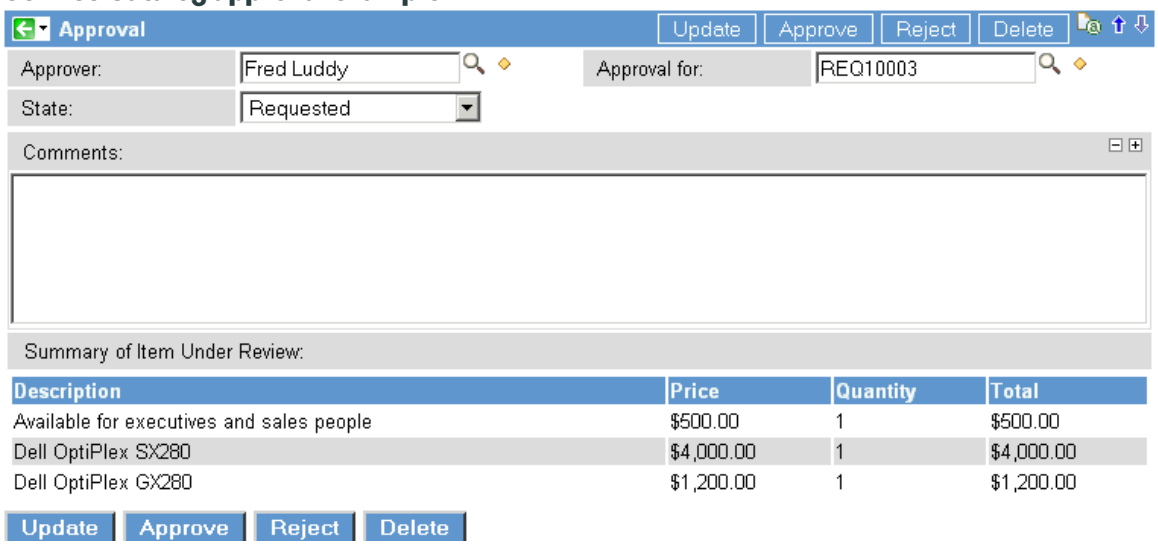
Change request approval example



Service Catalog approval example



Scripts and engines execution order

Scripts, assignment rules, business rules, workflows, escalations, and engines all take effect in relation to a database operation, such as insert or update. In many cases, the order of these events is important.

Note:
Client-based code that executes in the browser, using Ajax or running as JavaScript, will always execute before the form submission to the server.

The order of execution is as follows:

1. Before business rules: Scripts configured to execute before the database operation with an order less than 1000.
2. Before engines. The following are not executed in any specific order:
   - Approval engine (for task and sys_approval_approver tables)
   - Assignment rules engine (for task tables)
   - Escalation engine

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- Data policy engine
- Field normalization engine
- Role engine - keeps role changes in sync with sys_user_has_role table (for sys_user, sys_user_group, sys_user_grmember, and sys_user_role tables)
- Execution plan engine (for task tables)
- Update version engine - creates version entry when sys_update_xml entry is written (for sys_update_xml table)
- Data lookup engine inserts or updates
- Workflow engine (for default workflows)

3. Before business rules: Scripts configured to execute before the database operation with an order greater than or equal to 1000.
4. The data base operation (insert, update, delete).
5. After business rules: Scripts configured to execute after the database operation with an order less than 1000.
6. After engines. The following are not executed in any specific order:
   - Label engine
   - Listener engine
   - Table notifications engine
   - Role engine - keeps role changes in sync with sys_user_has_role table (for sys_user, sys_user_group, sys_user_grmember and sys_user_role tables)
   - Text indexing engine
   - Update sync engine
   - Workflow engine (for deferred workflows)
   - Trigger engine (for all Workflow Studio flows)
7. Email notifications. The following are executed based on the weight of the notification record:
   - Notifications sent on an insert, update, or delete
   - Event-based notifications
8. After business rules (Only active records). Scripts configured to execute after the database operation with an order greater than or equal to 1000.

Note:
Like After business rules, Async business rules execute their logic after a database operation occurs. Unlike After business rules, Async business rules execute asynchronously, running in the background simultaneously with other processes. Async business rules run after the user submits the form and after the scheduler runs the scheduled job created from the business rule. The system creates a scheduled job from the business rule after the user submits the form but before any action is taken on the record in the database.

State flows

State flows enable an administrator to customize transitions from one state to another in tables derived from the Task [task] table and configure the system to perform work during transitions to specific states.

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An example of a state transition is when the **State** field in an incident changes from **Active** to **Awaiting User Info**. An administrator might want to trigger an event during this transition or make a specific field mandatory when the incident reaches the end state.

State transitions in the Field Service Management application were reimplemented to use state flows. For information about customizing Field Service Management state flows, see State flow customization.

Installed with state flows

Several types of components are installed with state flows.

Tables installed with state flows

Tables are added with state flows.

Table	Description
State Flow [sf_state_flow]	Contains state flow definitions. This table contains all state flow definitions, including those for work orders and work order tasks.
Work Order Flow [sf_work_order]	Contains state flow definitions for work orders. This table is installed when Field Service Management is activated.
Work Task Flow [sf_work_task]	Contains state flow definitions for work order tasks. This table is installed when Field Service Management is activated.

Business rules installed with state flows

Business rules are added with state flows.

Business rule	Table	Description
Assert Field Uniqueness in State Flow	State Flow [sf_state_flow]	Ensures that business rules and UI actions are not accidentally copied to new state flows.
Check Client Script	State Flow [sf_state_flow]	Adds a client script to new records.
Check Event Rule	State Flow [sf_state_flow]	Adds or deletes event rules, as the event field is updated.
Check Work Notes Rule	State Flow [sf_state_flow]	Adds or deletes work note rules, as the work notes for a state flow are updated.
Create Business Rule	State Flow [sf_state_flow]	Automatically creates a business rule when automatic conditions or script are present.
Create script for Field controls	State Flow [sf_state_flow]	Create scripts for field controls, when they are in use.
Create UI Action	State Flow [sf_state_flow]	Automatically creates a UI action when manual conditions or script are filled in.

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Business rule	Table	Description
Delete Related Elements	State Flow [sf_state_flow]	When state flows are deleted, delete all related client scripts, business rules, UI actions and overrides.
Remove script for Field controls	State Flow [sf_state_flow]	If all field controls are disabled, see if any of the client scripts should be removed.
State Change	State Flow [sf_state_flow]	Get the correct state choice value when the state is changed.
Update dependent records	State Flow [sf_state_flow]	When a state flow is made active or inactive, ensure the business rule and UI actions are made active or inactive as well.

Script includes installed with state flows

Script includes are added with state flows.

Script includes for state flows

Script include	Description
StateFlow	Implements state flows and supports creation of state flow elements, such as business rules, UI actions, dictionary overrides, and client scripts.
StateFlowAJAX	Allows access to state flow functionality from client scripts.

Use state flows

You can create custom state flows for any table that uses states.

Make state transitions occur in any order or skip specific states according to your business practices. State flows can manage the behavior of fields and field visibility on a task form. State flows can also trigger system events that perform work such as sending Email and SMS notifications.

Administrators can configure state flows to:

- Limit the choice list for the **State** field to contain only those states that are valid for the flow.
- Define the behavior and visibility of specific fields on a task form when state transitions occur and for certain end states.
- Configure events that are triggered when a task changes states.
- Set up UI actions and business rules to implement certain state transitions, or while the task is in certain states.

The State Flow plugin installs records used by work management to control state transitions for work orders and work order tasks. For detailed information about using work management state flows, see State flow customization.

Creating and customizing state flows requires scripting knowledge. Users with the admin role can create state flow records.

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Dictionary overrides for state flows

A dictionary override in a state flow defines the starting state for all new records in a specific table.

You set an override in tables that extend a base table only, so that your customizations are applied only to the extended table.

1. In a state flow record, select an **Ending state**.

   This is the override value which becomes the starting state for all new records in the table named.

2. Click **Create Default Value**.

   The system populates the *Dictionary override* field with a value of *state*, which is the field in the task table affected by the override. The *Dictionary override* field is read-only. After the override is created, the system hides the **Create Default Value** button on all subsequent state flow forms for that table.

Events triggered on state changes

You can configure a state flow to trigger a registered system event when a task transitions from a starting state to a specified end state.

For example, you can use events to trigger email notifications and create script actions. When you attach an event to a state flow, the system creates a business rule called State Flow Events for <table name> for the table specified in the state flow. If you specify a start and end state, the business rule executes when the record transitions from the start state to the end state. If the state flow only specifies an end state, the business rule executes whenever that end state is reached. The system creates one business rule for all state flows containing events on a single table. When all events or all state flows on a table are deleted, the system deletes the business rule.

Field controls

You can define controls for individual fields that are enforced when a record transitions between states.

Settings in the Field Controls section of the State Flow form enable you to apply field controls when the system detects a specified state transition or when the end state is the current state when the form is opened. The control is applied only to existing fields on the form. State flows cannot add fields to the form.

For example, you might want the *Problem* field to be visible when an incident moves to the *Awaiting Problem* state. If the incident state changes to *Awaiting User Info*, you hide the *Problem* field and make the *Caller* field mandatory.

When creating field controls, configure state flow records with an ending state only and to create the correct behavior for every ending state you want to control. This configuration ensures that the field controls are set properly when the user selects a new state, and also when the user returns a record's *State* field to the original state. Only specify a full state transition, with both a starting and ending state, when you want a particular behavior for that precise state transition.

Note:
State flows use client scripts to enforce field controls. It is possible that your settings can be changed by existing UI policies, which execute after client scripts.

The system creates the following objects, as needed, to enforce field properties in state flows:

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Field Controls

Type	Name	Description
Business rule	State Flow Notes for <table name>	Enforces mandatory fields for the table on which that field behavior is defined.
Client script (onLoad)	<table name> state flow	Sets possible states and initial mandatory, read-only, and visible properties when a record is loaded.
Client script (onChange)	<table name> change state flow	Sets updated mandatory, read-only, and visible properties when a record is changed.

Rebuild state flows

You can rebuild state flows when a mismatch between existing and new sys_ids occurs.

When you use an XML file to import a state flow record into an instance, the system attempts to match the incoming states with existing states by comparing sys_ids. Because the sys_ids of items in a choice list can vary between instances, the system can fail to match the states, even though they are otherwise identical.

When matching fails, the start and end states of affected records are left blank or contain numeric values. To repair these records navigate to **State Flows** > **Admin** > **Rebuild State Flows**. This module runs a script that compares the numerical value of each item in the **State** field choice list until it finds a match in the imported state flow record.

State flow cleanup

Work notes

Related topics

Use state flows

Create a state flow

Create a state flow

Creating State Flows.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **State Flows** > **State Flows** and click **New**.
2. Fill in the fields, as appropriate.

   The system enforces the field controls with the same client script that filters the choice list for the *State* field.

Creating state flows

Field	Description
Number	Automatically generated record number

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Field	Description
Table	[Required] Table on which the state flow record runs. Only tables that extend the Task `[task]` table are available in the list.
Starting state	Name of the state at the beginning of the transition. The selections in this field are filtered by the possible states for the table selected.
Ending state	Name of the state at the end of the transition. The selections in this field are filtered by the possible states for the table selected.
Client script	Client script to run for this transition. The client script controls the available states you can select by limiting the contents of the *State* choice list to valid states. This client script also controls specific field behavior configured for state changes in the Field Controls section of the form.
Event	Name of an existing event to trigger when this transition occurs. See evernts triggered on state changes for more information.
Name	Name of this record. Make sure the name is descriptive of the state transition or the processing that the record is performing. This name does not have to be unique.
Roles	Not used for any processing.
Active	Enables or disables this state flow record.
Class	Defines the state flow class for this record. The system selects the appropriate class from these options: ○ *State Flow*: Records created for state flows in all task-based tables except those in work management. ○ *Work Order Flow*: Records created for state flows in the Work Order `[wm_order]` table. This class is available when work management is activated. ○ *Work Task Flow*: Records created for state flows in the Work Order Task `[wm_task]` table. This class is available when work management is activated.
Dictionary override	Sets the starting value for the *State* field on all new records for the table named in the state flow record. See dictionary overrides for configuration procedures.
Work notes	Noteworthy comments about this state flow transition. For details about how these notes are used, see Work Notes.
Comment	Details about the customized record.
Manual (Runs scripts from a UI action that require the user to click a button or related link.)	
Manual condition string	Conditions for enabling a UI action that cannot be defined with the condition builder. For example, you can use this string to define UI actions for mobile devices. This condition has an [and] relationship with the condition in the *Manual condition* field.
Manual condition	Conditions for enabling a UI action that can be defined for fields in the target table. This condition has an [and] relationship with the condition in the *Manual condition string* field.
Manual script	Script that defines what the UI action does when the conditions are true. This script runs when the user clicks a button or a related link.

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Field	Description
UI action	[Read Only] Name of the button that the system creates to enable this transition. The system creates the label using the same name as the state flow record that created it.
Automatic (Runs a business rule automatically when a task record is changed and updated.)	
Automatic condition string	Conditions for running the business rule that cannot be defined with the condition builder, such as evaluating if the proposed transition is a valid flow. This condition has an [and] relationship with the condition in the *Automatic condition* field.
Automatic condition	Conditions for running the business rule that can be defined for fields in the target table. This condition has an [and] relationship with the condition in the *Automatic condition string* field.
Automatic script	Script that performs additional work when the condition is true. This script can do tasks such as update the date and time the transition occurred or notify someone using email when a specific state change occurs. Automatic state transitions occur when changes are made to the task record.
Business rule	Name of the business rule created for this transition. Two conditions must be satisfied before this business rule can run. The task must be on a specific starting state, and the *Automatic condition* must be true. If both of these conditions are satisfied, the business rule performs the transition requested, using the starting and ending states from the State Flow form.
Field Controls (Determines field properties when a record transitions between states or reaches a specific end state.)	
Mandatory fields	Makes the selected fields required when this transition occurs, or when the end state is the current state.
Read only fields	Prevents the selected fields from being edited when this transition occurs, or when the end state is the current state.
Visible fields	Displays the selected fields when this transition occurs, or when the end state is the current state.
Not mandatory	Makes the selected fields optional when this transition occurs, or when the end state is the current state.
Not read only	Makes the selected fields editable when this transition occurs, or when the end state is the current state.
Not visible	Hides the selected fields when this transition occurs, or when the end state is the current state.

3. Determine if you want the state transition method to be manual or automatic and open the appropriate section on the form.
   - *Manual*: Click **Create UI Action** to create a button on the task form that enables users to execute the transition manually. The system uses the value in the *Name* field as the label for the UI action. The UI action executes the script in the *Manual Script* field when the conditions are true. For example, a manual transition can create an **Activate** button when an incident is in the *New* state that enables a user to mark the incident as active.
   - *Automatic*: Click **Create Business Rule** to create the business rule. The business rule executes the script in the *Automatic Script* field when the conditions are true. For example, a business rule created by the system can set an incident state to *Assigned* when the *Assigned to* field is populated. Business rules are automatically deleted when the state flow record is deleted. For more information, see Business rules.

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4. **Optional:** Click **Create Client Script** to create the script that limits the values offered in a task record's *State* field to valid states for that transition.
5. Configure the fields in the *Field Controls* section to control how specific fields display when a task record changes states.

Related topics

Use state flows

State flow cleanup

The business rules, client scripts, and UI actions that the system creates automatically to perform custom transitions exist only while the state flow records that use them are present.

When all the state flows on a table are deleted, the system attempts to delete any unnecessary programming elements that were created on that table, using these criteria:

State Flow Cleanup

Element	Deleted When
UI action Business rule Dictionary override	The state flow that created it is deleted.
Business rule that processes events triggered by a state flow	All state flows for the table specified that have events configured are deleted.
Client script (onLoad)	All state flows for the table are deleted.
Client script (onChange)	All state flows with field controls are deleted.
Work notes business rule	All state flows with field controls or work notes are deleted

Related topics

Use state flows

Create a state flow

Work notes

Work notes are an important part of the state flow process and are used to communicate information about state transitions.

The state flow adds these work notes to the *Work notes* field of any task making this transition.

These rules apply to state flow work notes:

- For a state flow with no Starting state, the work note is added every time the task transitions to the Ending state.
- For a state flow with a Starting state and an Ending state, the work note is added only when the task transitions from that starting state to that ending state.
- If two state flows with work notes have the same Ending state, but only one has a Starting state, the system adds the work notes from the state flow with the starting state. This better matches the state flow work note to the more important transition between specific starting and ending states.

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Related topics

- Use state flows
- Create a state flow

Domain separation and State Flows

Domain separation is unsupported in State Flows. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: No support

- The domain field may exist on data tables but there is no business logic to manage the data.
- This level is not considered domain-separated.

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

Overview

Domain separation provides complete data isolation for domain-specific users.

Related topics

- Domain separation for service providers

Geolocation

The geolocation feature uses Google Maps to track users, plan efficient routes between locations, and assist in finding accurate travel times for applications that require this information, such as Work Management.

The system locates users from latitude and longitude information provided by their mobile devices or browsers. Tracking the location of certain users can improve business processes such as the completion of work order tasks. For example, in work management geolocation, the system updates an agent's position each time that agent updates a task record. When the system updates an agent's location frequently, agents and dispatchers can use features like auto-routing to create efficient schedules.

Geolocation features can be configured by users with the admin role.

Related topics

- Geolocation Google key
- Geolocation history
- Location tracking
- Activate geolocation

Activate geolocation

An administrator can activate the Geolocation plugin.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Geolocation plugin (com.snc.geolocation) using the filter criteria and search bar.

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You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

Note:
When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Related topics

Geolocation

Installed with geolocation

Several component types are installed with Geolocation.

The Geolocation plugin adds a field called Geolocation tracked to the User `[sys_user]` table. This field allows the system to track individual users by their geographical coordinates.

Business rules installed with geolocation

Business rules are added with activation of Geolocation.

Name	Table	Description
GeoLocation Data updated	User [sys_user]	Populates the **Latitude** and **Longitude** fields on the Geolocation History [geo_history] table when the **Latitude** and **Longitude** fields are updated on the User [sys_user] table.

Related topics

Installed with geolocation

Client scripts installed with geolocation

Client scripts are added with activation of Geolocation.

Name	Table	Description
Update Geolocation on Task	Task [task]	Populates the **Latitude** and **Longitude** fields on a user record with GPS coordinates when that user loads any record on the Task table or a table that extends Task. This occurs only when geolocation tracking is enabled for the user.

Related topics

Installed with geolocation

Properties installed with geolocation

Geolocation provides the following configurable properties in **Geolocation** > **Administration** > **Geolocation Properties**.

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The Google Maps plugin provides additional map properties that are used to implement and control specific geolocation features. You must have a private key for Google Maps API for Business to take advantage of the properties listed here.

Properties

Name	Description
glide.geolocation.allow.toll.roads	Allow toll roads to be used. Allows the system to use toll roads when auto-routing or optimizing task routes for agents. • **Type**: True/false • **Default value**: True
glide.geolocation.default.start.time	Default start time for all agents when no schedule is set. This value sets the start time for a day other than the current day, when no scheduled task exists or is continued from the previous day. This property uses a 24 hour clock. • **Type**: String • **Default value**: 08:00
glide.geolocation.evening.rush.hours	Evening rush hour span, formatted as 14:30-16:00. All times are expressed as a range, separated by a dash with no spaces. Times not using this format are ignored. This property must be used with the work.management.morning.rush.hours and work.management.rush.travel.buffer properties and uses a 24 hour clock. • **Type**: String • **Default value**: 0
glide.geolocation.history.cleanup	Number of days to keep history data. ServiceNow keeps agent geolocation history records for the number of days specified by this value. • **Type**: Integer • **Default value**: 30
glide.geolocation.morning.rush.hours	Morning rush hour span, formatted as 06:30-08:00. This property uses a 24 hour clock. All times are expressed as a range, separated by a dash with no spaces. Times not using this format are ignored. This property must be used with the work.management.evening.rush.hours and work.management.rush.travel.buffer properties. • **Type**: String • **Default value**: 0

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Properties (continued)

Name	Description
glide.geolocation.proximity	Minimum distance an agent must move to be considered in a new location (in meters). This setting establishes a geolocation perimeter that prevents ServiceNow from creating unnecessary history records when an agent has multiple tasks in the same vicinity. An example of this might be when an agent has several tasks in one building. The system assumes that all task activity within the specified radius is part of a single record and does not create additional records when the agent moves from task to task around the building. • **Type**: Integer • **Default value**: 500 For an explanation of how location tracking works, using both the frequency and criteria properties, see the section How location tracking works, at the end of the table. **Note:** The iOS version of the app updates geolocation only when the mobile device detects a significant location change, which is determined by the your device's operating system. When the operating system updates its location, your app updates with that location change. Distance and time property values are not honored for the iOS version of ServiceNow apps.
glide.geolocation.proximity.location	Maximum distance an agent can be from a specific location and still be placed at that location (in meters). This setting defines the maximum distance that an agent can be from a specified location and still be placed at that location by the system. • **Type**: Integer • **Default value**: 200 For an explanation of how location tracking works, using both the frequency and criteria properties, see the section How location tracking works, at the end of the table.
glide.geolocation.rush.travel.buffer	Percentage to add to all rush hour travel times. The system uses this percentage to calculate schedules when auto-routing an agent. Use this property when both morning and evening rush hour times are defined. An example of a valid time buffer percentage is 15. • **Type**: Integer • **Default value**: 0

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Properties (continued)

Name	Description
glide.geolocation.tracking.frequency	Sets the length of the recurring interval, in seconds, that the system waits between attempts to capture a user's geographic coordinates. The system updates geographic coordinates only for users who have geolocation tracking enabled. The property *glide.geolocation.tracking.frequency* defines how long the system waits before updating an agent's location, regardless of task activity or travel. This prevents the ServiceNow AI Platform from creating unnecessary history records if an agent in one location views a task multiple times. • **Type**: Integer • **Default value**: 60 For an explanation of how location tracking works, using both the frequency and criteria properties, see the section How location tracking works, at the end of the table. **iOS variations** The iOS version of the app uses both proximity and frequency settings when updating geolocation. • Proximity: A new location is only saved if its distance to the previous location exceeds the configured threshold (in meters). This leverages the native iOS distanceFilter functionality. • Frequency: A new location is only saved if its timestamp is later than the previous known location's timestamp by the configured interval (in minutes). In iOS, frequency is recorded as the minimum interval to track location updates. **Android variation** The Android version of the app updates geolocation data at 1 minute intervals. The app collects a user's location using the interval set in this property, but that data is still uploaded to your instance every 1 minute. This interval at which data is sent to the server (every minute) is not configurable.

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Properties (continued)

Name	Description

	Note:
	Default proximity and frequency values differ based on the tracking type:
	• Manual tracking
	  ○ Frequency: 1 minute
	  ○ Proximity: 100 meters
	• Action-based tracking
	  ○ Frequency: 5 minutes
	  ○ Proximity: 500 meters

glide.geolocation.travel.buffer	Percentage to add to all travel times. An example of a valid percentage value is 15. • **Type**: Integer • **Default value**: 0
glide.geolocation.work.spacing	Amount of time (in minutes) to add between the end of a task and the travel start of the next. An example of a valid time value is 10. • **Type**: Integer • **Default value**: 0

How location tracking works

The location service captures new coordinates based on the configured tracking frequency and stores them in a local table. A separate service then sends all stored coordinates from the local table and send them to the server.

To determine whether to record a new location update, the system uses both frequency and proximity criteria. When the frequency interval is reached, the location service attempts to capture a new coordinate and automatically compares it with the previous location coordinate. If the difference is less than the configured proximity threshold, the coordinate is discarded and the service checks again after the specified frequency interval.

For example, if the frequency is set to 5 minutes and the proximity threshold is 50 meters, the service attempts to capture a coordinate every 5 minutes. However, if the new coordinate is within 50 meters of the previous one, it is discarded.

Script includes installed with geolocation

Script includes are added with activation of Geolocation.

Name	Description
GeolocationAJAX	Utilities the system uses when making geolocation AJAX calls.
GeolocationUtils	Core utilities for geolocation functionality.

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Related topics

Installed with geolocation

Geolocation Google key

Geolocation functions in the ServiceNow AI Platform® require a Google Maps API for Business license, or a Google Maps Javascript API Key, to enable use of Google Maps.

The auto-routing or auto-dispatch functions in Field Service Management require this license or Javascript API Key to calculate precise travel time estimates. Without these values, precise driving times cannot be calculated, and it uses rough estimates or fixed times instead.

In **System Properties** > **Google Maps**, enable the Geolocation feature using the appropriate entries from a Google Maps API for Business license, or a Google Maps Javascript API Key. To learn more, see Set up Google Maps API

Related topics

Geolocation

Geolocation history

The Geolocation History [geo_history] table contains the history of each tracked user's location over time.

To view geolocation history, navigate to **Geolocation** > **Geolocation History**. The record list shows time stamped location data for all users configured for geolocation tracking.

The following system properties, located in **Geolocation** > **Administration** > **Geolocation Properties**, control the data that appears in this table.

- Minimum distance an agent must move to be considered in a new location (in meters): Perimeter that defines a single location in which multiple tasks are present. This property prevents the system from creating unnecessary history records when multiple tasks are in the same general location.

  Note:
  A user's geo_history will not be logged if the user remained at approximately the same location, even if this property is set to 0.

- Maximum distance an agent can be from a specific location and still be placed at that location (in meters): Distance that a user can be from a specified location and still be placed at that location when the system creates history data.
- Number of days to keep history data: Time period for which the system retains history data.
- Minimum amount of time between updating the user's location (in seconds): Time period the system waits before updating a user's location, regardless of how often the user accesses tasks.

Location tracking

Geolocation adds the **Geolocation tracked** field to the User form. In the default view of a user record, select the **Geolocation tracked** check box to enable location tracking for the user.

When a user has geolocation tracking enabled, the system updates the user's geographic coordinates whenever the user opens, or loads, a record from the Task [task] table or from a table that extends Task. After this initial update, the system continues to update the user's geographic coordinates at a recurring interval if the user does not close or reload the record. To edit the length of this interval, navigate to **Geolocation** > **Administration** > **Geolocation Properties** and

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change the setting for the property that regulates the update interval for the user's location. The default setting for this property is **300** seconds (5 minutes).

Note:

- The system can update geographic coordinates only for users who have location services enabled in their browsers. Even users who have the **Geolocation tracked** check box selected may be prompted by their browsers to share or withhold their location.
- A user's geo_history will not be logged if the user remained at approximately the same location, even if the Minimum distance an agent must move to be considered in a new location (in meters) property is set to 0.

Related topics

Geolocation

Service Catalog

Use the ServiceNow® Service Catalog application to create service catalogs that provide your customers with self-service opportunities. Customize portals where your customers can request catalog items such as service and product offerings. You can also standardize request fulfillment to ensure the accuracy and availability of the items in the catalogs.

Get started

Explore	Configure	Integrate
Learn about the Service Catalog concept, types of catalog items, Catalog Builder, and catalog items.	Configure Service Catalog. Learn about setup, categories, scoping, request fulfillment, and Service Catalog security.	Learn about the integration of Service Catalog with other applications, such as ServiceNow® Employee Center, ServiceNow® Service Portal, Now® Mobile, and ServiceNow® Virtual Agent.

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Create a Service Catalog Wizard Learn about Service Catalog wizards that you can use when the input required is huge and complex. The wizard offers a step-by-step experience for the requester and also provides a side panel to provide contextual help.	Set up catalog builder Learn about setting up the catalog item building process.	Create or edit a catalog item template Pre-specify values or provide restrictions for attributes such as catalogs, categories, variable types, and portal settings, which are applicable during the catalog item creation or editing process.
Debug Debug user criteria of catalog items, UI customizations for Service Catalog pages, actions on catalog item variables, performance diagnostics of a catalog item, and so on.	Reference Get details about components like fields and properties.	

Troubleshoot and get help

- Ask or answer questions in the Service Catalog community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support
- Developer training
- Developer documentation

Exploring Service Catalog

You can use Service Catalog to customize portals where your customers can request catalog items such as service and product offerings. You can also standardize request fulfillment to ensure the accuracy and availability of the items in the catalogs.

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Service Catalog overview

You can set up one or more service catalogs and provide self-service opportunities. Organize your catalog offerings by using the ability to publish multiple catalogs targeted to specific audiences.

Catalog Builder overview

The Catalog Builder experience enables you to delegate the creation and maintenance of catalog items.

You can create or edit a catalog item (catalog item or record producer) using a visual and guided experience along with specified restrictions.

You can also create a template that can be used to create catalog items. While creating the template, you can specify values or restrictions for items created using the template, for example, restrictions to catalogs, categories, variable types, and portal settings.

From the home page of the Catalog Builder, you can do the following:

- Create a catalog item
- Create a catalog item template
- View the available catalog items
- View the available catalog item templates
- View catalog items that are recently updated
- View the configured content that describes the catalog building process in your organization.

Related topics

Catalog Builder

Types of catalog items

Service Catalog offers a few types of catalog items.

The basic Service Catalog item types include:

- Record producers: giving alternative ways of adding information such as Incidents via the service catalog.
- Order guides: to group multiple catalog items in one request.
- Content Items: catalog items which provide information instead of goods or services.
- Standard catalog items

Record Producer

A record producer is a specific type of catalog item that allows end users to create task-based records, such as incident records, from the service catalog.

Use record producers to provide a better end-user experience instead of using the regular task-based form for creating records. The look and feel of a record producer is similar to that of a catalog item. But the record producer generates a task record such as incident, instead of a requested item.

You can create a record producer for tables and database views that are in the same scope as the record producer. You can also create a record producer for tables that allow create access from applications in other scopes.

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Define a record producer in the service catalog or from the table record.

Note:

- Use a record producer to create task-based records only.
- To ensure that standard service catalog processes are followed, such as initiating workflows as expected, do not create requested item records from record producers. Instead, create requested item using catalog items.
- If the record producer script aborts the record generation, no record is generated in the Item Produced Record [sc_item_produced_record] table.

  Note:
  Do not call the update, setAbortAction method, or set the sys_class_name on current record to avoid unexpected behavior.

Create a record producer

You can create a record producer for tables and database views that are in the same scope as the record producer. Also for tables that allow create access from applications in other scopes.

Before you begin
Role required: catalog_admin or admin

About this task
An overview of record producers in the Service Catalog: what they are, and how to create them and define variables and templates for them.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Record Producers**.
2. Click **New** or select the record producer to edit.
3. Complete the Record Producer form.

   For more information about the fields and their descriptions on the Record Producer form, see Record Producer form.
4. To add attachments such as information and instruction documentation to the catalog item, see Add an attachment .
5. Click **Submit**.

   After you submit the form, the **Variables**, **Variable Sets**, **Categories**, and **Catalogs** related lists become available.
6. Open the record again to define variables for the record producer.

Create record producers from tables

You can create Service Catalog record producers directly from a table record.

Before you begin
Role required: admin

About this task
To create a record producer from a table record:

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Procedure

1. Navigate to **All** > **System Definition** > **Tables** and open the table record.

   Note:
   When using a workflow with a Record producer, set the condition to Run the workflow.

2. Under **Related Links**, select **Add to Service Catalog**.
3. Complete the **Name**, **Short Description**, and **Category** fields as you would for service catalog items.
4. Use the list to select the fields and the order in which you want them to appear.
5. To use container variables, select **|- container start -|** and **|- container end -|**.
6. Select **Save and Open** to open the record producer and define additional options.
   Alternatively, select **Save** to return to the table record.
   - A record producer is created with these values:
     - **Table name**: table record opened in step 1
     - **Name**, **Short Description**, and **Category**: information entered in step 3
   - A variable is created for each of the selected fields with these values:
     - **Name**: Column name of the field
     - **Type**: Variable type that corresponds to the field type
     - **Order**: Position selected in the slushbucket (for example, 100 for the first field and 200 for the second field)
     - **Question**: Column label of the field
   - If the field type is **Choice**, a corresponding question choice is created for each field choice.
   - The new record producer is added to the **Record Producers** related list on the table record.

Populate record producer data and redirect users

You can enter data for all records created by the record producer, and redirect an end user to a particular page after the record producer is submitted.

To enter data with a record producer, use any combination of the following methods:

- Create a variable on the record producer with the same name as the field in the target record. For example, a variable named caller_id on a **Create a New Incident** record producer populates the `caller_id` field on the new incident record. Use a variable type that corresponds to the field type.
- Define a template to assign a static field value for all records created by the record producer.
- Define a script that uses any variable or server-side objects and functions to assign values.
  - Use `current.*FIELD_NAME*` to reference fields on the record being created.
  - Use `producer.*VARIABLE_NAME*` to reference values entered by the end user.
  - Use RP.getParameterValue to return specified parameter values passed on the URL. The RP stands for Render Properties, not Record Producer.

Redirect after submitting a record producer

To redirect an end user to a particular page after the record producer is submitted, define the redirect link in the **Script** field using any of the following:

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- `producer.redirect`: Enables the redirect behavior within the Platform UI.
- `producer.portal_redirect`: Enables the redirect behavior within Service Portal.

For example, the following code redirects users to their homepage after the record producer is submitted:

- Within the Platform UI:

```
producer.redirect="home.do";
```

- Within Service Portal:

```
producer.portal_redirect = "sp?id=sc_home"
```

The following code gives the id of the record producer:

```
RP.getParameterValue('sysparm_id')
```

Order guides

Order guide submits a single service catalog request that generates several items.

For example, a New Employee Hire order guide can contain several items that new employees commonly need, such as business cards, computer, and cell phone. After selecting this order guide, the customer can then provide information about the new employee, including location and job title. The order guide then submits an order for catalog items like business cards, based on the details provided.

Order guides determine which catalog items to order by evaluating order guide rule conditions. Information the customer enters within the order guide can be passed as cascading variables to the ordered items, allowing common information to be reused across multiple items.

Administrators and catalog administrators can create order guides for the service catalog.

Order guides can be run automatically, generating a set of ordered items without needing to manually submit a service catalog request. For example, an onboarding workflow for a new employee can automatically run an order guide to order items for that employee. Order guides can also be configured to order the items of an order guide in a logical sequence. For example, you can configure your order guide to run the request for a new laptop before running the request for a new email.

Use the **Script** field in an order guide to add or remove catalog items to or from the order guide. Add catalog items to the order guide form by configuring the form layout.

- To add a catalog item that is not added to the order guide via a rule base, write the following code in the script field:

```
guide.add("<sys_id_of_cat_item>")
```

- To remove a catalog item that is added to the order guide via a rule base, write the following code in the script field:

```
guide.remove("<sys_id_of_cat_item>")
```

Create an order guide

You can create an order guide with a two-step or three-step ordering process.

Before you begin

Role required: catalog_admin or admin

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Order Guides**.
2. Click **New**.
3. Fill in the fields as appropriate.

   For more information about the fields and their descriptions on the Order guide form, see Order guide form.
4. Right-click the form header and click **Save**.
5. In the Rule base related list, define the rules that determine which items are included in an order.

   For more information, see Create a rule.
6. **Optional:** Configure the sequence in which the items in a rule base of an order guide must be fulfilled by selecting the **Generate sequence** button.

   (Optional) For more information, see Configure a sequence to fulfill items in order guides.
7. **Optional:** In the *Variables* related list, define any variables required.

Configure a sequence to fulfill items in order guides

Configure a sequence in Playbooks to fulfill items in order guides. Once you define a sequence, you don't have to manually check whether required items have been fulfilled before fulfilling their dependent items.

Before you begin

The Order Guide Sequential Fulfillment (com.glideapp.servicecatalog.order_guide_sequencing) plugin must be installed. Navigate to **System Plugin** and search for this plugin. The plugin form allows you to activate or repair the plugin.

The order guide must contain at least one item in the rule base.

Role required: admin or both catalog_admin and playbook.admin

About this task

A sequence can be defined for an order guide so that all the items in the order guide do not move to the in-progress state immediately after order guide fulfillment is started. You can configure when an item must be fulfilled. The requested items will remain in the pending state until the time order guide fulfillment reaches the point where the requested item must be fulfilled. Any record generated through record producers will only be generated when order guide fulfillment reaches the point where the record is processed.

Sequence generated for order guides with only record producers as rule base items will not be considered.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Order Guides**.
2. Select the order guide for which you want to create a sequence in which the items must be fulfilled.
3. On the form, select the **Generate sequence** button in the top-right corner.
4. Enter a name for the sequencing process in the **Process name** field.
5. Select **Generate**.

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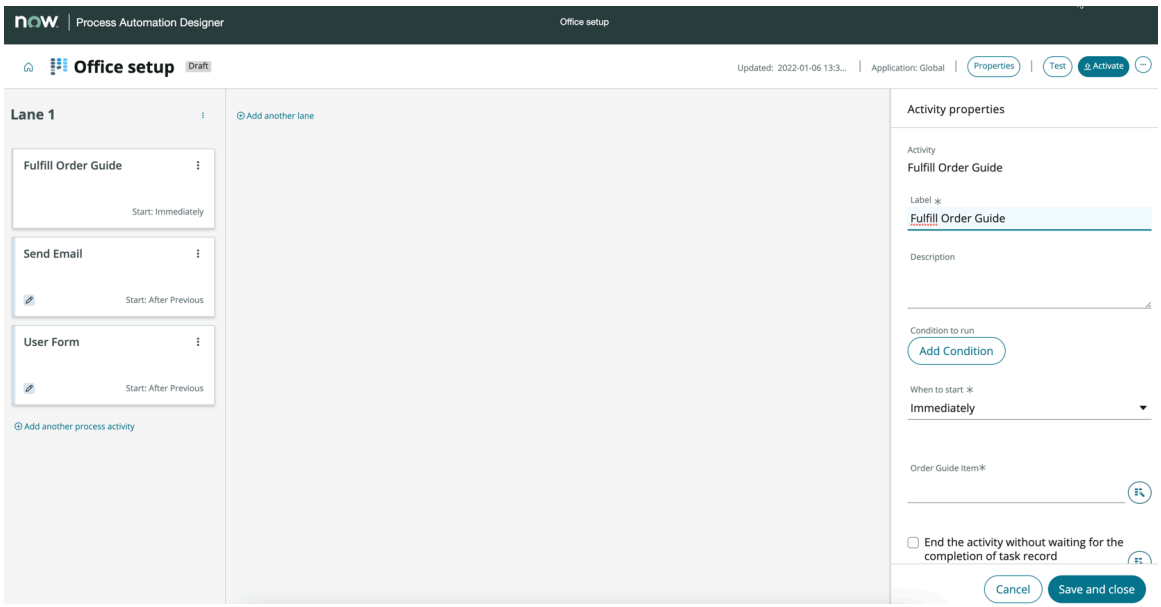
The Playbooks page is displayed on a new tab and items are added to **Lane 1** according to their sequence in the rule base.

You can change the default name of the first lane, Lane 1, by selecting **Lane actions > Configure lane** and modifying the name.



6. In the lane, select an activity card for the item you want to configure.
7. Configure the activity's properties.

Activity properties

Field	Description
Label	Name of the rule base in the sequence.
Description	Description of the activity.
When to start	Determines whether the activity must be run immediately, with the previous activity, or after the previous activity.
Order Guide Item	Item in the order guide for which the activity must be run.
End the activity without waiting for the completion of task record	Option to end the activity before completion of the task record. For example, you can select this option for an incident activity when you want to end the activity before the incident is closed so that the next activity can be started.

8. **Optional:** Add a condition for an activity that is configured to run after the previous activity by selecting **Add Condition**.
   The outputs (Generated Task Record, Record Id, Table) of the previous activity are available as options on which you can apply a condition. The Generated Task Record output is only available for catalog items and record producers whose target table is an extension of the Task table.
9. **Optional:** View the configured properties of the activity by selecting **View all properties**.
10. **Optional:** Add new items to the lane by selecting **Add another process activity** and then select an activity in the **Add activity** dialog box.

    (Optional) If an order guide contains more than 20 rule base items, only the first 20 items are added to the first lane. You can manually add the remaining ones to the sequence by selecting

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the **Fulfill Order Guide** activity in the **Add activity** dialog box. Items added via order guide script also needs to be added manually.

11. Select **Save and close**.

> **Note:**
> If the same activity is added multiple times in a sequencing process, the activity runs only once when it occurs for the first time in the sequence.

12. **Optional:** Create a lane to group similar catalog items by selecting **Add another lane**.
13. **Optional:** Change the sequence of the activities by dragging the activity cards within or between the lanes.
14. **Optional:** Determine when the lane will run by selecting an option from the **When to start** drop-down menu.
15. **Optional:** View the properties of the configured sequence by selecting the **Properties** button in the top-right corner.
16. Publish the sequencing process by selecting **Activate**.

Watch this six-minute video to understand how to configure a sequence to fulfill items in order guides. Configure a sequence to fulfill items in order guides

Related topics

Process Automation Designer

Request an order guide

Once created, order guides present the customer with a three-step ordering process by default.

Before you begin
Role required: admin

Procedure

1. *Describe Needs*: Enter information as prompted.
   Order guide rules evaluate this information to determine which catalog items to order.
2. *Choose Options*: Select configuration options for the ordered items and provide any additional information needed, including attachments.
3. *Check Out*: Review and edit item information, then click **Submit Order** to place the request.

If the requested item was ordered as part of an order guide, the **Order Guide** field on the Requested Item form shows the order guide name.

> **Note:**
> The *Check Out* step can be omitted from an order guide to provide a quicker two-step process. To omit this third step, select the **Two step** check box when creating the order guide.

Review an order guide example

Consider a scenario where you have a New Employee Hire order guide that provides services and items as part of the onboarding process.

Before you begin
Role required: admin

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About this task

Procedure

1. *Describe Needs*: The order guide prompts the end user for information.
2. *Choose Options*: The order guide uses the information entered and predefined rules to generate options.
3. *Check Out*: The end-user reviews and edits item information, then click **Submit Order** to place the request.

Create an order guide rule to add a catalog item

You can add a catalog item to an order guide using specific rules.

Before you begin
Role required: admin

About this task
Order guide rules define conditions that must be met for a specific item to be included in an order. For example, a New Employee Hire order guide rule can state that if the new employee job title is CTO or Director, and the department is IT, then add an executive desktop item to the order.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Order Guides**.
2. Open an order guide.
3. In the **Rule base** related list, click **New**.
4. On the form, fill in the fields.

Rule guide

Field	Description
Guide	The order guide to which the created rules are applied.
At this position	Tab positions are numbered in order from left to right, with the lowest number appearing at the left of the screen.
Application	Name of the application that is being used.
If this condition is true	Conditions that must be true for this rule to apply. Create conditions using the condition builder . Conditions can be evaluated against *Keywords*, *Requested By*, *Requested For*, or any variables defined for that order guide.
Include this item	Item to include in the order if all conditions defined in *If this condition is true* are matched. **Note:** You can also include record producers in the order guide.
Ignore Mandatory Evaluation	Option to allow customers to proceed without completing mandatory fields for the Describe Needs and Choose Options screens. The mandatory status of a field is determined by the variable defining that field. If mandatory fields are not enforced, then relevant information is not passed on to the ordered items. For example, in a New Employee Hire order guide, if the

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Field	Description
	address is not provided then this information is not included in business cards ordered.
Use cart layout	Option to use the cart layout that has been configured.
Show quantity	Option to display the ordered quantity of a catalog item in the Choose Options section when a customer requests for an order guide through the Service Portal or Now Mobile app. **Note:** If the **Hide Quantity** portal setting is selected while creating or editing a catalog item, the ordered quantity is displayed in the Summary section but not in the Choose Options section.
Quantity	Option to select the default quantity of a catalog item for the order guide. When quantity is shown, this value can be modified during checkout.

5. Click **Submit**.

Create an order guide variable

You can create variables within an order guide.

To create or edit order guide variables, open an order guide, then select an entry from the **Variables** related list.

Service catalog variables within order guides define the questions and potential answers presented to the customer while ordering. This information is used by order guide rules. Variables can also be cascaded, which passes the variable values along to individual ordered items.

Pricing is not supported for an order guide variable, even when you define the pricing for the variable though a variable set, and associate the variable set to the order guide.

Create an item variable assignment

Create an item variable assignment that enables the catalog admin set up a default value mechanism in the order guide context so that the user can focus only on required values.

Before you begin

Role required: admin

About this task

For example, you can set the default storage of an iPhone to 64 GB for Sales, and to 16 kB for Development. This setting is configured in the new hire order guide by using mutually exclusive rules and setting the storage variable accordingly for Sales and Development.

The value for an item variable is determined in the following order:

1. Item variable assignment
2. Cascading value (if no item variable assignment exists)
3. Default value defined in the variable definition (if no cascading value or item variable assignment exists)

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Order Guides**.
2. Open an order guide.
3. Open a rule.
4. In the **Item Variable Assignments** related list, click **New**.
5. On the form, fill in the fields.

Item Variable Assignment form

Field	Description
Item Variable	Name of the Item variable. Select an item variable from the list or create one.
Active	Check box to make the record active.
Assignment Type	Name of the assignment type. Select either Order Guide Variable or Value. When Order Guide Variable is selected, the **Order Guide Variable** field is enabled.
Order Guide Variable	Name of the order guide variable. Select an order guide variable from the list or create one. (This field is only visible if **Assignment Type** is Order Guide Variable.)

6. Click **Submit**.

What to do next
Set an item variable value to match an order guide variable value, or an order guide default value, using an item variable assignment.

Cascade an order guide variable

Cascading enables values entered for variables in the initial order form to be passed to the equivalent variables in the ordered catalog items.

Cascading allows values entered for variables in the initial order form to be passed to the equivalent variables in the ordered catalog items. For example, a variable on the initial order form prompts the customer to enter a delivery location value. If you enable cascading, the value for this variable then populates delivery location fields on each of the ordered items.

To enable cascading, select the **Cascade variables** check box when creating the order guide. Then, create variables on the catalog items that match the names of the corresponding variables in the order guide. When a customer places an order, the variables on the ordered items inherit the values of the identically named variables in the order guide.

Use a variable set

You can use a variable set with an order guide.

Before you begin
Role required: admin

About this task
Cascading variables require that the same variable be on both the order guide and the ordered items. It can be useful to define each variable once in a variable set, then assign the variable set to both the order guide and the individual catalog item. This approach avoids duplication and ensures that the variable is the same in both locations.

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To use a variable set with an order guide:

Procedure

1. Create the variable set.
2. In the Variable Set form, create each variable.
3. Add the variable set to the order guide and to each catalog item involved.

> **Note:**
> The individual variables in a variable set do not appear in the Order guide or Catalog Item forms. To view the variables in a variable set, open the variable set record.

Hide cascaded variables

You can hide the duplicated variables on the **Choose Options** screens to keep your screen clean.

When cascading variables, you can hide the duplicated variables on the Choose Options screens, making these screens simpler.

To hide duplicate variables on all screens after the initial Describe Needs screen in the Service Catalog Platform UI, run an *onLoad catalog client* script.

```
function onLoad(){
  var item = g_form.getControl("current_item");
  var guide = g_form.getControl("sysparm_guide");

  if (item == null && guide == null )
  return;

  if(item != null && guide != null && item.value == guide.value)
    return;
  g_form.setDisplay('YOUR_VARIABLE_NAME',false);
}
```

To hide duplicate variables on all screens after the initial Describe Needs screen in Service Portal, use the *isOrderGuide()* method.

```
if(g_service_catalog.isOrderGuide())
  g_form.setDisplay('variable_name', false);
```

Avoid enforcement of a mandatory field

You can avoid enforcing a mandatory field within tabs.

Before you begin

Role required: admin

About this task

By default, mandatory fields must be filled in before switching tabs in the **Choose Options** section of order guides.

In this example, if the customer attempts to select another tab without filling in the *Street Address* field, a warning prompt appears. The customer cannot switch tabs without entering this information.

To avoid this enforcement in all order guides:

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Properties**.
2. Locate the property *Validate mandatory fields when switching tabs in 'Choose Options' section of Order Guides* (`glide.sc.guide.tab.validate`).
3. Clear the *Yes* check box.

   If you make this change, mandatory fields are still mandatory, but the customer can switch between tabs before filling in the mandatory fields. Enforcement is then checked when the customer chooses to proceed to the next step.

   To avoid enforcement of mandatory fields altogether, use the *Ignore Mandatory Evaluation* check box within the relevant order guide rule.

Run order guides automatically

You can run an order guide automatically from within a workflow or a server script, passing parameters to that order guide to define variable values.

Automatically generate a set of ordered items as part of a wider process, without needing to manually submit a service catalog request and reenter existing information.

For example, you can run an order guide to fulfill HR onboarding requests, passing parameters such as the new employee's position and department. The order guide then generates a set of requested items such as laptop and email account, based on those parameters.

Related topics

Service Catalog API

Define a content item

A content item is a service catalog item that provides information instead of goods or services.

Before you begin
Role required: admin

About this task
Content items can reference knowledge articles, static blocks of text, or external web-based content.

To define content items:

Procedure

1. Navigate to **All** > **Service Catalog > Catalog Definition > Content Items**.
2. Click **New**.
3. Fill in the form to define the item.

Content Item form

Field	Description
Name, Category, Icon, Roles, Active,	As for standard catalog items.
Content type	The type of information to display when a user selects the item.

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Field	Description
	○ **KB Article**: a ServiceNow knowledge article available to users with the specified roles. ○ **Catalog Content**: a static block of text, formatted with HTML. ○ **External Content**: documents or web pages stored outside the base system instance.
Target	Location where the content appears. ○ **Within Catalog**: displays the content within the catalog iframe window (which may not render some external websites properly). ○ **New Window/Tab**: displays the content in a new browser window or tab. Choose this option if the content does not display properly within the catalog.
URL	The full URL (including the prefix http:// or https://) for external content to display when a user selects the item. This field is available only if the **Content type** is **External Content**. **Note:** Since base system instances are accessed via HTTPS, links to HTTP sites could result in a mixed mode content error or warning, depending on browser security settings.
KB article	The knowledge article to display when a user selects the item. This field is available only if the **Content type** is **KB Article**.
Short description, Description, Picture	As for standard catalog items. These fields are only available if the **Content type** is **Catalog Content**.
Meta	Comma-separated list of tags used to search for the content item. See Configure keyword search for catalog items.
Hide on Service Portal	If selected, the content item is not available on Service Portal.

4. Click **Submit**.

Configure a default width for Service Catalog variables

Configure the default width for variables on a catalog item page to specify what percentage of the screen size that it can span.

Before you begin
Role required: admin

About this task
A default width size cannot be set or does not apply to the following variables:

- The break, container end, container split, container start, and label variables.
- Any variable placed in a container with two-column layout.

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- A variable set with a two-column layout.
- Any variable that is created with a custom width set in the **Variable width** field on the Variable form. For details, see Create a service catalog variable. The custom width for the variable overrides the default width set for the variable type.

Note:
Custom variable widths are not supported in either Now® Mobile or Service Portal.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Variables** > **Variable Default Size**.
2. For each variable type, select a default width.

Option	Description
25%	Configures the variable to span 25% of the available screen size.
50%	Configures the variable to span 50% of the available screen size. By default, some vari ables require a minimum of 50% width.
75%	Configures the variable to span 75% of the available screen size.
100%	Configures the variable to span 100% of the available screen size.

3. Select **Save**.

Define a regular expression for a variable

Define a regular expression (regex) to validate a variable value.

Before you begin
Role required: catalog_admin or admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Variables** > **Variable Validation Regex**.
2. Click **New**.
3. On the form, fill the fields.

Field	Description
Name	Name of the regular expression.
Validation message	Message that appears when the validation fails.
Active	Specifies if the regex is active.
Regular Expression	Sequence of characters that define the format of the variable value. For example:

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Field	Description
	○ Invalid Regex: /((((ftp|http|https):\/\/)|(www\.))([-\w\.\/#$\?=+@&%_:;]+)/i ○ Valid Regex: ((((ftp\|http\|https):\/\/)\|(www\.))([-\w\.\/#$\?=+@&%_:;]+) **Note:** ○ Ensure that the regex does not cause catastrophic backtracking. ○ You should not use embedded flag expressions. ○ Use the **Regex Flag** list for the ignore case.
Regex Flag	Character set that is considered while validating the regular expression. ○ None: No regex flags are applied. ○ Case Insensitive: Enables case insensitive matching. Case insensitive matching assumes that only characters in the US-ASCII charset are being matched. Unicode-aware case-insensitive matching can be enabled by selecting **Both** as the regex flag. ○ Unicode Case: (Reserved for future use) Same behavior as **None**. ○ Both: Case insensitive matching is done in a manner consistent with the Unicode Standard.

4. Click **Submit**.

Related topics

Create a service catalog variable

Pass variables between tasks

Pass variables from one step of the fulfillment process to another.

Before you begin
Role required: admin

About this task
Variables can be processed by any workflow or execution plan that is associated with the requested items.

Note:
To pass a variable between tasks, select the **Global** check box when you create a Service Catalog variable.

For example, consider the following tasks within the fulfillment process for a New PC catalog item.

Procedure

1. Procure a PC.
2. Install corporate standard software.
3. Set up email account.
4. Deliver and set up PC for requester.
   Step 4 may require a piece of information from step 3 (the email account credentials for setting up email on the PC). If steps 3 and 4 are executed by different fulfillment groups, you can use

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variables to make this information visible in the tasks for steps 3 and 4. You can then pass the information between groups so that the second group can access the email account credentials.

Create or edit a catalog item

Define individual catalog items using Service Catalog. You can create, edit, and copy catalog items.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**.
2. Click **New**.
3. On the Catalog Item form, fill in the fields.

   For more information about the fields and their descriptions on the Catalog Item form, see Catalog Item form.
4. Click **Submit**.

What to do next

- Assign the item to additional catalogs and categories, if required.
- Define variables for the item, if applicable.
- To add attachments such as information and instruction documentation to the catalog item, see Add an attachment.

Read related topics:

- Create a service catalog variable
- Apply user criteria to items
- Set a recurring price

Edit a catalog item

Catalog administrators can edit an item from the service catalog listing. Catalog managers and catalog editors can also edit an item if they are assigned to the item.

Before you begin
Role required: admin

About this task
To edit a catalog item from the service catalog listing:

Procedure

Right-click the header and select one of the following options:

- **Configure Variables**: Add or remove variables from an item.
- **New Variable**: Create a new variable for the item.
- **Configure Item**: Edit the item definition.

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- **Configure Client Scripts**: Edit the catalog client scripts for the item.
- **Configure UI Policies**: Edit the catalog UI policies for the item.

Copy a catalog item

Copy an item to create a full duplicate of the item, including the item details, attachments, variables, client scripts, and approvals.

Before you begin
Role required: admin

About this task
Copying can be more useful than using the Insert function because the function only copies the item details.

Procedure

1. Open a catalog item form.
2. Use the **Copy** button to create a new copy of a catalog item, named **Copy of [item name]**.

Note:

- If you copy an active catalog item, the copy is also active. Consider deactivating the copy by clearing the **Active** check box until your changes are complete.
- When you specify a table in the **Relationship tables which should be part of the Copy Item Action. Table names should be comma separated** property in the **Service Catalog** > **Catalog Administration** > **Properties** page, the table records that have a reference to a catalog item are also copied. It is applicable only when you copy the catalog item using the **Copy** UI action. Table names should be comma-separated without any spaces.

Accessibility checker in the toolbar

Accessibility checker in the toolbar enables you to identify and resolve accessibility related issues while creating a catalog item in Service Catalog.

Before you begin
Role required: admin

Confirm that the following properties contain the correct values for accessibility checker:

Property	Value
glide.ui.html.editor.toolbar	a11ycheck
glide.ui.html.editor.enabled_plugins	a11ychecker

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**.
2. Select **New**.

Note:
If you want to check the accessibility of the content for an existing catalog item, select the catalog item form the list.

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3. Select the Item Details tab.
4. In the **Description** field, select the accessibility checker icon in the toolbar.
5. View accessibility-related issues in the **Accessibility Checker** window along with suggestions for resolution of each issue.
6. Select **Repair** to implement the suggestion, or **Ignore**.

   If there are no accessibility issues in the article, then the **Accessibility Checker** window displays a success message:

   No accessibility issues detected

Add a catalog item

Service Catalog enables you to add a catalog item to multiple catalogs and categories.

Before you begin
Role required: admin

About this task
A catalog item may be available in more than one catalog and category. For example, a laptop carrying case can be available from both Laptops and Cases and Accessories categories. Within an item:

- The Catalogs related list defines the catalogs where the item is available.
- The Categories related list defines the categories where the item is available.

Procedure

To assign an item to another category or catalog, enter the new details in the appropriate related list.

Note:
The values in these lists override the values of the **Catalogs** and **Category** fields in the catalog item form. If you change values for either related list, these changes automatically update the values in those fields.

Share catalog items across catalogs

You can share a catalog item, enabling users to order that item from different catalogs. For example, you can share a Password Reset item across catalogs serving different teams.

Before you begin
Role required: admin

About this task
To share a catalog item across several catalogs:

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**
2. Open the item to share.
3. Select the additional catalogs for that item in the **Catalogs** field.

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4. Select **Update**.

   The shared item then appears in the Catalog Items related list for each catalog selected.

Service Catalog customization

Service Catalog enables you to customize the catalog in various ways.

No updates are supported on the following internal service catalog tables, either directly or through business rules.

- Options [sc_item_option]
- Variable Ownership [sc_item_option_mtom]
- Question Answer [question_answer]
- Item Produced Record [sc_item_produced_record]
- Multi Row Question Answer [sc_multi_row_question_answer]

Cart layout

Service catalog enables catalog administrators to configure the layout and functionality of the service catalog cart used in your organization to place requests for catalog items.

You cannot check out a cart item that is no longer available.

You can perform the following:

- Remove components. For example, hide prices throughout the cart if your catalog does not use pricing.
- Change labels. For example, change the **Order now** button label to **Request Item** in the shopping cart.
- Change the order of elements. For example, change the order of the columns on the order status screen.
- Configure, hide, or create functionality. For example, add a **Requested For** reference field to the shopping cart.

Configure the cart layout

Configure cart layout records to define functionality for widgets or screens in the shopping cart.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Select a widget or screen.
   - Cart widgets: Item Ordering Widget, Shopping Cart Widget, or Item Ordering Widget (Order Guide)
   - Preview screens: Cart Preview Screen, Cart Preview Screen (Two Step), Cart Preview Screen (Wish List), or Cart Preview Screen (Classic Mobile)
   - Order status screens: Order Status Screen or Order, Status Screen (Classic Mobile)
3. Update the **Title** field to change the title that appears on the widget.
4. Leave the default **Target** value.
   Do not change this value because it identifies the cart element being defined.

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5. Update the other sections of the cart layout record, as required.
   The availability of these sections varies for each widget and screen record.

   - In the **Components** section, select the components to display, such as delivery times, item descriptions, and prices.
   - In the **Columns** section, select which columns to display, such as the item description column, delivery time column, or price column.
   - In the **Buttons** section, select the buttons to display, such as **Add to Cart**, **Edit Cart**, and **Delete Item**.
   - In the **Button Labels** section, enter new labels to replace the default button labels.

     A new label is used on all screens that the button appears on. For example, the **Continue Shopping** button is used on several screens, so changing its label affects all those screens.

6. If required, configure the widget and column macros.
7. Save the record, and then test the results of your configuration by ordering items from your service catalog.

   Some settings and properties in your instance can override or affect your cart layout.

Cart layout considerations

When you enable cart layouts, service catalog properties are impacted. Consider the possible outcomes and alter the settings or properties to achieve the cart layout and functionality you require.

Some of these properties are impacted when you use cart layouts. For example, with the order status screen, the **When to show prices and sub-totals on the Service Catalog Cart** (glide.sc.price.display) property overrides cart layout settings for displaying prices.

Table title

Property	Impact
Allow ESS users the option to cancel their requests from the checkout screen. [glide.sc.checkout.cancel]	Overridden when the **Cancel Request** check box in cart layout settings is selected. If this check box is selected, the **Cancel** button is displayed even if the property is set to **No**.
Enable cloning requests during checkout. [glide.sc.allow.checkout.clone]	Not used (deprecated) if cart layouts are enabled. Replaced by the **Clone Checkout**check box in cart layout settings. The **Clone Checkout** check box is cleared by default for new instances. For upgraded instances, the check box is set to the existing value of the glide.sc.allow.checkout.clone property.
List of roles (comma-separated) that can use the quantity selector in the shopping cart [glide.sc.allow.quantity]	Overrides any relevant cart layout settings.

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Table title (continued)

Property	Impact
Show the request item number for each line item on the checkout screen (default false). [glide.sc.checkout.request.number]	Not used (deprecated) if cart layouts are enabled. Replaced by the **Request Item Number column** check box in cart layout settings.
Show the 'Back to Catalog' button on the two-step checkout screen. [glide.sc.checkout.twostep.back]	Not used (deprecated) if cart layouts are enabled. Replaced by the **Back to Catalog** check box in cart layout settings.
When to show prices and subtotals on the Service Catalog Cart. [glide.sc.price.display]	Overrides any relevant cart layout settings.

Configure widget and column macros

Configure macros that define functionality for elements within each widget or screen.

Before you begin

Role required: admin

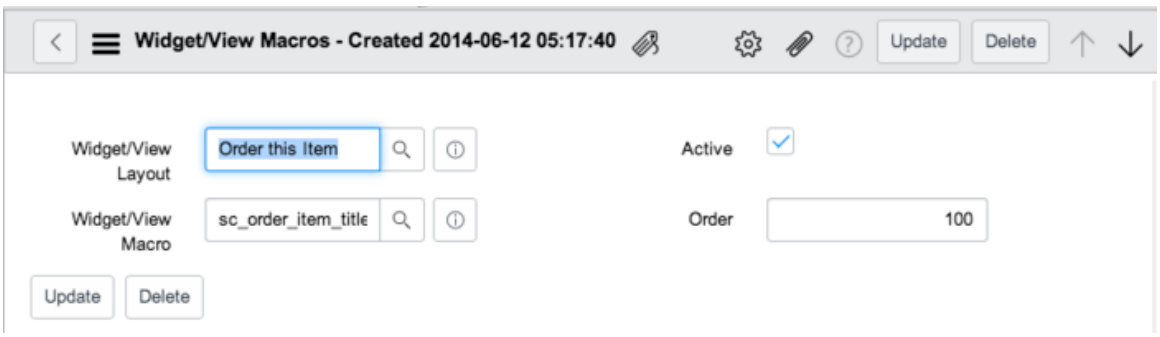
About this task

Some widgets or screens also have column macros that define the horizontal layout and configuration of shopping cart contents.

You can configure these macros to alter the display order of elements, or hide elements, within the widget or screen. You can also create new macros to implement any extra requirements.

Procedure

1. Navigate to **All** > **Widget Macros** > **Column Macros** related list.
2. Click the order number entry of a macro to edit its display order, or to activate or deactivate it.



3. Click **Update**.
4. Click the **Widget / View Macro** entry of a macro to view its functionality settings.
   You cannot edit functionality settings for default macros, but these settings can be a useful reference for creating your own widget macros.

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Create macros for cart layout

Create macros for cart layout records using Jelly scripts to define customized behavior and display within a widget or screen.

Before you begin

Role required: admin

About this task

Macros that you create do not affect upgrades because customized widget functionality is isolated from general cart behavior.

Procedure

1. Open the relevant cart layout record.
2. Navigate to **Widget Macros** or **Column Macro**related list.
3. Click **New**.
4. Enter details for the macro.

Macro form

Field	Description
Name	The name for the new macro.
Active	A check box to indicate whether the macro is displayed or not.
Description	A summary of how the macro is used.
Active	A check box to indicate whether the macro is displayed or not.
XML	The Jelly script to apply for your macro.

5. Save the macro record.

Example:

This example demonstrates the script to add a **Requested for reference** field as a widget macro to a cart layout record.

```
<?xml version="1.0" encoding="utf-8" ?>
<j:jelly trim="false" xmlns:j="jelly:core" xmlns:g="glide"
 xmlns:j2="null" xmlns:g2="null">
    <j:set var="ref" value="sc_cart" />
    <j:set var="jvar_ref"
 value="${jvar_cart.getRequestedFor()}" />
    <j:set var="jvar_ref_display"
 value="${jvar_cart.getRequestedForDisplayName()}" />
    <tr>
        <td colspan="3">
            ${gs.getMessage('Requested for')}:
        </td>
    </tr>
    <tr>
        <td colspan="3" style="padding: 4px;">
            <g:catalog_requested_for />
        </td>
    </tr>
</j:jelly>
```

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Configure cart layout for specific items

Set fields in the Catalog Item form to configure the cart layout for specific items.

Before you begin

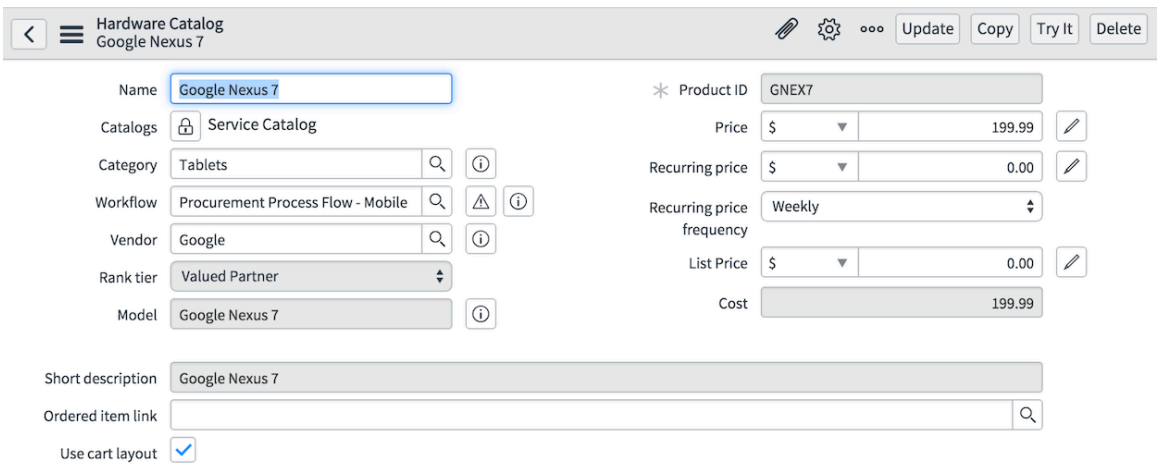
Role required: admin

About this task

Overrides any general cart layout settings. For example, you can hide the price of an item by setting the **Omit price in cart** field to **true** for that item.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**.
2. Select the catalog item.
3. Configure the form to add both **Use cart layout** and any of the following item configuration fields you require:
   - Omit price in cart
   - No cart
   - No order
   - No order now
   - No proceed checkout
   - No quantity
4. Clear the **Use cart layout** check box to display the configuration fields for that item.
5. Set the item configuration field values as required.



6. Click **Update**.

Override cart layouts for items

Service catalog enables you to use additional methods to configure cart behavior or layouts, which override cart layout record settings.

For example, your cart layout record settings can hide item prices, but you might decide to display the price of the **Sales Laptop**. In that case, you would set the relevant configuration values on that catalog item. Be aware of the impact of these additional methods, to ensure that your cart behaves in the way you want.

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Note:

If you are migrating to cart layouts, you can have defined additional settings and properties that impact your cart layout settings.

Configure Service Catalog cart widgets

You can configure widgets for the shopping cart, catalog items, and order guides.

Before you begin
Role required: admin

About this task
Overview of configurable options in the Service Catalog on the Service Portal and explains how to perform those configurations.

Configure order guide widgets

You can customize the widget that provides details of the current catalog item on an order guide or wizard.

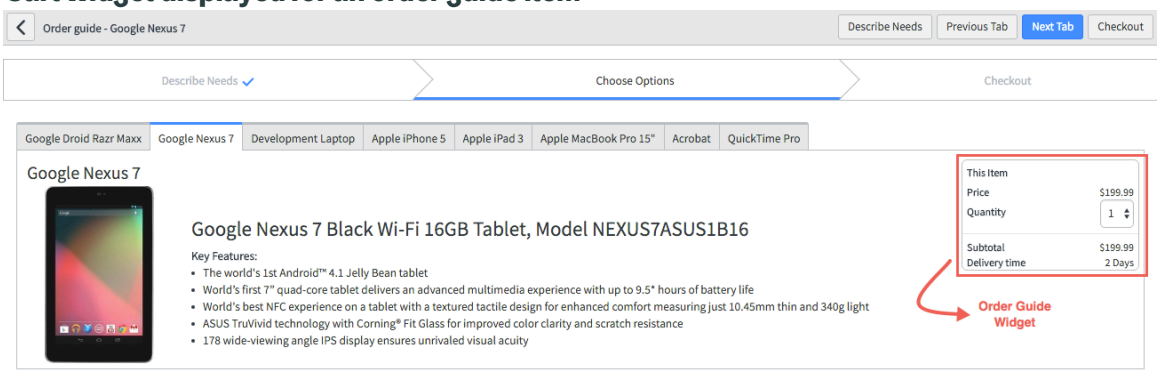
Before you begin
Role required: admin, catalog_admin

About this task
Order guide cart widget is visible when an order guide item is ordered.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Open the **Item Ordering Widget (Order Guide)** record.
3. You can add/remove components and rename widget title.
4. Click **Update**.

Cart widget displayed for an order guide item



Note:

By default, order guides use a two-step process, and catalog items use a one-step checkout process. If you configure the checkout process, keep in mind that order guides and catalog items provide different cart experiences if they use different checkout processes.

Configure catalog item widgets

You can customize widgets that appear for catalog items.

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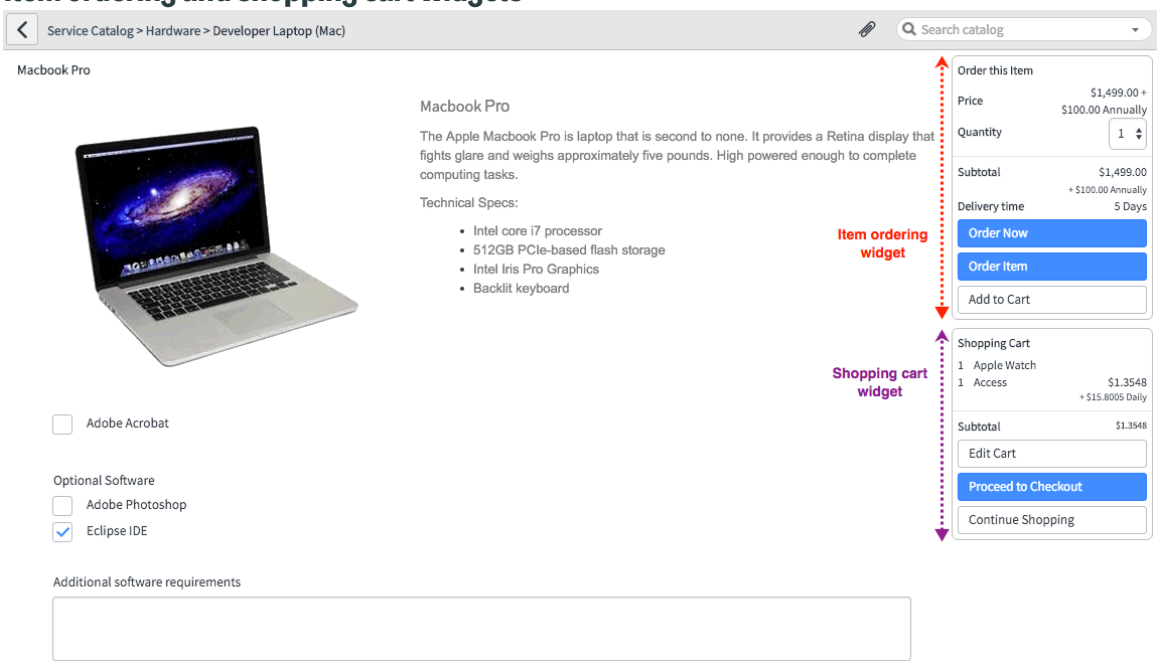
Before you begin
Role required: admin, catalog_admin

About this task
Both shopping cart and item ordering widgets are visible on the standard catalog page and any ESS catalog page. The shopping cart widget is also available in additional locations, such as the catalog homepage.

Procedure
1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
   a. Open the **Item Ordering Widget** record to modify the widget for ordering item.
   b. Open the **Shopping Cart Widget** record to modify the widget for shopping cart.
2. You can add/remove components, buttons, rename widget title and button labels.
3. Click **Update**.

Item ordering and shopping cart widgets



Configure Service Catalog preview screens

You can configure shopping cart preview screens for the one-step and two-step carts, for the wish list, and for the Classic Mobile app.

Configure the wish list screen

Using Service Catalog, customize the cart preview screen for wish list items.

Before you begin
Role required: admin, catalog_admin

About this task

Procedure
1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Open the **Cart Preview Screen (Wish List)** record.

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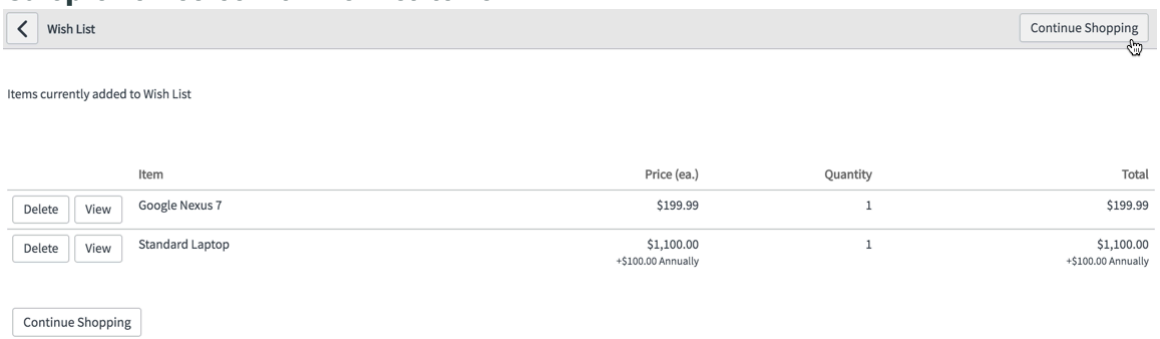
3. You can add/remove components, columns, buttons, and rename labels.
   For more information, see Configure cart layout.
4. Click **Update**.

Cart preview screen for wish list items



Configure Classic Mobile shopping cart screen

Using Service Catalog, customize the shopping cart screen that is displayed on mobile devices.

Before you begin

Important:

Mobile Classic Is Deprecated.

The App Has Been Removed From The Stores And Can No Longer Be Activated. We Are Not Offering Enhancements, Bug Fixes, Or Support For The App. See ServiceNow Classic Mobile App Deprecation Effective September 15, 2022.

Role required: admin, catalog_admin

About this task

The shopping cart on Classic Mobile devices always uses a two-step checkout process. You cannot modify widget macros or button labels on Classic Mobile devices.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Open the **Cart Preview Screen (Classic Mobile)** record.
3. You can add/remove components and buttons.

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4. Click **Update**.

Shopping cart screen on Classic Mobile

Configure a one-step shopping cart screen

Using Service Catalog, customize the shopping cart display screen for a one-step checkout process.

Before you begin

Role required: admin, catalog_admin

About this task

One-step checkout is the default checkout process for catalog items.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Open the **Cart Preview Screen** record.
3. You can add/remove components, columns, buttons, and rename title and button labels. See Configure cart layout.

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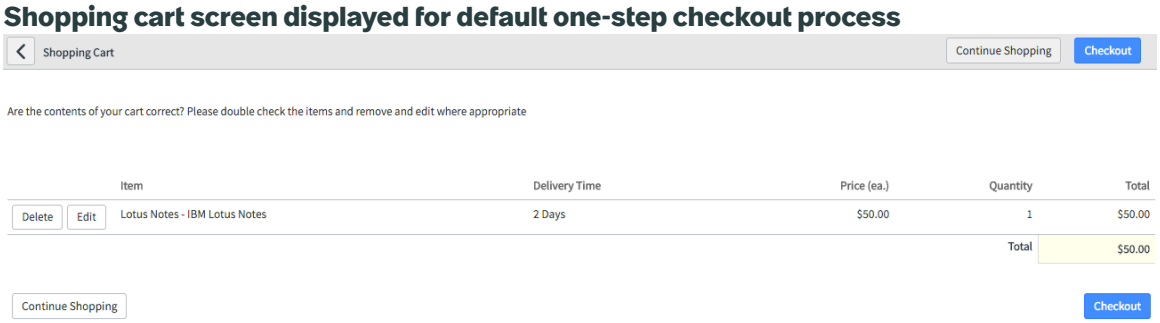
4. Click **Update**.



Configure a two-step shopping cart screen

Using Service Catalog, customize the shopping cart display screen for a two-step checkout process.

Before you begin

Role required: admin, catalog_admin

About this task

Changes made to the two-step record are visible only if the two-step checkout process is enabled in properties. By default, catalog items use a one-step checkout process.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Open the **Cart Preview Screen (Two Step)** record.
3. You can add/remove components, columns, buttons, and rename title and button labels. For more information, see Configure cart layout.

   In the **Components** tab, both **Shipping Location** and **Shipping Address** are not supported simultaneously. Deselect the selected component to select the other component.

   If you enable **Shipping Address** in the **Components** tab, the editable **Shipping address** field is displayed in the cart preview screen. If you enable **Shipping Location** in the **Components** tab, the editable **Shipping location** field and a read-only **Shipping address** field are displayed in the cart preview screen.

4. Click **Update**.

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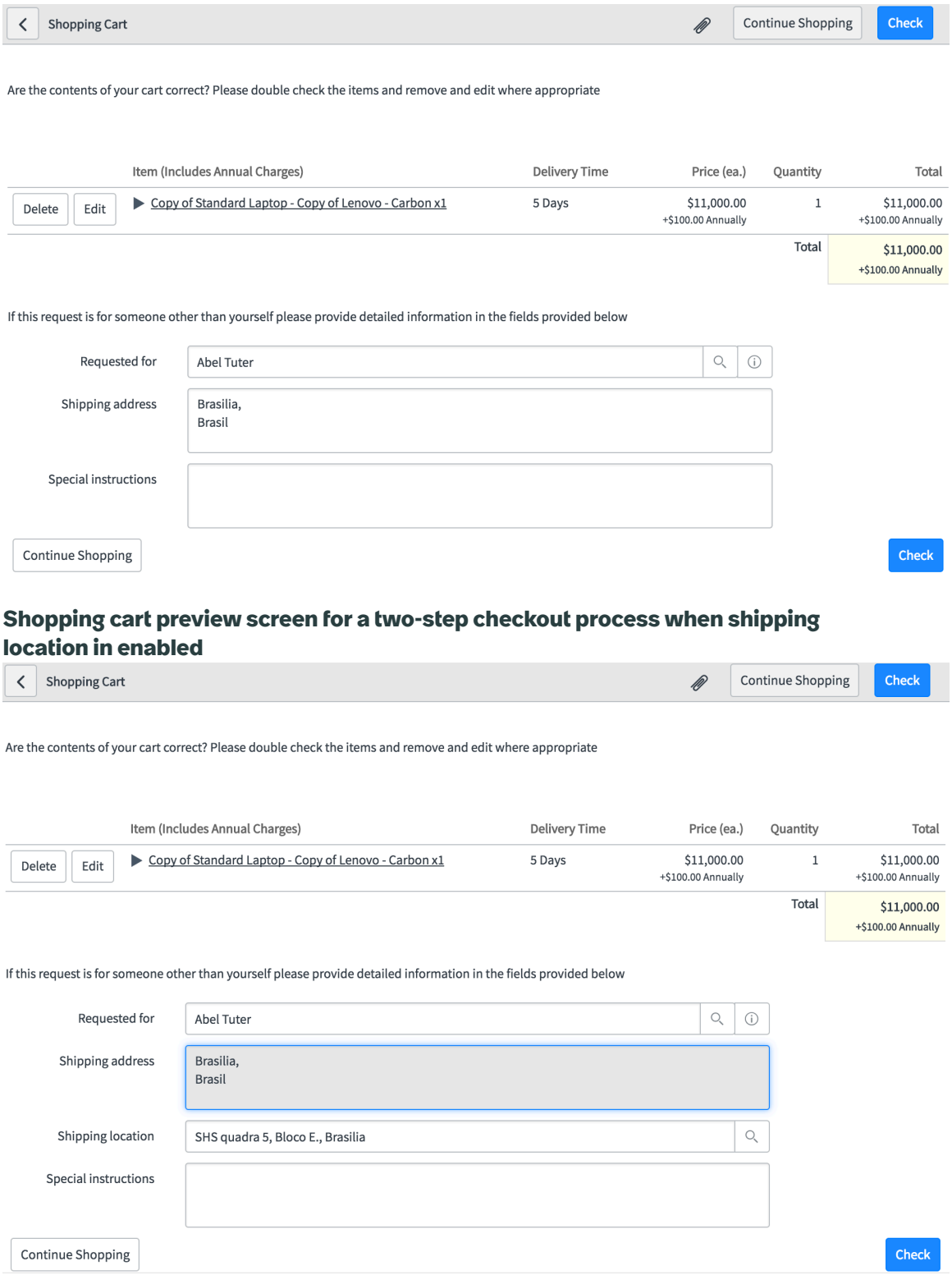
Shopping cart preview screen for a two-step checkout process when shipping address in enabled



Shopping cart preview screen for a two-step checkout process when shipping location in enabled

Configure Service Catalog status screens

You can configure shopping cart status screens for desktop and Classic Mobile orders.

Configure desktop order status screen

Using Service Catalog, customize the order status screen that is displayed on desktops.

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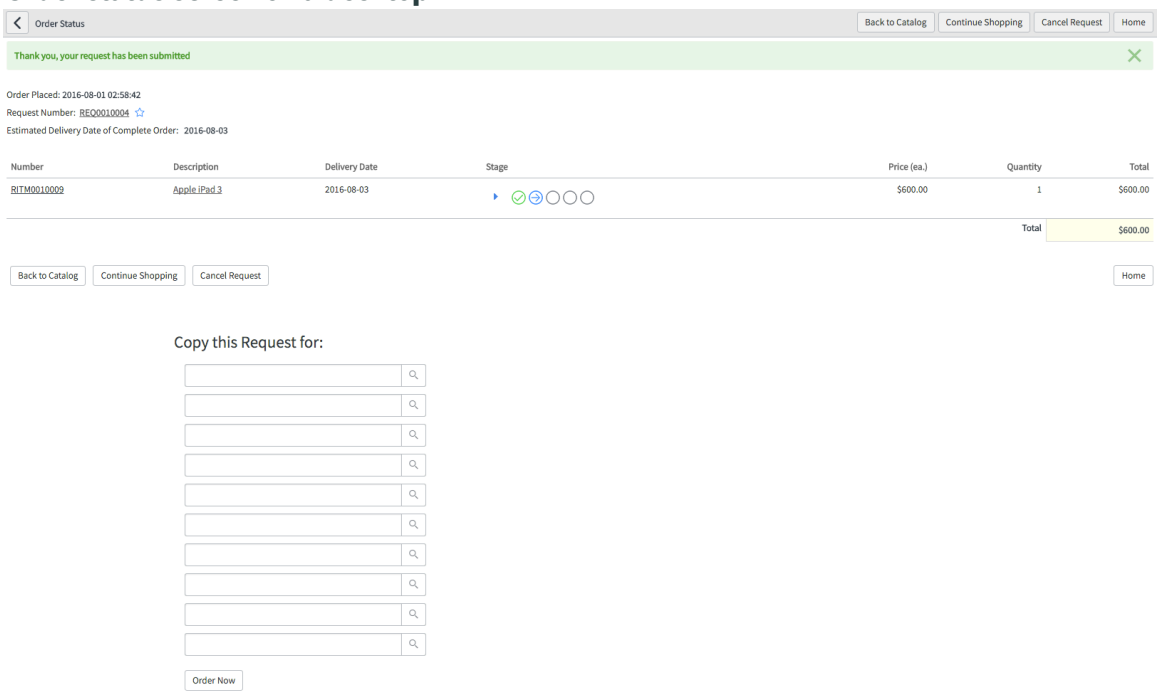
Before you begin
Role required: admin, catalog_admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Open the **Order Status Screen** record.
3. You can add/remove components, columns, buttons, and rename labels.
   See Configure cart layout.
4. Click **Update**.

Order status screen on a desktop



Configure Classic Mobile order status screen

Using Service Catalog, customize the order status screen that is displayed on Classic Mobile devices.

Before you begin
Role required: admin, catalog_admin

About this task
You cannot modify widget macros or button labels on Classic Mobile devices.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**.
2. Open the **Order Status Screen (Classic Mobile)** record.
3. You can add/remove components and buttons.

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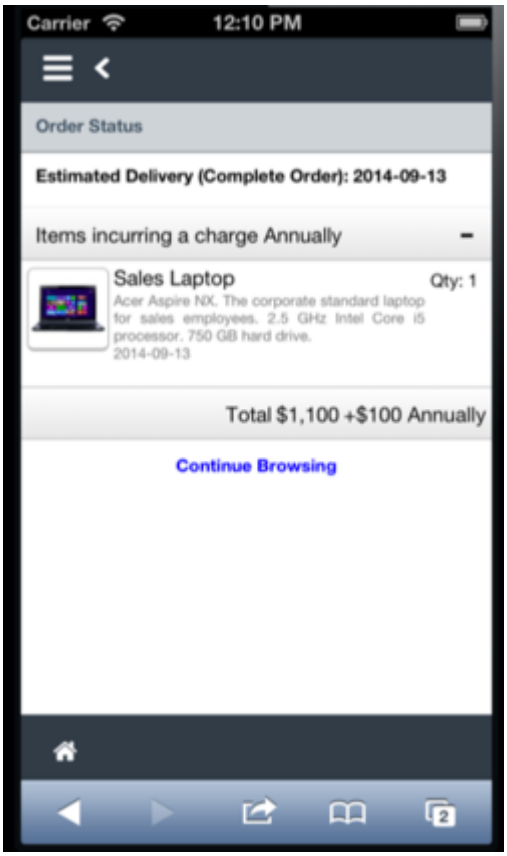
4. Click **Update**.

Order status screen on Classic Mobile



Migrating to cart layouts

Service catalog enables you to configure cart layouts to add, remove, or change elements of the service catalog shopping cart. Before you migrate your system to use cart layouts, familiarize yourself with existing configurations for catalog content and decide whether to discard or retain these configurations.

This feature is enabled by default in new instances and the default cart layout settings are implemented. For upgrades, an upgrade script checks to see if your current cart macros are customized. Only a user with an admin role can migrate cart layouts.

- If cart macros are not customized, cart layout configuration is enabled by default.
- If cart macros are customized, cart layout configuration is disabled. Migrate your system to use this feature.

Cart configuration settings

Check your current configurations for:

- UI macros defining custom shopping carts that have been linked to items.
- Service catalog properties impacted by cart layouts.
- Item-specific settings that can override cart layout record settings.

Item-specific settings

Some catalog items can have cart layout settings that are specific to them.

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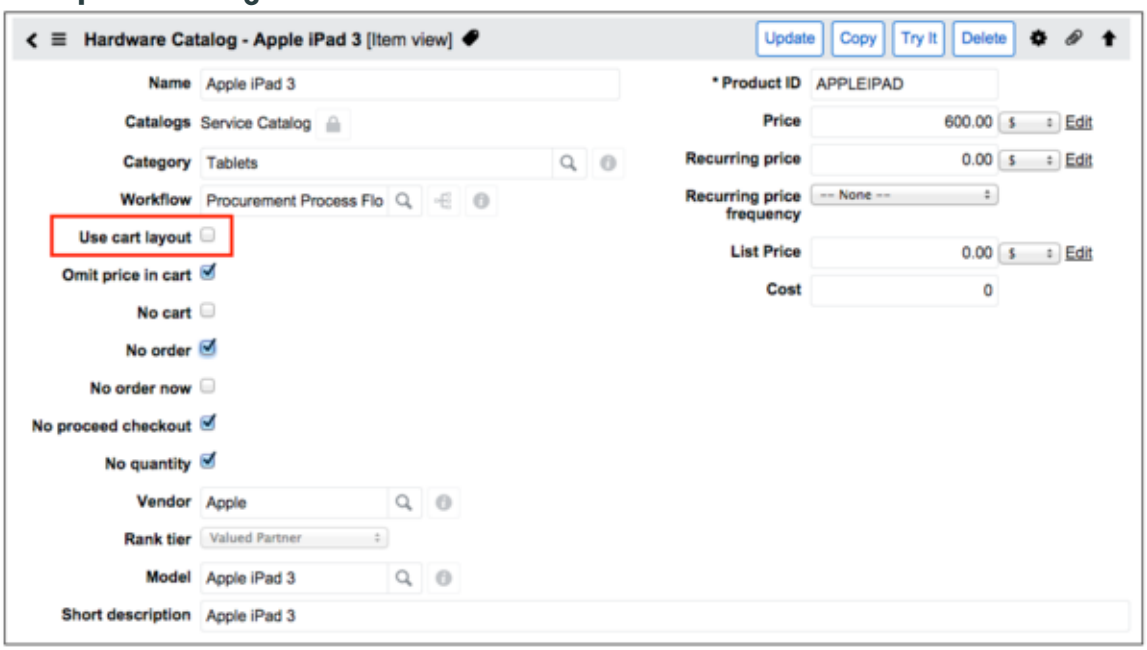
For example, these items can show prices even though the general cart layout record settings hide prices.

To retain item-specific settings, clear the **Use cart layout** check box in the catalog item form.

Item-specific settings



Note:
You can configure the form to display the **Use cart layout** check box.

Migrate customizations and enable cart layouts

Move customization to cart layout widgets, and then enable cart layouts.

Before you begin
Role required: admin

About this task
When you customize a few UI macros, you should migrate the customizations to cart layout widgets before you enable cart layouts.
Following are the UI macros whose customizations need migration before you enable cart layouts:

- sc_catalog_homepage_cart
- sc_catalog_requested_for
- catalog_item
- catalog_cart_default
- sc_cart_main

In addition, if you have customized the com.glideapp.servicecatalog_category_view UI page, or the Catalog Cart dynamic content, you must migrate these customizations before you enable cart layouts.

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Procedure

1. Save copies of the customizations for later reference.
2. Revert the customizations to restore the customized macros or other content to their standard state.
3. Remove the record for the customization from the Customer Update [sys_update_xml] table.
4. Run the following script in Background Scripts to set the property and set the correct state for all the items in the catalog:

```
var cm = new
 CartLayoutMigration();cm.configureLayoutProperty();cm.setLayou
tFalse();cm.setEmptyLayout();
```

5. Reimplement any cart layout customizations that you want to maintain in the upgraded instance by configuring widget macros.
6. To enable cart layouts, set the service catalog system property *glide.sc.use_cart_layouts* to **Yes**.

Legacy flexible checkout and delivery forms

ServiceNow includes several options that provide administrators some control over content in service catalog template-driven forms.

Some service catalog forms, such as the checkout form, are generated from templates, instead of being data-driven like other forms in the system, such as the Incident form.

Template-driven forms provide enhanced look-and-feel over standard data-driven forms, but they provide more limited control over the form content.

Note:

It is recommended that you use cart layout records to configure cart layouts. Using cart layout records lets you configure the service catalog cart without writing and maintaining scripts.

Modifications in the delivery screen

In the final checkout step, a summary screen provides a list of all items and services ordered.

Warning:
Modifying the Order Status or Summary screen requires advanced scripting and a knowledge of Jelly. Also, the upgrade process skips updates to the summary screen after a customization. With these constraints in mind, you can modify the summary screen by editing the *com.glideapp.servicecatalog_checkout_view* UI page.

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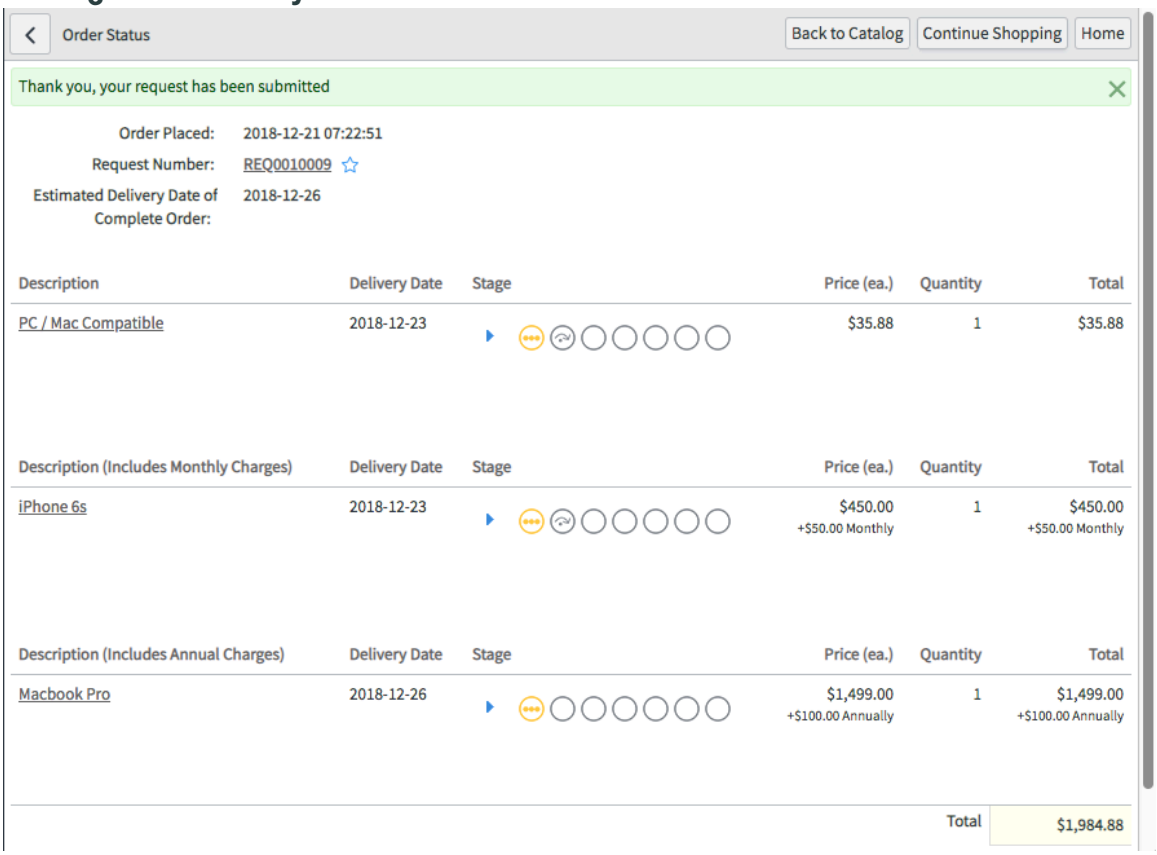
Catalog order summary status



Requester search results

After you enable the two-step checkout process, the *Requested for* field appears on the Request form.

The *Requested for* field references the User `[sys_user]` table and has an auto-complete feature. Two service catalog properties (**Service Catalog** > **Catalog Administration** > **Properties**) enable an administrator to add columns to the search results for this field and to order the list by one of the columns.

Service catalog properties

Property	Description
Additional columns for the "request for" Service Catalog widget. (glide.sc.request_for.columns)	Choose fields from the User `[sys_user]` table. Must be semicolon separated.
Ordering of matches for the "request for" Service Catalog widget. (glide.sc.request_for.order_by)	Choose fields from the User `[sys_user]` table.

Modifications in the checkout form

You can modify the checkout form to use an alternate description field or to add request item number for each line.

By default, the checkout forms list the **Description**, **Delivery Date**, **Stage**, **Price**, **Quantity,** and **Total** columns. An example of default checkout form is shown:

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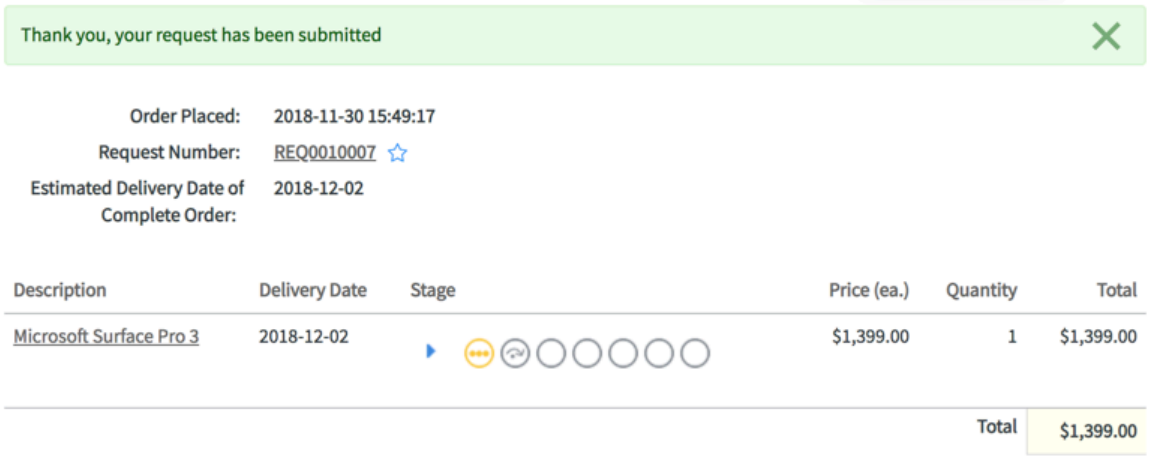
Checkout default



Add the request item number on checkout form

Add the request item number to display this number as an extra column on the checkout form. By default, the request item number is not displayed in the list.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Properties**.
2. Locate the property: **Show the request item number for each line item on the checkout screen (default false)**.
3. Select the **Yes** check box to add the number column to the checkout form.

Checkout number

Use an alternate description field on the checkout form

Use an alternate description field to describe your category item in the checkout form. By default, the **short_description** column of the catalog item appears as the item description.

Before you begin

Role required: admin

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Policy** > **Properties**.
2. Locate the property **Field name to use for the description column of the checkout form. If blank, the default (short_description) is used**.
3. Enter the name of the alternative field (a column in the Catalog Item `[sc_cat_item]` table) and save it.
   For example, if you've selected **name**:

Define item quantity choices

In the Service Catalog, the default quantity choices are 1–10. You can configure the quantity selector with additional choices. This configuration is also applicable in Service Portal.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Choice Lists**.
2. Search for the table **sc_cart_item** and the element **quantity**.
   The existing quantity choices appear.
3. Add quantity choices, modeling them after the existing ones.

   To reduce the quantities available for catalog items, delete the relevant quantity records. For example, to reduce the quantity range to 1-3, delete the records for 4 and 5.

   To restrict the roles allowed to change quantities, edit the **List of roles (comma-separated) that can use the quantity selector in the shopping cart** (*`glide.sc.allow.quantity`*) service catalog property. For example, you can limit this ability to the admin and catalog_admin roles.

Related topics

Service Catalog administration

Remove item restrictions

Service Catalog enables you to remove or apply restrictions on all order guides, record producers, and wizard launchers.

Before you begin

Role required: admin

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About this task

Catalog administrators can use Service Catalog properties to configure the behavior and usage of a catalog item.

By default, all order guides, record producers, and wizard launchers have these restrictions:

- They cannot be added to a requested item
- They do not provide a **Try It** action
- They are not added to the cart as items

To remove these restrictions or apply these restrictions to other types of items:

Procedure

Modify the comma-separated lists of tables in the following properties:

- **List of class names for catalog items that cannot be added to an existing request**(*glide.sc.item.cannot_add_to_request*): restricts the items that can be added to a requested item, after an end user places a request. For example, to restrict content items from being added to an existing request, add sc_cat_item_content to the list for this property.
- **List of class names for catalog items that do not use the default "Try It" UI Action**(*glide.sc.item.cannot_try_it*): restricts the items which allow you to click **Try It** on the item form to preview how it appears in the service catalog. Items with such restrictions do not display **Try It** on the form.
- **List of class names for catalog items that do not generate a normal cart item**(*glide.sc.item.not_normal_cart_item*): restricts which item types are added to the cart by default.

Using variables for price setup

You can define a price for every service catalog item. The price or recurring price of a catalog item can be modified with variables, increasing the base price for that item.

This pricing is useful if you want the price or recurring price dynamically calculated based on how a user completes the ordering form. For example, the cost of an item can be increased based on options the user selects, such as extra memory in a PC.

The following variable types can be configured to modify the total cost of an item:

- Check box
- Multiple choice
- Reference
- List collector
- Select box
- Lookup select box

Check box

A check box variable helps to set the price or recurring price of the item being ordered.

You can Create a check box variable and set the price of the item. Use the **Price if checked** or **Recurring price if checked** field to specify the price or recurring price difference for that variable when the option is selected.

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Under the **Type Specifications** tab, you can specify the price in different currency types. Also, you can configure the price in the following pricing models:

- Calculated
- Fixed
- Multiple

For information on the pricing models, see Price fields .

Multiple choice

For a multiple choice variable, there are two options for pricing.

- Specify the price difference in the **Price** field on the question choices.
- Specify the recurring price difference in the **Recurring Price** field on the question choices.

Note:
Select boxes operate the same as multiple choice variables but are displayed as select boxes.

Reference

A reference variable includes a **Pricing implications** field.

If this field is selected and there is a **price**, **u_price**, **recurring_price**, or **u_recurring_price** field on the referenced table, the value of that field is used to modify the cost of the item being ordered when a reference value is selected.

For example, suppose that computers in Phoenix cost $100 more than the ordering price, and computers in Boise cost $100 less than the ordering price.

1. Set up a reference variable to the Location [cmn_location] table.
2. Put a **u_price** field on the Location table.
3. Set that field to `100` for the Phoenix location.
4. Set that field to `-100` for the Boise location.

When ordering a computer, if **Phoenix** is selected as the location for this variable, the ordering price is increased by $100. If **Boise** is selected, the ordering price is decreased by $100.

Note:
List collectors operate the same as a reference variable, but use the **List table** field to specify the table being referenced. Since it is a list collector variable, multiple selections can be made that all modify the ordering price or recurring price.

Lookup select box

A lookup select box variable is more powerful than a reference variable.

Specify the following when creating a lookup select box variable:

- **Lookup from table**: the table from which values are queried.
- **Lookup value field**: the field on the lookup table whose value is used as the value of the variable (typically sys_id).

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- **Lookup label field(s)**: a comma-separated list of fields on the lookup table whose values are used to display the selections in the select box. For example,**manufacturer,name** for the Software [cmdb_ci_spkg] table would display selections as:
  - Microsoft | Excel
  - Adobe | Photoshop Elements
- **Lookup price field**: the field whose value is used to modify the price of the item being ordered.
- **Lookup recurring price field**: the field whose value is used to modify the recurring price of the item being ordered.

Set a recurring price

A catalog item can have a recurring price in addition to an initial price.

Before you begin

Role required: admin

About this task

The price and the recurring frequency are set on the catalog item record. After the price and frequency are set, the recurring price appears in the catalog, catalog search results, catalog page for the item, shopping cart, and order summary screen.

For example, a subscription to a mobile phone contract could cost $500.00, with a $30.00 monthly recurring price.

Procedure

1. **Optional:** If multiple items with the same recurring price frequency are placed in the shopping cart, they are grouped.

   (Optional) The grouping makes it easier to view how much items cost for each frequency (for example, weekly, monthly, and annually). If the shopping cart contains items with and without recurring costs, they are grouped separately.

2. **Optional:** If multiple items with the same recurring price frequency are placed in the shopping cart, they are grouped.

   (Optional) The grouping makes it easier to view how much items cost for each frequency (for example, weekly, monthly, and annually). If the shopping cart contains items with and without recurring costs, they are grouped separately.

   On a request record, recurring prices are grouped by frequency and shown in the **Recurring Prices** related list.

3. **Optional:** If a request record contains multiple items with the same recurring frequency, select the arrow next to the corresponding recurring prices record to view details.

Extend the pricing model

The pricing model is useful if you want the price or recurring price to be dynamically calculated based on how a user completes the ordering form. You can extend the pricing model of a catalog item by editing the item price or the recurring price.

Before you begin

Role required: admin

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Procedure

1. From the left navigation pane, select **System Definition** > **Script Includes**.
2. Edit the CatalogPriceCalculator script to customize the item price and the CatalogRecurringPriceCalculator script to customize the recurring price.

Hiding prices in the service catalog

Administrators can configure options to hide catalog item prices in the service catalog for listings of specific items, for specific types of items, or for all items.

Item prices can appear in the following locations:

- A catalog item listing in the **Order This Item** panel.
- Catalog item listings in categories and subcategories.
- The **Shopping Cart** panel.
- The Edit Cart, Order Confirmation, and Order Status pages.

Hide prices globally

Configure service catalog properties to hide prices globally.

To view and edit service catalog properties, navigate to **Service Catalog** > **Catalog Administration** > **Properties**.

Hiding prices by item types

By default, prices do not appear for order guides, record producers, and wizard launchers.

You can change which catalog item types show prices using the **List of class names for catalog items that do not show the price in listings** property (*glide.sc.item.cannot_show_price*). Provide a comma-separated list of table names for item types that you want to hide prices for.

For example, to hide prices for standard catalog items, add **sc_cat_item** to the list.

You can also remove an existing entry to display prices for that item type. For example, to display prices for order guides, remove the order guide entry **sc_cat_item_guide** from the list.

Hiding prices for all items

By default, zero-priced items have prices hidden in listings and carts.

You can configure this behavior to always hide or show prices, using the **When to show prices and sub-totals on the Service Catalog Cart** property (*glide.sc.price.display*).

Set this property to **Always show prices** to display prices for all items on all service catalog screens, or to **Never show prices** to hide prices for all items on all service catalog screens.

Hide prices for specific items

You can hide prices for specific items to match your organizational requirements.

Before you begin

Role required: admin

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**.
2. Open the relevant item definition.
3. Select the **Omit Price on Cart** check box.

   The price does not appear in the catalog listing or when the item is added to the cart. The price is listed as "-" on the edit cart, order confirmation, and order status screens.

Create up to ten copies of Service Catalog request

Clone a request to create up to ten copies (clones) of the same Service Catalog request, for different users, without having to enter the same information multiple times. For example, you can request a new piece of equipment for several specified people, generating multiple individual requests quickly from a single initial request.

Before you begin

Role required: admin or catalog_admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Cart Layouts**
2. Under the **Target type: Browser Screen** section, select **Order Status Screen**.
3. In the **Components** tab, select the **Clone Checkout** check box.
4. Navigate to **Service Catalog** > **Catalog Administration** > **Properties**.
5. In the **Cart** category, perform the following:
   - Enable the **Enable cloning requests during checkout** property.
   - For the **List of roles (comma-separated) that can use bulk ordering functionality** property, enter the roles for which you want to enable bulk request capability for all users with these roles, or leave the field blank to enable the capability for all users.
6. Click **Save**.

Related topics

Clone a request

Request a catalog item from Service Portal

Request an order guide from Service Portal

Delegated request experience

Create scripts

Service Catalog enables you to use certain scripts.

Some functions are available, specifically for Service Catalog:

- Client-side scripting allows catalog designers to use the same functionality available on other forms.
- The Service Catalog Script API makes catalog ordering easier from inside business rules.
- Scriptable Assignment of Execution Plans allows selection of an execution plan at the time of ordering, based on scripted conditions.

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Create a custom cart

Administrators with a knowledge of Jelly can customize the look and feel of service catalog carts, either globally or for specific catalog items, using the UI macro capability.

Before you begin
Role required: admin

About this task
Note:
You can configure cart layouts without scripting.

Procedure
1. Navigate to **All** > **System UI** > **UI Macros**.
2. Click **New** to create a new macro.
3. Fill in the details and write the script to define your custom cart.

   Note:
   Designing a custom cart requires knowledge of the Jelly expression language. For reference purposes, the default cart script appears in the list as `catalog_cart_default`.

4. Click **Submit**.

What to do next
After creating a custom card, you can reuse it and link it to catalog items.

Link a cart to an item

Link the default cart or a custom cart to an item so the requester sees the pertinent information.

Before you begin
Role required: catalog_admin or admin

Procedure
1. Navigate to **All** > **Service Catalog** > **Catalog Items**.
2. Open an item to test the new cart.
3. In the **Cart** field, select the cart to use.
   You can configure the form layout to add this field to the form.
4. Save the changed form.

Service Catalog home page configuration

The home page for a Service Catalog provides the primary front end for ordering items within that catalog. You can configure various elements of the pages within the Service Catalog.

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Important:

The functionality found in homepages, arranging information from your instance to tell a story about your data, is found in dashboards on new instances. On upgraded instances with Next Experience enabled, users can view existing homepages if they have a direct URL, but they can't create or edit them. Responsive dashboards and Analytics Center dashboards take over homepage functionality.

Use the Homepage deprecation help tool to convert the homepages on your instance to responsive dashboards.

For more information, see:

- Dashboards in the Analytics Center.
- Working with responsive dashboards.

Administrators and catalog administrators can design a home page in any of the following ways.

- Customizing the catalog home page.
- Adding, removing, and arranging categories.
- Enabling content types.
- Using catalog properties to provide additional control over behavior and appearance.
- Using renderers to define the appearance of categories.

Note:
End users can access the catalog through the customizable user home page, or with content management pages that use content blocks for categories.

Configure search and navigation

You can use service catalog properties to configure search and navigation within the service catalog homepage.

Navigate to **Service Catalog** > **Catalog Administration** > **Properties** to view service catalog properties.

Restrict search access

Each catalog homepage provides a search bar to help locate items not displayed on the homepage. By default, any user who can access the catalog homepage can search using this search bar.

To restrict access to this search function by role, use the **List of roles (comma-separated) that can search the service catalog** property (*glide.sc.can_search*).

For example, to only allow logged-in users to access search, set this field to empty. To remove the search function for all users, set this field to **None**.

Note:
Search results only show items that the logged-in user can access.

Hide search results from inactive categories

By default, search results are returned from all categories, including inactive categories.

To avoid returning results from inactive categories, set the **Service catalog searches return items in inactive categories** property (*glide.sc.search.disabled_cats*) to **No**. For

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example, when designing a new category, you can avoid users seeing search results from this category until you're ready to make it active.

Note:
Security constraints can also make a category or catalog item inaccessible.

Restrict search by item type

By default, a search field does not appear when viewing order guides, record producers, and wizard launchers.

To define which catalog item types do not show the search field, list these types in the **List of class names for catalog items that do not have the search field displayed** (*glide.sc.item.cannot_show_search*) property.

For example, to enable searching when viewing record producers, remove `sc_cat_item_producer` from this list.

Enable breadcrumb links

By default, breadcrumbs appear without links when using content management pages as service catalog homepages.

To display these breadcrumbs with links, set the **Use links for breadcrumbs rendered in Service Catalog pages accessed via a CMS site** property (*glide.sc.use_breadcrumb_links.cms*) to **Yes**. This setting provides greater navigational control for end users.

Disable search suggestions

By default, service catalog searches display "Did you mean?" suggestions if a search does not return any results and an alternate spelling or similar recent search does.

To disable these suggestions, set the **Specify whether search suggestions should be enabled** property (*glide.sc.search.suggestions*) to **No**.

Refine search results

Use properties to refine search results in Service Catalog.

Before you begin
Role required: admin

About this task
The auto-completion feature returns values that contain an exact match to the letter combination entered.

Administrators can use the **Additional columns for the "request for" Service Catalog widget** (*glide.sc.request_for.columns*) property to add columns to this list, to further refine the search results, and help determine which user to select when two users have the same name.

In this example, the property is set to display two additional columns, **Department** and **Title**:

Administrators can use the **Ordering of matches for the "request for" Service Catalog widget**. (*glide.sc.request_for.order_by*) property to configure the columns to sort by one of the values.

In this example, the is set to sort the results list by **department**.

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Auto-completion also applies to the **Request for** field, which can be added to the service catalog homepage.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog**.
2. Select **Add Categories**.
3. Select **Request for**.
4. Place the category on the page.

Configure keyword search for catalog items

When you search for a catalog item by a keyword in Service Catalog, the search results are displayed by considering a few fields of the catalog table.

Before you begin
Role required: admin

About this task
If the keyword doesn't have exact matches, its closest matches are displayed as **Did you mean** suggestions. This search functionality is also applicable in Service Portal.

The search results are sorted in the following order based on the frequency of the keyword:

- Catalog items whose **Name** field contains the keyword (top).
- Catalog items whose **Meta** field contains the keyword.

> **Note:**
> The **Meta** field is used for the Zing search, and if AI search is enabled, the field is used for the keyword search as well. If the **Meta** field is empty, the Zing search uses other sources, such as short descriptions and names.

- Catalog items whose **Description** or **Short description** field contains the keyword.
- Categories whose **Name** or **Description** field contains the keyword.
- Catalogs whose **Name** or **Description** field contains the key term, or the catalog items whose **Class** field contains the keyword (bottom).

> **Note:**
> - If your organization has multiple service catalogs, a search returns a result only from the catalog being viewed.
> - Search results return an item only when the item is active, has a valid catalog and category association, and you're authorized to view the item.

Procedure

1. Complete the following steps to regenerate a text index for the sys_metadata table.

   a. Navigate to **System Definition** > **Text Indexes**.

   b. Open the text index for the Application File [sys_metadata] table.

   c. Select the **Regenerate Text Index** related link and select **OK**.
   The system schedules the table for the text indexing.

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2. Complete the following steps to enable the **Did you mean** suggestions.
   a. Navigate to **System Properties** > **Text Search**.
   b. Under the **Did You Mean Properties** section, enable the **Suggest alternate search spellings for knowledge, catalog or global search** property.

Related topics

Search administration

Service Catalog for managers and end users

Regenerate a text index for a table

Configure a "Did You Mean?" suggestion

Create or edit a catalog item

Create a record producer

Create an order guide

Define a content item

Configure AI-based catalog search experience

Improve employee engagement with an AI-based catalog search experience in Service Portal and Now Mobile. Intelligent query features enable users to quickly and easily find the answers they need.

Before you begin

Role required: admin

About this task

You can configure AI-based catalog search experience in portals and Now Mobile. Following are the default search application configurations for Service Portal and Now Mobile:

- Service Portal Default Search Application. For information about AI Search in Service Portal, see AI Search in Service Portal.
- NowMobile App Search Configurations. For information about AI Search in Now Mobile, see AI Search in mobile.

Each of these search application configurations have an associated search profile based on which the search results are filtered and displayed.

Note:
If the AI Search is enabled for Now Mobile, the **Experience for items not available in NOW Mobile** (*glide.sc.mobile.unsupported_discover*) property is not applicable. For information on Now Mobile properties, see Service Catalog properties.

Following are a few limitations for AI-based catalog search experience:

- The facets in Service Portal always show the primary category of the catalog item (even if the user does not have access to the primary category and the accessible path to the item is via another category that the item is associated with).
- If the user does not have read permissions for the category record and its fields, the search results cards in Now Mobile do not show the category of the item.

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Procedure

1. Navigate to **All** > **AI Search** > **Search Experience** > **Search Applications**.
2. To edit the searchable catalogs in a portal or Now Mobile, perform the following steps.

> **Note:**
> Items are searched for only in the catalogs configured in the search source, irrespective of the catalogs associated with the portal. For information on associating a catalog with a portal, see Configure a catalog in Service Portal.

a. In the Search Application Configurations list, select the search application configuration associated with the portal.
For example, **Service Portal Default Search Application** for Service Portal.

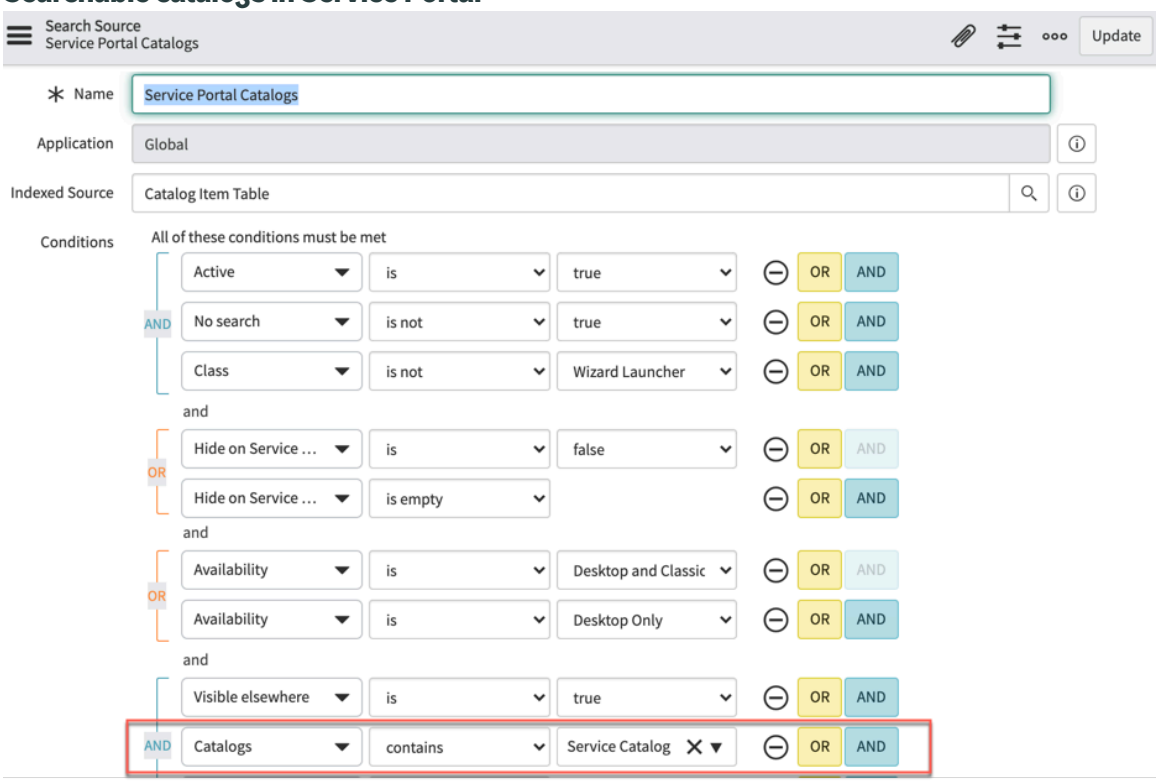
b. On the Search Application Configuration form, open the search profile.
For example, **Service Portal Default Search Profile** specified for Service Portal.

> **Note:**
> To avoid conflicts with future upgrades, it is recommended that you create a search profile instead of using the search profile available in the base system.

c. From the Search Sources related list, select a search source.
For example, **Service Portal Catalogs**.

d. In the **Conditions** field, add catalogs where you want the items to be searched for.

Searchable catalogs in Service Portal



e. Click **Update**.

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Related topics

AI Search

Configure preview

Configure the number of items that have the **Preview** section expanded to display item details. You can also change the default number (5) of items and categories that display, and hide the **Exists in categories** information.

Before you begin

Role required: admin

About this task

By default, if not showing item details using pop-ups, the first two items listed in the category display have the **Preview** section expanded to display item details.

To change the number of items with this information expanded, set the **Number of Catalog Items to expand in browsing and search when not using pop-up icons to view details** (glide.sc.auto_expand) property to the number required.

Expanding to 2 items	Expanding to 1 item

Set number of items and categories to preview

By default, up to five items or categories appear in each category on the homepage.

About this task

To change this number, set the *Number of Catalog Items/Categories to preview in a section* (glide.sc.max_items) property to the required value.

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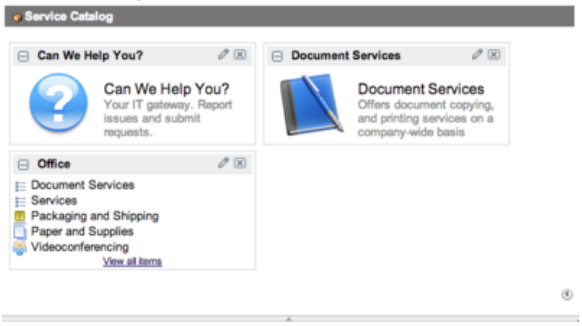
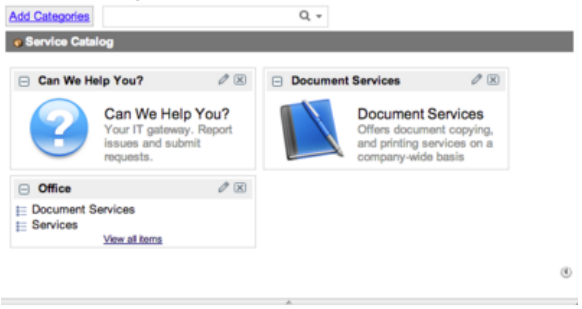
Previewing five items



Previewing two items



Hide the existing categories in the categories display

By default, catalog items that are in several categories show **Exists in categories** information that shows other categories that the items are available in. You can hide this information.

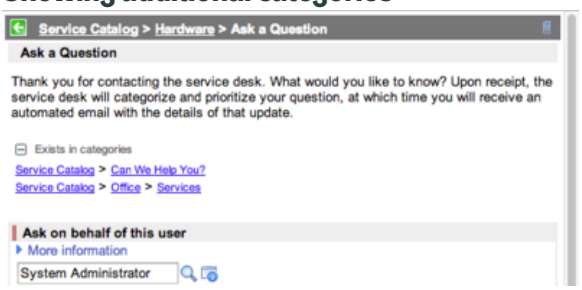
Before you begin

Role required: admin

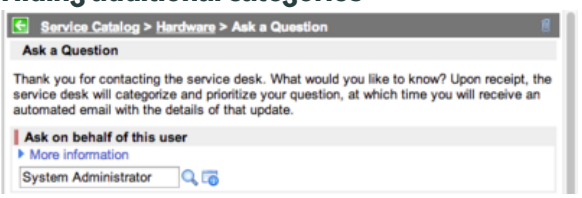
Procedure

Set the **Show the additional categories section when viewing a catalog item**(glide.sc.show_additional.cats) property to **No**.

Showing additional categories



Hiding additional categories



Create a renderer

Create or modify renderers using UI macros to provide the rendering instructions. Renderers define a specific look and feel for a catalog or category.

Before you begin

Role required: catalog_admin or admin

About this task

Use renderers to specify the following formats:

- How catalogs appear on the multi-catalog homepage.
- How categories appear on a catalog homepage.

For example, you can create a renderer showing the category homepage image, the description, and the first two catalog items in a category.

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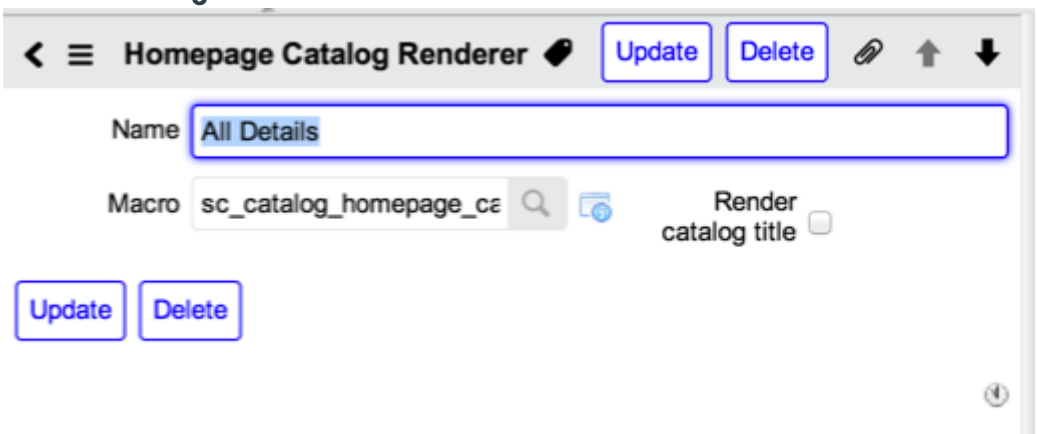
Procedure

1. **Optional:** Create a UI macro to define specific rendering instructions.
2. Navigate to **Service Catalog** > **Catalog Definition** > **Renderers**.
3. Click **New**.
4. Select to create a catalog or category renderer.
5. Enter the renderer details.

Renderer Details

Field	Description
Name	A name for the renderer.
Macro	The UI Macro to use.
Render catalog title	Appears for catalogs renderers. A check box to display the catalog title bar on the multi-catalog homepage.
Render title	Appears for category renderers. A check box to display the category title bar on the catalog homepage. **Note:** The **admin** and **catalog_admin** roles can view the **Render title** even when the check box is not selected.

Service Catalog Renderers



6. Click **Submit**.

Note:
To modify a default catalog or category renderer, follow a similar process, by selecting one of the default renderers listed.

This new renderer is added to the list of available choices when applying a renderer.

Select a renderer for a catalog

Select a renderer and apply them to a catalog to change its appearance.

Before you begin

Role required: catalog_admin or admin

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About this task

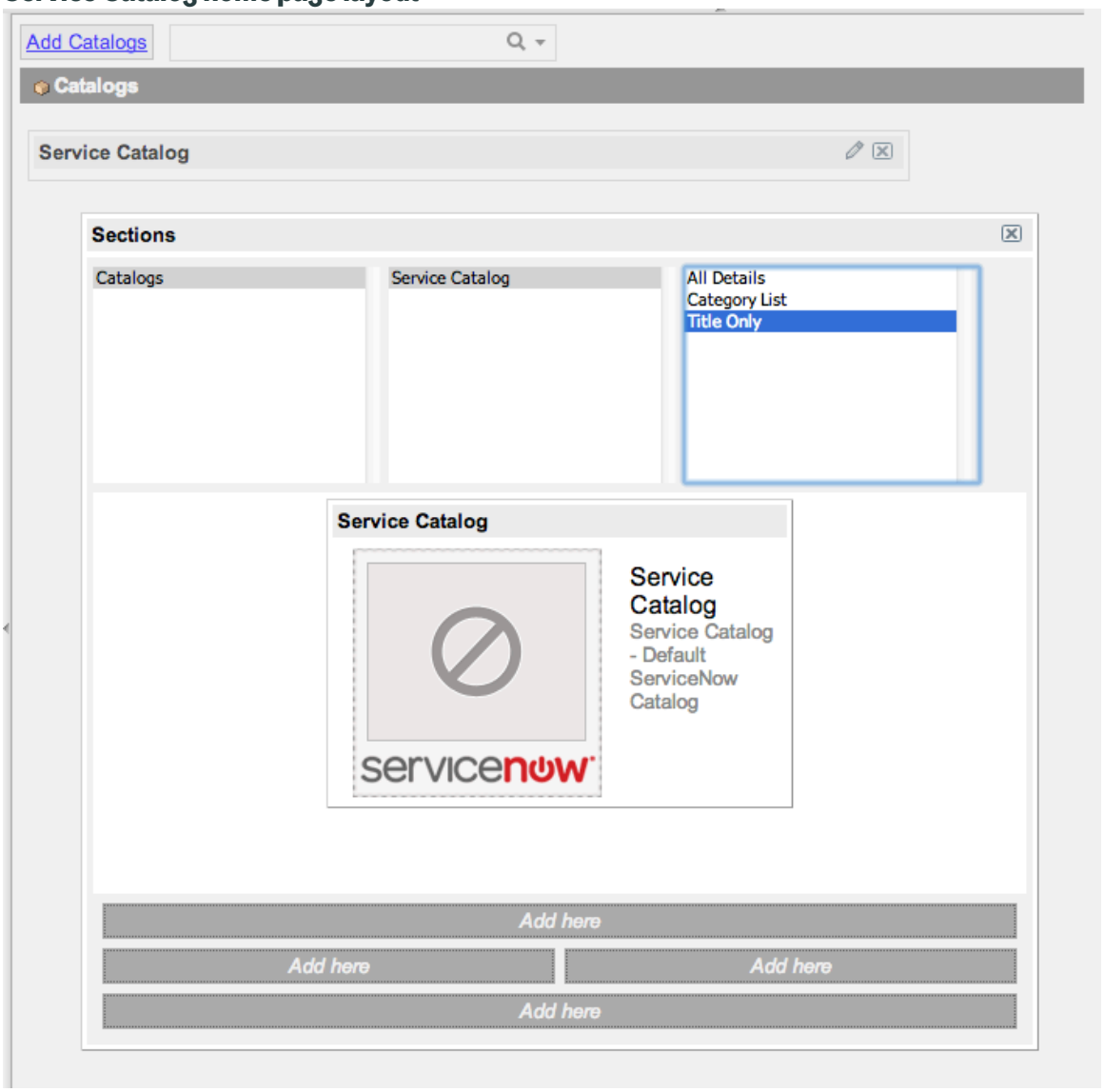
The following default catalog renderer schemes are available:

- **All Details**: shows desktop image, title, and categories.
- **Image Only**: shows desktop image only.
- **Title and Image**: shows title and desktop image.
- **Title Only**: shows title only.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalogs**.
2. Click the add content icon (+) on the upper right.
3. Select a catalog in the middle panel of the pop-up window.

Service Catalog home page layout



4. Select a renderer from the list displayed in the right-hand panel, for example **Title Only**.
5. Click **Close** to save the catalog with the renderer settings you defined.

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Select a renderer for a category

Select a renderer scheme for your categories.

Before you begin
Role required: catalog_admin or admin

About this task
The following default category renderer schemes are available:

- **Category Items**: shows desktop image, title, and description.
- **Category Items No Title**: shows desktop Image and description.
- **Category Details**: shows the subcategories and items in that category.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog**.
2. Click the add content icon (+) on the upper right.
3. Select a category in the middle panel of the pop-up window.
4. Select a renderer from the list displayed in the right-hand panel, for example **Category Items**.
5. Click the close icon (x) to save the catalog with the selected renderer.

Customize a catalog homepage

Customize a catalog homepage to provide end users with access to catalogs from one homepage.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog**.
2. Click the add content icon (+) at the top of the page to add a category.
3. Select a category in the middle panel of the pop-up window that appears.

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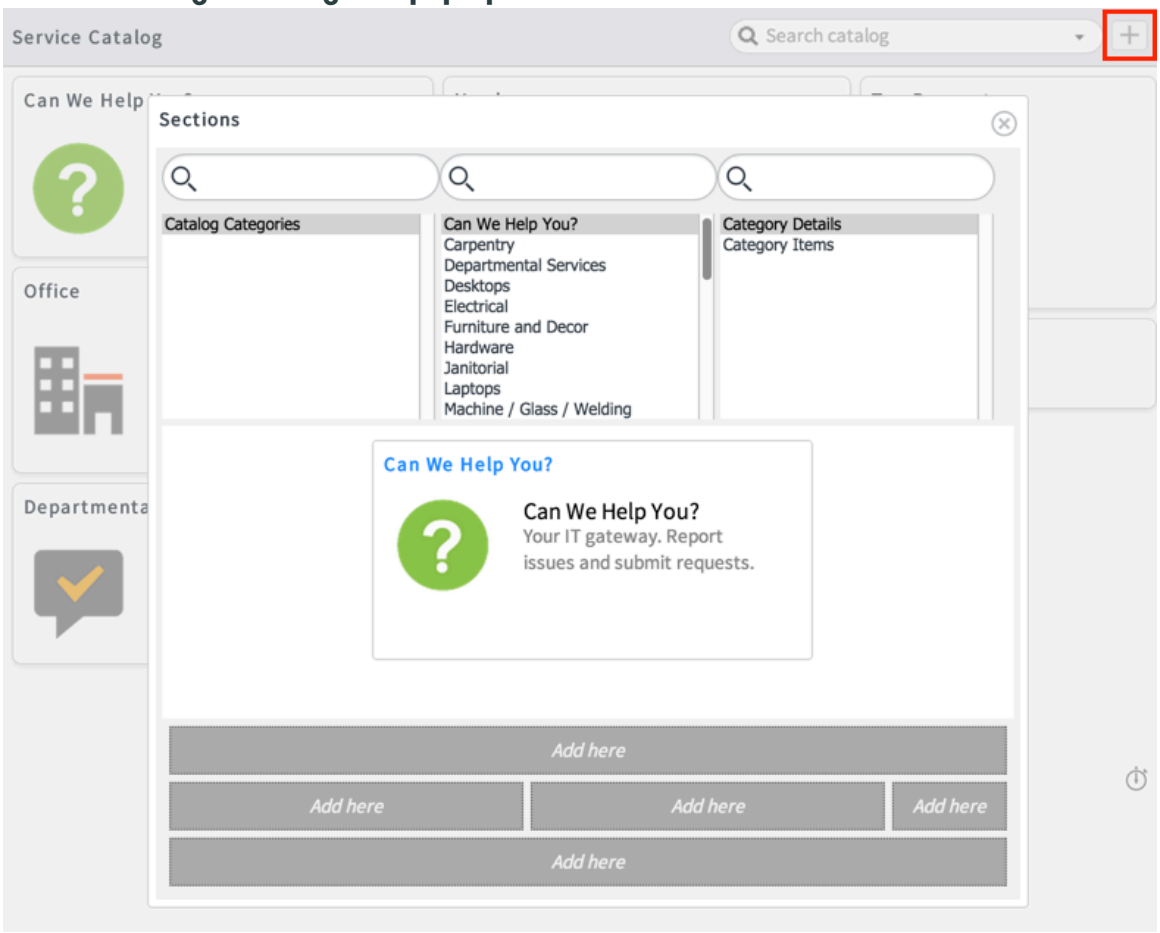
Service Catalog add categories pop-up window



4. Click **Add here** in the location where the category appears on the homepage.
5. **Optional:** Repeat steps 3–4 to add more categories.
6. Close the pop-up window.
7. **Optional:** To change a category location, drag it to the appropriate place.
8. **Optional:** To remove a category, click the (**X**) icon on the top right of the category header.
9. **Optional:** Add a shopping cart on the page.

Display subcategories in a panel

By default, subcategories are displayed in a panel at the bottom of the category page. You can change a system property to list subcategories at the top.

Before you begin

Role required: admin

Procedure

Use the **In category view display subcategories in a panel** property (*glide.sc.use_sub_cat_section*).

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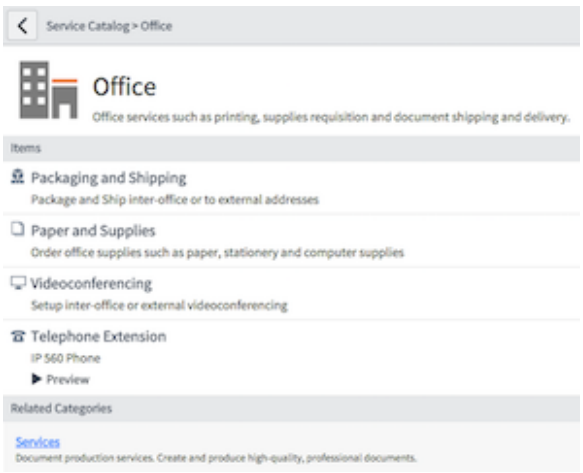
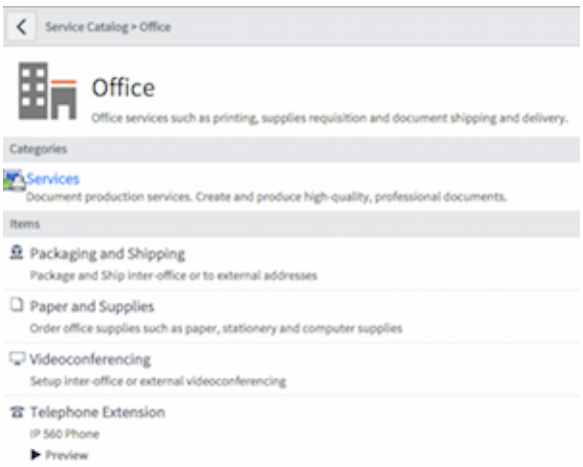
Name of form

When set to **Yes**, the subcategories appear in a panel at the bottom.	When set to No, the subcategories appear as a list at the top.
Set to Yes  	**Set to No** 

Customize the multi-catalog homepage

Customize the multi-catalog homepage to provide end users with access to multiple catalogs from one homepage.

Before you begin

Role required: admin

About this task

This task is similar to customizing the homepage for an individual catalog. In this task, you are adding catalogs, not catalog categories.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalogs**.
2. Select **Add Catalogs** at the top of the page to add catalogs to this page.
3. Select a catalog in the middle panel of the pop-up window.

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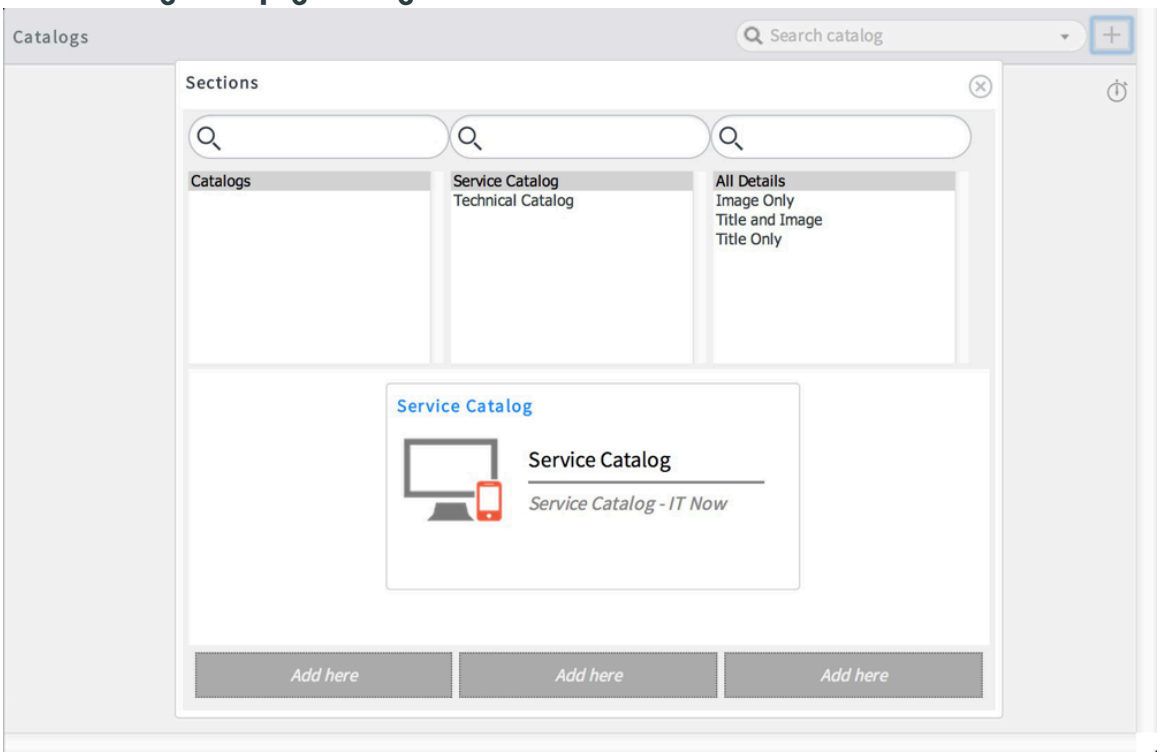
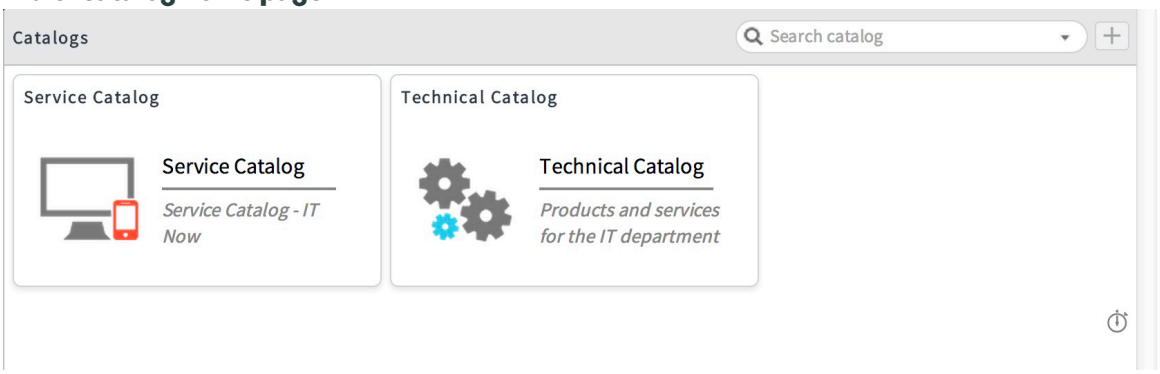
Multi-catalog home page arrangement



Note:
Only administrators can see catalogs that do not contain active categories or items.

4. **Optional:** Select a renderer from the right-hand panel, for example **Title Only**.
5. Click **Add here** in the location where the catalog appears on the homepage.
6. **Optional:** Repeat steps 3–5 to add more catalogs.
7. Close the pop-up window to save the changes.

Multi-catalog home page



You can modify the arrangement of catalogs within the homepage:

- To change a catalog location, drag it to the appropriate place.
- To remove a catalog, click the X in the catalog title bar.
- To edit details for a catalog, click the pencil icon in the catalog title bar.

The catalogs appear on the homepage.

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Show item details in sections or pop-ups

By default, a service catalog category displays the first two items with the preview section expanded to show item details. You can change the number of items that are previewed, or change the preview to appear in a pop-up window.

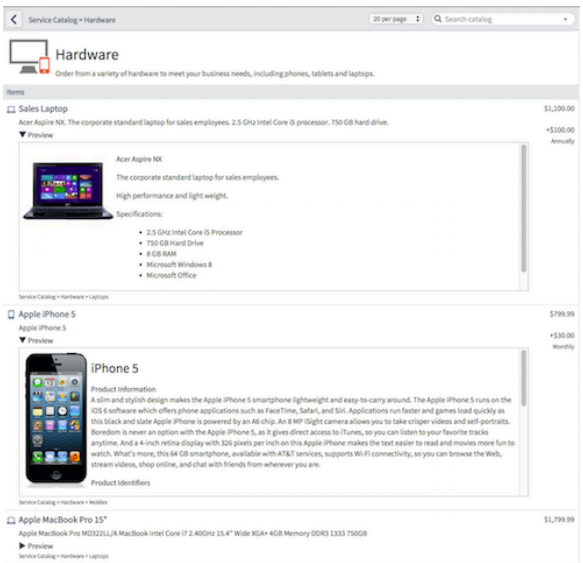
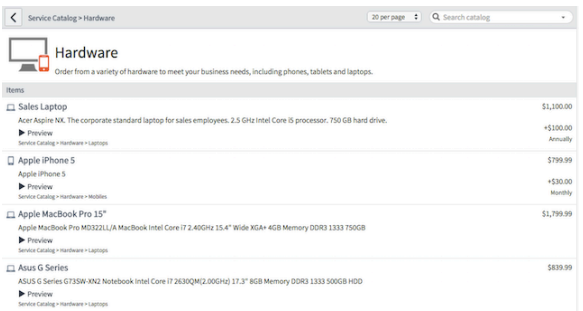
Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Properties**.
2. To change the number of items previewed, set the **Number of Catalog Items to expand in browsing and search when not using pop-up icons to view details** (*glide.sc.auto_expand*) property to the desired number.

   Example

Expanded to 2 items.	Expanded to 1 item.
2 items 	**1 item** 

3. To use the preview icon, set the **When browsing a category use the pop-up icon to show item details** (*glide.sc.cat_view_use_popup_for_details*) property to **Yes**.

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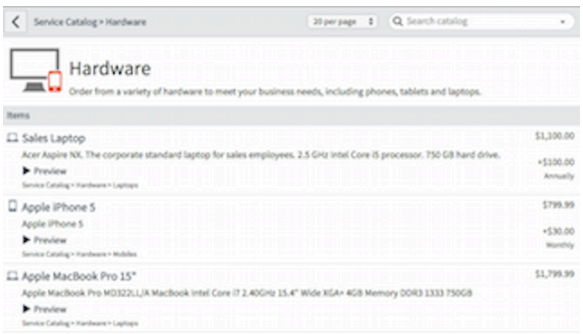
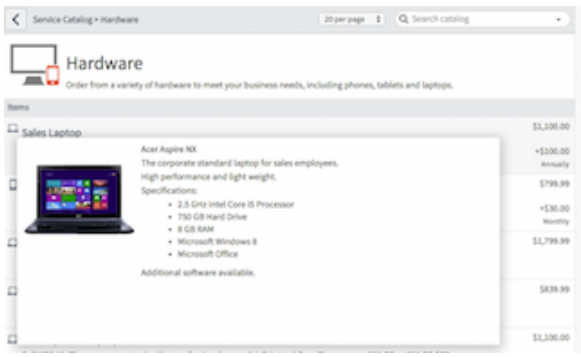
When set to **No**, the item details appear when you click **Preview**.	When set to **Yes**, the item details appear as a pop-up when the cursor hovers over the item icon.
Set to No 	**Set to Yes** 

Configure Classic Mobile devices

When you configure Service Catalog on a Classic Mobile device, you can define the layout and presentation of catalogs. You can then perform actions such as ordering products and services, submit incidents and problems using record producers.

Before you begin

Important:

Mobile Classic Is Deprecated.

The App Has Been Removed From The Stores And Can No Longer Be Activated. We Are Not Offering Enhancements, Bug Fixes, Or Support For The App. See ServiceNow Classic Mobile App Deprecation Effective September 15, 2022.

Role required: admin

About this task

Users can access the service catalog on Classic Mobile devices to:

- View and order products and services.
- Submit incidents and problems using record producers.

Note:
Users cannot access order guides, wizards, or content items from Classic Mobile devices.

Administrators and catalog administrators can configure the layout, presentation, and other aspects of the service catalog for Classic Mobile devices.

Including:

- Defining rendering options for Classic Mobile categories.
- Defining rendering options for Classic Mobile catalog items.

Accessing the Service Catalog on Mobile Devices

To access the service catalog, navigate to **Self-Service** > **Catalog**.

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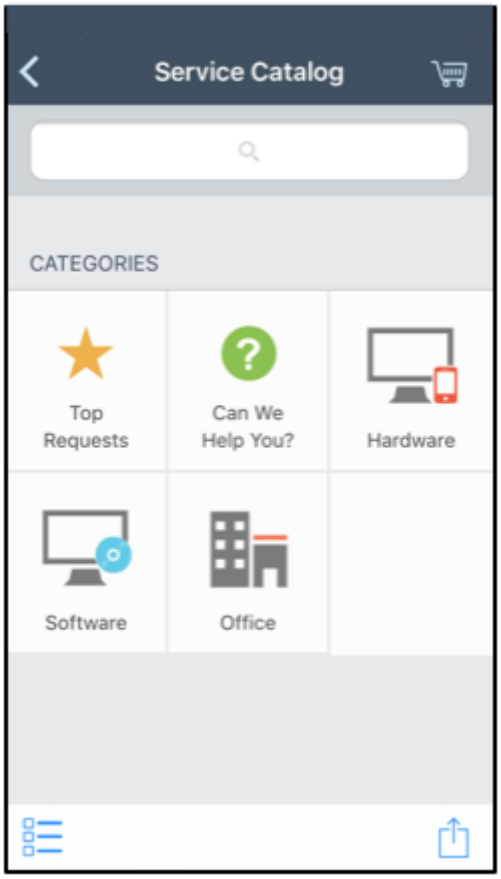
Service Catalog homepage Classic Mobile



Catalog items are grouped into categories, which can also contain one or more subcategories.

You can browse and select an item. To browse for an item within a category, tap the category filter to select the category or subcategory.

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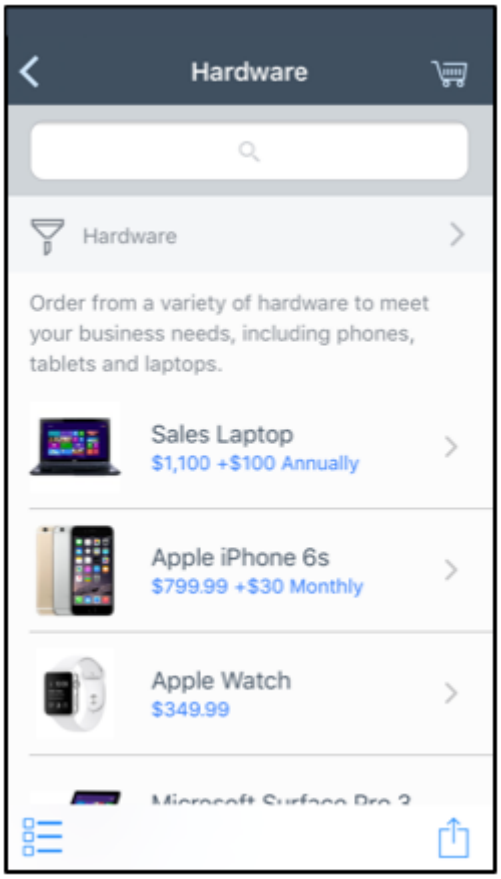
Sample service catalog category



To request an item:

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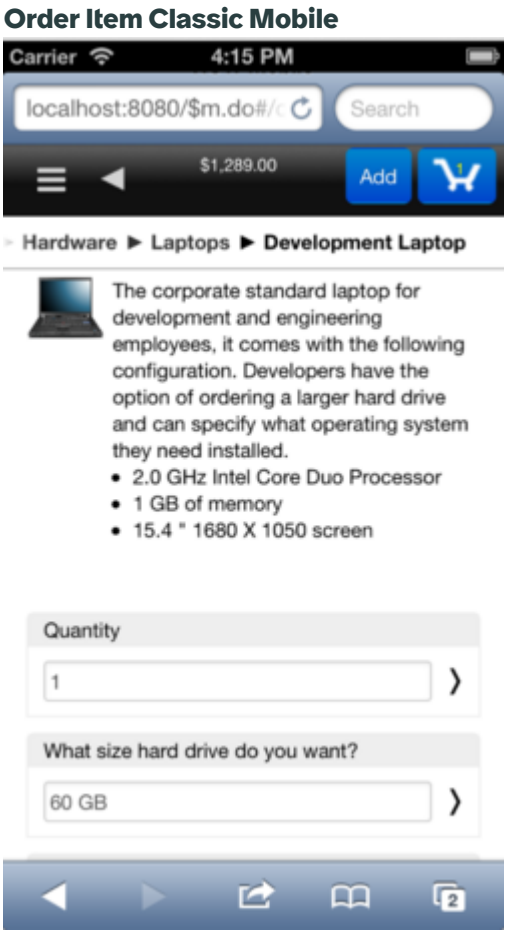
Procedure

1. Select an item.



2. Tap any field with an arrow (>) to add information, such as the name or location of the requestor, the need-by date, or item quantity.
3. Tap **Add to Cart** to add the item to your cart.

   The order screen appears.

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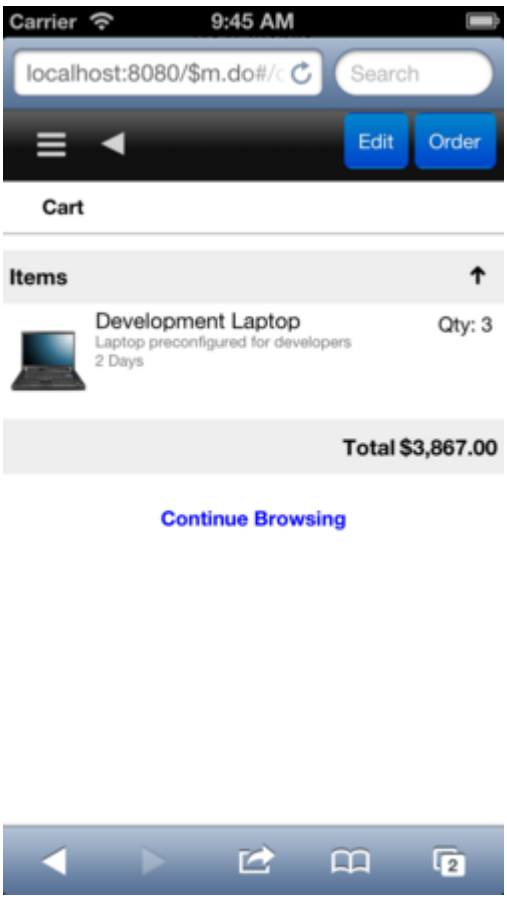
Order Item Classic Mobile 2



4. Tap **Edit** to edit your order, if required.
5. To order the item as specified, tap **Order**, then tap **OK** when prompted to confirm ordering. A confirmation message appears.

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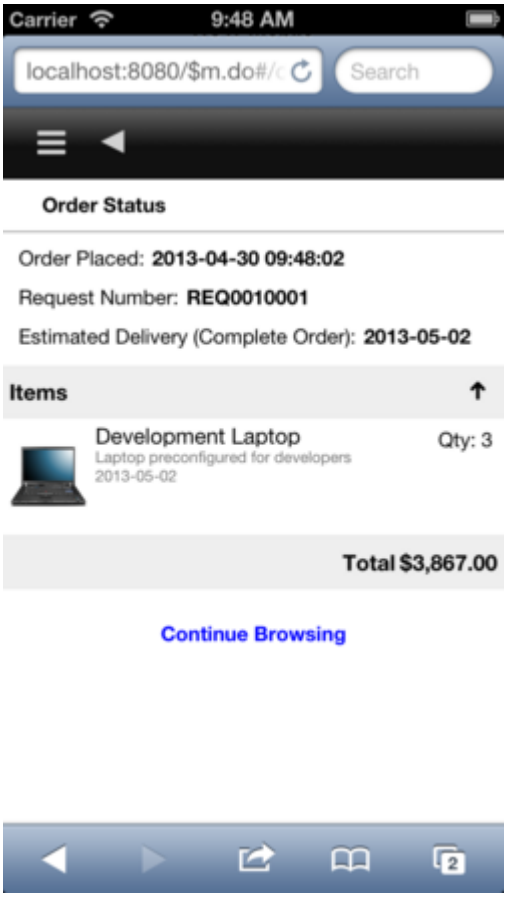
Classic Mobile Order Confirmation



6. Tap the item to see further details.

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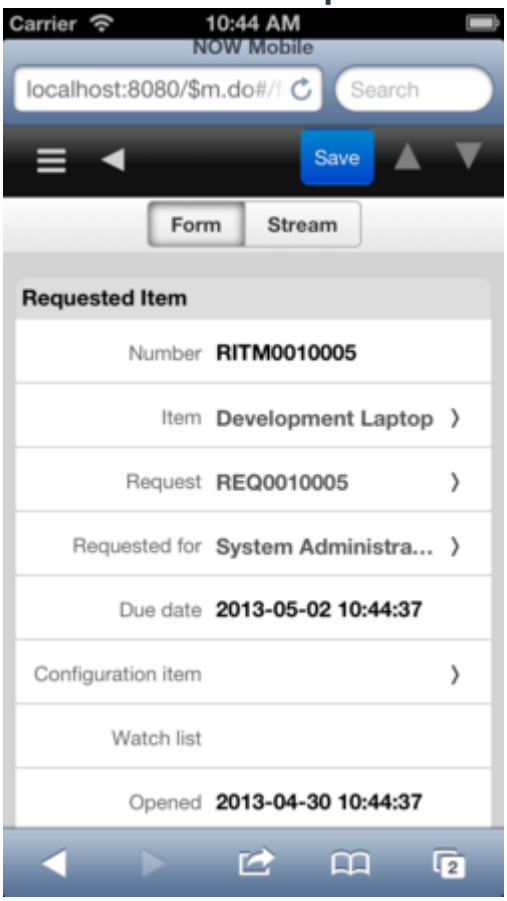
Classic Mobile Order Requested Item Details



7. Tap the back arrow to return to the confirmation message.
8. Tap **Continue Browsing** to return to the service catalog.

   After the request is submitted, ServiceNow follows request fulfillment processes to fulfill the ordered item.

Define the mobile layout

You can configure the Classic Mobile layout for categories within a service catalog.

Before you begin

Role required: admin

About this task

By default, service catalog categories appear on mobile devices in the same order as on desktop devices.

Procedure

1. Navigate to **All** > **Service Catalog** > **Classic Mobile Admin** > **Classic Mobile Layout** to display a list of service catalogs.
2. Click the lookup icon for the service catalog you want to configure.
   The mobile layout displays details for the catalog.
3. Click **Edit** to select which categories appear on mobile devices, and in which order.

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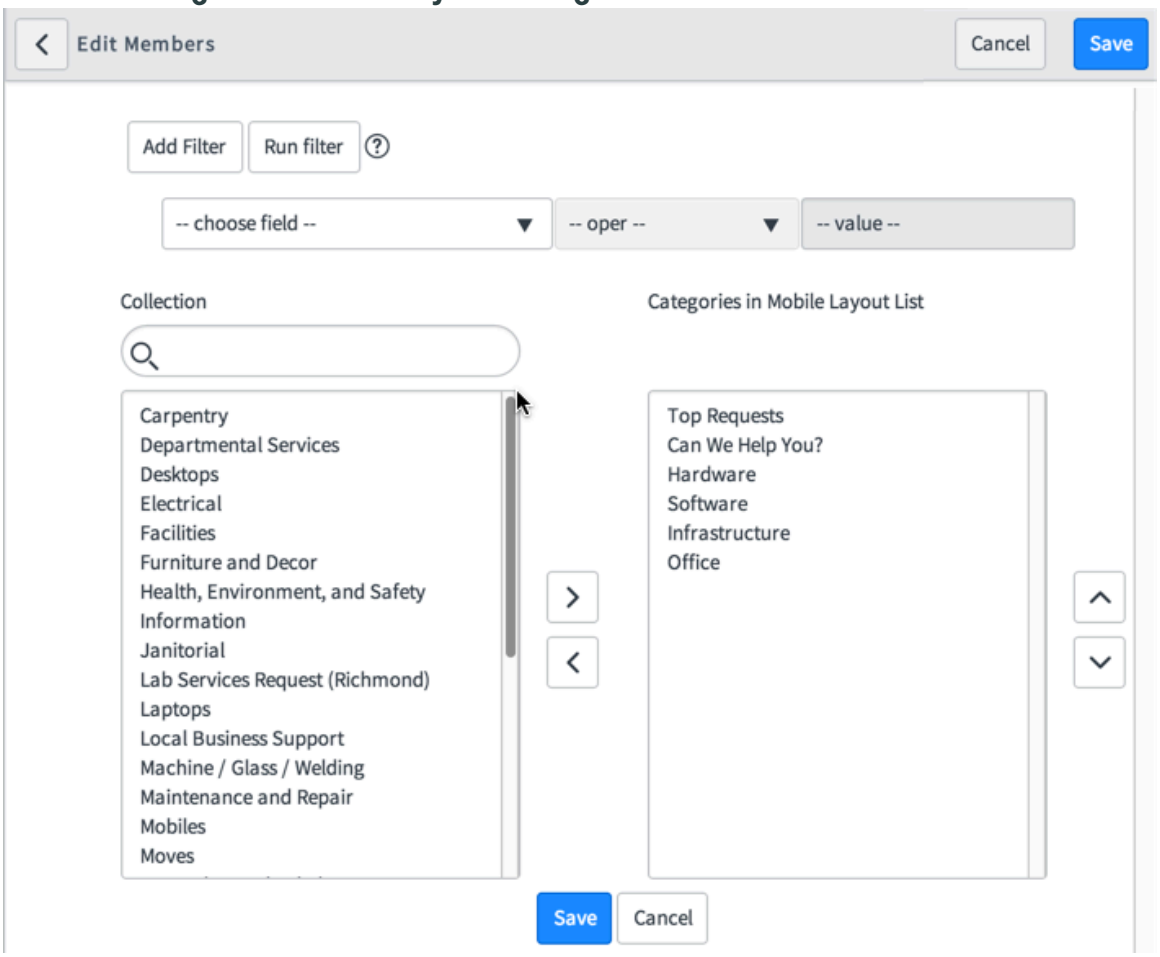
Service Catalog Classic Mobile layout catalogs



4. Add, remove, or reorder the selected mobile categories, and then click **Save**.

Note:
To return the display to the default desktop layout settings for the portal page associated with that catalog, click the **Replace categories with desktop layout** related link.

Limit description sizes in the Classic Mobile UI

By default, item descriptions in the smartphone interface are truncated to a maximum of two lines.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Properties**.
2. Set the **Limit descriptions in category and item listings to two rows in the Mobile UI** property (glide.sc.mobile.limit.description) to **No**.

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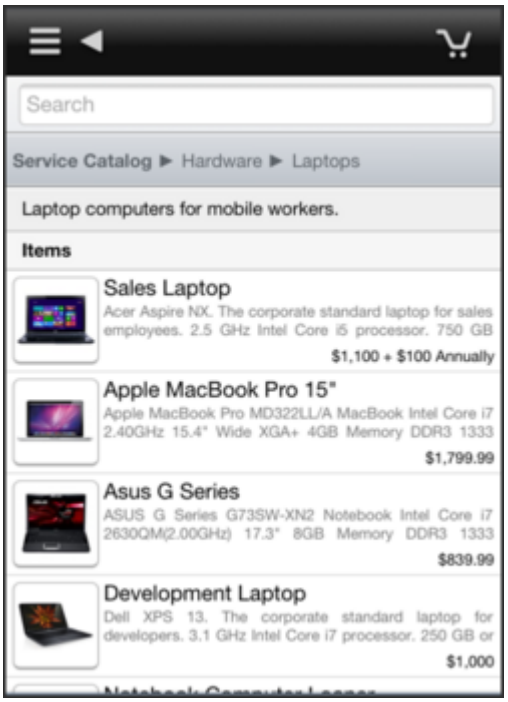
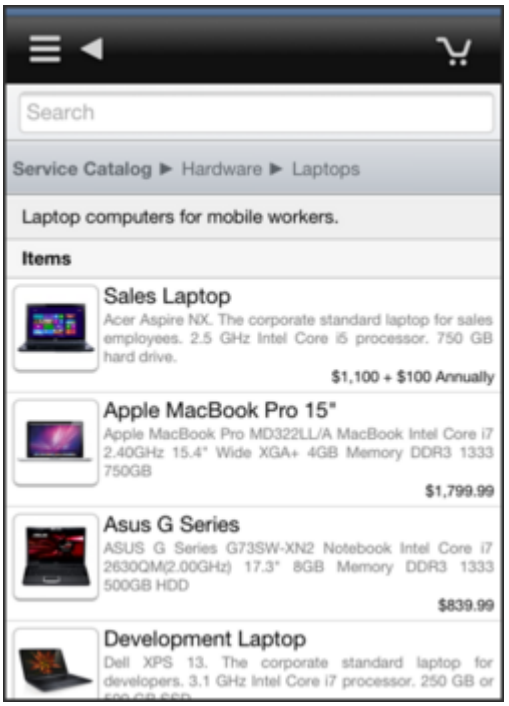
If set to **Yes**, descriptions are limited to two lines	If set to **No**, the full descriptions are given
Set to Yes 	**Set to No** 

Using the content management system with the Service Catalog

Use the content management system (CMS) to create a custom interface for the service catalog.

> **Important:**
> Use Service Portal for new development instead of CMS. Service Portal is an alternative to CMS with a refined user experience, and is active by default in the base system. For more information, see Service Portal and Content Management and Service Portal.

Manage catalogs in CMS sites

When your organization uses the content management system (CMS) as well as Service Catalog, you can select which catalogs are supported within the CMS sites.

Before you begin

Role required: catalog_admin or admin

About this task

Associating catalogs with sites ensures that users can always access an appropriate catalog.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Catalogs** and open the catalog to associate with a site.
2. In the Sites related list, click **Edit**, select the site to associate with the catalog, and then click **Save**.
3. Click the reference icon beside the site name, and then click **Open Record**.

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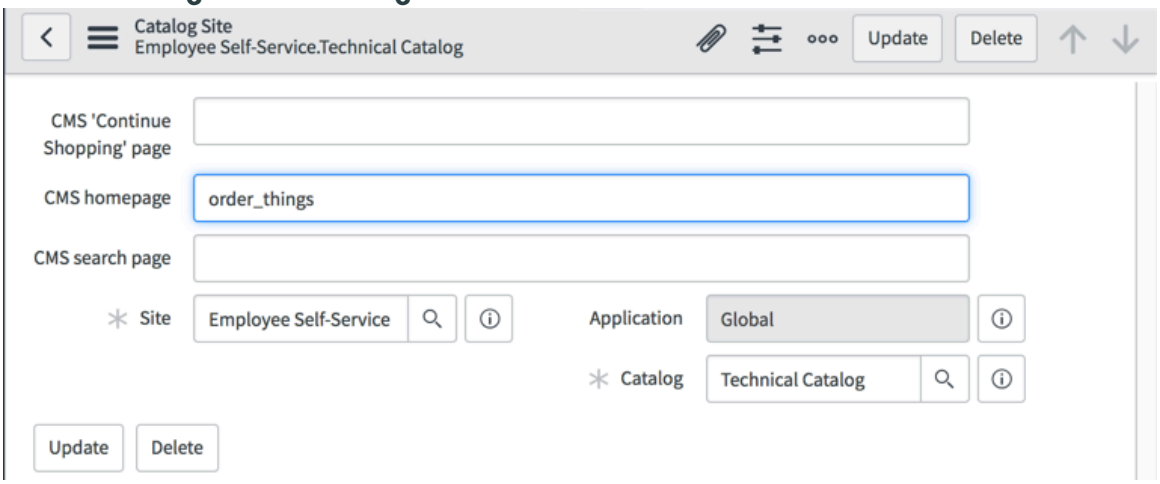
Service catalog details - catalog sites details



4. Enter values in the fields, as appropriate.

Field	Description
CMS homepage	The homepage for this site.
CMS search page	The location of the search page for the site.
CMS 'Continue Shopping' page	The location to direct end users to when they click the **Continue Shopping** button in that CMS site. This field is designed to reference a content page URL suffix.

5. Click **Update**.

Set up catalog portal pages

The Catalog Portal Page `[sc_catalog_view_mtom]` table links catalogs to CMS portal pages and defines the default catalog to portal page combination used by URLs.

For example, the default portal page for the service catalog is the catalog_default page.

Catalog portal page records appear in the *Catalog Portal Pages* related list on the Catalog form. The Catalog Portal Page table generates two values in a URL: **sysparm_catalog_view** and **sysparam_catalog**. Use the Catalog Portal Page form to enter a custom link, if required.

Resolve missing catalog portal pages

If a catalog record is not associated to a catalog portal page record, ServiceNow attempts to present a view based on a set prefix of: **catalog_<catalog name>**.

For example, if the default service catalog has no catalog portal page record, the system sets **sysparm_view** to **catalog_Service_Catalog**. With this setting, when you navigate to **Self-Service** > **Service Catalog**, you view a new and apparently blank **catalog_Service_Catalog** portal page, instead of the existing and populated **catalog_default** portal page.

To correct, go to the *Sites* related list on the Catalog form and add a new catalog portal page record manually.

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For example, for the default service catalog, add a record with the following values:

- *Catalog*: Service Catalog
- *Portal Page*: Catalog (catalog_default)
- *Default*: true

Manage catalog portal pages

Using Service Catalog, you can create and manage multiple portal pages for a catalog.

Before you begin
Role required: admin

About this task
A catalog portal page provides a homepage for a specific catalog. You can use portal pages to create different catalog views for different user groups. Each portal page accesses the same catalog content and presents that content in different ways.

Catalog portal page details include the owner, title, and view to use for that page.

Procedure

1. The Catalog Portal Pages related list shows portal pages available for that catalog. Each catalog has a default page, created automatically when the catalog is created.
2. Select an appropriate action:
   - Click **New** to create a new portal page.
   - Click **Edit** to select another portal page for the catalog.
   - Select a portal page to view and edit details for that page.

Customization vs configuration

There are important differences between customizing and configuring ServiceNow applications. The ServiceNow platform is built to embrace customization and configuration but how you do so can have significant impacts on ServiceNow support, upgrading to future ServiceNow platform versions, and the functionality of the ServiceNow platform.

The general rules around customization are:

- Customize an application only if it extends the original intent of the application. For example, add IT functionality to ITSM but don't add a travel workflow. Instead of over-customizing an application, create a new application using App Engine products, such as Creator Studio or ServiceNow Studio.
- Configure as much as you can before customizing an application.
- If you add code or make other modifications to out-of-the-box functionality, you own them.

What is configuration

Configuration is the process of using ServiceNow built-in tools and features to modify an application's behavior without making changes to flows or the code that is part of the baseline installation on a ServiceNow instance.

Configuration can take the form of using ServiceNow built-in tools to add tables and more, setting instance-wide parameters, as well as using code to extend an application's functionality to meet business needs as long as the code does not modify the baseline code installation. The entire platform is designed for you to add configuration code.

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If you add code, such as workflow scripts, you own it, even if it doesn't alter the baseline code installation. That includes owning the impact it has on the entire ServiceNow platform. Issues that arise from added code are beyond the scope of ServiceNow support to debug.

Reverting a configuration should not require any change to the baseline code.

Configuration examples include:

- Forms: Configure tables, fields, data types, default values, and field dependencies to configure the data you capture and display.
- UI elements: Modify layouts, add related lists, add buttons, and change field names.
- Service Catalog: Configure portals where your customers can request catalog items such as service and product offerings.
- ACLs: Restrict unauthorized users from accessing forms and data.
- System property values: Modify the application's experience for all users.

What is customization

Customization is any change made to the flows or the code that is part of the baseline installation on a ServiceNow instance. You use ServiceNow products or code to customize applications.

If you add code, you own it, even if it doesn't alter the baseline installation. That includes owning the impact it has on the entire ServiceNow platform.

Customization examples include:

- Scripting: Customize ServiceNow through scripting using JavaScript. This includes creating client scripts, server-side scripts, and business rules with intricate logic that modify the baseline code.
- Custom tables: Develop custom tables to accommodate specialized data that doesn't fit within standard tables.
- Integration: Customize integration with external systems, such as APIs and web services, for seamless data exchange.
- Widgets and portals: Create custom widgets and portals to provide unique features and user experiences.
- Workflows: Create and modify workflows using Workflow Studio. Create and manage playbooks, flows, actions, decision tables, and integrations from one design environment to automate tasks. Upgrading to a new version of a flow requires reapplying your customizations.

Tools for customization and configuration

ServiceNow offers many tools and features, such as business rules, to modify the out-of-the-box behavior of ServiceNow applications. Whether they customize or configure an application depends on how they're used. Using these tools to modify the installed code base constitutes customization. Using these tools to add code that does not modify the flows, or the installed code base constitutes configuration. In both cases, you own the code you add as well as the impact it has on the ServiceNow platform.

ServiceNow tools include:

- UI Policies: Dynamically modify the visibility of fields and attributes on a form according to user inputs.
- Business rules: Automatically trigger actions based on specified conditions.

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- UI Actions: Extend and customize forms and lists by adding buttons, context menu items, or other UI elements that perform specific actions when clicked.
- Client-side scripts: Scripts that execute within the user's browser when certain actions occur on a form or a UI page.
- Server-side scripts: Scripts that execute on the ServiceNow server or database, for example, to update record fields when a database query runs.

What is personalization

Personalization is when users use out-of-the-box application tools to modify an application's look and feel only for themselves. Admins can change the look and feel for all users and that is considered configuration. Personalization examples include a user choosing to use dark mode or choosing which table columns to display.

Personalization does not change the baseline code installation on a ServiceNow instance. So, personalization does not impact customer support or interfere with upgrades to new ServiceNow versions.

Ramifications of customizing ServiceNow products

The ServiceNow platform is extremely flexible and built to embrace customization and configuration to fulfill a wide range of business requirements. How you customize ServiceNow applications, however, can have significant impacts on ServiceNow support, upgrading to future ServiceNow platform versions, and the functionality of the platform. Instead of customizing ServiceNow applications, consider using App Engine development products, such as Creator Studio and ServiceNow Studio to create new applications.

The ServiceNow platform uses a framework that supports applications in how they process tasks, how forms are rendered in multiple browsers, and the overall user experience. ServiceNow relies on the framework's integrity to develop and provide support in a consistent manner. Customizations can impair this framework, change platform functionality, and impair workflows and upgradeability.

Customizations trigger the platform to create sys_update_xml records, which are stored in the Customer Update table. The platform marks all customizations and skips the customized records when you update to a new version of the ServiceNow platform. That means you are responsible for manually updating the customizations. This can have a significant impact on the time and resources required to update to new platform versions.

Note:
The Customer Update table also contains modifications or additions to configuration metadata, for example, creating a new catalog item or a new workflow.

For more information, see the Customer Updates table. Note that the complexity of maintaining customizations dramatically increases as the number of customizations increases.

Customizing the installed code base can be costly, generate technical debt, lengthen your upgrade cycle, and complicate future platform upgrades because the custom code may not easily migrate to new platform versions. Custom code can change the standard functionality of the ServiceNow platform in unintended ways. Evaluate demands for customization carefully and only resort to customization where there is clear business value and no alternative. Wherever possible, avoid customization by using configuration instead.

If you customize a product:

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- You are responsible for maintaining the customization going forward.
- Customer Service and Support will not support problems caused by custom code. If it is the cause of the problems, the support team will likely advise you to revert to the out-of-the-box code.

What is the Customer Service and Support stance on supporting customization

The ServiceNow Customer Service and Support stance on customization is if you add code, you own it and its consequences. Why? Customer Support is not privy to your custom business logic, doesn't know what the expected behavior should be, is unable to reproduce the issue on an out-of-the-box instance, and customer support engineers are not certified implementation specialists, so they are not certified to review customized code logic.

Alternatives to customization

If you have requirements and ideas for enhancements, instead of customizing the installed code base, you can:

- Use configuration instead of customization.
- Submit an Enhancement Request to the ServiceNow development team. Each request is evaluated and, if approved, will be incorporated into a future release.
- Create an app using App Engine developer products to handle desired functionality.

When to use App Engine developer products instead of customizing

When your company needs to add new functionality to the ServiceNow platform, you can customize existing applications, such as ITSM, or create a new application using App Engine developer products, such as Creator Studio or ServiceNow Studio. A simple guideline for which path to choose is:

- If the customization extends the intended purpose of the application, it works better to customize. For example, you can add IT functionality to ITSM.
- If the customization doesn't extend the intended purpose of the application, it works better to create a new application using App Engine developer products. For example, do not repurpose the ITSM workflow to create a travel request workflow.

For example, ITSM is designed to handle IT issues. To customize it to handle travel requests goes beyond the original intention of ITSM. Because IT and travel requests have different workflows, it's better to create a travel request app using App Engine developer tools, such as Creator Studio and ServiceNow Studio, instead of customizing ITSM.

Examples of when to use App Engine developer products

ServiceNow products work best when they're used as they were intended. If you find yourself heavily customizing an application to repurpose it, a better plan is to create a new application using App Engine developer products.

The following scenarios demonstrate where creating a new application works better than heavily customizing an existing ServiceNow application:

- You have a novel use case for an app that doesn't align with any product workflow.
- You have a use case that could be built by heavily customizing an out-of-the-box application, but it doesn't align with what the existing application was intended to do.
- Your company has a user group or business process that should be separate from the OOTB product workflow.

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Guidelines for customizing ServiceNow products

If you must make a customization, consider the following suggestions:

- Maximize configuration options first.
- Avoid copying objects. Instead, update objects in place wherever possible, except for Service Portal widgets and other items designated to be reused.
- Default to "add before edit." This means that you should, for example, add fields to forms rather than change the type of an existing field. Avoid using the same names as out-of-the-box objects, methods, or classes when adding them.
- Minimize the number of fields you add to a form. The more fields you have on a form, the longer it may take to load.
- Export original records as backups before customizing them. Keep track of their out-of-the-box sys_id's in case you must restore them in the future.
- Use scoped applications as your default for any new custom development.
- Document all customizations. Add comments explaining why you customized (including business justification). Review all comments before upgrading to determine if you can revert to out-of-the-box code.
- Create tests for all customizations. Write Automated Test Framework (ATF) tests for all customizations where possible.
- Use HealthScan regularly to identify unnecessary customizations.
- Customizations should be made to baseline objects where necessary so that conflict resolution and decision-making can be appropriately recorded in the updates. Hidden customizations may cause administrators to overlook updates in future assessments in case reverts or merges are necessary.
- Test your customization for all use cases. Include performance testing and the introduction of unintended consequences.
- Administrators are responsible for verifying that their customizations work after a ServiceNow platform upgrade, and for keeping track of what customizations are made.

Handling customizations when you upgrade

Customizations trigger the platform to create sys_update_xml records, which are stored in the Customer Updates table. These records are not updated during platform version upgrades. ServiceNow marks them as skipped records in the ServiceNow Upgrade Monitor. To make sure they're successfully ported to the upgraded instance, you must manually process the skipped changes. For more information, see the Customer Updates table.

Assuming you've documented all your customizations—including the business justification—take your documented inventory and compare it with the skipped records identified in the Upgrade Monitor. After filtering out low-risk changes that have resulted in skipped records (for example, field labels or form layouts), you'll need to decide whether to:

- Retain each customization
- Revert to out-of-the-box
- Merge your customization with the base system to resolve conflicts

Service Catalog for managers and end users

Every user with a login can view and order items from the Service Catalog from departments within your organization. These catalog items can include goods, services, and information.

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Anything that can be ordered individually can be ordered as a catalog item. Anything that only exists as a part of a larger whole cannot be a catalog item. For example, a laptop can be a catalog item, but a high-resolution display for a laptop cannot.

After placing an order, its progress can be tracked by the requester. Fulfillment groups complete a predefined series of tasks in a fulfillment process that includes required approvals.

Managers can review record history and run reports to improve the service catalog process. For example, the manager can see most commonly ordered items, or those that are on backorder.

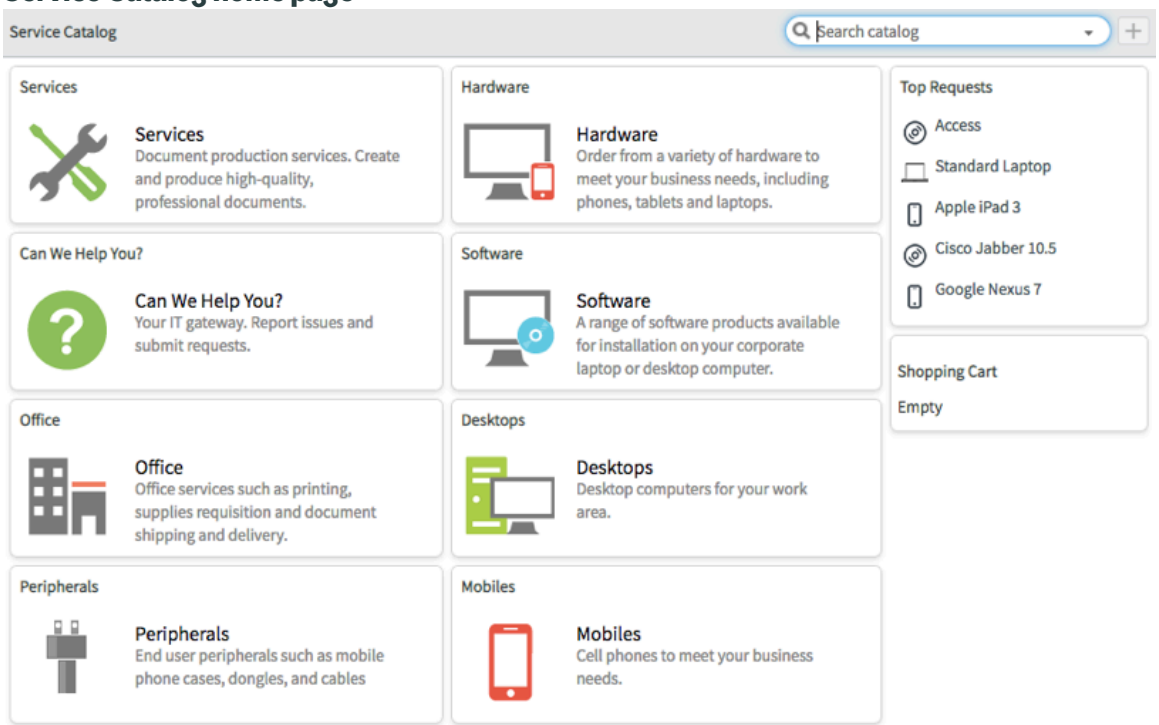
Service Catalog home page

The home page for a service catalog lists the goods and services available to order from that catalog.

Catalog items are grouped into categories, which can also contain one or more subcategories. By default, the first 10 items in a category appear under the category name on the service catalog home page.

To access the default service catalog home page, navigate to **Self-Service** > **Service Catalog**.

Service Catalog home page



Click a category name to see a list of all subcategories and items in the category.

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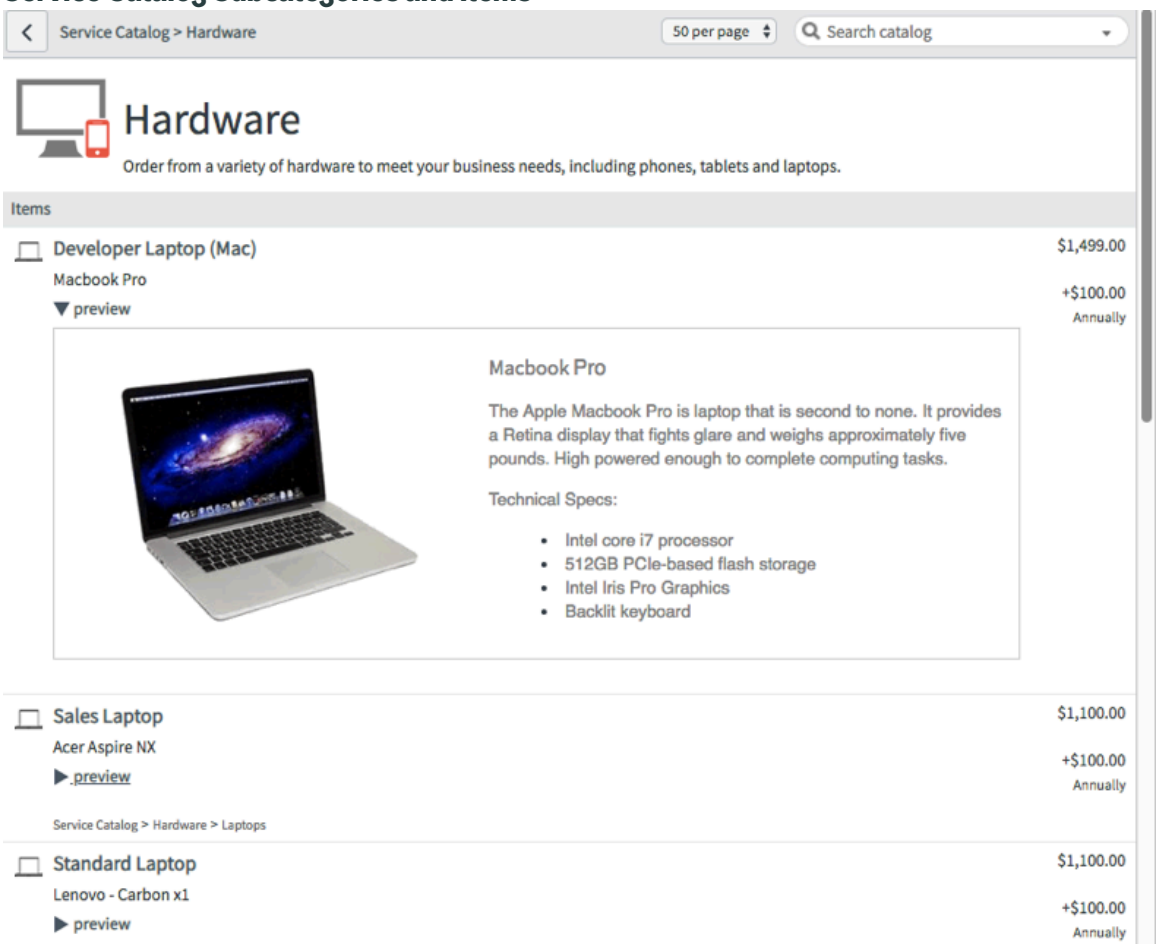
Service Catalog Subcategories and Items



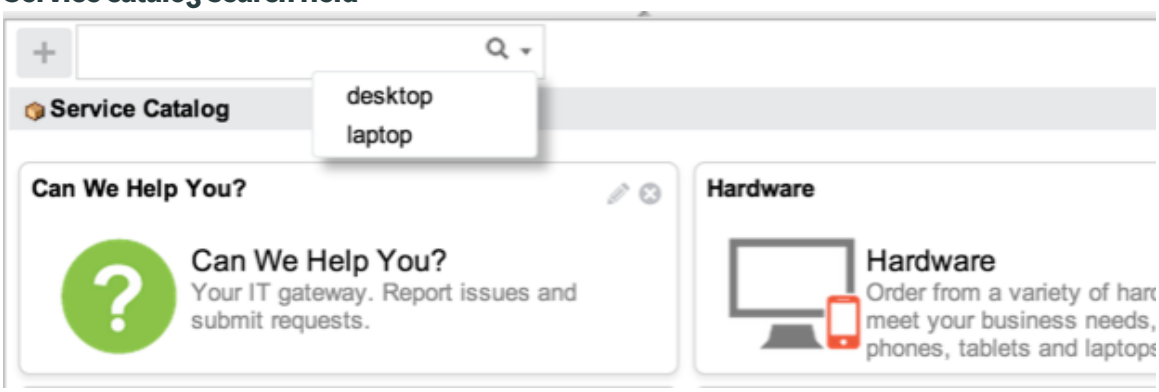
Searching a service catalog

If your organization has multiple service catalogs, you can search for the required catalogs using the **Search** field. The search results list items in active categories along with their short description.

Note:
If your organization has multiple service catalogs, searches return results only from the currently viewed catalog.

To find a specific item in a catalog, use the **Search** field. Click the down arrow to see a list of previous searches. Catalog search is available on catalog and category pages.

Service catalog search field



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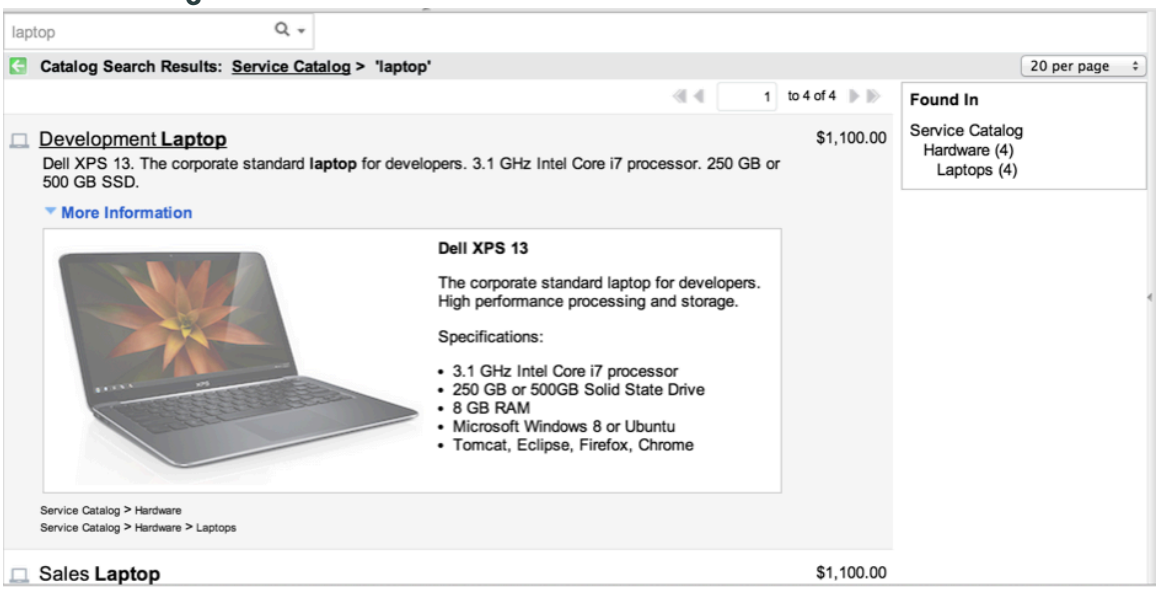
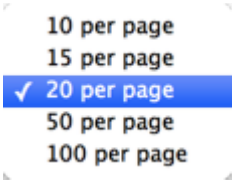
Search results list items in active categories along with their short description. Use the breadcrumbs in the header bar or below the short description to quickly navigate to a different page. The **Found In** list shows the categories related to the search results in hierarchical format.

Service catalog search results



You can control the number of results shown on one page with the search results selection list.

Search results selection list



In the catalog listing, click a link in the breadcrumbs at the top of the screen to quickly navigate back one or more levels in the hierarchy.

To remove the search term from the breadcrumbs, click the **x** next to the term.

If a search returns multiple results, obtain details about a specific catalog item by clicking **Preview**.

Note:
The system performs the type-ahead search based on keywords only.

Related topics

Service Catalog for managers and end users

Service Catalog request screens

To place a request from a service catalog, navigate to the catalog home page and select the item to order.

When an item is ordered, the base system generates a request to track the order and displays a summary that includes the order status in the **Stage** column:

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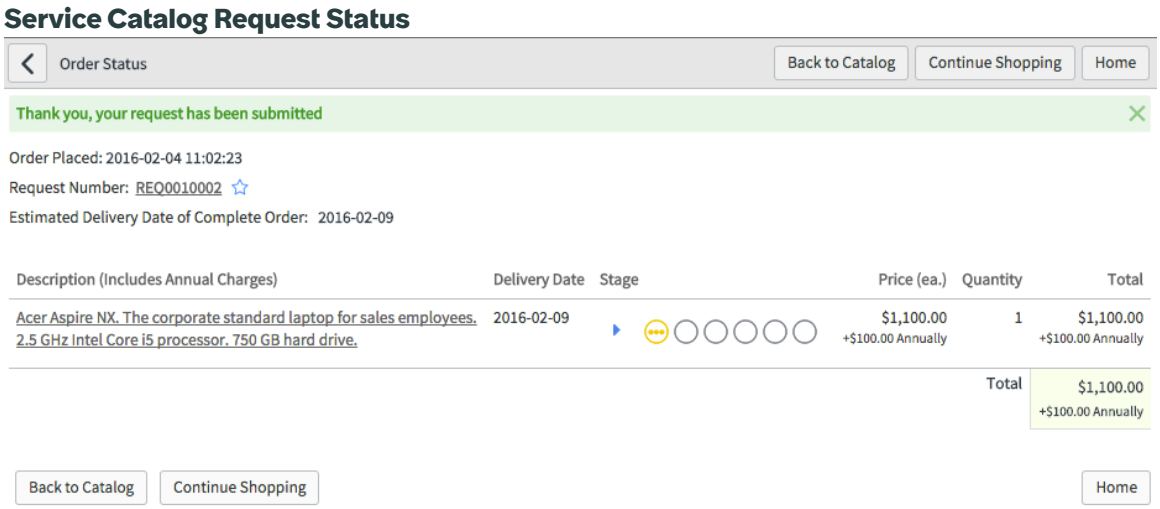

Each individual catalog item in a request creates a discrete request item. For example, a request for 2 PCs, 1 chair, and 1 desk would produce four request items on a single request.

Shopping cart screens

The shopping cart screen displays previews of the cart immediately before an order is placed.

You can configure the layout for either the one-step or two-step catalog checkout process.

Order status screens

The order status screen is the final summary screen a user sees in the service catalog after placing an order successfully.

Request generation for a Service Catalog item

When a customer orders something from the catalog, a request is generated to track the order.

The user specified in the **Opened By** field of a Requested Item (sc_req_item) record has read access to it.

Each individual catalog item that is part of a request creates a discrete request item with the request.

For example, a request for 2 PCs, 1 Chair, and 1 Desk would produce:

Request REQ0000001 -- 4 Things

- Requested item RITM0000001 -- 2 X PC
- Requested item RITM0000002 -- 1 X Chair
- Requested item RITM0000003 -- 1 X Desk

After a service catalog request is submitted, a fulfiller may determine that the item is not in stock. The full filler can select the **Backordered** check box, and enter comments about when the item may be back in stock. The backorder status can be used in reports and dashboards.

If a service catalog request is canceled, all associated purchase orders and transfer orders that have not been received are canceled.

Related topics

Service Catalog home page

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Clone a request

You can clone a request for up to 10 users on the notification list.

Before you begin

Your admin must enable cloning of requests before you can clone a request. For more information, see Clone requests.

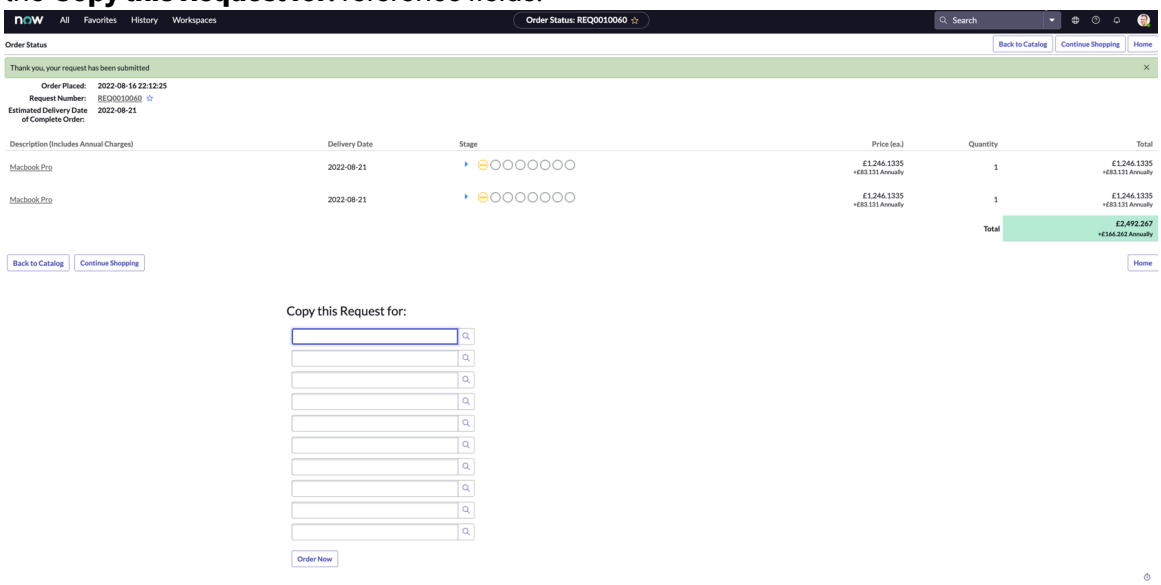
Role required: admin

About this task

When you clone a request that contains a multi-row variable set, the information that is specified in the multi-row variable set is available in all cloned requests. All UI policies and client scripts on the multi-row variable set are also cloned.

Procedure

1. Create a Service Catalog request.
2. On the checkout page, enter the users for whom to copy the request, up to a maximum of 10, in the **Copy this Request for:** reference fields.



3. Click **Order Now**.

View catalog item audit history

You can view the audit history of changes to items you requested. For example, you can view changes to variable values to find out who made the changes. Fulfillers and administrators can view history for any requested item.

Before you begin

Role required: admin (history list or calendar), itil (calendar only)

Procedure

1. Complete one of the following actions for the history to view.

Option	Description
View history for your requested items	Navigate to **Self-Service** > **Requested Items** and open the item you requested.

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Option	Description
View history for any requested item	Navigate to **Service Catalog** > **Open Records** > **Items** and open the requested item to view.

2. Open the form context menu and select **History** > **Calendar**, or **History** > **List** (with permission).
   The history calendar shows you the days where the record was changed, who made the change, and when. The history list displays each change in a list view. History records of variables are prefixed with "VARIABLE:."
3. Click the day number to get a view of the changes for that day, or click the week number to get the week view.

Saving catalog items to a wish list

You can save catalog items to your wish list and visit them later to complete the ordering process.

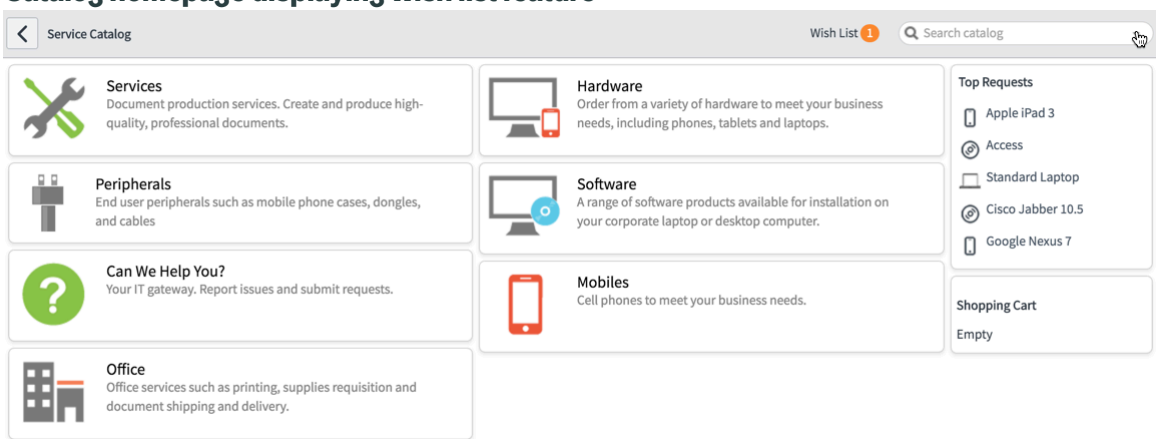
For example, you need a laptop with specific software installed on it. Add the laptop to your wish list, then visit it when you have the complete software configuration list. Data you enter is saved when you add items to your wish list.

Users with catalog_admin or admin role can enable/disable the wish list feature and configure the wish list cart for end users. By default, the wish list is always disabled for a catalog.

To enable the wish list feature for catalog end users, select the check box for **Enable Wish List** in the catalog record.

The wish list feature does not function if the property `glide.ui.doctype` is set to `false`.

Catalog homepage displaying wish list feature



Note:
When the wish list feature is disabled for a catalog, any items in its wish list are deleted. The items in the wish list are retained only if the item is associated with another wish list-enabled catalog.

Working with wish lists

To save an item to your wish list, click **Add to Wish List** on the catalog item page. A pop-up dialog informs you that the item is added to your wish list. Duplicate entries of an item are not added to your wish list. If you try to add an item that is already in your wish list, the latest entry of that item gets updated in the wish list.

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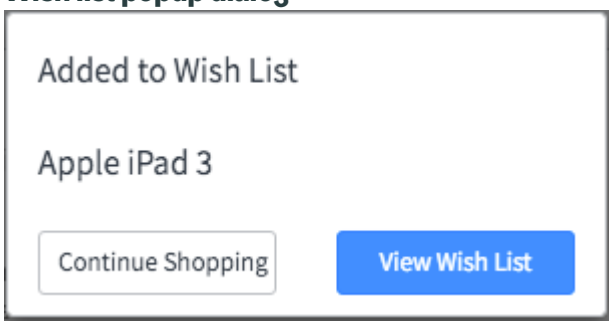
Wish list popup dialog



To access your wish list of catalog items, click **View Wish List** on the popup dialog. You can also click the link to wish list items on the header. The wish list cart allows you to update or delete wish list items.

To update a wish list item, go to wish list cart and click **View** for the item. Change the information, and then click **Update** to save the changes. To proceed with ordering the item, click **Add to Cart**. The item is removed from your wish list and added to the shopping cart for final checkout.

Service Catalog items

The overall catalog is made up of a collection of discrete catalog items.

The basic Service Catalog item types include:

- Standard catalog items
- Record producers: Provide alternative ways to add information such as `Incidents via the service catalog`.
- Order guides: Enable grouping multiple catalog items in one request.
- Content Items: These are the catalog items which provide information instead of goods or services.

Standard catalog item

A catalog item can be a good or service. If something can be ordered by itself, it is a catalog item. If something only makes sense as part of a greater whole, it is part of an item, rather than an item in and of itself. For example, a new Dell server is a catalog item, as is a new Executive Desk.

Use a catalog item to publish a service to your users. Add a service description, images, and a workflow to determine the approval and fulfillment processes for the catalog items.

Use the variables to present and gather information from the users. Catalog UI Policies and Catalog Client Scripts can also be added to control the item behavior based on user input.

Specify related items and articles for a catalog item

Specify related items and articles for a catalog item to provide alternatives and additional information. These items and articles are displayed in the catalog item page in Service Portal and Now Mobile.

Before you begin

Role required: admin, catalog_admin, or catalog_editor

About this task

You cannot specify related items and articles for an order guide.
You cannot specify these types of items as related items for a catalog item.

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- Wizard Launcher
- Content Item
- Standard Change Template
- Any item in Admin Home catalog

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Items**.
2. Select the required catalog item.
3. To specify a related article, perform these steps.
   a. In the Related Articles related list, click **Edit**.
   b. On the Edit Members form, move the required articles from the **Collection** column to the **Related Articles List** column.
   c. Click the up or down icon to arrange articles in the required order and click **Save**.
4. To specify a related catalog item, perform these steps.
   a. In the Related Catalog Items related list, click **Edit**.
   b. On the Edit Members form, move the required items from the **Collection** column to the **Related Catalog Items List** column.
   c. Click the up or down icon to arrange items in the required order and click **Save**.

Note:
In Service Portal, use the instance options to configure the number of articles and items shown in the **Related Articles** and **Related Items** section. See Configure related catalog item widget instance options or Configure knowledge related articles widget instance options.

Related topics

Map related articles

Add an ordered item link to an item

Use ordered item links to provide a link on the ordered item screen that provides more information about an item.

Before you begin
Role required: Catalog administrator

About this task
After you order the catalog item, you can click the link to see relevant information about the item ordered, for example, for standard delivery terms and conditions. The URL text and link can be defined once and reused across multiple items.

Links are rendered with an added parameter providing the sys_id of the requested item. For example, if the link is mylink.com, it is rendered as mylink.com?req_item=abcde12345. This added parameter can be useful for virtual provisioning situations.

Note:
Ordered item links cannot be configured for Classic Mobile devices.

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Ordered Item Links**.
2. Click **New**.
3. Enter a **Name** for the ordered item link.
4. Enter **Link text** to display as the link.
   For example, `Click here to see more information about the iPhone`.
5. Enter the exact **Link URL**.
   For example, http://www.mylink.com.
6. Select the **Target**.
   You can choose to open the link in a new window or tab, or within the catalog. If Within Catalog is chosen, the link must be within the same site. An HTTP site cannot be called from within HTTPS.
7. Click **Submit**.
8. Navigate to **Service Catalog** > **Catalog Definition** > **Maintain Items**.
9. Click an item **Name**.
10. In the **Ordered Item Link** field, click the reference lookup icon.
11. Click an ordered item link **Name**.
12. Click **Update**.

Create a Service Catalog client script

You can create client scripts to customize the catalog.

Before you begin

Role required: admin

About this task

Use catalog client scripts to control the behavior of the catalog items when presented to your users. Catalog client scripts can be applied to a catalog item or a variable set. These scripts run on the browser instead of the server, allowing you to better control the information that the user submits.

The priority order for g_form APIs is:

1. Mandatory (highest)
2. ReadOnly/Display

If a variable is set to mandatory and doesn’t have a value, readonly or hide doesn't work on that variable. If a variable is hidden or readonly, and then set to mandatory, the variable field becomes visible or editable.

This priority order is also applicable for variable sets and containers. If a variable set or container has a mandatory variable without any value, then the container or variable set can’t be hidden.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Catalog Client Scripts**.
   A list of current custom catalog client scripts appears.
2. Select **New**.
3. On the form, fill in the fields.

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Field	Description
Name	Unique name for the catalog client script.
Applies to	Item type this client script applies to: ○ **A Catalog Item**: enables the Catalog item field. ○ **A Variable Set**: enables the Variable set field.
Active	Check box to enable the client script. Clear the check box to disable the script.
UI Type	Whether to apply this field to desktop, Classic Mobile, or both.
Script	Enter the client script to run on the service catalog item.
Type	Select when the script runs, such as **onLoad** or **onSubmit**.
Catalog item or Variable set	Select a catalog item or variable set from the list. The field name and options available depend on the selection in the **Applies to** field.
Applies on a Catalog Item view	Check box to apply the catalog client script to catalog items displayed within the order screen on the service catalog. Available in the requester view.
Applies on Requested Items	Check box to apply the catalog client script on a Requested Item form, after the item is requested. Available in the fulfiller view. See VEditor.
Applies on Catalog Tasks	Check box to apply the catalog client script when a Catalog Task form for the item is being displayed. Available in the fulfiller view. See VEditor.
Applies on the Target Record	Check box to support the catalog client script on a record created for task-extended tables via record producers. See Default variable editor.

4. Select **Submit**.

Translation of Service Catalog items

You can translate Service Catalog items into multiple languages using the ServiceNow® Localization Framework.

Localization Framework standardizes and enhances the translation process of artifacts such as Service Catalog items through configurable workflows. For more information, see the Localization Framework topic. You can translate Service Catalog items by activating the Localization Framework Installer plugin (com.glide.localization_framework.installer). For information about the plugin activation, see the Activation of Localization Framework topic.

You can request translation for a single or multiple items from a catalog item list. For more information, see Request translations for Service Catalog items

Note:

- When you translate a catalog item from a form or list, the corresponding variables, variable sets, catalog client scripts and catalog UI polices associated with the catalog item also get translated.
- You can create catalog items only in the primary language. If you change the language and edit a catalog item using catalog builder, the corresponding content of the catalog item does not get translated.

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You can monitor the overall localization health of the Service Catalog items from the Localization Insights dashboard. The dashboard provides the localization health of the system with reports that are generated from the localization insights records as per the scheduled jobs.

Watch this six-minute video to learn more about the process of localizing catalog items.

Localization framework overview

Monitoring aggregated catalog item data

Monitor aggregated catalog item data like fulfillment automation coverage, translation coverage, and conversational coverage using the Service Catalog Overview dashboard.

Aggregated catalog item data graphs

You can access the aggregated catalog item data graphs in the Service Catalog Overview dashboard by navigating to **All > Service Catalog > Service Catalog Overview** if you have the catalog_admin role.

The Catalog item translation coverage graph is displayed only if you have enabled the Localization framework. For more information, see Localization Framework.

Service Catalog Overview dashboard

Graph	Description
Catalog request channel analytics - last 12 months	Vertical bar graph representing the count of catalog requests made through different channels such as Virtual Agent, Service Portal, Mobile in the last 12 months.
Catalog item best practice deviations	Pie-chart representing the Item Diagnostic Results report scores for catalog items, which indicate the health of items. A higher score means that an item has more deviations from best practices. For example, duplicate variables for a catalog item will represent a higher score. Each score is represented by a different color.
Catalog item VA render type	Horizontal bar graph representing the individual count of the way catalog items are rendered in Virtual Agent. It specifies whether an item is rendered as a pop-up, window, or conversation in Virtual Agent.
Catalog item fulfillment automation coverage	Vertical bar graph representing the count of fulfillment automation coverage of catalog items. It specifies whether items are fully automated, semi-automated, manual, unspecified, or empty.
Catalog item translation coverage	Vertical bar graph representing the count of the translation status of catalog items. It specifies whether items are completely translated, partially translated, not translated, or in-progress.

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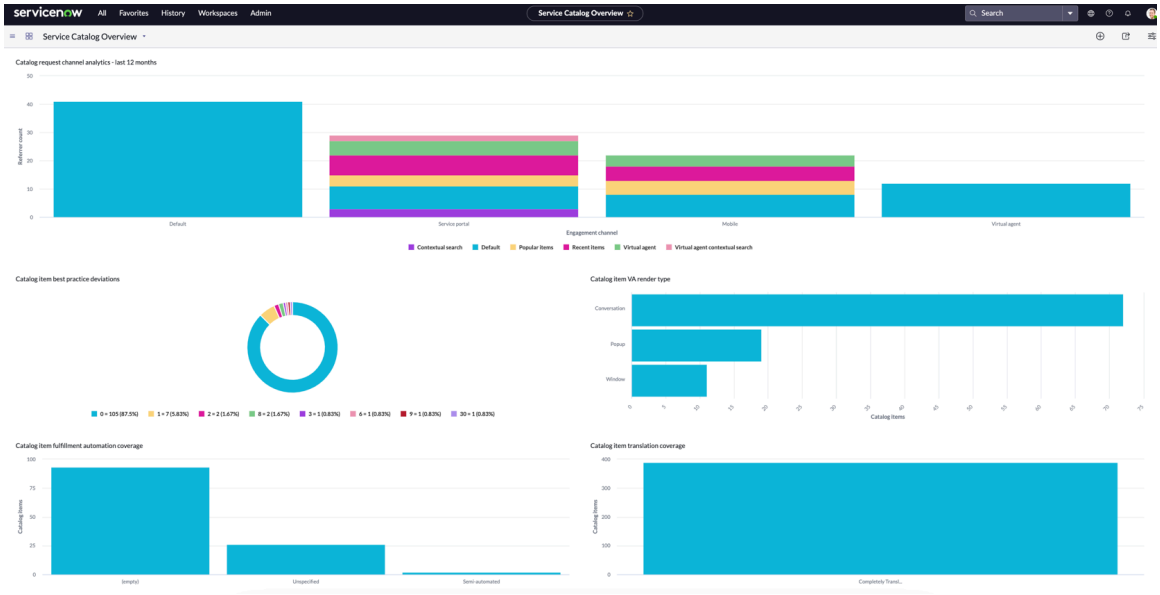

Related topics

Dashboards overview

Configuring Service Catalog

Service Catalog enables users with the Catalog Administrators role (catalog_admin) to set up the service catalog.

Configuration overview

Set up one or more service catalogs and provides self-service opportunities. You can organize your catalog offerings by using the ability to publish multiple catalogs targeted to specific audiences.

Service catalog categories

Categories organize service catalog items into logical groups. Administrators and catalog administrators can create and configure categories, defining their characteristics and adding content such as catalog items to them.

Categories can have a parent-child relationship, for example, **IT** and **Laptops**. A child category is a subcategory of its parent category. Each catalog item, order guide, record producer, content item, and subcategory appears as a single item within the category. A catalog item can exist in multiple categories, giving you the flexibility to offer the same service from multiple places within your catalog.

Certain system properties control the following Service Catalog category configuration.

- How categories are displayed to users. For example, are subcategories displayed in a panel or as a list in the category view.
- What content types and search and navigation elements are available on the homepage. For example, searching the service catalog can be enabled or disabled for all users.
- How catalog items, item class names and item categories appear to users. For example, what number of catalog items or categories are previewed in a section.

Catalog managers and catalog editors can also configure categories, but only categories to which they are assigned.

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Note:

- If there are no active items in a category's hierarchy, that category does not appear in the catalog, and cannot be added to the catalog.
- Users with the admin or catalog_admin roles can view categories only if there is an active item in the category and **Availability** is set to either **Desktop** or **Both**.
- Configure the *glide.sc.category.canview.override* property to change the roles for this behaviour.

Create a category

Administrators and catalog administrators can create or edit a category.

Before you begin

Role required: admin

About this task

To create or edit a category:

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Categories**.
   A list of existing categories appears. If the **Parent** field is blank, the category does not have a parent category.
2. Click **New** or select the category to edit.

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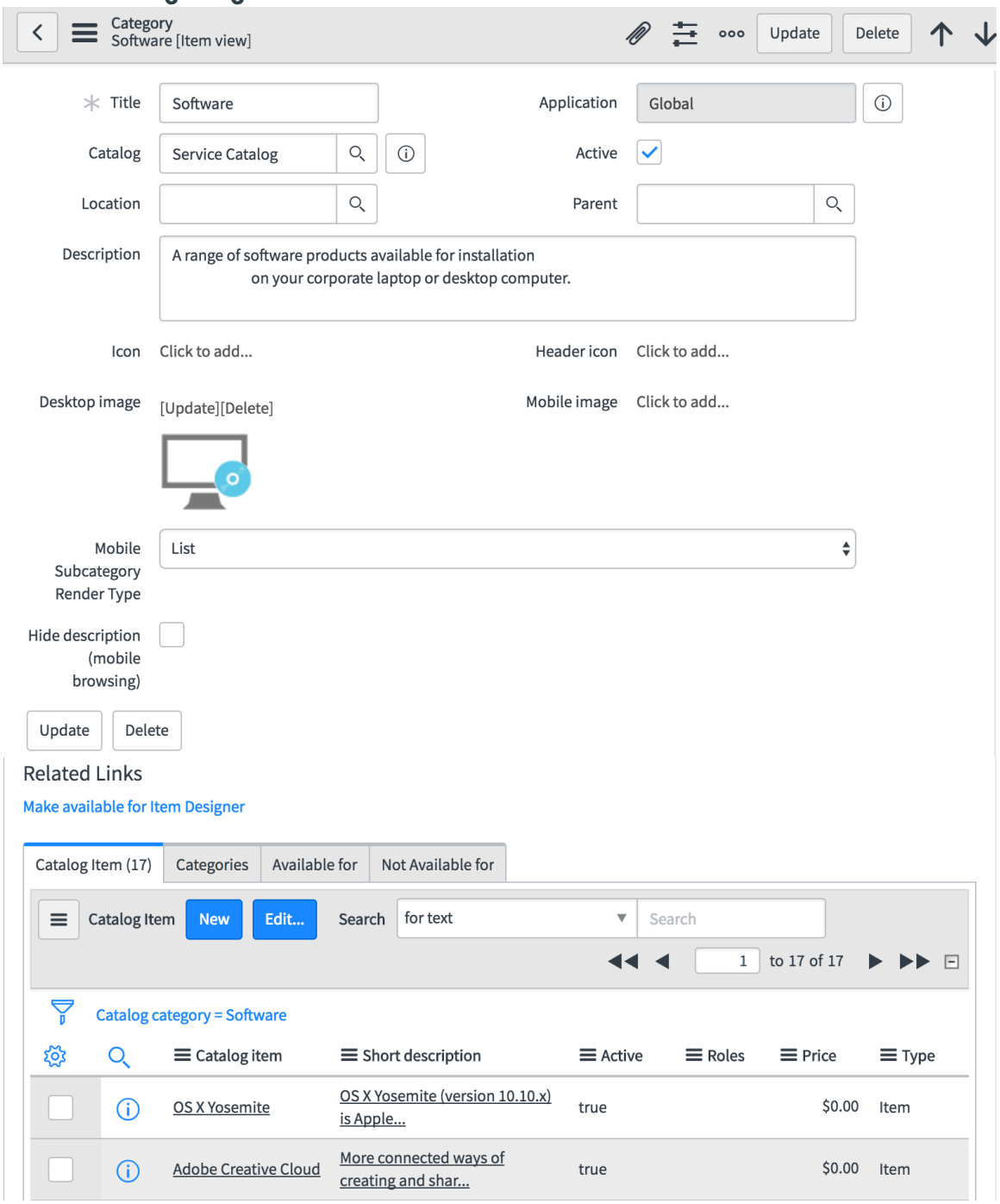
Note:
The visibility of a category is controlled by user criteria. See Apply user criteria to items and categories.

Service Catalog categories



3. Fill in the fields on the form, as appropriate.

Service Catalog category form

Field	Description
Title	Descriptive name for the category.

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Field	Description
Application	The application scope in which the category is applicable.
Catalog	The catalog this category belongs to.
Active	Check box to indicate that the category is available to add to the service catalog homepage.
Location	Any location information relevant for the category.
Parent	Any parent category for which this category is a subcategory.
Description	Information about the category. The description appears when the category is collapsed on the service catalog homepage. The description also appears in the **Related Categories** list when a user clicks the parent category title.
Icon	The small icon displayed beside the category name, when the category is listed as a subcategory.
Header icon	The icon displayed beside the category header, when the category is a top-level category.
Desktop image	A larger image to display with the category on the Service Catalog homepage. This image is visible only if the relevant renderer defines it to be used (the default renderer does not display this field).
Classic Mobile image	A picture to use on Classic Mobile devices for this category. If a mobile image is not selected, the **Desktop image** appears if the **Classic Mobile Subcategory Render Type** is set to **Cards**.
Classic Mobile Subcategory Render Type	The rendering option to control how subcategories are displayed. Select **List** for a single-column list, or **Cards** for a multi-column display.
Hide description (classic mobile browsing)	Option for displaying the description at the top of the list on Classic Mobile devices.

Configure dynamic categories

Dynamic categories let you organize and display commonly requested items and knowledge articles. Dynamic categories appear on the right side of the service catalog homepage by default.

Before you begin

Role required: admin

About this task

Use dynamic categories to provide users with an access option that automatically adjusts to changing request trends.

To configure dynamic catalog categories:

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Dynamic Categories**.
2. Select **New** or open an existing dynamic category.
3. Fill in the fields on the **Dynamic category** form, as appropriate.

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The **Dynamic category** form contains many of the same fields as the Category form. Additional fields are:

Name of form

Field	Description
Type	The kind of items to display. Can be **Requested items** or **KB Articles**
Search how long?	For catalog items only, the period during which to search for the most common requests. For example, enter 7 00:00:00 to display the most commonly requested items in the previous seven days.
Number of Entries	The number of items to display in the dynamic category.

4. Use this example of a step with additional info.
   The results displayed are limited to those items or knowledge articles available in the currently viewed catalog.

Service catalog setup

Service Catalog enables users with the Catalog Administrators role (catalog_admin) to set up the service catalog.

Service Catalog enables you to set up one or more service catalogs and provides self-service opportunities. You can organize your catalog offerings by using the ability to publish multiple catalogs targeted to specific audiences.

Set up a service catalog

To set up a Service Catalog, plan the way your organization defines and maintains Service Catalog items, and how it fulfills them.

Before you begin
Role required: admin

About this task
Administrators and catalog administrators, users with the catalog_admin role, can use the Service Catalog application to define service catalog content and layout. Catalog managers, users with the catalog_manager role, can define and manage a single service catalog. Catalog editors, users with the catalog_editor role, can manage a single service catalog.

Administrators and catalog administrators can define and manage multiple service catalogs. A catalog manager can define and manage a single catalog. One or more catalog editors can manage a single catalog.

Follow these steps to plan for your service catalog:

Procedure

1. Assign roles to the users working with the service catalog.
2. Define content to provide in the service catalog:

Catalog items	The goods and services available within the catalog.
Categories	The groups of items displayed on the catalog home page

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Variables	The options available for tailoring a catalog item to meet specific needs.

3. Customize the service catalog homepage to meet your requirements such as defining a Classic Mobile layout.
4. Define the request fulfillment processes your organization uses to deliver ordered catalog items.
5. **Optional:** Create a navigation module for the new catalog.
6. **Optional:** Add the catalog to the multi-catalogs home page.

What to do next

Administrators and catalog administrators can further extend the service catalog to provide more powerful features, using specialized catalog items, configuration options, and scripting functions. For example, administrators can customize the checkout process used when ordering catalog items.

Related topics

Service Catalog terms and roles

Set up Platform URLs for catalog modules

You can direct users to a specific catalog via a URL to a module in that particular catalog.

Before you begin

Role required: admin

About this task

When you create a module for your catalog page, you can direct users to a specific catalog and view from this module via a URL.

Procedure

In the **Link Type** section, select **URL (from Arguments)**, then in the **Arguments** field, enter a URL of the form `catalog_home.do?sysparm_catalog=id of sc_catalog record&sysparm_catalog_view=view name of sys_portal_page`.

For example, `catalog_home.do?sysparm_catalog=742ce428d7211100f2d224837e61036d&sysparm_catalog_view=catalog`

Note:
If you make the default catalog inactive, then deactivate the **Catalog** module otherwise users can continue to access the inactive catalog using that module.

If a URL has a valid *sysparm_catalog* parameter, but an invalid or missing *sysparm_catalog_view* parameter, the view with the default value from the corresponding Catalog Portal Page record is used.

If a URL has a valid *sysparm_catalog_view* parameter, but an invalid or missing *sysparm_catalog* parameter, the corresponding Catalog Portal Page record is used to set the catalog.

Note:
To ensure peak performance, define both parameters correctly.

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Multiple service catalogs setup

Multiple service catalogs enable your organization to offer different sets of services to different teams within the organization, such as IT services, human resources, and facilities management.

Administrators and catalog administrators can define and manage multiple service catalogs. End users can access multiple catalogs from a single homepage, can search across all catalogs, or can search directly within each catalog.

Enabling access for catalogs

You can enable read access to the catalogs by applying the rule **read ACL** on Catalog (sc_catalog) table. See Access Control Rules for more information.

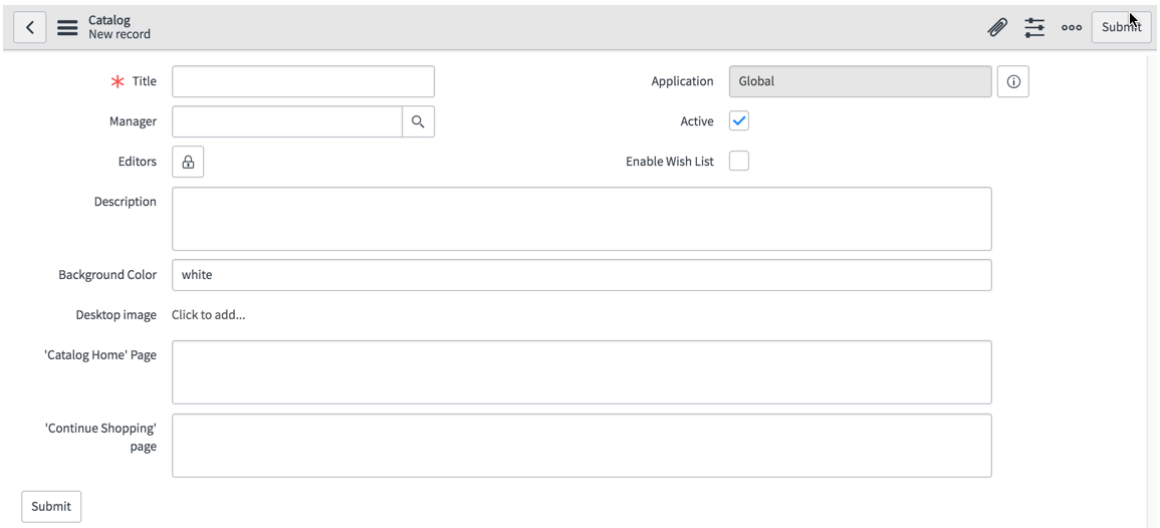
Create a catalog

Using Service Catalog, you can create a catalog and define items and categories within the catalog.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Catalogs**.
2. Select **New**.



3. Enter the new catalog details (see table).
4. Right-click the form header and select **Save**.
5. Define catalog items and categories to include in the catalog.
6. **Optional:** Define additional portal pages for the catalog.
7. **Optional:** Manage sites if you are using a CMS system.

Field	Description
Title	Descriptive name for the catalog.
Application	The application scope for this catalog. For information on the application scope, see Application scope .

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Field	Description
Manager	Name of the catalog manager assigned to this catalog. (Optional) The manager is able to edit and update the catalog, as well as the categories and catalog items within the catalog. The manager can assign editors and also a different manager for the catalog, if desired. Only one manager can be assigned to a catalog and must have the catalog manager role or catalog_admin role assigned.
Active	Select the check box to make the catalog available to end users.
Editors	Name of the catalog editor. (Optional) The editor is able to edit and update the catalog, as well as categories and catalog items within the catalog. The editor can assign other editors, but cannot change the manager. Multiple editors can be assigned to a catalog. Each user must have the catalog editor role assigned.
Enable Wish List	Select the check box to enable the wish list feature for the catalog.
Description	Information about the catalog, displayed on the multi-catalog homepage.
Background Color	The background color used for the catalog on the multi-catalog homepage.
Desktop image	The larger image to display with the catalog on the multi-catalog homepage. This image is only shown if image display is included in the renderer selected, such as the default **Title and Image** renderer.
'Catalog Home' page	The location to direct service catalog users to when they click the **Catalog Home** button. This field is designed to reference a content page url suffix.
'Continue Shopping' page	The location to direct service catalog users to when they click the **Continue Shopping** button. This field is designed to reference a content page url suffix.

What to do next
To add a module in the navigator for the new catalog, see Create a module.

Manage items in a catalog

Using Service Catalog, you can view and manage items within a catalog.

Before you begin
Role required: admin

About this task
Use the **Catalog Items** related list on the Catalog form to view and manage the items available in the catalog.

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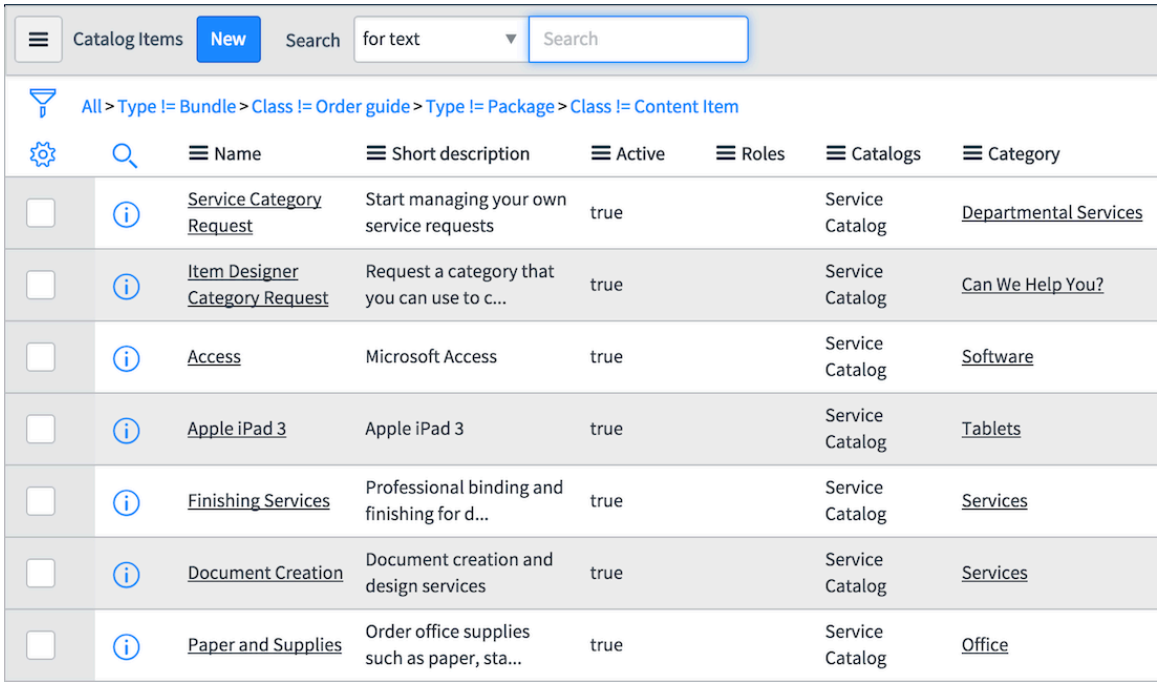

To define a new catalog item for the catalog, click **New** and enter the details for the item.

Manage catalog portal pages

Using Service Catalog, you can create and manage multiple portal pages for a catalog.

Before you begin

Role required: admin

About this task

A catalog portal page provides a homepage for a specific catalog. You can use portal pages to create different catalog views for different user groups. Each portal page accesses the same catalog content and presents that content in different ways.

Catalog portal page details include the owner, title, and view to use for that page.

Procedure

1. The Catalog Portal Pages related list shows portal pages available for that catalog. Each catalog has a default page, created automatically when the catalog is created.
2. Select an appropriate action:
   - Click **New** to create a new portal page.
   - Click **Edit** to select another portal page for the catalog.
   - Select a portal page to view and edit details for that page.

Tables provided with multiple service catalogs

Administrators and catalog administrators must consider these points before they upgrade to multiple service catalogs.

Before upgrading, be aware of changes made to the underlying Service Catalog data model. These changes are made to implement multiple catalogs and do not affect a standard upgrade. However, if you have made customizations, such as changes to the data model, the changes can impact the instance.

The following tables are provided with multiple service catalogs:

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Tables provided with multiple service catalogs

Table [name]	Description
Catalog Site [sc_catalog_site]	Associates catalogs to sites.
Catalog Portal Page [sc_catalog_view_mtom]	Links catalogs to CMS portal pages. Defines the default catalog to portal page combination used by default links.
Catalog Items Catalog [sc_cat_item_catalog]	Stores the catalogs an item is available in.
Catalog Item Category [sc_cat_item_category]	Stores the categories an item is available in.

Catalog site records

Catalog site records appear in the **Sites** related list on the Catalog form.

The Catalog Site [sc_catalog_site] table associates catalogs with CMS web sites.

Several service catalog system properties are used to specify values for different sites used by different catalogs.

Catalog site records properties

Property	Catalog site field [name]
glide.sc.home.cms_page	CMS homepage [cms_home]
glide.sc.search.cms_page	CMS search page [cms_search]
glide.sc.continue.shopping.target	CMS 'Continue Shopping' page [cms_continue_shopping]

Service Catalog scoping

Scoping support is available to define the limits of entities in Service Catalog.

- A catalog can have categories from different scopes.
- A category can only be in the same scope as its parent category.
- You can associate a catalog item with categories of a different scope.
- Catalog items can contain variable sets from a different scope.
- Variables can only be in the same scope as the catalog item or variable set.
- Catalog UI policies can only be in the same scope as the catalog item or variable set.
- Catalog client scripts can only be in the same scope as the catalog item or variable set.
- Catalog data lookup can only be in the same scope as the catalog item or variable set.
- The rule base of an order guide can have items from different scopes.
- The scope of the record producer and the target table should be the same.

Scriptable service catalog variables

You can use scripting to reference any request item variable from a table in scoped and non-scoped environment.

An example of a variable reference follows.

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```
current.variables.<variable_name>
```

Where current refers to the current record, and *<variable_name>* is the name of your variable.

Note:
In order to reference a variable from JavaScript, it must have a name.

When a variable is part of a variable set, you can reference it as current.variables.<variable_name> or current.variables.<variable_set_name>.<variable_name>.

Variable set is also a first-class citizen in Service Catalog. Like variables, a variable set has read, write, and create roles. If roles are provided for a variable set, the roles are applicable for the variables within the set. Roles of an individual variable are overridden by the roles of the variable set.

Print a variable

```
var original = current.variables.original_number;
gs.print(original);
```

Set a variable

```
current.variables.name = "Auto-Generated:" +
 current.variables.asset_tag;
```

Create an inventory item with fields set from variables

```
doCreation();

function doCreation ( ) {
var create = current.variables.create_item;
if (create == 'true') { // we want to create an asset
  var computer = new GlideRecord('cmdb_ci_computer');
  computer.initialize();
  computer.asset_tag = current.variables.asset_tag;
  computer.serial_number = current.variables.serial_number;
  computer.name = current.variables.name;
  computer.manufacturer = current.variables.company;
  computer.insert(); } }
```

Get GlideElementVariable of variables and variable sets associated with a GlideRecord

```
now_GR.variables
```

Get the name value pair of variables associated with a GlideRecord

```
now_GR.variables.getVariableValue();
```

Get a list of GlideElementVariable for variables within a task record

```
now_GR.variables.getElements();
```

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Get a list of GlideElementVariable for variables (including multi-row variable set) within a task record

```
now_GR.variables.getElements(true);
```

Note:
The *getElements()* method returns all the variables present on the given task record except for the formatter variables like label, break, container end, container split, and so on.

APIs for GlideElementVariable

- *now_GR.variables.<var_name>.isMultiRow()*: Get whether the GlideElementVariable is a multi-row variable set or a variable.
- *now_GR.variables.<var_name>.getQuestion()*: Get the Question object for a variable. Applicable only for a variable (*isMultiRow()* is false) and not for a multi-row variable set.
- *now_GR.variables.<var_name>.getLabel()*: Get the label of the GlideElementVariable. For a variable, the label of the variable is returned. For multi-row variable set, the title of the variable set is returned.
- *now_GR.variables.<var_name>.canRead()*: Get whether the user can view a variable or multi-row variable set.
- *now_GR.variables.<var_name>.canWrite()*: Get whether the user can edit a variable or multi-row variable set.
- *now_GR.variables.<var_name>.getDecryptedValue()*: Get the decrypted value for a masked variable. Applicable only for a masked variable.
- *now_GR.variables.<var_name>.getRows()*: Get the list of row objects for a multi-row variable set. Applicable only for a multi-row variable set (*isMultiRow()* is true).
- *now_GR.variables.<var_name>.getRowCount()*: Get the number of rows for multi-row variable set. Applicable only for a multi-row variable set (*isMultiRow()* is true).

Example to access variables of GlideRecord for the Task table

```
var now_GR = new GlideRecord('sc_req_item');
if (now_GR.get('635a1f5387320300e0ef0cf888cb0b73')) {
    var variables = now_GR.variables.getElements();
    for (var i=0;i<variables.length;i++) {
        var question = variables[i].getQuestion();
        gs.log(question.getLabel() + ":" + question.getValue())
    }
}
```

Example to access a multi-row variable set of GlideRecord for the Task table

```
var now_GR = new GlideRecord('sc_req_item');
now_GR.get('02c38dcd87013300e0ef0cf888cb0bb2');

var vars = now_GR.variables.getElements(true);

for (var i=0; i<vars.length; i++) {
    var now_V = vars[i];
    if (now_V.isMultiRow()) {
        var rows = now_V.getRows();
        for (var j=0; j<now_V.getRowCount(); j++) {
```

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```
            var row = rows[j];
            var cells = row.getCells();
            for (var k=0; k<cells.length; k++) {
                var cell = cells[k];
                gs.info(cell.getLabel() + ":" +
 cell.getCellDisplayValue())
            }
        }
    }
}
```

Multi-row variable set

Multi-row variable set

Operation	Usage
Table operations	
Return JSON array value as String	`now_GR.variables.table_var`
Set value of a multi-row variable set	`now_GR.variables.table_var = <val>` **Note:** An array of ordered (key, value) pairs is also applicable as input.
Get value of column, var1, of a multi-row variable set	`now_GR.variables.table_var.var1`
Set value of a variable set, var1	`now_GR.variables.table_var.var1 = <val>` **Note:** An array of ordered (key, value) pairs is also applicable as input.
Row operations	
Get the current row count	`now_GR.variables.table_var.getRowCount()`
Returns the row specified by the variable "i" - getRow(<int> i)	`var row = now_GR.variables.table_var.getRow(<int> i);`
Get the cell value for a question column mapped to <var_name>	`row.<var_name>`

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Multi-row variable set (continued)

Operation	Usage
Set the cell value for a question column mapped to <var_name>	`row.setCellValue('<var_name>', value)`
Set the cell value for a question column mapped to <var_name>	`row.<var_name> = value`
Add an empty row at the end of the table and return a scriptable object	`var row = now_GR.variables.table_var.addRow()`
Delete a row	`row.deleteRow()`

Notes and limitations

- //Single column of table_Var
- now_GR.variables.table_var.var1
- now_GR.variables.table_var.var1 = <val>

1. You can only set a variable in a before business rule. Variables set in an after rule are not written to the database.
2. There is nothing in place to prevent namespace collision with variables. Creating two variables named computer_speed would result in only one of them showing up; the second one would overwrite the first one.
3. Date/time variables use the same time zone formatting and storage rules as all other dates in the system. They are stored internally in GMT, but translated into the user's local time zone and format for display.

Define filters for My Requests

Define request filters to filter incidents, requests, or tasks under the **Self-Service** > **My Requests** module in ServiceNow AI Platform, the **My Requests** widget in Service Portal, and the My Requests applet in the Now® Mobile app.

Before you begin

Role required: catalog_admin or admin

Since the My Request Filter [request_filter] table has been reparented to the Filter [sys_filter] table, a few fields from the My Request Filter table have been migrated to fields in the Filter table. The **Short Description** field from the My Request Filter table has been migrated to the **Title** field in the Filter table. The **Table Name** field from the My Request Filter table has been migrated to the **Table** field in the Filter table.

Note:
If the My Request Filter form is modified, the form still displays the **Short Description** and **Table Name** fields that are no longer valid. Delete these invalid fields from the form and add the **Title** and **Table** fields to the form.

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Procedure

1. Navigate to **Service Catalog** > **Catalog Administration** > **My Request Filter**.
2. On the form, fill the fields.

My Request Filter form

Field	Description
Title	Name of the filter.
Table	Table on which the filter condition is applied.
Application	Application scope of the filter.
Active	If set to true, the filter is active.
Applies to	Interface for which the filter is applicable. Possible values: ○ Desktop ○ Service Portal ○ Desktop/Service Portal ○ Mobile
Filter	Conditions to filter requests.
Portal Settings	
This section is displayed when the **Applies to** field is set to **Service Portal** or **All**.	
Portal page	Portal page that opens when you click the request.
Primary field to display	Primary information displayed for the request.
Secondary fields to display	Secondary information displayed for the request. **Note:** ○ Add a maximum of three secondary fields. ○ Do not add an image field. ○ If the Request [sc_request] table is selected, secondary field is not configured. If the request contains only one item, the Requested Item name is displayed. Else, it contains the requested item count.

3. Click **Submit**.

Related topics

My Requests widget

Activate the page route map for the standard ticket page

Delegated request experience

You can request a catalog item on behalf of another user or multiple users using the Requested For variable.

Delegated request experience comprises of the following entities:

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- Requested For variable for a catalog item. For information about this variable, see Types of service catalog variables.
- Requested For field on a requested item (RITM)

Note:
The form views, list views, and email notifications are not updated to reflect the Requested For field on a RITM.

Configuration options

The following configuration options are available:

- Specify who you want to submit the request for using the Requested For variable. You can also map the Requested For variable to a field on the table for record producers.
- If required, configure the **Requested For** field on the RITM form. This field automatically stores the value of the Requested For variable.
- Allow delegated requests for a catalog item using its **Access Type** field, where you can specify if a request can be submitted for a user who does not have access to the catalog item.
- Submit a single request for an item on behalf of multiple users in Service Portal

Important:
If two-step checkout is enabled, the delegated request experience is not supported.

Request Management

After you submit a catalog item request, the Requested For variable value is copied to the **Requested For** field of the RITM. In case this field is not available on the RITM form, you should configure it.

Note:
After you submit a catalog item, the **Requested For** field value is not automatically updated when the Requested For variable is modified, and vice versa.

In Service Portal,

- If RITMs have different Requested For users, the following information is displayed in the order status page.
  - The **Requested For** column to display the RITM's Requested For user.
  - When the user viewing the Order Status page is not the user who submitted the request, the **Requestor** information to display the request's Requested For user. This is also applicable in Now Mobile, when the user viewing the RITM is not the user who requested it.
- If the RITM's Requested For user is different from the request's (REQ) Requested For user, My Requests menu displays the RITM records to the user who the RITM is being requested for. If the RITM Requested for is the same as the REQ requested for user, My Requests menu displays REQs.
- When you create a bundle from the cart by adding a catalog item with a Requested For variable, the item preserves the variable value. When you later add it to the cart to request for another user, you should edit the Requested For variable value as required.

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Request experience for a record producer

After you submit a record producer, the Requested For variable value is copied to the target record's field based on the **Map To Field** configuration.

Request experience for an order guide

This experience is supported in an order guide only if the following conditions are met:

- Order guide has a Requested For variable
- All items in the order guide have a Requested For variable

A catalog item is included in an order guide based on the Requested For user's access to a catalog item.

- When the user has no access to the catalog item and its **Access Type** is set as `Restricted`, that item is not included in the order guide.
- When the user has no access to the catalog item and its **Access Type** is set as `Delegated`, that item is included in the order guide.

The Requested For variable value from the **Describe Needs** section is always cascaded to the Requested For variable of catalog items in rule bases.

- The cascading of the Requested For variable value depends just on the variable type, but not the variable name.
- The Requested For variable value is cascaded even when the **Cascade Variables** check box is not selected for the order guide.
- The Requested For variables in the included catalog item cannot be edited.

Submitting a catalog item request for multiple users

To support submitting a request for multiple users, you can configure the Requested For variable of a catalog item.

1. From the **Type Specifications** tab, select the **Enable also request for** check box.
2. Specify the roles in the **Roles to use also request for** field that can submit a catalog item request for multiple users. If no role is specified, anyone who has access to the catalog item can submit the request.

After you configure the Requested For variable of a catalog item, the **Also request for** field is displayed for that item in Service Portal. After you specify multiple users in this field, you can:

- Add the item to the cart
  - Separate cart items are created for each user specified in the **Also request for** field.
  - The Requested For variable of each cart item is populated with the corresponding user.
- Submit the request
  - A single request is created and assigned to the current logged-in user requesting the item
  - Separate RITMs are created, one for each user specified in the **Enable also request for** field and the Requested For variable.

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Note:

- This experience is available in Service Portal.
- This experience is not available in Now Mobile and Workspace.
- This experience is not available for a record producer and order guide.
- The **Also request for** field is not displayed in the wish list and cart.
- Catalog client scripts, catalog UI policies, and g_form() APIs are not applicable for the **Also request for** field.
- The **Also request for** field is displayed only if the Requested For variable is editable. For example, the field is not displayed if the requesting user has no write permissions for the Requested For variable, or if the variable is made read-only via catalog client scripts.
- You can add up to a maximum of 50 users in the **Also request for** field.
- If any of the users does not have access to a catalog item with **Access Level** set as **Restricted**, then the item cannot be added to cart.

Request cloning

When you clone a request:

- The Requested For value for the cloned request is updated with the user for whom the request is being cloned.
- The Requested For value for cloned RITMs (with or without a Requested For variable) is updated with the user for whom the request is being cloned for the following entities:
  - RITM Requested For user
  - Requested For variable value

For information about cloning requests, see Create up to ten copies of Service Catalog request.

Important:

- You can clone a request only when all RITMs are requested for the same user.
- You cannot clone a request for a user who does not have access (based on **Access Type**) to any item in the request.
- Variable dependencies on the Requested For variable are not considered when a request is cloned.

Cart behavior

Using the Requested For variable, you can add multiple catalog items to the cart for different users and submit the cart as one request. When you submit a request for a cart with multiple items, a single request is created with separate RITMs, one for each catalog item. In this case, the **Requested for** field of each RITM inherits the corresponding Requested For variable value.

When you add multiple items to the cart for different users and submit the request, a single request is created with a separate RITM for each catalog item with the corresponding Requested For user.

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Cart submission scenarios

Scenario	Cart behavior
All items in the cart have a Requested For variable and are requested for the same user	• Requested For value of the RITM is the Requested For variable value. • Requested For value of the request is the Requested For variable value.
All items in the cart have a Requested For variable and are requested for different users	• Requested For value of the RITM is the Requested For variable value. • Requested For value of the request is the logged-in user or the default Requested For user specified in the cart.
No items in the cart have a Requested For variable	• Requested For value of the RITM is the default Requested For user specified in the cart. • Requested For value of the request is the logged-in user or the default Requested For user specified in the cart.

Few items in the cart have a Requested for Variable while others do not	• Requested For value of the RITM is one of the following:
	  ○ If a Requested For variable exists, it is the variable value.
	  ○ If no Requested For variable value exists, it is the logged-in user or the default Requested For user specified in the cart
	• Requested For value of the request is the logged-in user or the default Requested For user specified in the cart.

Passing parameters for the Requested For variable

You can use parameters in ServiceNow AI Platform and Service Portal to specify the default Requested For variable value for a catalog item.

- In Platform, pass a user's sys_id as the *sysparm_requested_for* value in the URL.
- In Service Portal, specify the *requested_for_id* and *requested_for_display* parameters in widget instance options.

  For example, navigate to a catalog item widget, press Ctrl+click to select **Instance in Page Editor**, and specify the following parameters in the **Additional options, JSON format** field.

```
"requested_for_id": "a8f98bb0eb32010045e1a5115206fe3a
"requested_for_display": "Abraham Lincoln"
```

Note:
The Requested For value is set after the catalog form is loaded.

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Related topics

Types of service catalog variables

Configure the default behavior to request items for other users

Define the default behavior when no roles are specified in the *glide.sc.req_for.roles* property.

Before you begin

Role required: admin

About this task

The *glide.sc.req_for.roles* property specifies the list of roles who can request items for other users. When no roles are specified, then the default behavior is defined by the *glide.sc.req_for.roles.default* property. For information about the *glide.sc.req_for.roles* property, see Service Catalog properties.

Following are the possible values for the *glide.sc.req_for.roles.default* property.

- When the property is set to `allow`, then any user can request items for other users.
- When the property is set to `deny`, then no user can request items for other users.

The value of the *glide.sc.req_for.roles.default* property is considered as `allow` in any of the following scenarios and any user can request an item for other users:

- The *glide.sc.req_for.roles.default* property is not defined.
- The value of the *glide.sc.req_for.roles.default* property is empty, `allow`, or any string other than `deny`.

A user with the admin role can request an item for other users. In this case, values of both the properties, glide.sc.req_for.roles and glide.sc.req_for.roles.default, are not considered.

For zBoot customers, the *glide.sc.req_for.roles.default* property is available in the base system with the default value as `deny`. Upgrade customers can add and modify the property if required.

Procedure

1. Navigate to sys_properties.list.
2. Select the *glide.sc.req_for.roles.default* property.
3. On the System Property form, in the **Value** field, specify the value.
4. Click **Update**.

Service Catalog request fulfillment

When a user orders a catalog item, a request is created that follows a fulfillment process. A fulfillment process defines the steps to request approval, assign fulfillment tasks, and fulfill requests. Workflow Studio flows, workflows, or execution plans are used to define fulfillment processes.

Preparing to fulfill catalog item requests involves the following activities.

- Set up fulfillment groups to assign to tasks.
- Define the fulfillment processes using Workflow Studio flows, workflows, or execution plans.
- Assign the fulfillment process to catalog items.

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Using Workflow Studio flows

The Workflow Studio application enables process owners to automate work, such as approvals, tasks, and notifications, without having to code. Build multi-step flows from reusable components. For more information, see Exploring Workflow Studio.

Using workflows

Workflows provide greater flexibility than execution plans, which are linear. Workflows allow for different paths to the end of the process. For example, an approver can reject a request, ending the process. If the request is approved, the process continues through fulfillment to the end of the process.

Use the Workflow Editor to define fulfillment workflows. The Workflow Editor offers the following features.

- Edit workflows graphically.
- Modify activities and conditions.
- Define transitions between workflow activities.
- Summarize workflow progress through stages.
- Validate workflows to identify potential problems.
- Publish workflows for other users.

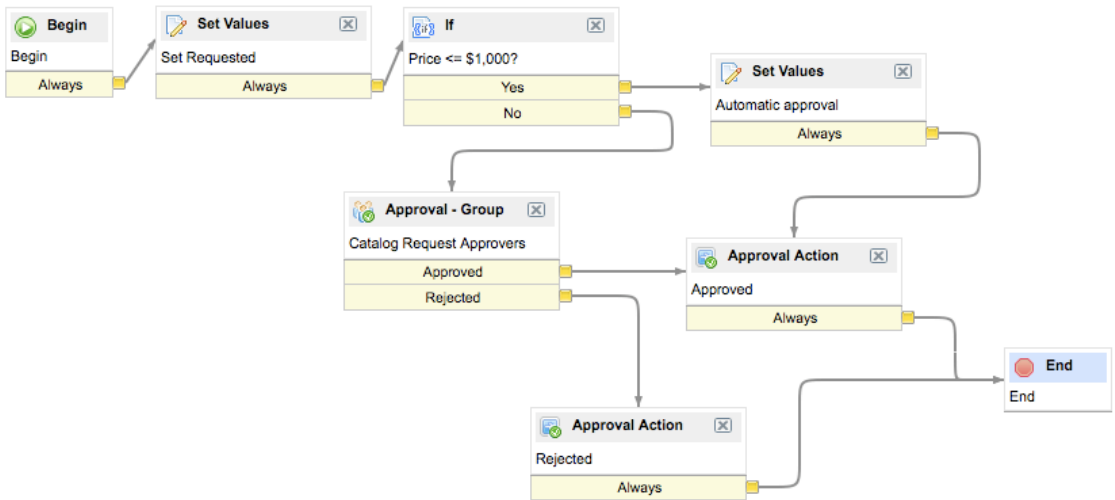
Service catalog workflows

Two service catalog workflows are provided in the base system. Use the Graphical Workflow Editor to modify the default workflows or to create additional service catalog workflows. Service catalog workflows support domain separation.

Default service catalog workflows

- **Service Catalog Request**: a simple workflow that fulfills a simple order.
- **Service Catalog Item Request**: a more complex workflow that fulfills a more complex order.

Service Catalog Request workflow



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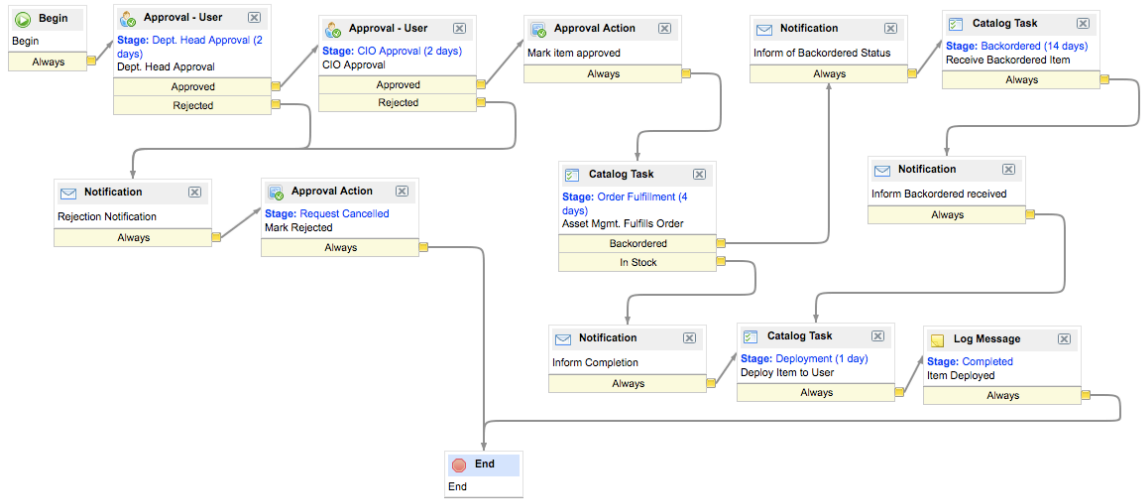
Service Catalog Item Request workflow



Defining service catalog workflows

Creating a workflow involves the following processes:

- Create a workflow to process the catalog item.
- Define the workflow activities to process the catalog item.
- Publish the catalog item workflow.
- Create or edit a catalog item to call the catalog item workflow

Note:
If your catalog workflow requires catalog tasks to access catalog variables, create the catalog tasks from a parent workflow. A catalog workflow cannot access catalog variables from catalog tasks created by a subflow.

Deleting catalog workflow records

Workflow stage fields for service catalog workflows display when a user deletes a record required by the workflow. If a user deletes a catalog item and that catalog item has active request workflows running, the workflow stage field displays **Catalog item removed**. Similarly, deleting the associated workflow context causes the stage field to display **Workflow context removed**.

Associating items with the domain-specific workflow

When using service catalog workflows with domain separation, ensure your catalog items use the domain-specific workflow. If you create a domain-specific version of a workflow, existing catalog items continue to use the original workflow. To configure the catalog item to use the domain-specific workflow, select the new workflow in the **Workflow** field on the catalog item record.

Create a catalog workflow

Create service catalog workflows when the default workflows are not appropriate for a fulfillment process.

Before you begin
Role required: workflow_creator, workflow_admin, or admin

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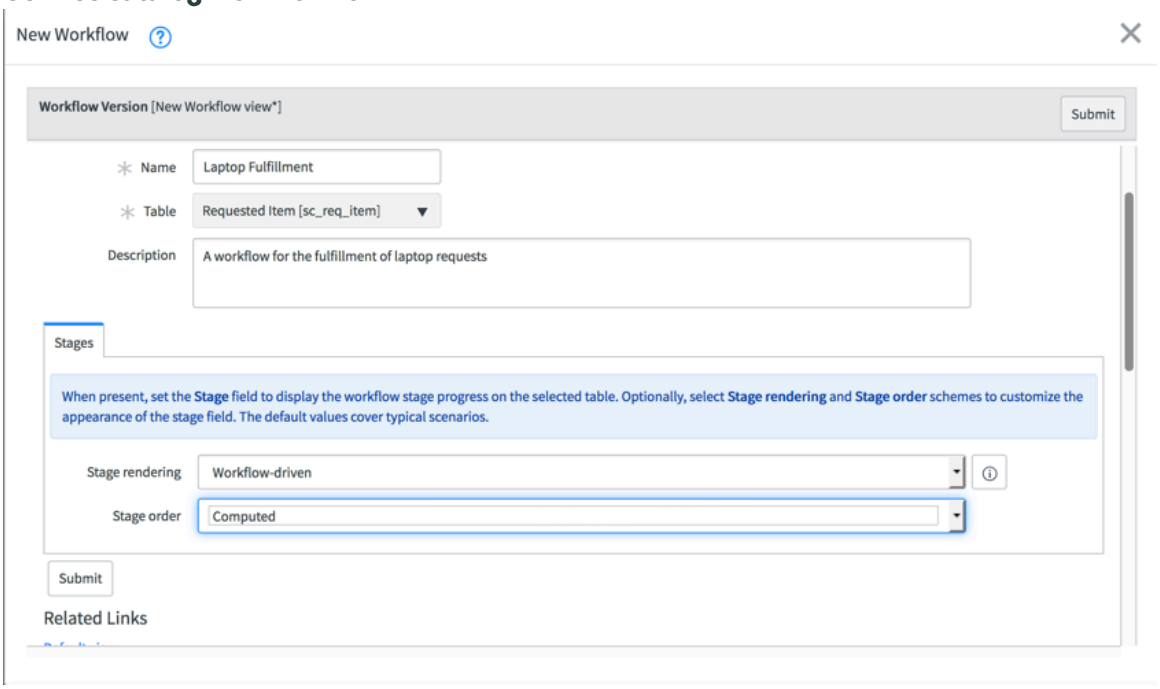
About this task

This example describes the procedure to set up fulfillment for a laptop request.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**
2. Click **New Workflow**.

Service catalog workflow form



3. Complete the form with the following information.

Field	Input value
Name	`Laptop Fulfillment`
Table	**Requested Item [sc_req_item]** Consider the following information: ○ Workflows on the Service Catalog Requested Item [sc_req_item] table fulfill the request of a single catalog item. Each requested item triggers its own fulfillment workflow when the item is ordered. Use the Requested Item table to add workflows for requested items. **Note:** To enable approval-type workflows to operate smoothly, make sure that the appropriate users have the correct role to access necessary tables in all domains. ○ Use caution when using *`before query`* business rules, as they can restrict access to the requested item record. ○ Workflows on the Request [sc_request] table always run when a service catalog request is submitted, regardless of what item was ordered. These

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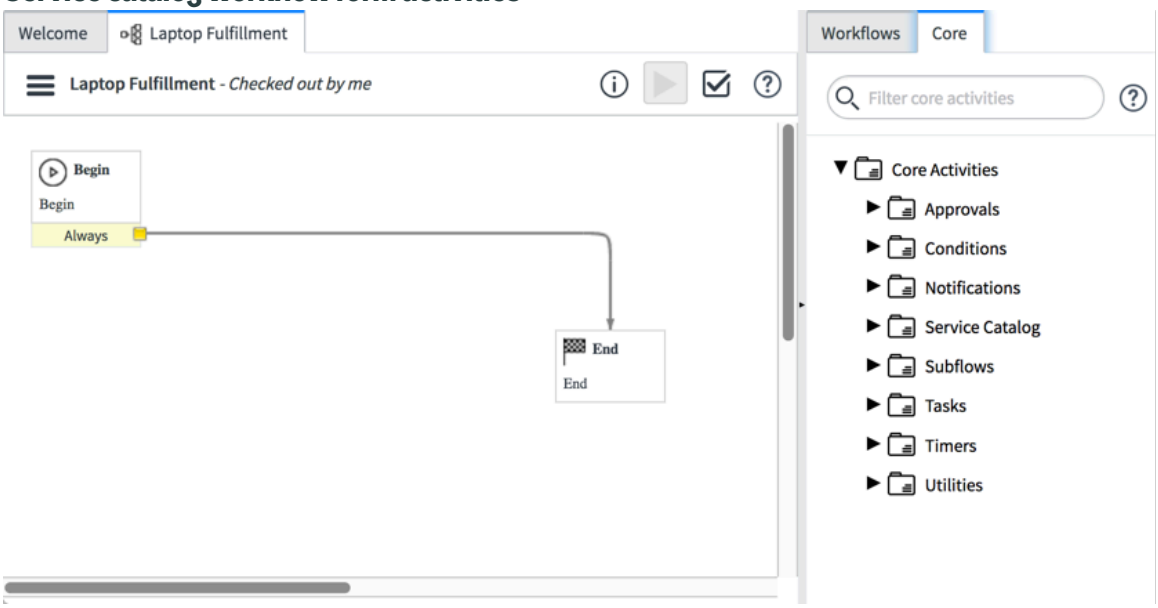
Field	Input value
	workflows control the entire request process, which can involve delivering several requested items. Therefore, Request table workflows are not assigned to a specific item from the maintain item form. If you do use the Request table for service catalog requests, add conditions to the workflow to ensure it runs when the correct item is requested.
Expected time	**Days** 7, **Hours** 00 : 00 : 00. Workflows cannot calculate the end time because not all the activities within the workflow have defined times. Therefore, the **Expected time** on the workflow becomes the **Delivery Time** on the catalog request. **Note:** When both **Expected time** and **Schedule** are filled in, the catalog delivery time is then calculated based on the combination of both. For example, if you put 2 days as **Expected time**, it is calculated as 48 hours. If you then add a schedule that defines a work day as 8 hours, the delivery time becomes 48 / 8 = 6 days. If your schedule excludes weekends, the calculation also add 2 days for the weekend, making the delivery time 8 days.
Schedule	**8–5 weekdays**.
Timezone	**US/Pacific**. The timezone that the schedule applies to.
Description	`A workflow for the fulfillment of laptop requests.`

4. Click **Submit**.

Service catalog workflow form activities



What to do next

After initiating a workflow, add workflow activities to it. Workflow activities are listed on the **Core** tab in the right pane.

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Add an activity to a catalog workflow

You can add activities to a workflow to perform tasks such as running a script, sending notifications, or requesting approvals. Activities can succeed or fail, which can result in actions performed by other activities.

Before you begin

Role required: workflow_creator, workflow_admin, or admin

About this task

After creating the workflow to add a laptop fulfillment process, add the activities.

Procedure

1. Complete the following steps to add an activity that requests manager approval.

   a. In the **Core** pane, expand **Approvals** and drag the activity **Approval - User** onto the arrow between **Begin** and **End**.
   This activity generates an approval from the manager of the person requesting the laptop.

   b. Complete the form with the following information.

   - **Name**: `Manager Approval`
   - **Stage**: **Waiting for Approval**
   - **User**: Click the lock icon in the Approvers section, and then click the select fields icon. Expand **Requested** > **Requested For**, and then select **Manager**.

   c. Click **Submit**.

2. Complete the following steps to add an action for when the approver rejects the request.

   a. Expand **Utilities** in the **Core** pane and drag the activity **Set Values** to the space below the approval.

   b. Complete the form with the following information.

   - **Name**: `Rejected`
   - **Stage**: **Completed**
   - **Values** condition builder: **[Approval] [Rejected]**

   c. Click **Submit**.

   d. Drag from the yellow box beside **Rejected** on the **Approval - User** activity to the new **Set Values** activity.

   e. Drag again from the yellow box beside **Always** on the **Set Values** activity to **End**.
   This activity marks the request as rejected if the manager rejects the request and then ends the workflow

3. Complete the following steps to add an action for when the approver approves the request.

   a. Drag the activity **Set Values** onto the arrow between **Approval - User** and **End**.

   b. Complete the form with the following information.

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- **Name**: `Approved`
- **Stage**: **Fulfillment**
- **Values** condition builder: **[Approval] [Approved]**

This activity marks the request as approved once a manager approves it.

c. Click **Submit**.

4. Expand **Tasks** and drag the activity **Create Task** onto the arrow between **Approval - User** and **End**, add the following information, and click **Submit**.
   - **Name**: `Laptop Procurement`
   - **Stage**: **Fulfillment**
   - **Task Type**: **Catalog Task [sc_task]**
   - **Priority**: **3 - Moderate**
   - **Fulfillment group**: **Procurement**
   - **Short description**: `Procure a Laptop`

   This task tells Procurement to procure a laptop for the user.
5. Expand **Notifcations** and drag the activity **Notification** onto the arrow between **Laptop Procurement** and **End**, add the following information, and click **Submit**.
   - **Name**: `Procurement`
   - **Stage**: **Fulfillment**
   - **To**: Click the lock icon in the Addressee(s) section, and then click the select fields icon. Expand **Requested** and select **Requested For**.
   - **Subject**: `Your laptop has been procured.`

   This activity marks the request as approved if a manager approves it.
6. Drag the activity **Create Task** onto the arrow between **Procurement** and **End**, and then fill in the form.

Option	Description
Name	Set Up Laptop
Stage	Fulfillment
Task Type	Catalog Task
Priority	3 - Moderate
Fulfillment Group	Hardware
Short Description	Set up laptop.

   This task tells Hardware to configure the laptop and prepare it for use.
7. Drag the activity **Create Task** onto the arrow between **Set Up Laptop** and **End**, add the following information, and click **Submit**.
   - **Name**: `Pickup Laptop`
   - **Stage**: **Delivery**
   - **Task Type**: **Catalog Task [sc_task]**

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- **Priority**: **3 - Moderate**
- **Assigned to**: Leave the field blank, as the script in the **Advanced** field assigns this task to the requester.
- **Short description**: `Pick up laptop.`
- **Advanced**: Select the check box and set the **Advanced Script** value to: `task.assigned_to=current.requested_for;`

This task informs the requester to come pick up the laptop.

8. Drag the activity **Log Message** onto the arrow between **Pick Up Laptop** and **End**, add the following information, and click **Submit**.
   - **Name**: `Delivered`
   - **Stage**: **Completed**
   - **Message**: `The laptop delivery workflow is complete.`

   Leaves a message in the log to record the successful completion of the workflow.

Publish a catalog workflow

Publish the catalog workflow to make it available for use in the system.

Before you begin

Role required: workflow_creator, workflow_admin, workflow_publisher, or admin

About this task

After adding activities to your workflow, publish it to make it available for use.

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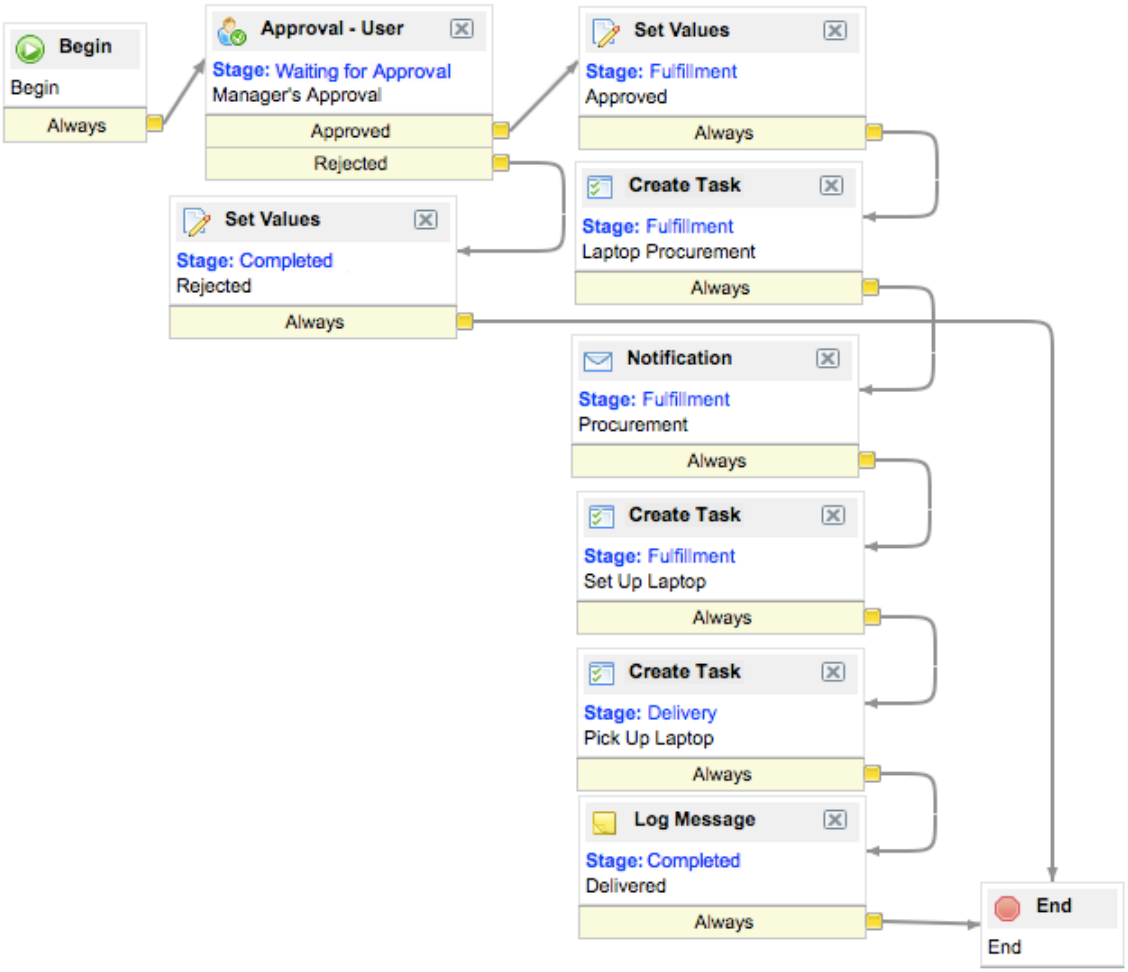
Procedure

1. Open the workflow actions menu on the left beside the workflow name.
2. Click **Publish** to publish the workflow.



Execution Plans

An execution plan describes how a catalog item is procured, configured, and installed.

Execution plans enable you to describe simple, linear processes. Each execution plan contains one or more tasks. For example, an organization could create an execution plan for delivering a corporate standard PC that contains these tasks:

1. Procure the PC from a supplier.
2. Configure the PC according to requester specifications.
3. Deliver the PC to the requester.

An execution plan is not specific to any one catalog item. There could be many different models of PC that a user can order, all using the same execution plan. It is not necessary to create a new execution plan for each individual catalog item in a mature service catalog.

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Note:
Execution plans are not as powerful or flexible as workflows, and cannot be designed using a graphical editor. Execution plans are useful in some circumstances, for example, if you want to build your processes programmatically or through imports. ServiceNow recommends using workflows for request fulfillment processes.

Create an execution plan

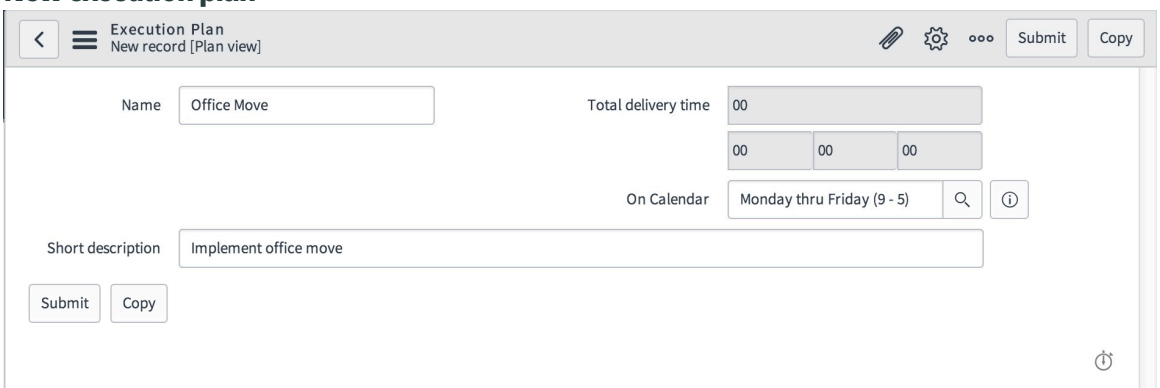
Administrators and catalog administrators can create and manage execution plans and the associated variable tasks.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Execution Plans**.
2. Click **New**.

New execution plan



3. Enter a *Name* and *Short description* for the execution plan.
4. Specify delivery information in the *Total delivery time* and *On Calendar* fields.
5. Click **Submit**.

Add catalog item variables to a task

You can add variables of a catalog item to a task to specify information about the requested catalog item.

Before you begin
Role required: admin

About this task
For example, when a user requests a laptop, the fulfillment group can need to know what screen size and how much memory to order.

Each catalog item can contain one or more variables for gathering information from the user who requests the item. Assuming that the relevant catalog items have been associated to the execution plan, you can associate these variables to the specific created tasks that need the information.

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Execution Plans**.
2. Open an execution plan.
3. In the *Execution Plan Tasks* related list, open a task.
   Ensure that the form shows the Plan view. If not, right-click the header bar and select **View** > **Plan**.
4. Go to the *Available Variables* related list and click **Edit**.
5. Use the slushbucket to select the variables that are appropriate for the task.

   Consider all the types of catalog items that could use this execution plan, and select all the variables that can be assigned to them.
6. Click **Save** to associate these variables to the execution plan task, making them accessible.

Execution plan tasks

An execution plan contains one or more execution plan tasks, such as for obtaining approval. Execution plan tasks are assigned to a fulfillment group.

Each task represents work to be completed by a specific group as part of the overall request fulfillment process.

Administrators create templates for tasks as part of defining an execution plan. The catalog tasks themselves are then created when the relevant item is requested, based on these task templates.

Set up an execution plan approval task

Approval tasks are specific types of tasks within execution plans.

Before you begin
Role required: admin

About this task
If an approval task is rejected, the execution plan can roll back to a previous task, but the approval record does not roll back.

To set up an approval task including a rollback action:

Procedure

1. Navigate to **All** > **Service Catalog** > **Execution Plans**.
2. Select an execution plan.
3. From the Execution Plan Tasks related list, select **New Approval** to create the approval task.
4. Fill in the fields for that approval task.

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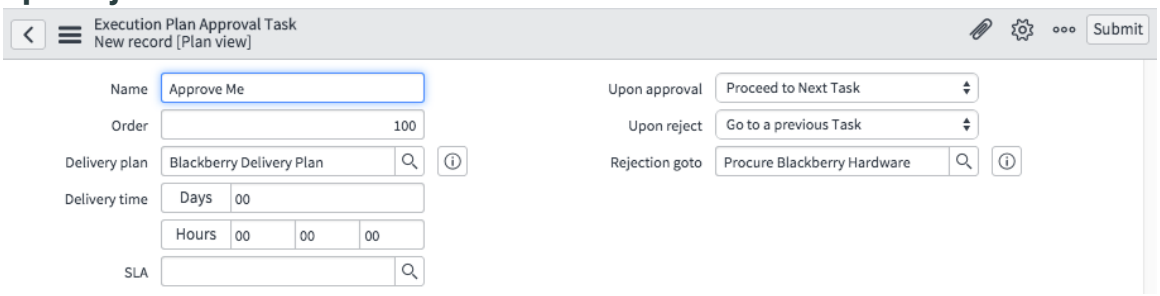
Upon Reject



5. Use the *Upon reject* field to define the action to take if the task is rejected:
   - *Cancel all future Tasks*: [default] cancels all future tasks in the execution plan and also cancels the parent request item.
   - *Go to a previous Task*: displays the *Rejection goto* field where you can select which task this execution plan rolls back to.
6. **Save** the task, then scroll down to the *Approved By* list and select one or more approvers for the tasks.

   You can also use an Approval script to select approvers.
7. Select **Update** to add the task to the execution plan.

   This example shows how the process works in practice, using a request to order a Blackberry phone.

   First, the request is ordered:

Rollback 1

Catalog Tasks | New | Request item = RITM10007 | 1 to 5 of 5

Number	Assignment group	Assigned to	Short description	Due date	Work start	Work end	State
TASK10007	Procurement		Order Blackberry Hardware or Move from I...	2009-08-06 11:48:10	2009-08-05 11:48:12		Open
TASK10008	Field Services		Pick up Blackberry and deliver to IT Labs	2009-08-07 11:48:10			Pending
TASK10009			Example Approval Tasks	2009-08-07 11:48:10			Pending
TASK10010	Hardware		Configure Blackberry	2009-08-09 11:48:10			Pending
TASK10011	Field Services		Deliver Blackberry to Customer	2009-08-10 11:48:10			Pending

   Next, complete the first two steps, which leads to the approval task.

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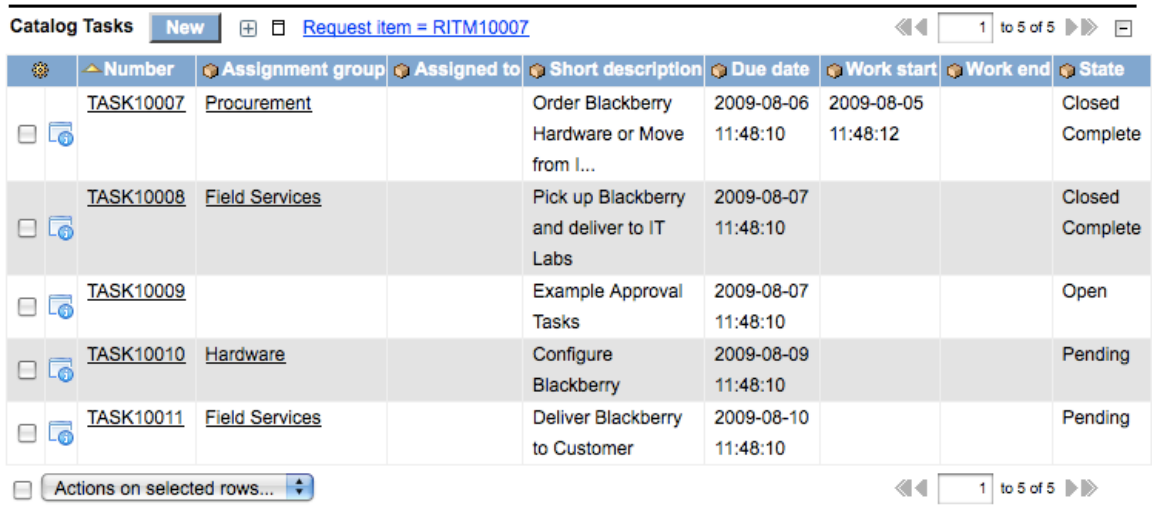
Rollback 2



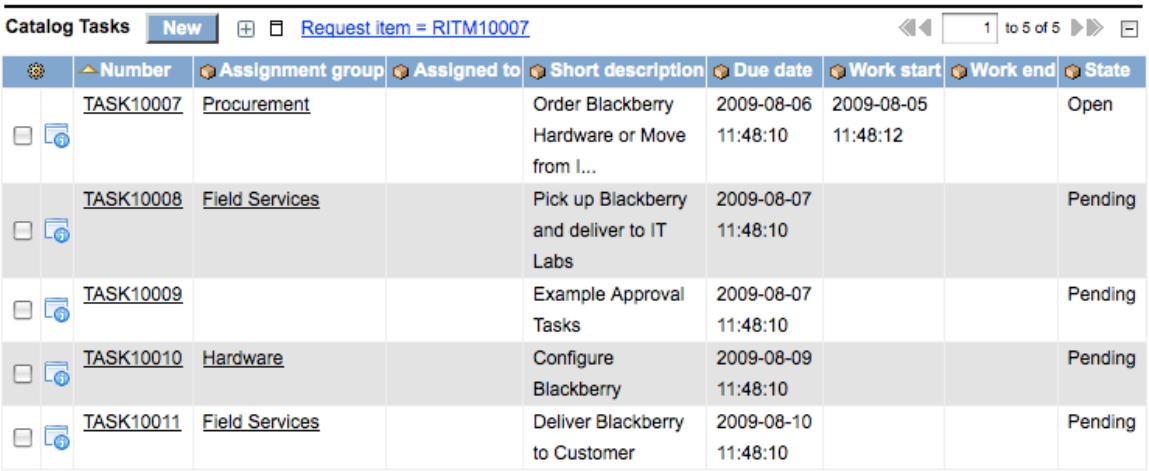
Catalog Tasks | New | Request item = RITM10007 | 1 to 5 of 5

Number	Assignment group	Assigned to	Short description	Due date	Work start	Work end	State
TASK10007	Procurement		Order Blackberry Hardware or Move from I...	2009-08-06 11:48:10	2009-08-05 11:48:12		Closed Complete
TASK10008	Field Services		Pick up Blackberry and deliver to IT Labs	2009-08-07 11:48:10			Closed Complete
TASK10009			Example Approval Tasks	2009-08-07 11:48:10			Open
TASK10010	Hardware		Configure Blackberry	2009-08-09 11:48:10			Pending
TASK10011	Field Services		Deliver Blackberry to Customer	2009-08-10 11:48:10			Pending

Actions on selected rows... | 1 to 5 of 5

Reject the request to roll back the execution plan to a previous task, and reset any intermediate tasks to pending:

Rollback 3



Catalog Tasks | New | Request item = RITM10007 | 1 to 5 of 5

Number	Assignment group	Assigned to	Short description	Due date	Work start	Work end	State
TASK10007	Procurement		Order Blackberry Hardware or Move from I...	2009-08-06 11:48:10	2009-08-05 11:48:12		Open
TASK10008	Field Services		Pick up Blackberry and deliver to IT Labs	2009-08-07 11:48:10			Pending
TASK10009			Example Approval Tasks	2009-08-07 11:48:10			Pending
TASK10010	Hardware		Configure Blackberry	2009-08-09 11:48:10			Pending
TASK10011	Field Services		Deliver Blackberry to Customer	2009-08-10 11:48:10			Pending

After a plan has been rolled back, ServiceNow adds to the rolled-back task a note indicating that it was rolled back and why.

Note:
Rolling back reverts all intermediate tasks within the execution plan. Other plans within the same request are not rolled back, however.

Set up a fulfillment group

Fulfillment groups perform the tasks related to fulfilling an order.

Before you begin
Role required: admin

About this task
This group setting can include approving an order based on characteristics such as content and price, or any direct action required to complete the order. For example, loading software or installing hardware. Any existing user group (in **User Administration** > **Groups**) can be assigned fulfillment tasks.

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To create a group specifically for order fulfillment:

Procedure

1. Navigate to **Service Catalog** > **Catalog Policy** > **Fulfillment Groups**.
2. Click **New**.
3. Fill in the Group form as described under creating groups.
   These groups have the type *catalog* and are assigned the catalog and itil roles, but are otherwise normal groups.

Delivery information for tasks

When managing execution plans, catalog administrators can specify the delivery information to provide an estimated date of delivery based on the execution plan.

Use the **Total delivery time** field to specify an estimated delivery time for each task in your execution plan. This estimate is calculated based on the combined total of times for the tasks in that execution plan.

By default, time estimates do not use a "working days" calendar system, but are based on simple elapsed time. For example, for a 5-day execution plan, if you submit the request on a Friday, the delivery date is Wednesday of the following week. This estimate means five elapsed days later, even if your organization does not work on weekends.

Setting the calendar to Monday through Friday (9-5) defines each day as being eight hours long, but the task delivery time day is 24 hours. If you create a task that takes one day (24 hours), the plan calculates the task as needing three work days (which are eight hours each) for the total delivery time. Similarly, if a task takes two days (48 hours), the plan calculates eight days of total delivery time. This total breaks down as six work days of eight hours each and, because six days are longer than the five-day work week, two weekend days. When assigning delivery times, keep this calculation process in mind.

Use the *On Calendar* field to specify a calendar system to apply to the execution plan, to help estimate more accurate delivery times.

If using this calendar system for estimated delivery time, ensure that estimates are expressed in working hours and days. For example, a task which is supposed to take one day on a 9-5 calendar is assumed to take 24 working hours. This process takes three working days.

Note:
This calendar system is used to help provide delivery estimates only, and is not linked to any SLAs you have set on execution tasks.

Skipped tasks

If a task is skipped, the request fulfillment process moves on to the next task.

If the last task in an execution plan is skipped, the process is finished and the appropriate request item is closed as complete. Skipped tasks have their state set to **Closed Skipped** and display as gray boxes on a requested items list.

Creating execution plan tasks

An execution plan contains one or more task templates. Each task template defines work that can be completed by a specific fulfillment group.

Execution plans are associated with catalog items. When the relevant catalog item is requested, these task templates are used to generate tasks. That is, tasks to be performed as part of the

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request fulfillment process for that requested item. Each generated task within that requested item is assigned a catalog task number.

Example

The execution plan for an executive desktop computer catalog item could define the following task templates in the execution plan:

- Obtain managerial approval
- Order hardware
- Install standard corporate applications
- Deliver computer to requester

When this catalog item is ordered, the following request, requested item, and tasks are then created:

Request REQ0002 -- 1 PC

Requested Item ITEM0004 -- 1 X executive desktop

- Catalog Task0001 -- Obtain managerial approval
- Catalog Task0002 -- Order hardware
- Catalog Task0003 -- Install standard corporate application
- Catalog Task0004 -- Deliver computer to requester

Define task templates

Each execution plan contains one or more task templates that define actions that must be taken to fulfill a request.

Before you begin

Role required: admin

About this task

After creating the execution plan, define these task templates.

When the relevant catalog item is ordered, request tasks are generated for that requested item, based on this information.

To define an execution plan task template:

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Policy** > **Execution Plans**.
2. Open an execution plan.
3. In the **Execution Plan Tasks** related list, select **New**.
4. Fill in the fields on the Execution Plan Task form (see table).
5. Select **Submit**.

Defining Task Templates

Field	Description
Name	Name of the task. This name is set to the created task name.

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Field	Description
Fulfillment group	The group that performs the task. Whenever a user requests a catalog item associated with this execution plan, the task is automatically assigned to the fulfillment group. Leave empty if automatic assignment to a group is not required.
Assigned to	The individual who performs the task. Leave empty if automatic assignment to a user is not required.
SLA	The service level agreement that applies to catalog items associated with this execution plan. **Note:** This field is normally left empty, as the functionality was superseded by the service level management functionality.
Delivery plan	The parent execution plan for this task.
Order	A number representing the task sequence in the execution plan. It is good practice to "leave gaps" between order numbers (for example, 100, 200, 300). That way you can insert new tasks without changing the order number of existing tasks. (If the order for several execution plan tasks is the same, each of these tasks starts at the same time.)
Delivery time	Amount of time the task is expected to take. This value is set to a component of the overall time to complete the execution plan.
Condition	Condition under which the task is performed (if the condition is not met, the task is skipped).
Short description	Brief description of the task activity. This information populates the created task short description field.
Instructions	Details of the activities to be performed for the task. This information populates the created task description field.
Work notes	A journal field for entering comments about the task template. Note: this information is separate from the created task work notes field.

Conditions to run execution plan tasks

Administrators and catalog administrators can define conditions under which a particular execution plan task runs, or is skipped, when the relevant item is requested.

For example, an execution plan can contain the following tasks:

1. Order hardware
2. Receive hardware
3. Configure hardware
4. Deliver hardware

If the hardware requested is already on-site, it does not need to be ordered. The first task in the list can be skipped.

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Note:
Skipped task records are still created, but are marked as skipped, and are not processed within the execution plan.

Conditional Tasks

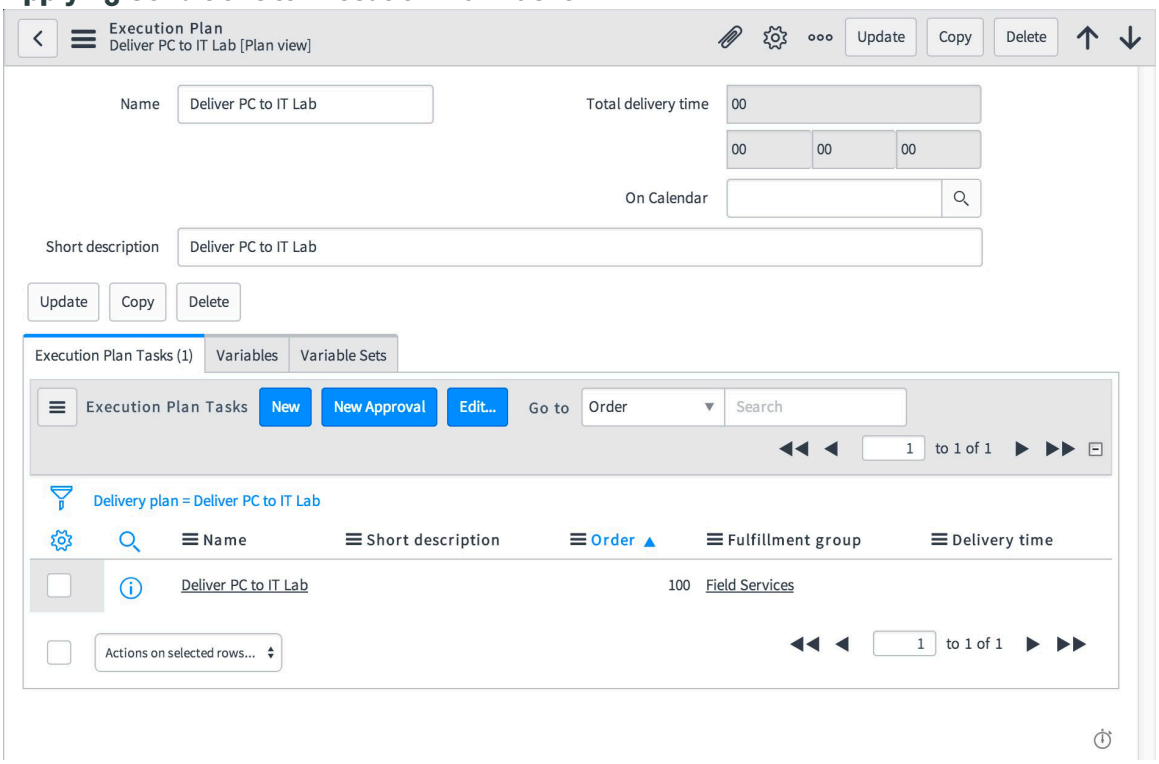
To make an execution plan task conditional, defining the conditions under which the task runs.

1. Navigate to **Service Catalog** > **Execution Plans**.
2. Open an execution plan, and then open a task within that plan.
3. Use the **condition** field to select the condition under which the task runs.

If no conditions are set, the task runs every time a user orders an item associated with this execution plan.

Here is an example of conditional task for an IT lab based in Atlanta:

Applying Conditions to Execution Plan Tasks



In this example, the **Deliver to IT Labs** step does not run if the request itself is in Atlanta. There is no need to deliver something to the IT lab if it is already there.

Condition scripts to run tasks

Administrators can use a condition script in addition to or instead of any condition to determine whether a task runs.

Note:
If you are using both a condition (via the condition field) and a condition script, both must be true before the task runs.

To use a script, you must configure the Execution Plan Task form to add the "Condition script" field. If the script returns true, the task runs. If the script returns false, the task does not run.

Ensure that you add the variable used in the script to the execution plan task.

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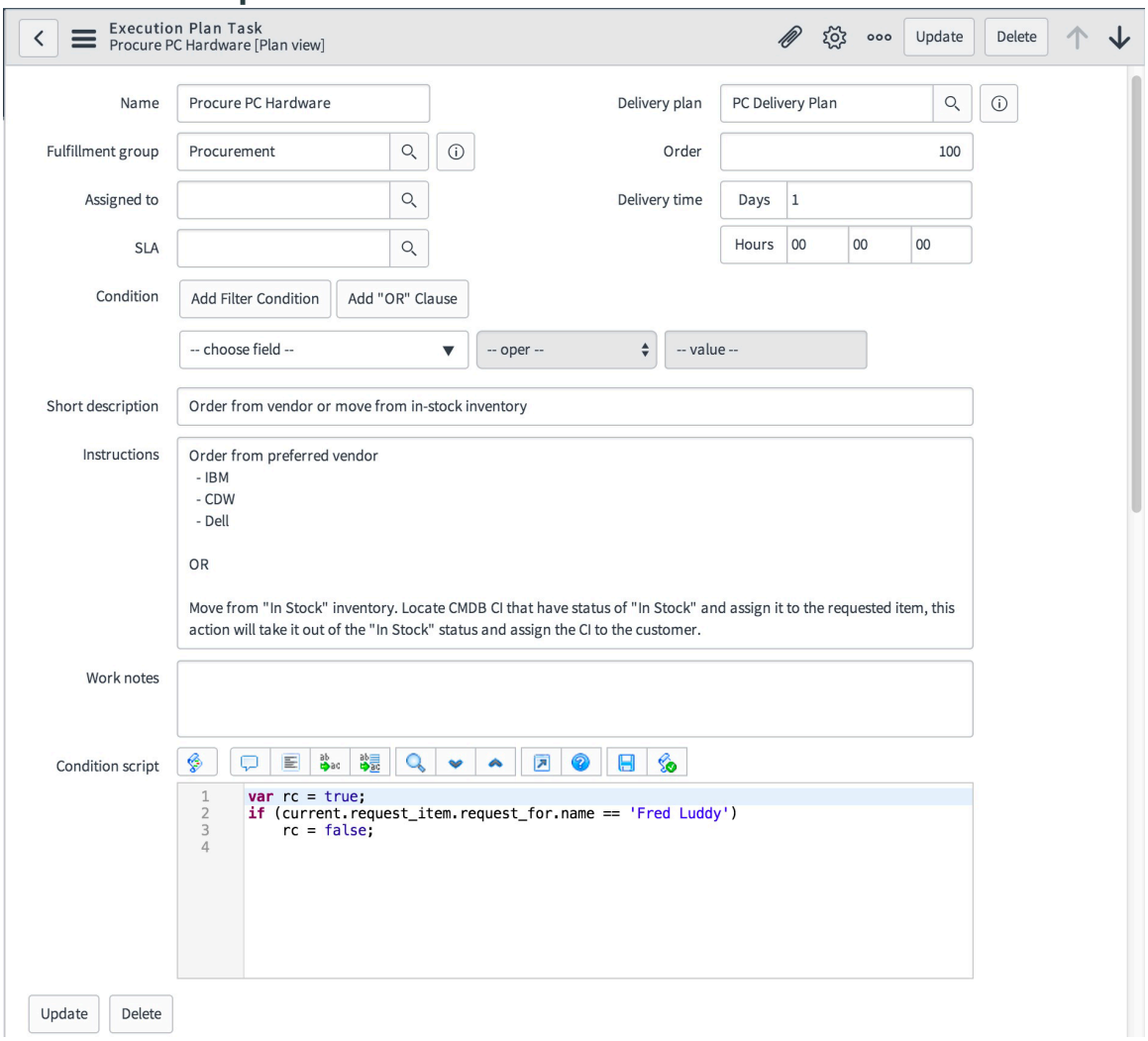
Use Condition Scripts



Service catalog execution plans

Service catalog enables you to associate execution plans with catalog items.

Once you have created the execution plan record, you can associate it with catalog items, create task templates, and associate any catalog item variables to tasks, if required.

You can also:

- Apply conditions to tasks
- Create approval tasks, enabling you to step back to a previous step if the approver rejects the request.

Associate execution plan with items

After you submit the execution plan record, you select a catalog item to use the execution plan.

Before you begin

Role required: admin

About this task

This association can be done later, but doing it at this stage enables you to access relevant catalog item variables in the execution plan.

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**.
2. Select a catalog item.
3. In the *Execution Plan* field, select the new execution plan.
4. Click **Update**.

Service Catalog checkout models

The service catalog defaults to one-step checkout model, but also allows two-step checkout. Administrators and users with the catalog_admin role can enable and configure the two-step checkout model and control how the delivery address is populated.

The service catalog defaults to a one-step checkout model. When a user clicks **Proceed to checkout** or **Order now**, items in the shopping cart are ordered and the order summary or status screen appears. The one-step checkout model runs in the following order:

Press Checkout > **Order Summary**

The service catalog also supports a two-step checkout model. Under this model, when a user clicks **Proceed to checkout** or **Order now**, an order confirmation screen appears. You can edit the order, choose a delivery location, or upload an attachment before submitting the order. The two-step checkout model runs in the following order:

Press Checkout Order > **Confirmation Screen** > **Submit Order** > **Order Summary**.

Access check for a catalog item is performed during its checkout. This check is also applicable in scripts and APIs.

Enable the two-step checkout process

You can enable the two-step checkout to specify a recipient, delivery address, and special instructions for an order.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Properties**.
2. Locate the property *Use the two step catalog checkout model (default false)*.
3. Select the **Yes** check box to enable the two-step process.
4. Locate the property *Show the 'Back to Catalog' button on the two step checkout screen*.
5. Select the **Yes** check box to provide a button that navigates back to the catalog from the order confirmation screen (default).
   Clear the check box to hide the button.

Specify requester location

Administrators can control how the delivery address is populated. By default the delivery address is defined by the client script called set location.

When the two-step checkout process is enabled, the `set location` script retrieves the address of the user and enters formatted details in the *Deliver to* field.

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Create a catalog request from another flow

You can create a catalog request to join the Service Catalog flow from a different flow. For example, from an incident flow, you can create a request, and associate the request with the incident. It helps you in tracking the requests associated with an incident and vice versa.

Before you begin

Role required: itil

- To associate a request with any parent table record, the corresponding mapping configuration should be available in the **Catalog Administration** > **Request Parent Mapping** submodule.
- To associate a record producer request with the parent table record, retrieve the *sysparm_parent_sys_id* and *sysparm_parent_table* parameters from the URL using the RP.getParameterValue() method in the **Script** field of the record producer.

Note:
If you set the **Use the sc_layout driven cart macros (default true)** (*glide.sc.use_cart_layouts*) property to **false** and create a request from a parent table record, the request is not associated with the parent table record.

Procedure

1. Navigate to the required table and select a parent record.
2. Click the additional actions menu icon and select **Create Request**.
   The Catalogs home page is displayed with all active catalogs that you can access.

   Note:
   If there is only one active catalog, then that catalog page is displayed with available categories.

3. Select the required catalog and navigate through its categories and items.
4. Check out the required catalog item, order guide, or record producer.
   For information on checkout models, see .
   For a catalog item or order guide, a request is created and displayed under the **Requests** tab of the parent table record. For a record producer, the corresponding task is created and displayed under the **Problems** tab of the parent table record, for example, an incident.

   Note:
   - The associated incident is specified in the annotation message throughout the request process.
   - Both for the one-step and two-step checkout, the caller of the incident is automatically set as the **Requested For** user for the request. If the two-step checkout is enabled, the fulfiller can change the **Requested For**.

     Note:
     For delegated request experience, the caller of the incident is populated in the Requested For variable. For information on delegated request experience, see Delegated request experience.

   - You cannot add items to the wish list, or save a record producer in this flow.

Configure a parent mapping for a request

You can configure a mapping that specifies the association between the parent record and the request record.

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Before you begin
Role required: admin or catalog_admin

Procedure
1. Navigate to **All** > **Catalog Administration** > **Request Parent Mapping**.

   Note:
   The Incident request configuration that creates a mapping between the incident table and the request table is available by default.

2. Click **New** and specify the field information.

Request Parent mapping fields

Field	Description
Name	Name of the mapping configuration for a request.
Parent table	Table from which the request is created.
Request Parent	Request table field that specifies the association with the parent table.
Parent requestor	User reference field on the parent table that is specified as the requestor of the request. **Note:** For delegated request experience, the user from the parent table record is populated in the Requested For variable. For information on delegated request experience, see Delegated request experience.

3. Click **Submit**.

State closure in the request fulfillment execution plan

The state closure in the request fulfillment process of a catalog item depends on the status of the associated catalog tasks, request items, and the request. It is applicable only for execution flows.

State closure dependency between a catalog task and RITM

- If all catalog tasks are closed as **Closed Complete**, the RITM is closed as **Closed Complete**.
- If there is at least one catalog task closed as **Closed Incomplete**, the RITM is closed as **Closed Incomplete**.
- If all catalog tasks are closed as **Closed Skipped**, the RITM is closed as **Closed Skipped**.

State closure dependency between a RITM and request

- If all RITMs are closed as **Closed Complete**, the request is closed as **Closed Complete**.
- If there is at least one RITM closed as **Closed Incomplete**, the request is closed as **Closed Incomplete**.
- If all RITMs are closed as **Closed Skipped**, the request is closed as **Closed Skipped**.

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View request notifications

View request notifications that are sent during specific events in a catalog request life cycle. These notifications are sent to various recipients including the Employee Center and ITIL users.

Before you begin

Role required: admin

About this task

Use the email notification layout and template that is shipped with the Employee Experience Foundation (com.snc.sn_ex_emp_fd) plugin to deliver notifications that are consistent and built with industries best practices layout. Applying the layout to email notifications elevates the look and feel, and also helps to deliver branded notifications. For more information, see Use email notification layout.

Procedure

1. Navigate to **All > System Notification > Email > Notifications**.
2. View the notifications related to request by filtering the **Table** field by **sc_request**and **sc_req_item**.
3. Click the notification name to view the details.

> **Note:**
> To receive these notifications, the end user must enable notifications. For more information, see Subscription-based notifications.

Service Catalog security

Service Catalog enables you to set the security for catalog with user criteria.

Set security for items and categories

An administrator can control access to content in the service catalog by creating and applying user criteria records.

Catalog managers and catalog editors can apply existing user criteria for items and categories to which they are assigned. Catalog managers and catalog editors cannot create or edit user criteria directly.

You can create user criteria records that define conditions for user information and then apply these criteria records to catalog items and categories. In this way you can control access to these items and categories.

For example, create a **USA Sales** user criteria record matching users who are both in the sales team and based in the USA. Then apply this record to the **USA IT Hardware** catalog category, so only users matching the record can access that category.

The feature is active by default in new Fuji instances and upgraded instances that do not use entitlement-based access controls. If you upgrade an instance that uses entitlements, you can migrate to user criteria to take advantage of the improved control, flexibility, and reuse.

Access controls allow you to:

- Manage access to multiple items and categories in one user criteria record. For example, create a single **UK Employees** user criteria record and apply it to multiple items and categories that are available to employees in the UK.
- Allow access if one condition matches, or if all conditions match. For example, define that only users who are both in a specific location and who belong to a specific department can have access.

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- Use **Available For** and **Not Available For** lists to allow or prohibit access to users matching the conditions in a criteria record. For example, specify that a US-based catalog category is available for the users located in the USA but is not available for users belonging to the Sales department (whether in the US or not).
- Extend matching to create conditions matching additional fields in the User [sys_user] table, without having to use a script. For example, you can add a condition to match items against the **Cost center** field in user records.

Important:
After making user criteria additions or changes, you may need to log out and log back in to clear the prior configuration.

Related topics

Debug user criteria of a catalog item

Create a user criteria record in Service Catalog

Create a user criteria record to define conditions that are evaluated against user records.

Before you begin
Role required: admin, catalog_admin

About this task
You can apply several user criteria records to a single catalog item or category. In this situation, users match only one of these criteria records to have access.

Procedure
1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **User Criteria** and create a record.
2. Fill in the fields on the form, as appropriate.

User criteria fields

Field	Description
Name	The name of the criteria record.
Users	The individual user records to match.
Groups	The group records to match.
Roles	The roles to match. **Note:** ○ The evaluation of a role is cached in the session, so any change in the role requires you to logout and login, similar to roles in ACL (Access Control List). ○ User Criteria is not applicable for elevated privilege roles.
Advanced	A check box to display or hide the **Script** field.
Script	A script to define any additional criteria, and return **true** or **false**. This field is available only if **Advanced** is selected.

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Field	Description
	Note: ○ The script is evaluated in the scope that the user criteria is created in. ○ The evaluation of the script is cached in the session, so any change in the evaluation requires you to logout and login, similar to roles in ACL. ○ Do not use `gs.getUser()` or other session APIs since they cause conflict when used in diagnostic tools. Use the pre-defined `user_id` variable available in the script to get the user id of the user being used to evaluate the script. ○ Because scripts are evaluated dynamically, including scripts in user criteria records can decrease performance. ○ Because answer is a pre-reserved keyword, do not use a function with its name as answer, that is, answer().
Active	A check box to activate or deactivate this criteria record.
Companies	The companies to match.
Locations	The locations to match.
Departments	The departments to match.
Match All	A check box to determine whether all elements from each populated criteria field must match. If selected, only users who match all criteria are given access. If cleared, the user must meet one or more of the set criteria to be given access. By default, this check box is cleared so that any condition met provides a match. For example, consider a user criteria record for the following: ○ Locations A or B ○ Company C or D With **Match All** selected, only users meeting all these conditions are matched. For example, a user with a location A and a company C. With **Match All** cleared, users meeting any of these conditions are matched. For example, a user with a location B. **Note:** If you select **Match All**, ensure that you do not create contradictory conditions which can never be met. For example, if all users in location A work for company G, then the conditions in this example can never be met.

Implementing user criteria

When creating user criteria for your system, consider the following recommendations.

- Design Criteria for Reuse:

  Ensure that you design user criteria for maximum reuse. Create user criteria records with common sets of conditions matching your organization requirements. Allow them to be shared

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across as many items and categories as possible, rather than creating multiple similar criteria records for individual items and categories.

- Naming conventions: Give each user criteria record a meaningful name, to help you determine the function for that record. For example,
  - Users in company Cloud Dimensions AND in Madrid
  - Users in company Cloud Dimensions OR in Madrid
  - Users belonging to the Group Development, IT, or Sales
  - Users with role itil, asset_manager, or catalog_admin
- Test user criteria on a development or test instance, and then transfer the records from the user criteria tables and catalog records to your production instance using update sets.

Apply user criteria to items and categories

Apply a user criteria record to items and categories, either from the item or category form or from the user criteria form.

Before you begin

Role required: admin

About this task

The user criteria restriction applies only within Service Catalog for the specific item that it's applied for. However, the user criteria restriction isn't applied outside the Service Catalog where the user has access to the item via the table.

To apply criteria directly to an item or category, use the Available For or Not Available For related lists in the Item or Category form.

Note:

- Changes to the user's profile, such as location or department, apply immediately for standard user criteria. The catalog item visibility is updated without needing a new session. However, for the scripted user criteria, a session relaunch is needed for the changes to take effect.
- The user criteria restrictions of a category don't automatically apply to the catalog items within the category. If necessary, you should apply the user criteria restrictions to the individual catalog items.

To apply criteria directly from the User Criteria form, add items to the Available For Catalog Items and Not Available For Catalog Items related lists, and add categories to the Available For Categories and Not Available For Categories related lists. You can configure the User Criteria form to add these lists.

Note:

The **Not Available For** settings override **Available For** settings. A user on the **Not Available For** list for an item can't access that item, even if that user is also on the **Available For** list for that item.

Apply user criteria to items

Apply user criteria to an item to define which users can and cannot access that item.

Before you begin

Role required: admin

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About this task
You can apply user criteria to all types of catalog item, including order guides, content items, and record producers.

Note:
The user criteria restriction applies only within Service Catalog for the specific item it is applied for. However, the user criteria restriction is not applied outside the Service Catalog where the user has access to the item via the table.

Procedure
1. In an item record, navigate to the Available For or Not Available For related lists.
2. Click **Edit** to add an existing user criteria record, or click **New** to create a new one.
3. Save the record to associate the user criteria record with the item.

Note:
The **Not Available For** settings override **Available For** settings. A user on the **Not Available For** list for an item cannot access that item, even if that user is also on the **Available For** list for that item.

Apply user criteria to categories

Apply user criteria to a category to define which users can and cannot access a category.

Before you begin
Role required: admin

Procedure
1. In a category record, navigate to the Available For or Not Available For related lists.
2. Click **Edit** to add an existing user criteria record, or click **New** to create a new one.
3. Save the record to associate the user criteria record with the category.

Note:
- The **Not Available For** settings override **Available For** settings. A user on the **Not Available For** list for a category cannot access that category, even if that user is also on the **Available For** list for that category.
- The user criteria restrictions of a category do not automatically apply to the catalog items within the category. If required, you should apply the user criteria restrictions to the individual catalog items.

Extend user criteria

Extend the user criteria table when the available user criteria fields are not sufficient. User criteria references various user fields (fields from the User [sys_user] table), such as department, company, and groups. You can extend user criteria with a custom field to include any other user reference field (field from the User [sys_user] table) of interest.

Before you begin
Role required: admin

About this task
For example, you can extend user criteria to include the user's cost center, and then restrict certain catalog items only to members of that cost center.
Meet the following rules to extend the user criteria table.

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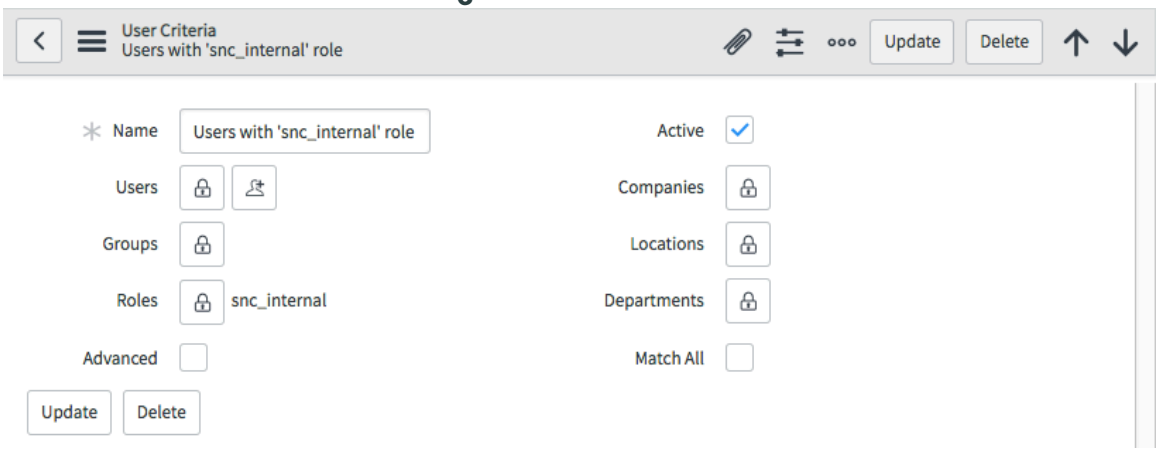
- The field to add must be a reference field in the user record.
- The field added to the user criteria table must be **List** type.
- The fields must have matching names. For example, **cost_center** [sys_user] and **u_cost_center** ("u" prefix is added to custom fields in a table) are considered to be matching.

This example demonstrates how to extend the current user criteria record to include **Cost center** as an option.

User criteria record before extending Cost center



Procedure

1. Navigate to **All** > **System Definition** > **Tables**.
2. Open the **User Criteria** record.
3. In the **Table Columns** related list, click **New**.
4. Set the type to **List**, and then enter `Cost center` as the column label.
   The **Column name** field populates with **u_cost_center**.
5. In the Reference Specification form section, select **Cost Center** for the reference field.
6. Add any conditions or additional information to the dictionary entry as desired.
7. Click **Submit**.
8. Navigate to **Service Catalog > Catalog Definition > User Criteria**.
9. Select or create a user criteria record, and see that you can now use the new field.

What to do next

Test the user criteria record by navigating to **Service Catalog** > **Catalog Definition** > **User Criteria**, and opening any record. Verify that the extended field is available.

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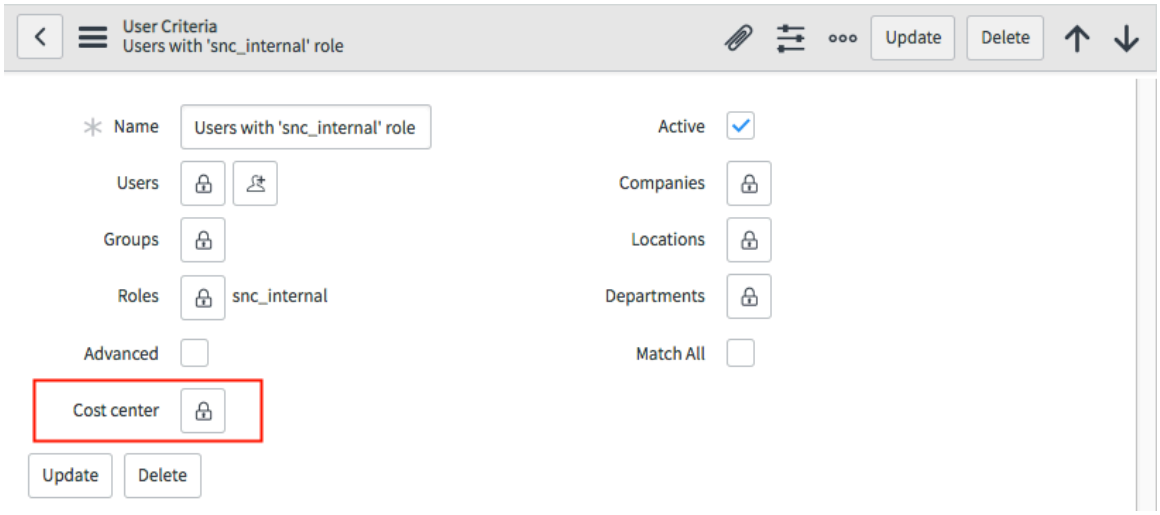
User criteria with cost center



You can extend the User [sys_user] table if there are fields in other tables that you want considered in user criteria. After extending the User table, follow the steps in this procedure to extend it to user criteria.

User criteria migration

Service catalog user criteria records provide access control for service catalog items and categories.

You can migrate your access controls to use user criteria. The user criteria feature is automatically enabled for new instances. If you upgrade your instance, a script runs to determine current access control usage.

- If your instance does not use entitlement-based access controls, the user criteria feature is automatically enabled.
- If your instance does use entitlements, the user criteria feature is not enabled. If you want to use user criteria, use the procedure described on this page to migrate your access controls from entitlements to user criteria.

Migrate to user criteria to provide more reuse, control, and flexibility compared to entitlements.

For example, you can use a single criteria record to make multiple catalog items available to only users who meet all these requirements:

- Are located in EMEA or APAC
- Belong to ACER
- Are in the Training department

Migrate to Service Catalog user criteria

Service Catalog enables you to maintain the required access controls to your service catalog while migrating from entitlements to user criteria.

Before you begin
Role required: admin

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About this task

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Properties** and verify that the user criteria feature is not already enabled on your system.
   - If the property **Use "User Criteria" to define access to catalog items and categories** (*glide.sc.use_user_criteria*) is set to **true**, you can skip the following steps. The user criteria feature is automatically enabled because entitlements were not used in your old system.
   - If this property is set to **false**, continue with the following steps. The user criteria feature has not been enabled yet on your system.
2. To preview the user criteria feature, set the service catalog property **Enable both "User Criteria" and "Entitlement" related lists for catalog items and categories when migrating from entitlements** (*glide.sc.user_criteria_migration*) to **true**.
   This option lets you compare user criteria records and entitlements before you fully switch to user criteria.
3. Inspect your service catalog items and categories to identify access control sets that you can configure user criteria records for.
   Review your current entitlements and record your current design for access controls. Focus on identifying patterns where multiple items have the same combination of location, group, and so on. Each combination is a possible access control set.
4. Create a user criteria record for each access control set that you identified from your inspection of the service catalog.
   You have a step with a list, note, and image.
5. Apply these user criteria records to the items and categories identified, replacing the equivalent entitlements.
6. Enable user criteria on your system by setting the service catalog property **Use "User Criteria" to define access to catalog items and categories** (*glide.sc.use_user_criteria*) to **true**.
   When this property is set to **true**, any remaining entitlements are no longer used.

   Note:
   Scripts in user criteria cannot reference the category or catalog item as **current** as entitlement scripts do. For scripts in user criteria, use the **user_id** available for the user currently being evaluated against the category or catalog item.

Data structure differences

There are significant data structure differences between entitlements and user criteria, which you must be aware of while migrating.

Using entitlements, the following tables are loaded into memory and evaluated before rendering.

For catalog items:

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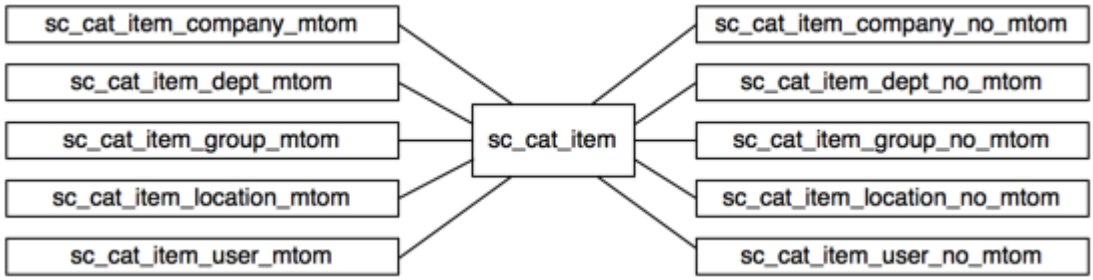
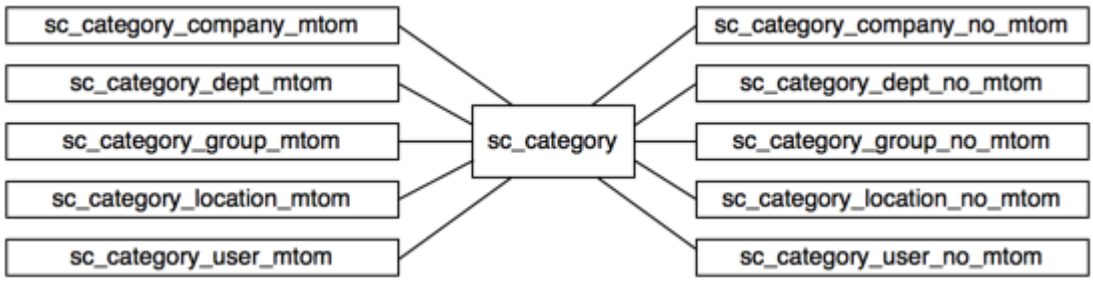
Entitlements Data Structure - Catalog Items



For categories:

Entitlements Data Structure - Categories



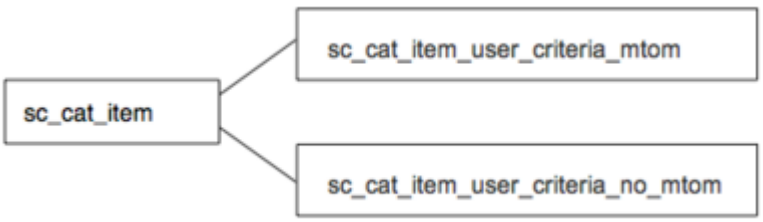
The user criteria architecture collects all user attributes in the User Criteria [user_criteria] table.

User criteria records can link to items and categories, as follows.

For catalog items:

- Catalog Item Available for [sc_cat_item_user_criteria_mtom]
- Catalog Item Not Available for [sc_cat_item_user_criteria_no_mtom]

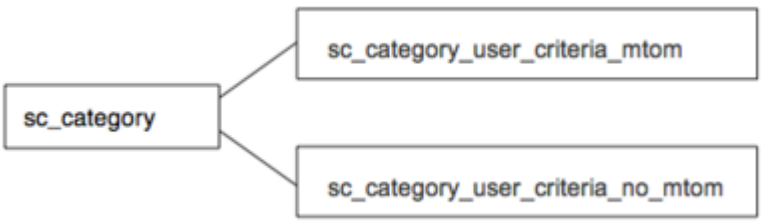
User Criteria Data Structure - Catalog Items



For categories:

- Category Available for [sc_category_user_criteria_mtom]
- Category Not Available for [sc_category_user_criteria_no_mtom]

User Criteria Data Structure - Categories



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Legacy service catalog access controls

Service catalog supports several ways to control access to a catalog item or category. These controls are also known as catalog entitlements.

Instead of access controls, use user criteria that is the supported security model for catalog item and category. For information about user criteria, see Apply user criteria to items and categories.

A service catalog item with no specific access controls is available to all users. If access controls are specified, only users who meet all conditions have access.

The following entitlements are available:

- Role
- Custom script
- Company, Department, Group, User, or Location

Access controls are checked in the following order: roles, then scripts, then Company, Department, Group, User, or Location.

Note:
The functionality described here is superseded by access controls using user criteria. Migrate to user criteria for a more flexible and reusable way to define access controls.

Service Catalog administration

Service Catalog enables an administrator to configure the service catalog.

Before you begin
Role required: admin

About this task

Procedure

1. Navigate to **All** > **Service Catalog** > **Maintain Items** or **Service Catalog** > **Maintain Categories**.
2. Open an item or category, and then configure the related lists in the form to add **Available for Department and Available for Company**.
3. Click **Update** to save the form layout.
4. Open the item or category you wish to secure and add companies and departments to related lists.

   The item or category is available only for the companies and departments listed. If no companies or departments are listed, then the item or category is available to all companies or departments.

Restrict access

Service Catalog enables an administrator to grant or deny access to a service catalog item or category by company, department, group, user, or location.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **Service Catalog** > **Maintain Items** or **Service Catalog** > **Maintain Categories**.
2. Open the relevant catalog item or category.
3. Configure the form to add the appropriate **Available** or **Not available** lists.

4. Add the companies, departments, groups, users, or locations to the appropriate list.
5. Click **Update**.

Restrict access by role

By default, individual catalog items and categories do not have access restrictions.

Before you begin

Role required: admin

About this task

Administrators can grant or deny access to a service catalog item or category based on role.

Procedure

1. Navigate to **All** > **Service Catalog** > **Maintain Items** or **Service Catalog** > **Maintain Categories**.
2. Open the relevant catalog item or category.
3. Add the required roles to the **Roles** field.

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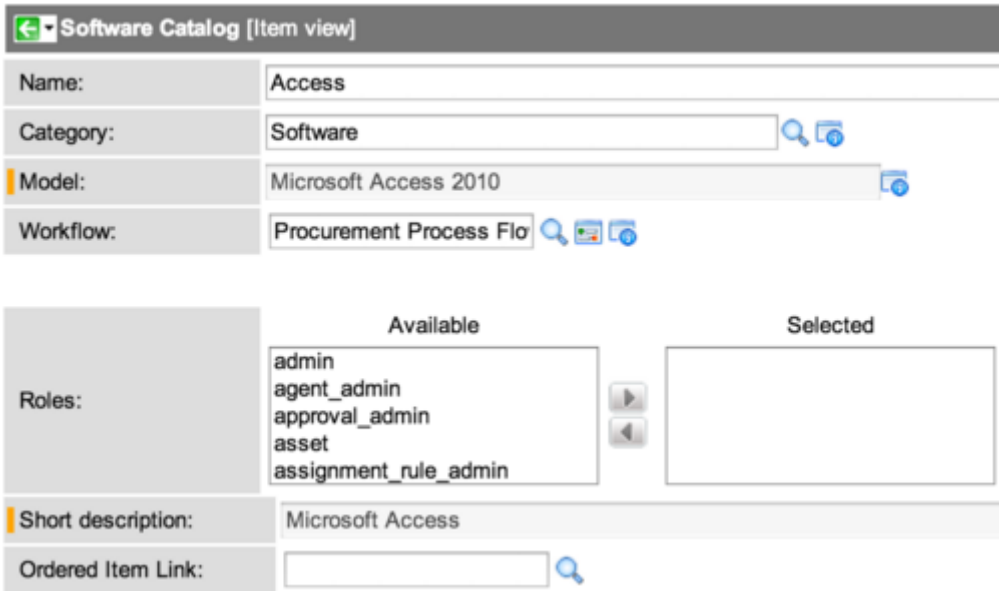
You can, if needed, Configure the form or change to **Default View** to see the **Roles** field.

Roles Granted



Restrict access by a script

Service Catalog enables you to control access to a service catalog item or category with a custom script.

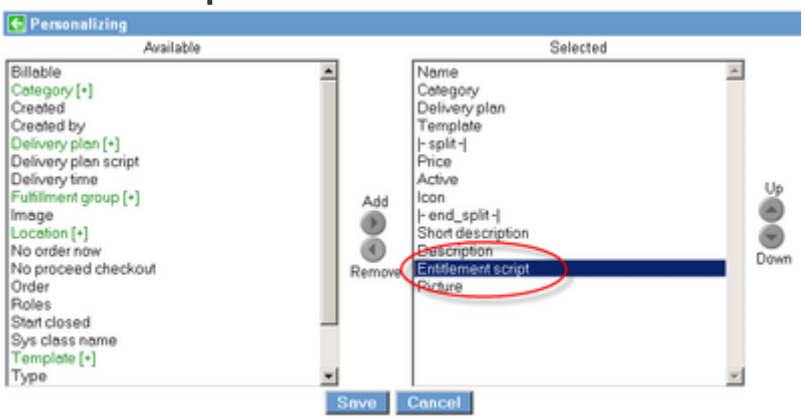
Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Maintain Items** or **Service Catalog** > **Maintain Categories**.
2. Open the relevant catalog item or category.
3. Configure the form to add the **Entitlement Script** field.

Entitlement Script



4. In the **Entitlement Script** field, enter the access control script.

   Sample Scripts:

   The following example script grants access to a catalog item named French Blackberry to users with a language of Fr (French):

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```
gs.log ( 'Running Entitlement script for French Blackberry' ) ;

 if (gs. getUser ( ). getLanguage ( ) == 'fr' )
    answer = true ; else
    answer = false ;

answer ;
```

The following example script could be used to distinguish between two categories of users (one with full access and one with restricted access) on the catalog of services:

```
var userid  = gs. getUserID ( ) ; var now_GR  = new GlideRecord
 ( 'sys_user' ) ;
now_GR. get ( 'sys_id' , userid ) ;

 if (now_GR. source )
    answer = true ; else
    answer = false ;

answer ;
```

Overriding Entitlement Scripts by Role

a. Navigate to **Service Catalog** > **Properties**.

b. Enter the roles for which to override the entitlement script (grant access) in the property List of roles (comma-separated) that can override normal entitlement checking inside the catalog. An itil role of "itil" means that the itil role can order any catalog item, even one protected by entitlement restrictions.

Service Catalog and CSDM

The Service Catalog lets you create other catalogs (such as the Request Catalog and the Product Catalog) that provide self-service opportunities in the channel you want to use, such as the self-service portal, the mobile app, or the Virtual Agent.

The goal of this product view is to help you to understand how Service Catalog key entities work with the core CSDM framework.

Related topics

Applying CSDM guidelines to your product — product views

Service Catalog and CSDM tables

Service Catalog manages and uses CSDM tables. Several ServiceNow products benefit from and add value to Service Catalog.

CSDM tables managed by the Service Catalog

The Service Catalog primarily manages business services in the Sell/Consume domain. Technical Services are also viewed from the Operate domain of Event Management.

The Service Catalog manages the Catalog Item table [sc_cat_item]. The Catalog Item table creates requests in Request Management. The requests usually have an automated, semi-automated, or business workflow for fulfilling the request, which can consist of approvals and tasks. When part of Service Portfolio Management, the CIs are associated with service offerings. When you link a catalog item, you can track request activity for all catalog items associated with a service offering. An offering can have multiple catalog items.

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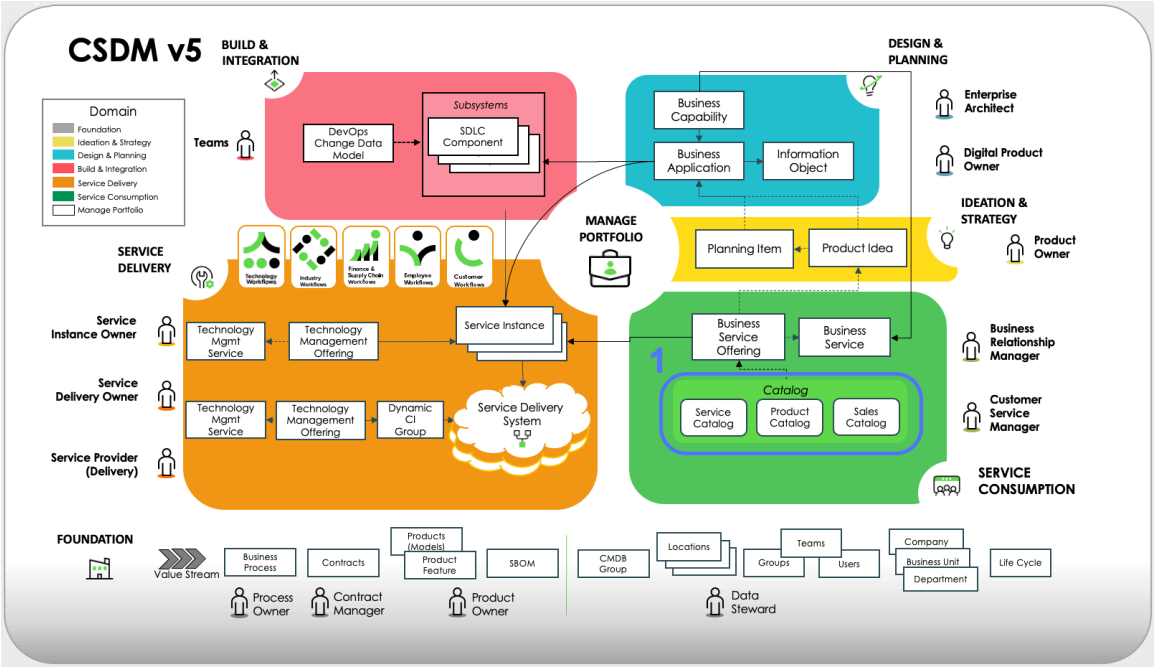
The CIs can include:

- PC Hardware Item (pc_hardware_cat_item): Submits hardware asset requests included in Asset Management workflows.
- PC Software Item (pc_software_cat_item): Submits software asset requests included in Asset Management workflows.
- Record Producer (sc_cat_item_producer): Submits requests or generates records other than Request Management tables for services that aren't serviced by Request Management (for example, HR Cases, Facilities Requests, or Legal Requests).

CSDM tables managed by the Service Catalog



CSDM tables used by the Service Catalog

1. Configuration Item tables [cmdb_ci*]
2. Service Offering table [sc_cat_item_subscribe]
3. Application Service table [cmdb_ci_service_discovered]
4. Product Model tables [cmdb_model]

> **Note:**
> The following legacy CMDB relationships that once provided access to catalog items are no longer supported. To provide access, use the new relationships listed in the table.

Relationship tables

CMDB table	Catalog item relationship table	New relationship to use instead
User (sys_user)	sc_cat_item_user_mtom, sc_cat_item_user_no_mtom	User criteria
Group (sys_user_group)	sc_cat_item_group_mtom, sc_cat_item_group_no_mtom	User criteria
Department (cmn_department)	sc_cat_item_dept_mtom, sc_cat_item_dept_no_mtom	User criteria

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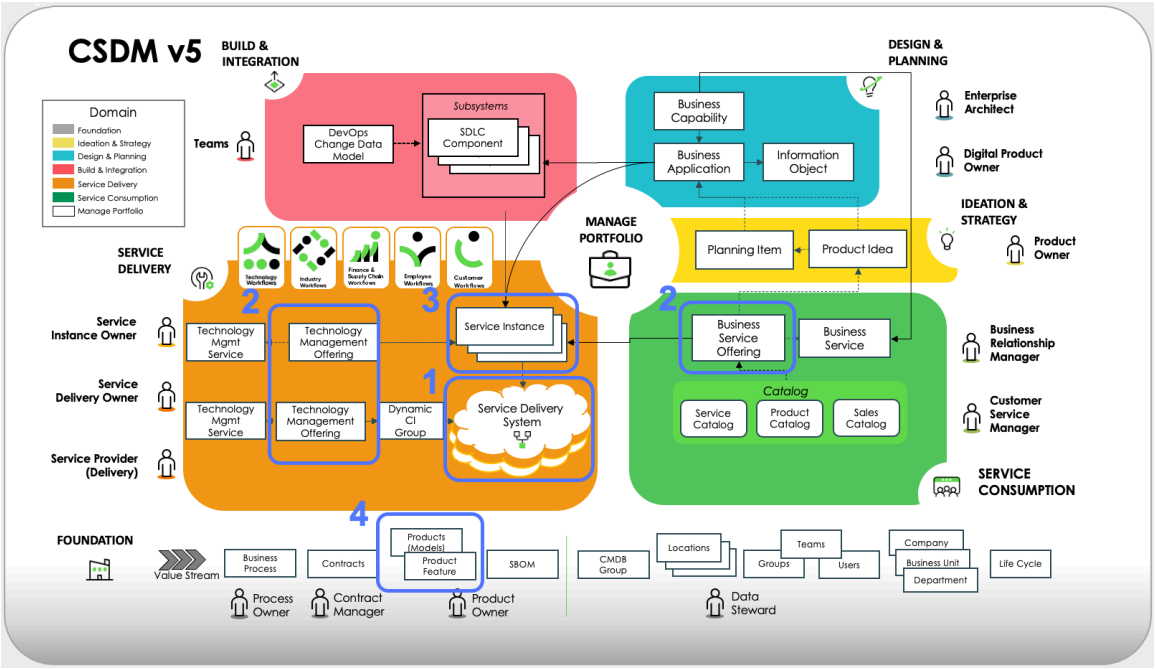
CMDB table	Catalog item relationship table	New relationship to use instead
Location (smn_location)	sc_cat_item_location_mtom, sc_cat_item_location_no_mtom	User criteria
Company (core_company)	sc_cat_item_company_mtom, sc_cat_item_company_no_mtom	User criteria

CSDM tables used by the Service Catalog



Products that benefit from the Service Catalog

Service Portfolio Management (Service Portfolio Management)

Ties catalog items to service offerings. Lets service owners create and maintain catalog items more easily, and gives more visibility into the service offerings.

Hardware Asset Management and Software Asset Management

Self-service catalog lets you order an asset and track service delivery.

Human Resources (HR)

Exposes the creator (Record Producer) of HR cases and displays the Record Producer in the relevant self-service catalogs (for example, Portal, Mobile, and Virtual Agent).

Customer Service Management (CSM)

Exposes the creator (Record Producer) of customer service cases and displays the Record Producer in the relevant self-service catalogs (for example, Self-service Portal, Mobile, and Virtual Agent).

Service Catalog use case

You can create customized catalogs where you can request items such as a specific service or product. With this use case, CSDM provides Service Catalog connection to the service offerings and services.

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Service Catalog use case

Catalogs contain catalog items and are the starting points for accessing available services. Request Catalogs and Product Catalogs are two of the customized catalogs you can create from the Service Catalog. For details, see Service Catalog.

- A Request Catalog is a list of business and technical products, services, service commitment options, and offerings that you can order.
- A Product Catalog is a set of information about individual models. A model is a specific version or configuration of an asset. Asset managers use the Product Catalog as a centralized repository for model information.

Key features of the Service Catalog use case

Digital Portfolio Management (DPM) uses the CSDM framework to navigate the Service Portfolio. You can then use the Service Portfolio to locate the services and their related service offerings, catalog items, dependents, dependencies, metric roll-ups, costs and initiatives. The associated metrics are aggregated using the CSDM framework with the related tables.

Catalog items

A catalog item is an item or a service that you can request from the catalog. A service can contain multiple catalog items. Catalog items are listed on the catalog portal and are available to the users who need them (either through subscription or job responsibility). Each catalog item is linked to one service offering.

The Catalog Item form includes the following tabs.

- Item Details: Description of the catalog item.
- Process Engine: The defined process used to fulfill the catalog Item request.
- Picture: Picture used to represent the catalog item when it appears in the catalog.
- Pricing: Pricing details for the catalog item.
- Portal Settings: Provides specific settings on how you interact with the catalog item in the catalog portal.

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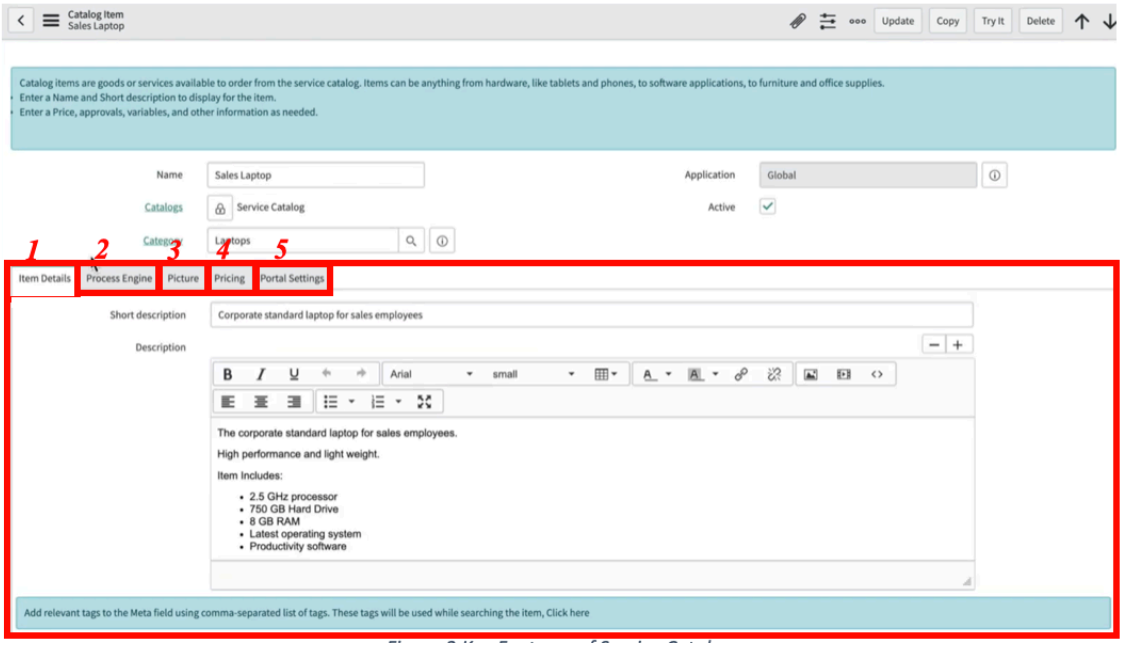
Catalog Item form



Product Catalog use case

Use the Product Catalog to specify information about a product model. Product models are specific versions or configurations of an asset. Asset managers use the Product Catalog as a centralized repository for model information.

A detailed and well-maintained Product Catalog can coordinate with the Service Catalog, asset, procurement, request, contract, and vendor information. Models published to the Product Catalog are automatically published to the Service Catalog. The Service Catalog includes information about goods (models) and services. If the model is available from multiple vendors, a model can be listed more than once. Models are included with Asset Management.

Key features of the Product Catalog use case

This use case lets you include hardware and software product information as items in the Product Catalog.

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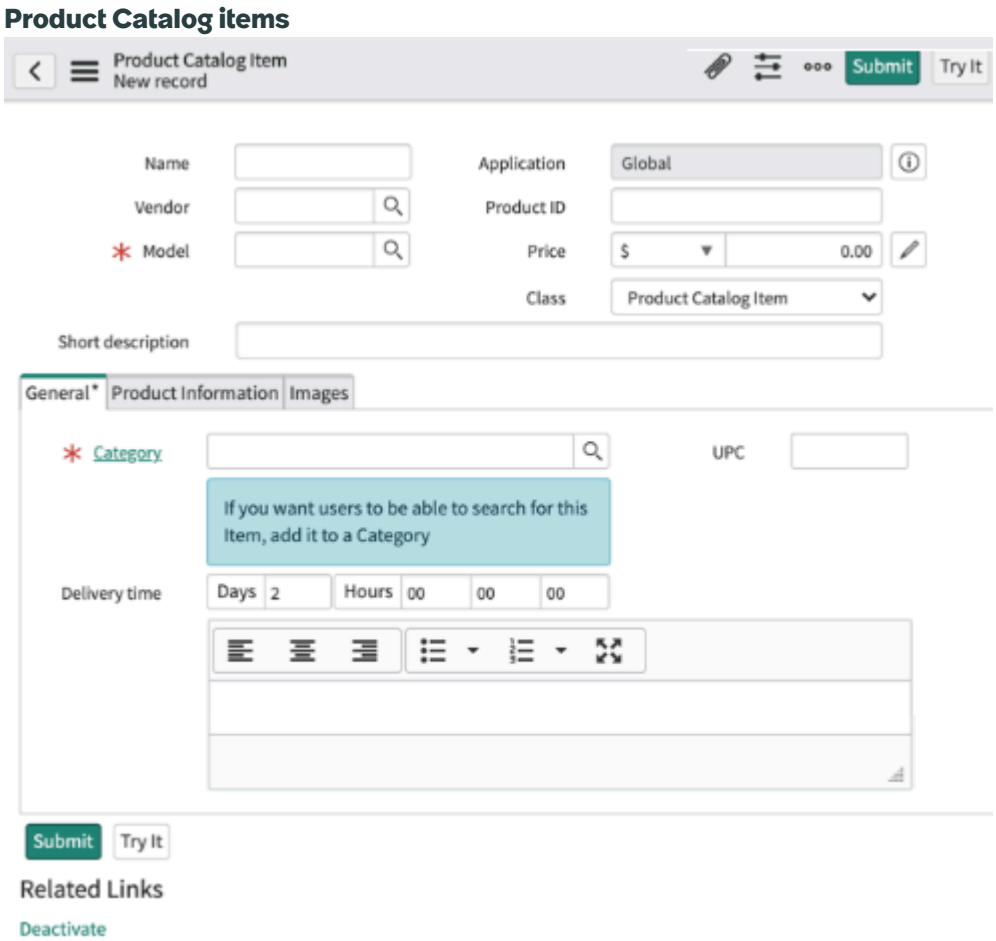

Results of Product Catalog use case

The CSDM framework ensures that product models are available in the catalog and that there are processes defined to consume the models.

Service Catalog considerations

Consider these points while implementing the CSDM framework.

- The Product Catalog builds on the Service Catalog. Product catalogs specify the product models that are available for use. Product-specific attributes are captured in each catalog item. You can create product catalogs for each type of products in your portfolio.
- You can create catalog types that reflect the types of offered products and services.

Creating a Service Catalog Wizard

Service Catalog wizards help you to create wizard like, multi-step experiences.

Before you begin

Service Catalog wizards are especially useful when the input required is huge and complex since the wizard offers a step-by-step experience for the requester and also provides a side panel to provide contextual help. A visa application is a good example where Service Catalog wizards could be used as the data needs to be presented in steps such as Personal details, Education details, and so on.

Pre-requisites for creating Service Catalog wizards:

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- Ensure that you have either a composite record producer, or a record producer set up. For more information, see Create a record producer.
- The **Save options** field must have the value **Save in destination** in the composite record producer or record producer to enable the wizard to create records.
- The **Allow edit** option should be selected on the composite record producer or record producer form so that records are editable in the wizard.

Role required: wizard_admin, or admin

About this task

The Service Catalog Wizard is available as a component in UI Builder (UIB). You can use it to create guided experiences backed by composite record producers or record producers. You can create multi-step wizard experiences using Service Catalog Wizard.

Service Catalog Wizards are used in these modes:

- **Normal** mode: To create records in the table configured in the record producer, or the composite record producer associated with the wizard.
- **Template** mode: To create a template where admins can predefine some data and provide guardrails to fine-tune and personalize the creation of records.

Procedure

1. Navigate to **Service Catalog Wizards** > **Maintain Wizards**, and click **New** to create a new wizard.
2. On the form, fill in the fields.

Service Catalog Wizard form

Field	Description
Name	Name of the wizard.
Type	The wizard uses a composite record producer, or record producer.
Producer	Reference of the composite record producer, or record producer.
Has feedback panel	Option to specify if the wizard has a feedback panel.
Layout[Stacked/Tabbed]	The rendering of wizard steps can be either stacked or tabbed layout mode.
Title	Title of the wizard. **Note:** The title can also dynamically refer to the composite record producer, or record producer variables using ${variable} syntax.
Enable Save	Auto-save the wizard on each step change.
Show review step	The Review and submit step is displayed to summarize the wizard steps, and field values.

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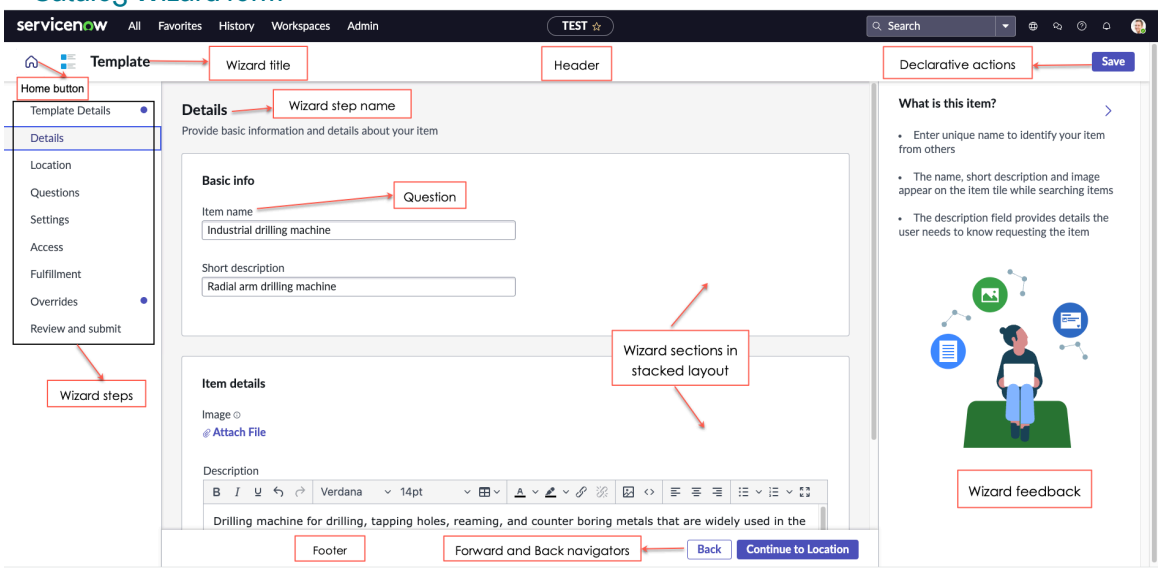
Field	Description
Show Submit on last step	If **true**, the **Submit** button is displayed in the last step.
Review step label	Label of the Review and submit step.

For more information on fields, steps, sections, or questions on Service Catalog wizard, see the following:

- Add a step, section, or question to a catalog item wizard
- Catalog Wizard form



After you set up the field values, the resulting wizard with the steps, layout, labels, and other elements appear as follows:

Elements of a Service Catalog Wizard

3. Set up the Catalog Wizard component properties using the UI Builder (UIB) components, for more information see Customize UI Builder pages using components.

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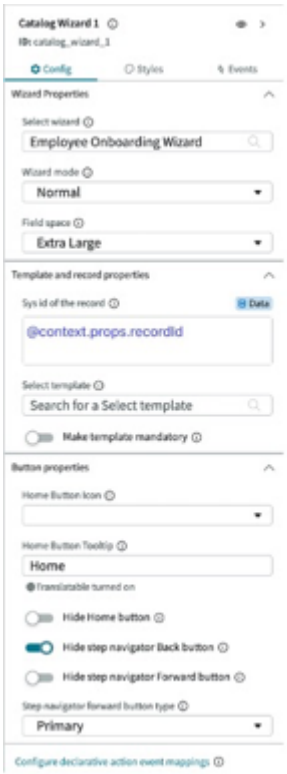

a. **Select Wizard**: Select the wizard that you're creating the experience for (you can choose the wizard you created in the previous step).

b. **Wizard mode**: Select the mode for this experience.

c. **Field space**: Specify the spacing that should appear between fields in the wizard. The possible values are **Small**, **Medium**, **Large**, and **Extra Large**.

d. **Sys_id of the record**: In Normal mode, the sys_id of the record being edited or created by the wizard. In Template mode, the sys_id of the template that is being edited.

e. **Select template**: Select the template that must be applied to the wizard. The **Select Template** option is applicable only in Normal mode.

f. **Make template mandatory**: If **true**, providing a template is mandatory for creating records, and is applicable only in Normal mode.

g. **Home button icon**: Select an icon that appears in place of the Home button icon.

h. **Hide home button**: If **true**, the **Home** button is hidden in the wizard.

i. **Hide step navigator Back button**: If **true**, hides the **Back** button in the footer of the wizard.

j. **Hide step navigator Forward button**: If **true**, hides the **Forward** or **Continue** button in the footer of the wizard.

k. **Step navigator forward button type**: Specify the button type for the **Forward** button in the wizard footer. The possible values are **Primary** or **Secondary**.

For more information, see Next Experience Components in the developer documentation site.

Create declarative actions for Service Catalog Wizards

Create and configure declarative actions to enable administrators to configure buttons (wizard actions) in Service Catalog Wizards.

Before you begin

There are two types of declarative actions for catalog wizards:

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- UXF Client Action: Create declarative actions and map an action to a UIB page level event handler. Use this if you need to handle events at the UIB level such as opening a dialog box, or opening another catalog wizard, and so on.
- Client Script: Use a client script that executes on a button click. Use this if you need to manipulate g_form fields of the composite record producer that are linked to the catalog wizard.

The Catalog Wizard model is the declarative action model for catalog wizard which has the model fields that define the properties of the wizard. Use these fields to define what the payload can contain (for UXF Client Action type), or define conditions for button display on the wizard. Every wizard must use the Catalog Wizard model to create declarative actions.

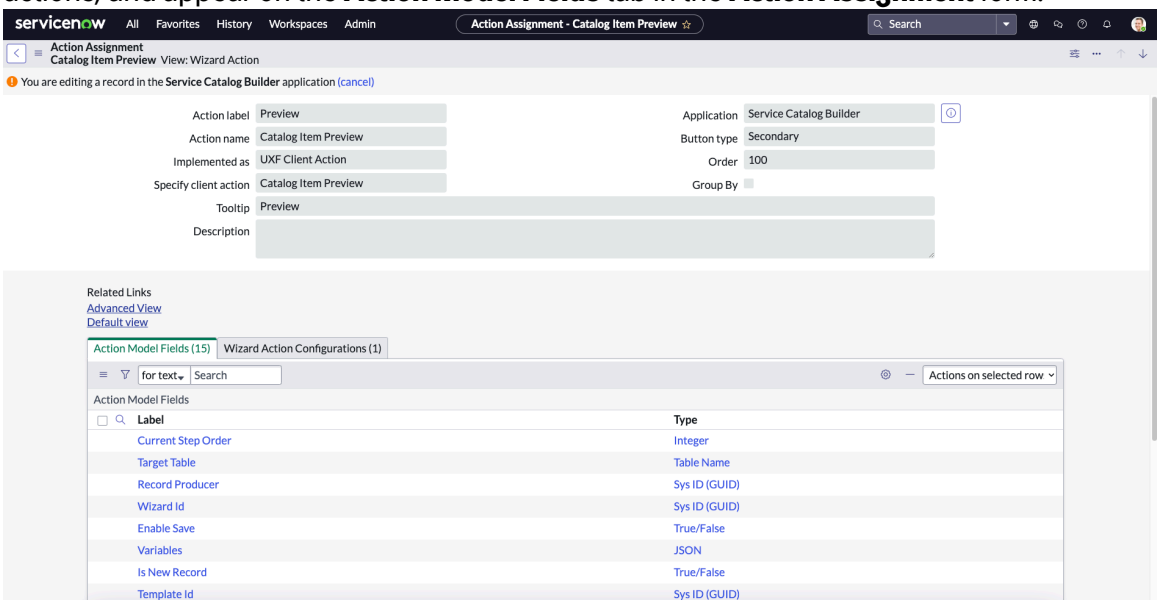
Role required: wizard_admin, admin

Procedure

1. Navigate to **Service Catalog Wizards > Catalog Wizard Declarative Actions**.

> **Important:**
> Use this navigation path only to create declarative actions. This path sets the fields correctly when the declarative action form is loaded.

2. Click **New** to create a new declarative action.
3. Specify Catalog Wizard **Action Model Fields** to create payloads.
   The action model fields are available by default for catalog wizard declarative actions, and appear on the **Action Model Fields** tab in the **Action Assignment** form.



Action Model Fields tab

Field	Description
Current Step Order	Order of the current selected step.
Target Table	Target table of the record producer or composite record producer used by the wizard.

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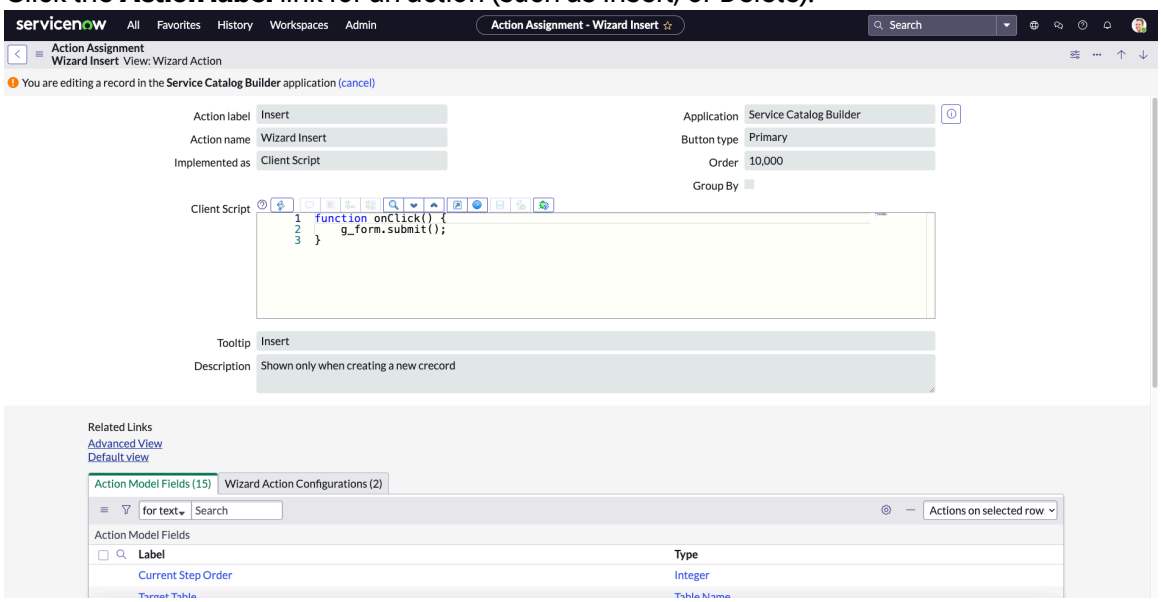
Field	Description
Record Producer	Sys_id of the record producer or composite record producer used by the wizard.
Wizard Id	Sys_id of the wizard.
Enable Save	Value of the **Enable Save** field on the wizard record.
Variables	Object containing name and value for composite record producer variables associated with the wizard.
Is New Record	The value is **True** when creating a new record using the wizard.
Template Id	Sys_id of the template applied on the wizard.
Has Review Step	The value of the **Has Review Step** field on wizard record.
Is Last Step	Indicates if it's the last step of the wizard. The last step is not dependent on order, and could change dynamically based on client scripting or UI policies of the wizard.
Form Dirty	The value is **True** if the wizard has unsaved changes.
Submitting	The value is **True** if a submission of the wizard is in progress.
Mode	Mode in which the wizard is operating (Template or Normal mode).
Target Record Data	Not Applicable (this field is no used).
Record Id	Sys_id of the record being created or edited by the wizard.

4. Click the **Action label** link for an action (such as Insert, or Delete).



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Action Assignment form

Field	Description
Action label	Display label for the button on the wizard.
Action name	Identifier for the action.
Implemented as	UXF Client Action or Client Script for wizard declarative actions.
Specify client action	The payload definition if **Implemented as** is the UXF Client Action.
Client Script	If the **Implemented as** field value is Client Script, this value must be specified. **Important:** You can only use the variables on the CRP that are linked to the wizard.
Tooltip	Tooltip for the button.
Button type	Possible values are **Primary** or **Secondary**.
Order	Sequence that the button appears in.
Group By	Option that must be selected if the button is part of a group.
Group	The group the button belongs to, for the **Group By** option. Grouped buttons are displayed as a split button in the wizard.
Scripted client conditions	The conditions to be evaluated during button display. For example: `mode=='template'&&variables.var=='xxxx'`. **Note:** This field does not appear on the form by default.

5. Click **Submit** to create the Wizard action.
6. Navigate to **Service Catalog Wizards** > **Catalog Wizard Actions Configurations** and click **New**.
   Create a Wizard Action Configuration record so you can use the declarative action in a wizard. Enter the following fields in the form.

Wizard Action Configuration record

Field	Description
Name	Identifier of the wizard action configuration record.
Declarative action	Select a declarative action that was created using the Catalog Wizard model.

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Field	Description
Applies to	The wizard mode in which this action should appear. The values are **Normal mode**, **Template mode**, or **All** (both modes).
Global	This action configuration applies to all wizards, regardless of whether it's mapped to a particular wizard or not. **Note:** The global actions **Save** and **Submit** are available by default.
Overflow	The button is displayed as part of overflow menu.
Force Save	Saves the wizard if any field values have been updated in the wizard before triggering the action.
Label override	Enter a label to override the label specified in the declarative action.
Button type override	The button type specified by the declarative action is overridden.

7. Navigate to **Catalog Wizard** > **Maintain Wizards**.

   To display a declarative action as a button on the wizard, map the Wizard Action Configuration with the Catalog Wizard.

   Open the wizard that you want to add the declarative action to. Use the related list **Wizard Actions Configurations** to create a mapping record between the wizard and the wizard action configuration.

   a. Click **New** to create a new configuration directly.

   b. Click **Edit** to attach an existing configuration to create a mapping record between the wizard and the configuration. The mapping record also has a toggle to hide a specific action.

   c. Toggle the **Hide action** field to True to hide a specific action.

   Tip: Buttons with global configurations are available on the wizard by default. To hide a global action in a wizard, map the global configuration to the wizard and set the **Hide Action** to true.

   For more information on Catalog Wizards, see Creating a Service Catalog Wizard.

8. Use the **Configure declarative actions event mappings** action on the **Config** tab of UI Builder. Configure declarative actions event mappings is applicable only to UXF Client Action type of declarative action. Create a page level event handler, then map the declarative action to the page level event handler and specify the payload. For more information on binding events to declarative actions in UI Builder, see Bind an event to a declarative action.

Integrating Service Catalog

You can integrate Service Catalog with other applications, such as Service Portal and Employee Center.

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Integrate Service Catalog

- Submit requests for service and product offerings using catalog items from the Employee Center.
- Configure an improved version of catalog. Customize Service Portal where your customers can request catalog items such as service and product offerings.
- Use a mobile and track request and approval flows of Service Catalog.
- Configure a catalog item or record producer to create a universal request when a request is submitted.
- Design a topic conversation in Virtual Agent by including reusable topic blocks to perform request submission tasks.

Service Catalog in Employee Center portal

Employees can submit requests for service and product offerings using catalog items from the Employee Center portal.

ServiceNow® Employee Center provides a single and unified portal experience for employees to find information and request services across various departments, including HR, IT, Legal, Workplace, and Procurement. Using the Content Taxonomy framework, you can modify the default IT taxonomy to include your catalog items as content in the topics or child topics.

To enable Service Catalog on the Employee Center portal, ensure you've the following ServiceNow applications and plugins installed:

- Employee Center plugin (sn_ex_sp)
- Employee Experience Taxonomy plugin (sn_ect)

IT taxonomy on Employee Center

The base system taxonomy—Employee—is installed when you install the Employee Experience Taxonomy plugin. To provide catalog items, the following IT taxonomy structure is available by default under the IT taxonomy:

1. **Hardware**
2. **Software**
3. **Network**
4. **Browse IT**

Associate a catalog item with a taxonomy topic in Employee Center

Associate your existing and new catalog items, knowledge base articles, and quick links to the appropriate taxonomy topics so that the catalog items are available in the Employee Center as content in the topics or child topics.

Before you begin

Role required: admin

About this task

You must associate your catalog items that you want to display in the Employee Center with a taxonomy topic.

By default, Employee Center application ships employee-centric taxonomy and taxonomy topics for IT, HR, Workplace, Legal, and Procurement. You can use the default IT taxonomy to associate your catalog items or you can clone a taxonomy to make your own additions or modifications

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to the default topic structure that matches your requirements. To clone a taxonomy, refer to the steps mentioned in the Clone taxonomy for employee content topic.

You can associate your existing or new catalog items with a taxonomy topic directly from the Content Taxonomy also. To associate your existing or new catalog items with a taxonomy topic, refer to the steps mentioned in the Associate connected content to a topic topic.

For more information about Unified taxonomy, see Unified taxonomy for Employee Center.

To associate a catalog item from the Service Catalog:

Procedure

1. Navigate to **All** > *Service Catalog* > **Catalog Definition** > **Maintain Items**.
2. Select the item that you want to associate with a taxonomy topic.
3. In the Assigned Topics related list, click **Add**.
4. Select the base taxonomy from the **Taxonomy** list.
5. Select the appropriate topic, for example **IT**.
6. Select the appropriate child topic from the topic list.
   For example, to add a laptop, select **Hardware**, and then **Computers**.
7. Click **OK**.

Result
The catalog item is associated with the selected taxonomy topic and appears on the Employee Center.

Enable Shopping Cart and Add to Wish List options in Employee Center

Modify the Main Menu configuration of the Employee Center to provide the Shopping Cart and Add to Wish List options while requesting catalog items.

Before you begin
Enable the wish list feature for catalog. For information about enabling the wish list, see Saving catalog items to a wish list.

Role required: admin

About this task
The Shopping Cart and Add to Wish List menu options that are available by default on the Service Portal are not available in the Employee Center. You must enable these options in the Employee Center to allow employees to add catalog items to the Shopping Cart and Wish List.

If these features are not required, then consider disabling these options in Service Catalog for a seamless experience in the Employee Center. To enable or disable the shopping cart option in Service Catalog follow the first three steps mentioned in the Enable the Shopping Cart Widget topic and for information on enabling or disabling the Wish list option in Service Catalog, see Saving catalog items to a wish list topic.

Procedure

1. Navigate to **All** > **Service Portal** > **Portals**.
2. Search for and select **Employee Center**.
3. If you are prompted with the message `To edit this record click here`, then click **here**.

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4. Open the **Main menu** by clicking the preview this record icon (ⓘ).
5. Change the values for **enable_cart** and **enable_wishlist** to **True**.

```
{
 "enable_cart":{
  "displayValue":"true",
  "value":true
 },
 "auto_update_cart":{
  "displayValue":"true",
  "value":true
 },
 "exclude_search_on_homepage":{
  "displayValue":"true",
  "value":true
 },
 "enable_wishlist":{
  "displayValue":"true",
"value":true
```

6. Click **Update**.

Result
The Shopping Cart and Add to Wish List options appear on the Employee Center.

Add an item to the wish list in Employee Center

Add catalog items or record producers to the wish list to review them when required.

Before you begin
Role required: requester

Procedure
1. Navigate to **All** > **Employee Center** > **IT**.
2. Select a topic to view the catalog items and then select catalog item or record producer from the Catalog.
3. Click the Add to Wish List icon ( ) in the Ordering widget.

> **Note:**
> When you edit an item that is added to the wish list, the Update Wish List icon ( ) is displayed in the corresponding Ordering widget.

4. Click **View Wish List** from the confirmation message or the **Wish List** menu option on the main navigation bar.
   The wish list details page is displayed.
5. If required, perform any of these actions.

Option	Description
Remove Item	To remove an item from the wish list, click the Remove Item icon ( ).
Clear Wish List	To clear the wish list, click **Clear Wish List**.

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Option	Description
View the Catalog	To navigate to the Service Catalog landing page, click **View the Catalog**.

6. To navigate to any wish list item page, click the image or name of the item in the wish list details page.

Note:
This does not open a new instance of the item, but the instance that is in the wish list, where you can edit the details.

Add a catalog item to the shopping cart in Employee Center

Add a catalog item or order guide to the shopping cart to store at one place and checkout.

Before you begin
Role required: requester

Procedure

1. Navigate to **All** > **Employee Center** > **IT**.
2. Select a topic to view the catalog items and then select catalog item or record producer from the Catalog.
3. Click **Add to Cart** in the Ordering widget.

Note:

- You can add the same item to the cart multiple times. Every time you add an item to the cart, a new instance of the item is created.
- The cart information is automatically updated.

4. Click **View Cart** from the confirmation message or the **Cart** option on the main navigation bar. The cart details page is displayed.
5. To navigate to any cart item page, click the image or name of an item in the cart details page.

Note:
This step doesn't open a new instance of the item, but the instance that is in the cart, where you can edit the details.

6. **Optional:** If necessary, edit the quantity of items.
7. **Optional:** To remove an item from the cart, click the Remove Item icon ( ).
8. **Optional:** To make changes to this item, select it, and then select **Save as Draft**.

   (Optional) The item is removed from the cart. You can access the saved drafts from the My Request widget in the **Drafts** tab.
9. To navigate to the Service Catalog landing page, click **Continue Shopping**.
10. **Optional:** To clear all the items from your cart, click **Clear Cart**.
11. **Optional:** To create a bundle from the cart:

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a. Click **Save as Bundle**.

b. In the Create New Bundle window, specify the **Bundle Name** and select the items that you want to include.

c. Click **Save**.

Note:
When you create a bundle from the cart, which includes an order guide, the association of the items to the order guide is lost.

12. **Optional:** To add a saved bundle to the cart, open the bundle from the **My Saved Bundles** section and click **Add to Cart**.
13. **Optional:** To replace the cart items with a saved bundle, open the bundle from the **My Saved Bundles** section and click **Replace Cart**.
14. Click **Proceed to Checkout**.
The Order Confirmation window is displayed.
15. **Optional:** Specify the **Delivery Information** and **Special instructions**.
16. **Optional:** To add one or more attachments for the cart, click the add attachment icon ( ).

    (Optional) You can browse and choose the files, drag the files, or copy and paste them in the Add attachments window.
17. Click **Checkout**.

    The corresponding request is displayed in the My Requests page with the request number, estimated delivery date for the entire order, price, and the order status of individual ordered items.

Related topics

Save a draft of a catalog item

Request a catalog item from Employee Center

Use the SC Catalog Item widget in Employee Center to request a catalog item.

Before you begin
Role required: requester

Procedure

1. Navigate to **All** > **Employee Center** > **IT**.
2. Select a topic to view the catalog items and then select catalog item or record producer from the Catalog.
3. Enter the required information in the catalog item form.
4. Enter the number of items in the **Quantity** field.
5. If required, perform any of these actions.

Option	Description
Add attachments	To add one or more attachments to the cat alog item, select the choose a file link to browse and choose the files or directly drag the files in the **Add attachments** window.

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Option	Description
Add to Cart	To add the catalog item to the shopping cart, click **Add to Cart**.
Add to Wish List	To add the catalog item to the wish list, click the Add to Wish List icon ( ).

6. Click **Order Now**.
   The Order Confirmation window is displayed.
7. From the **Request for** list, select the user for whom you are requesting.

   Note:
   By default, the user who is logged in is selected in this list.

8. If required, specify the **Delivery Information** and **Special instructions**.
9. Click **Checkout**.
   The corresponding request is displayed in the My Requests page with the request number, estimated delivery date for the order, price, and the order status.

Request an order guide from Employee Center

Request multiple catalog items together as an order guide from the Employee Center for a specific purpose.

Before you begin
Role required: requester

About this task
An order guide submits a single service catalog request that contains several catalog items so that you don't have to request each item manually. For more information, see Order guides.

For example, a New Employee Hire order guide can contain several items that new employees commonly need, such as business cards, computer, and cell phone. After selecting this order guide, the customer can then provide information about the new employee, including location and job title. The order guide then submits an order for catalog items like business cards, based on the details provided.

Procedure

1. Navigate to **All** > **Employee Center** > **IT**.
2. Select an order guide from the Catalog.
3. In the **Describe Needs** section, enter the required information and click **Next**.

   Note:
   The **Next** button is disabled until you fill all mandatory fields on the form.

4. In the **Choose Options** section, enter the requirements for catalog items and click **Next**.

   Note:
   - If a catalog item has fields that need user inputs, **Options** is displayed on the accordion.
   - If the fields are mandatory, a red asterisk is displayed beside **Options**.

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a. To expand or collapse the catalog item information, click the accordion.

b. To include or exclude the catalog item from the order guide request, set the toggle switch to off on the accordion.

> **Note:**
> When the item is excluded from the order guide request, the item is not editable and the corresponding mandatory field restrictions are ignored.

c. To add an attachment for the catalog item, click the Add attachments icon ( ) and select the required attachment.

d. Click **Previous** to navigate to the **Describe Needs** section.

5. In the **Summary** section, review the order guide summary.
6. **Optional:** To add the order guide to the shopping cart, click **Add to Cart**.

> **Note:**
> When you add an order guide to the cart, you can only edit the order guide instance in the cart.

7. **Optional:** To go to the **Choose Options** section and edit the order guide items, click **Edit Options**.
8. Click **Order Now**.
   The Order Confirmation window is displayed.
9. From the **Request for** list, select the user for whom you are requesting.

> **Note:**
> By default, the user who is logged in is selected in this list.

10. **Optional:** If required, specify the **Delivery Information** and **Special instructions**.
11. **Optional:** To add one or more attachments for the cart, click the add attachment icon ( ).

    (Optional) You can browse and choose the files, drag the files, or copy and paste them in the Add attachments window.

12. Click **Checkout**.
    The corresponding request is displayed in the My Requests page with the request number, estimated delivery date for the entire order, price, and the order status of individual ordered items.

Related topics

Request an order guide

Create an order guide

Save a draft of a catalog item

Save a draft of a catalog item while requesting it on the Employee Center, Service Portal, and Now Mobile.

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Before you begin
Role required: requester

About this task
If enabled, save the draft if you don't want to discard the form and edit it later. For example, this procedure explains how you can save a draft in Employee Center.

For information about enabling **Save as Draft**, see Catalog Item form.

Procedure
1. Navigate to **All** > **Employee Center** > **IT**.
2. Select the item that you want to request and start filling the form.
3. If you want more information to fill the form and want to save it, select **Save as Draft**.

   Your draft is saved. You can access the saved drafts from the My Request widget in the **Drafts** tab.

   If you open a new but the same item to request, and the draft of the item is already saved, you get a message stating that the draft of this item exists. If you want to save the draft of this new item as well, you must give a unique name to this item in the **Save as draft** field, and select **Save**.

   The **Drafts** tab shows all the draft items related to the same item name.
4. Open a draft item that you want to edit, and if you still don't want to submit it, select **Update draft** or if you want to submit it, select **Submit**.

Related topics
Add a catalog item to the shopping cart in Employee Center

Service Catalog in Service Portal
Use Service Portal to configure an improved version of Catalog. You can customize Service Portal where your customers can request catalog items such as service and product offerings. You can use the Service Catalog widgets to build a catalog for your portal.

Note:
If you're an existing customer using Service Portal we recommend that you migrate to the Employee Center for a better experience. For more information on Employee Center, see Employee Center

The Catalog landing page provides an interface from where you can access the catalog items, requests, approvals, popular items, recent items, and saved bundles. This page is available by default for zBoot users.

Note:
Upgrade users need to activate the Service Portal - Service Catalog v2 plugin (com.glideapp.servicecatalog.portal).

Overview of configurable options in the Service Catalog on the Service Portal and explains how to perform those configurations.

You can access the Catalog landing page in Service Portal using the **Catalog** option from the main menu header of Service Portal.

The landing page has:

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- A search bar to search within all configured catalogs in Service Portal. When you search for a specific item, the search results page displays results based on the configured catalogs and categories.

  Only the items associated with a catalog and category are searchable. The primary category of the item is displayed under the **Category** filter. The catalog where the primary category is defined for the item is displayed under the **Catalog** filter.

- The **Browse by Categories** option to navigate to the list of categories in Service Catalog and the items within. Click this option to navigate to the categories landing page.
- The Requests and Approvals widget to display the list of requests and approvals associated with the user. The list is based on the configurations available in the **My Request Filter** module in Platform. For information about the **My Request Filter** module, see Define filters for My Requests.
- The My Saved Bundles widget to display the saved bundles associated with the user. You can remove a bundle, or open a bundle to add or replace the cart with the items in the bundle.
- The My Recent Items widget to display catalog items, record producers, or order guides that are most recently viewed or requested by the user. An instance option on the widget allows you to display either the viewed or requested items. This widget is not displayed when it has no data.
- The Popular Items widget to display the most popular catalog items ordered across the organization by other users. These items are displayed based on the **Top Requests** dynamic category. This widget is not displayed when there is no data.

Note:

- In the order status page of a request, stage renderer displays the current stage in a collapsed view. You can expand this view for all stages.
- These pages have dynamic titles to display the name of the selected entity.
  - Catalog Item [sc_cat_item]
  - Catalog Categories [sc_category]
  - Order Guide [sc_cat_item_guide]

Related topics

Service Catalog widgets

Content Management and Service Portal

Access Service Catalog categories in Service Portal

Access Service Catalog categories to access the catalog items within.

Before you begin

Role required: requester

Procedure

1. Navigate to **All** > **Service Portal** > **Service Portal Home**.
   The Service Portal homepage is displayed.
2. Click any of the following:
   - The **Request Something** link from the Service Portal landing page.
   - The **Catalog** option from the main menu header of Service Portal and then the **Browse by Categories** option.

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The popular items from all categories are displayed.

3. In the **Catalogs** section, select the required catalog from the list.
   For information on how you can configure a catalog, see Configure a catalog in Service Portal.

   Note:
   - The **Catalogs** section is available only when you have multiple catalogs and have access to items of multiple catalogs.
   - The list contains all catalogs configured for Service Portal.

   The following information is displayed:
   - Categories of the selected catalog in the **Categories** section.
   - Popular items of the selected catalog.
4. In the **Categories** section, click the required category.
   The category details and the items within are displayed.

   Note:
   - You can click the category count or anywhere in the row to view the category details.
   - For a category with a long name, additional text is displayed as ellipses. Point to the category name to view the additional text.
5. To change the display of category items, click the card view icon ( ) or the grid view icon ( ).

   Note:
   When you access a catalog item from the Catalog landing page or type ahead search results, the breadcrumb of the item displays the path based on the primary category configured on that item. When you access the item from a specific category, the breadcrumb of the item displays the path based on that category.

Related topics

SC Categories widget

Add an item to the wish list in Service Portal

Add catalog items or record producers to the wish list to review them when required.

Before you begin

Role required: requester

Procedure

1. Navigate to **All** > **Service Portal** > **Service Portal Home**.
   The Service Portal homepage is displayed.
2. Select a catalog item or record producer from Service Catalog.
3. Click the Add to Wish List icon ( ) in the Ordering widget.

   Note:

   When you edit an item that is added to the wish list, the Update Wish List icon ( ) is displayed in the corresponding Ordering widget.

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4. Click **View Wish List** from the confirmation message or the **Wish List** menu option on the main navigation bar.
   The wish list details page is displayed.
5. If required, perform any of these actions.

Option	Description
Remove Item	To remove an item from the wish list, click the Remove Item icon ( ).
Clear Wish List	To clear the wish list, click **Clear Wish List**.
View the Catalog	To navigate to the Service Catalog landing page, click **View the Catalog**.

6. To navigate to any wish list item page, click the image or name of the item in the wish list details page.

Note:
This does not open a new instance of the item, but the instance that is in the wish list, where you can edit the details.

Related topics

SC Wish List Cart widget

Add a catalog item to the shopping cart

Add a catalog item or order guide to the shopping cart to store at one place and checkout.

Before you begin
Role required: requester

Procedure

1. Navigate to **All** > **Service Portal** > **Service Portal Home**.
   The Service Portal homepage is displayed.
2. Select a catalog item or order guide from Service Catalog.
3. Click the Add to Cart icon ( ) in the Ordering widget.

Note:

- You can add the same item to the cart multiple times. Every time you add an item to the cart, a new instance of the item is created.
- The cart information is automatically updated in all open tabs or windows.

4. Click **View Cart** from the confirmation message or the **Cart** menu option on the main navigation bar.
   The cart details page is displayed.
5. To navigate to any cart item page, click the image or name of an item in the cart details page.

Note:
This step does not open a new instance of the item, but the instance that is in the cart, where you can edit the details.

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6. If required, edit the quantity of items.
7. To remove an item from the cart, click the Remove Item icon ( ).
8. To navigate to the Service Catalog landing page, click **Continue Shopping**.
9. To clear the cart, click **Clear Cart**.
10. To create a bundle from the cart:
    a. Click **Save as Bundle**.
    b. In the Create New Bundle window, specify the **Bundle Name** and select the items that you want to include.
    c. Click **Save**.

    Note:
    When you create a bundle from the cart, which includes an order guide, the association of the items to the order guide is lost.

11. To add a saved bundle to the cart, open the bundle from the **My Saved Bundles** section and click **Add to Cart**.
12. To replace the cart items with a saved bundle, open the bundle from the **My Saved Bundles** section and click **Replace Cart**.
13. Click **Proceed to Checkout**.
    The Order Confirmation window is displayed.
14. From the **Request for** list, select the user for whom you are requesting.

    Note:
    - By default, the user who is logged in is selected in this list.
    - The User [sys_user] table columns specified in the **Additional columns for the "request for" Service Catalog widget. Choose fields in the sys_user table. Must be semicolon separated** (*glide.sc.request_for.columns*) Service Catalog property are displayed in the **Request for** list and you can search for a user by the specified columns.
    - You can provide additional widget options to control the **Request for** default value. For example:

```
"requested_for_id": {
"value": "62826bf03710200044e0bfc8bcbe5df1"
},
"requested_for_display": {
"value": "Abel Tuter"
}
```

15. If required, specify the **Delivery Information** and **Special instructions**.
16. To add one or more attachments for the cart, click the add attachments icon ( ).

    You can browse and choose the files, drag the files, or copy and paste them in the Add attachments window.

17. Click **Checkout**.

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The corresponding request is displayed in the Order Status page with the request number, estimated delivery date for the entire order, price, and the order status of individual ordered items.

Note:

- Use the instance options on the Order Status page to display the pre-defined columns.
- You can display either the RITM number or the name of the catalog item. By default, the name of the catalog item is displayed.

Related topics

SC Shopping Cart widget

Request a catalog item from Service Portal

Use the SC Catalog Item widget in Service Portal to request a catalog item.

Before you begin
Role required: requester

Select the **Allow Cloning** instance option on the Order Status page to display the **Additional Actions** section after placing the request.

For information about the SC Catalog Item widget, see SC Catalog Item widget

Procedure

1. Navigate to **All** > **Service Portal** > **Service Portal Home**.
   The Service Portal homepage is displayed.
2. Select a catalog item or record producer from Service Catalog.
3. Enter the required information in the catalog item form.
4. Enter the number of items in the **Quantity** field.
5. If required, perform any of these actions.

Option	Description
Add attachments	To add one or more attachments to the cat alog item, select the choose a file link to browse and choose the files or directly drag the files in the **Add attachments** window.
Add to Cart	To add the catalog item to the shopping cart, click the Add to Cart icon ( ).
Add to Wish List	To add the catalog item to the wish list, click the Add to Wish List icon ( ).

6. Click **Order Now**.
   The Order Confirmation window is displayed.

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Note:
For a record producer, you can edit the label of the **Submit** button by using the widget instance options.

For example, if you want to change the label to **Request**, press Ctrl+click on the catalog item widget, select **Instance in Page Editor**, and specify the following parameters in the **Additional options, JSON format** field.

```
"record_producer_label":{
   "value" : "Request"
  }
```

7. From the **Request for** list, select the user for whom you are requesting.

Note:
- By default, the user who is logged in is selected in this list.
- The User [sys_user] table columns specified in the **Additional columns for the "request for" Service Catalog widget. Choose fields in the sys_user table. Must be semicolon separated** (*glide.sc.request_for.columns*) Service Catalog property are displayed in the **Request for** list and you can search for a user by the specified columns.
- You can provide additional widget options to control the **Request for** default value. For example:

```
"requested_for_id": {
"value": "62826bf03710200044e0bfc8bcbe5df1"
},
"requested_for_display": {
"value": "Abel Tuter"
}
```

8. If required, specify the **Delivery Information** and **Special instructions**.
9. Click **Checkout**.
The corresponding request is displayed in the Order Status page with the request number, estimated delivery date for the order, price, and the order status.

Note:
- Use the instance options on the Order Status page to display the pre-defined columns.
- You can display either the RITM number or the name of the catalog item. By default, the name of the catalog item is displayed.
- When a service catalog item is ordered from an existing record, a link is added between the order item request and the parent record.

10. **Optional:** To clone a request for other users, perform the following steps.

a. In the **Additional Actions** section, from the **Also request for** list, select the required users and click **Submit**.

b. In the Cloning Requests window, click **Ok**.

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Note:

- The logged in user should be specified in the **List of roles (comma-separated) that can use bulk ordering functionality. Blank means all users** (*glide.sc.allow.clone.roles*) property.
- You can clone the request for multiple users.
- When you clone a request that contains a multi-row variable set, the information that is specified in the multi-row variable set is available in all cloned requests. All UI policies and client scripts on the multi-row variable set are also cloned.

- A separate request is created for each specified user and that user is displayed in the **Requested For** field of the request.
- The **Opened By** field of the cloned requests is updated with the logged in user.
- Select the **Requests** menu option or the My Requests widget on the catalog homepage to view the cloned request created for the user.

Related topics

Service Catalog request screens

Create a variable set and add it to an item

Request an order guide from Service Portal

Use the SC Order Guide widget on Service Portal to request an order guide with several catalog items for a specific purpose.

Before you begin

Role required: requester

Select the **Allow Cloning** instance option on the Order Status page to display the **Additional Actions** section after placing the request.

For information about the SC Order Guide widget, see SC Order Guide widget.

Procedure

1. Navigate to **All** > **Service Portal** > **Service Portal Home**.
   The Service Portal homepage is displayed.
2. Select an order guide from Service Catalog.
3. In the **Describe Needs** section, enter the required information and click **Next**.

   Note:
   The **Next** button is disabled until you fill all mandatory fields on the form.

4. In the **Choose Options** section, enter the requirements for catalog items and click **Next**.

   Note:
   - If a catalog item has fields that need user inputs, **Options** is displayed on the accordion.
   - If the fields are mandatory, a red asterisk is displayed beside **Options**.
   - The ordered quantity value is displayed in the **Quantity** field and can be modified only if the **Show quantity** option is selected while creating an order guide rule base,

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a. To expand or collapse the catalog item information, click the accordion.

b. To include or exclude the catalog item from the order guide request, click the toggle on the accordion.

Note:
When the item is excluded from the order guide request, the item is not editable and the corresponding mandatory field restrictions are ignored.

c. To add an attachment for the catalog item, click the Add attachments icon ( ) and select the required attachment.

d. Click **Previous** to navigate to the **Describe Needs** section.

5. In the **Summary** section, review the order guide summary.
6. To add the order guide to the shopping cart, click the Add to Cart icon ( ).

Note:
When you add an order guide to the cart, you can only edit the order guide instance in the cart.

7. To go to the **Choose Options** section and edit the order guide items, click **Edit Options**.
8. Click **Order Now**.
The Order Confirmation window is displayed.
9. From the **Request for** list, select the user for whom you are requesting.

Note:

- By default, the user who is logged in is selected in this list.
- The User [sys_user] table columns specified in the **Additional columns for the "request for" Service Catalog widget. Choose fields in the sys_user table. Must be semicolon separated** (*glide.sc.request_for.columns*) Service Catalog property are displayed in the **Request for** list and you can search for a user by the specified columns.
- You can provide additional widget options to control the **Request for** default value. For example:

```
"requested_for_id": {
"value": "62826bf03710200044e0bfc8bcbe5df1"
},
"requested_for_display": {
"value": "Abel Tuter"
}
```

10. If required, specify the **Delivery Information** and **Special instructions**.
11. To add one or more attachments for the order guide, click the add attachments icon ( ).

You can browse and choose the files, drag the files, or copy and paste them in the Add attachments window.

12. Click **Checkout**.

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The corresponding request is displayed in the Order Status page with the request number, estimated delivery date for the entire order, price, and the order status of individual ordered items.

Note:

- Use the instance options on the Order Status page to display the pre-defined columns.
- You can display either the RITM number or the name of the catalog item. By default, the name of the catalog item is displayed.

13. **Optional:** To clone a request for other users, perform the following steps.

    a. In the **Additional Actions** section, from the **Also request for** list, select the required users and click **Submit**.

    b. In the Cloning Requests window, click **Ok**.

    Note:

    - The logged in user should be specified in the **List of roles (comma-separated) that can use bulk ordering functionality. Blank means all users** (*glide.sc.allow.clone.roles*)) property.
    - You can clone the request for multiple users.
    - If a record producer is included in the order guide, a request is created for all items other than the record producer.
    - When you clone a request that contains a multi-row variable set, the information that is specified in the multi-row variable set is available in all cloned requests. All UI policies and client scripts on the multi-row variable set are also cloned.

    - A separate request is created for each specified user and that user is displayed in the **Requested For** field of the request.
    - The **Opened By** field of the cloned requests is updated with the logged in user.
    - A user can view the cloned request created for the user from the **Requests** menu option or the My Requests widget on the catalog homepage.

Related topics

Request an order guide

Create an order guide

Service Catalog in mobile

You can use a mobile and track request and approval flows of Service Catalog.

Fulfiller experience in Mobile Agent

Approve catalog requests, requested items, or change requests from anywhere using the ITSM ServiceNow Agent application.

As an ITSM agent or technician, you can use the mobile app when connected online to accomplish the following:

- Accept or reject the pending approval requests.
- View the completed approval requests.

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Note:

- The request experience is not available in this mobile app.
- On-load catalog UI policies (non-scripted) are supported for variables in record views, for example, requested item and incident.
  - Only the visibility condition is considered.
  - A variable with no value is not displayed.
  - These policies are also applicable for container variables and a group of check boxes.
  - Since the multi-row variable set is displayed with a message that it is not viewable, these policies can be used to display or hide that message.

Watch this three-minute video to learn how to manage approval requests in the mobile app. This video covers: Accessing the Approvals mobile app and viewing and approving or rejecting requests.

Activation information

This mobile application runs on the ServiceNow® mobile platform. You should activate the ITSM Mobile Experience (com.sn_itsm_mobile) plugin that enables the ITSM mobile application.

Get started with the mobile app for Approvals

Access the My Approvals application instance on your mobile app to manage approval requests using your mobile device.

Before you begin

Role required: business_stakeholder or approver_user

About this task

Download the ServiceNow® mobile application on an iOS platform from the Apple App Store or on an Android platform from the Google Play Store.

Procedure

1. Open the mobile app and tap the plus icon ( ).
2. Add a ServiceNow instance. For more information on adding the instance, refer to Add a ServiceNow instance.
3. Tap **My Approvals** to start managing your requests.

Related topics

Agent mobile app

Manage a catalog request approval

Manage your assigned catalog request or requested item by approving or rejecting it from anywhere using your mobile device.

Before you begin

Role required: business_stakeholder or approver_user

Procedure

1. Tap **My Approvals** on your mobile app.
2. To approve or reject a pending approval request, perform the following steps.

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a. Tap the Pending Approvals applet.
All approvals in the Requested state are displayed.

b. Swipe a request and tap **Approve** or **Reject**.

> **Note:**
> You should specify the reason while rejecting a request.

c. **Optional:** To view the details of a pending approval request, tap it.

> **Note:**
> To approve or reject a request, tap the menu icon ( ) and tap **Approve** or **Reject**.

3. To view a completed approval request, perform the following steps.

a. Tap the Completed Approvals applet.
All approval requests that are either accepted or rejected are displayed.

b. To view the details of the request, tap it.

Request experience in Now Mobile

You can enable users to request for an item or service, and track or approve requests on mobile using the Now® Mobile app.

Activation of Now Mobile for Service Catalog

If you have the admin role, activate the ServiceNow Mobile Request Native Application Screens and Applet Launcher plugin (com.glide.mobile-employee). See Now Mobile app. This plugin enables the Service Catalog functionality by default.

For Me tab

When you log into Now Mobile, the following functionality related to Service Catalog is available:

- **My To-Dos**: Displays approval records of requests and requested items assigned or delegated to the user.
- **My Requests**: Displays requests based on the filters defined for mobile in the **My Requests Filter**. By default, the Incident Mobile and Service Catalog Request Mobile filters are available. For information about configuring filters, see Define filters for My Requests and Configure My Requests.

> **Note:**
> It is recommended to include only open requests.

Services tab

You can submit or track requests.

- **Recent Services**: Displays the items and services (10 items and services in the last 12 months) that were requested recently by the logged-in user.
- **Popular Services**: Displays the most requested items and services (10 items and services in the last 12 months) that are visible to the user. Displays the 10 recent items and services in the last 12 months.

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- **Browse Services**: Displays the categories of items and services that you can browse through and order.

  Note:

  - If a category contains both items and sub-categories, the items specific to the category are displayed under **Others**.
  - The category listings do not display the catalog information for users who do not have the roles that have permissions to read the records in the sc_category table. For such users, an ACL can be added to provide read permission for the Title field of the sc_catalog table.

Note:

- You cannot request these item types in the mobile app.
  - Content items
  - Wizard
  - Standard change template
- All items hidden in Service Portal are also hidden in the mobile app.
- In the RITM and record view, these variable types are not supported.
  - HTML
  - Custom
  - Custom with Label
  - UI Page
- In the RITM and request view, a multi-row variable set is not supported. A message is displayed in this view that this variable set is not viewable.
- On-load catalog UI policies (non-scripted) are supported for variables in record views, for example, requested item and incident.
  - Only the visibility condition is considered.
  - A variable with no value is not displayed.
  - These policies are also applicable for container variables and a group of check boxes.
  - Since the multi-row variable set is displayed with a message that it is not viewable, these policies can be used to display or hide that message.

From Now Mobile, you can also perform the following tasks:

- Browse catalog items using the catalog hierarchy in addition to the category hierarchy. For information about its configuration, see Browse catalog items using the catalog hierarchy.
- Change the label of the **Submit** button for a record producer. For information on editing the button label, see Edit the label of Submit button for a record producer.
- Use the mobile camera to scan bar codes for identifying a variable value of a catalog item. This is only applicable by using the *barcode* attribute for the Single Line Text variable. For information about this variable attribute, see Service Catalog variable attributes.

Quick actions

You can provide easy access to a catalog item by creating a quick action. For information on creating a quick action in Now Mobile, see Create a quick action.

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Siri shortcuts

iOS users can use Siri shortcuts to open the following pages in the mobile app.

- Browse items and services.
- Open my requests

See Siri shortcuts.

Now Mobile properties

You can define the following behavior for various catalog entities by configuring the Now Mobile properties. For information about configuring these properties, see Configure Now Mobile properties.

- Sort categories by the **Order** field.
- Define the availability of a catalog item in one of the following ways:
  - Include the catalog item with **Availability** set to `Desktop only` in Now Mobile.
  - Specify catalog item types to exclude in Now Mobile.
- Define the non-availability behavior of a catalog item by making it discoverable but not viewable, or not available at all.
- Specify colors for buttons to match your mobile theme.

Related topics

Now Mobile app

Mobile plugins and upgrades

Configure catalogs

Enable your users to view and request their associated items in the Now Mobile app. If no catalogs are selected, users can view and request items from all catalogs in the system. By default, the app uses Service Catalog.

Before you begin

Role required: admin

About this task

Demonstrates configuring service catalogs, knowledge bases, and My Requests in the Now Mobile App.

Procedure

1. Navigate to **All** > **Now Mobile App** > **Catalogs**.
2. **Optional:** In the portal catalogs [m2m_sp_portal_catalog] table, add a catalog in addition to the base system catalog, or change the catalog that is associated with the base system record:

   a. Click **New** or open the base system record.

   b. On the form, fill in the fields.

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Portal catalogs form

Field	Description
Portal	Portal that you select. Select **Employee Center**.
Catalog	Catalog that you would like to associate with the app.
Order	Number that indicates the order that the configurations should run. If there are multiple configurations on a portal, the system runs the configurations from the lowest to the highest order that you selected.

Result
Your users can view and request items from all added catalogs.

Browse catalog items using the catalog hierarchy

In addition to the category hierarchy, browse catalog items using the catalog hierarchy for proper context.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **System Mobile** > **Now Mobile app** > **Applet Launchers**.
2. Select the **Services** applet launcher.
3. Replace the **Browse Services** applet launcher section with the **Browse Catalog** applet launcher section.
   a. On the Applet launcher form, navigate to the **Body** section.
   b. Under the **Section** column, click **Browse Services**.
   c. On the Item Section form, set **Destination screen** as `Browse Catalog`.
   d. Click **Update**.
   After the **Browse Catalog** applet launcher section is enabled, the catalog appears as the first level of browsing and then the categories.

Submit and track a request

Submit a request for an item or service and track the progress of your request with the Now Mobile app.

Before you begin
Role required: none

Procedure

1. In the navigation bar, tap **Services**.
2. Browse items and services, or search for an item.
3. Tap the item or service that you would like to request.

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Note:
If configured by your administrator, the related items and articles area provides alternatives and additional information.

4. Select **ORDER NOW**.
5. On the form, fill in the fields.

Field	Description
Request for	Change this field if ordering the item for someone else.
Delivery Information	Confirm the shipping address for the item.
Special instructions (Optional)	Add any special instructions for the item.

6. Tap **CHECKOUT**.
   The app displays a confirmation that your request is submitted.
7. To return to the list of items, tap **Close**.
8. In the navigation bar, tap **For Me**.
9. To view all your requests, tap **My Requests**.
10. To view the status of your request, tap the item that you ordered.

    a. To view information about the request, use the **Details** tab.

    Note:
    You can add comments for an open incident.

    b. To view field changes and comments about your request, use the **Updates** tab.

    c. Tap to add comments and work notes, or to attach a file.

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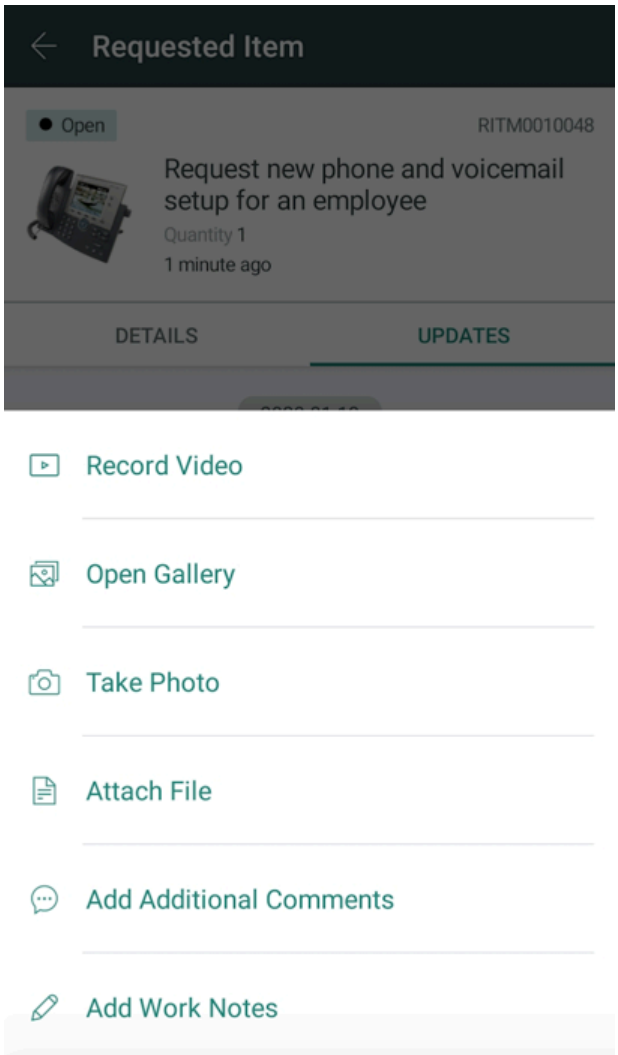
Note:
When you add comments for a resolved incident, you can reopen it.



Create a quick action in your mobile applications

Provide easy access to an important item by creating a quick action. For example, you can create a quick action that opens a Service Catalog item.

Before you begin

Role required: admin

Procedure

1. Create a function for the quick action.

   a. Navigate to **System Mobile** > **Functions**.
   The Function [sys_sg_button] table opens.

   b. Click **New**.

   c. On the form, fill in the fields.

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Button fields form

Field	Description
Name	Name of the function record.
Description	Description to enable other users to easily understand the purpose of the function.
Type	Type of quick action that you want to create. To create a quick action that opens a Service Catalog item, select **URL**. For more information about function types, see Configure a smart button.
Context	Whether the function applies at the record or table level. ▪ Record: Action only applies at the record level. For example, updating a field. ▪ Global: Action that only applies at the table level. For example, creating or deleting a record. For this example, select **Global**.
Link Label	Label for the link. This value does not display in the user interface.
Link URL	Relative URL for the item that you want to open when the user clicks the function. For example, to open a Service Catalog item in the Now Mobile portal, enter `/mesp?id=sc_cat_item&sys_id=060f3afa3731300054b6a3549dbe5d3e`. This field only displays if the **Type** field is **URL**.
Relative URL	Option that is selected to determine whether the URL is relative. For this example, choose **Selected**. This field only displays if the **Type** field is **URL**.
Condition	
Table	Table on which the condition runs.
Condition	Condition that should be met for the action to be successful. For a catalog item, enter `var item = new sn_sc.CatItem('3f1dd0320a0a0b99000a53f7604a2ef9'); answer = item.canView() && item.isVisibleServicePortal();` to display the quick action only when the end user has permissions to view the item.
Roles	Roles that you want to user to have to view the quick action.

2. Add an instance of the function that you created to the page.

   a. In the native UI, navigate to **Now Mobile App** > **Applet Launchers**.

   b. Open the applet launcher record that you would like to add the quick action to.

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c. Select the **Body** tab.

d. Insert a new row in the Quick Actions Menu Maps related list.
If you're not able to insert a row, make sure that you're in the **ServiceNow Now Mobile App Screens and Applet Launcher** application scope.

e. Click the magnifying glass to look up an item
The Function Instances [sys_sg_button_instance] table opens.

f. Click **New**.

g. On the form, fill in the fields.

Function instance form

Field	Description
Name	Name of the function instance.
Description	Description to enable other users to easily understand the purpose of the function instance.
Parent	Page on which you are adding the quick action. For example, select **Applet Launcher: Homepage** to add the quick action to the home page. Select a value in the **Parent table** field first.
Application	Application scope.
Parent table	Table that contains the record type where the button appears. For this example, select **applet Launcher [sys_sg_applet_launcher]** to add the quick action to an applet launcher page.
Function	Function record that you created earlier.
Label	Label to help the user understand what the quick action opens. For example, `Report an outage`.
Location	Location where the button appears in the UI. For this example, select **Quick Action**.
Icon	Icon to display next to the label. For more details on mobile icons, see Mobile icons. **Note:** Not all listed icons work with quick actions. To see a list of compatible icons, filter your list where the **Icons** field contains `now-mobile-icons-buttons`. **Note:** The **Icons** field is not on the icon list by default. To add the **Icon** field to your list, right-click the list header and select **Configure** > **List Layout**. Then, add the *Icon* field to the selected list. You should see the icon field on your reference field list.
Order	Number that indicates the order that the functions are listed. If there are multiple instances in the same location, the app displays them from the lowest to the highest.

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h. Click **Submit**.

i. Save the applet launcher record.

Result

Your users can open the quick action by selecting the icon on the applet launcher page.

Enable notifications in Now Mobile

Allow push notifications on your mobile device when there is an update for a request.

Before you begin

Role required: admin

Procedure

1. Tap **Notifications** in the navigation bar.
2. Tap the **Enable notifications** radio button.
   You will receive a notification in any of the following scenarios.
   - Request Completed (one RITM)
   - Request Completed (multiple RITM)
   - Request not Processed
   - Approval Record Assigned - RITM
   - Approval Record Assigned - Request
   - Request Rejected
   - Agent adds comment to Requested Item

Enable the cart in Now Mobile

Allow a requester to add or edit items in the cart. By default, the cart is disabled in Now Mobile.

Before you begin

Role required: admin

Procedure

1. Navigate to sys_properties.list.
2. For the *glide.sc.cart.enabled* property, specify **Value** as `true`.
3. Click **Update**.
   The Cart icon is displayed at the top of the app and the **Add to Cart** button is enabled for items.

Edit the label of Submit button for a record producer

For a record producer submission experience that you can relate to, edit the label of the **Submit** button.

Before you begin

Role required: admin

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Procedure

1. Navigate to **All** > **Service Portal** > **Widgets**.
2. Select the SC Catalog Item (widget-sc-cat-item-v2) widget.
3. From the Instances related list, preview and open the instance for the ServiceNow NowMobile App – Catalog Screens and Applet Launcher application.
4. In the **Additional options, JSON format** field, specify the *record_producer_label* parameter.

   For example, if you want to change the label to **Request**, press Ctrl+click on the catalog item widget, select **Instance in Page Editor**, and specify the following parameters in the **Additional options, JSON format** field.

   ```
   "record_producer_label":{
      "value" : "Request"
     }
   ```

5. Click **Update**.

Configure Now Mobile properties

Define the behavior of various catalog entities in Now Mobile.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Properties**.
2. On the Service Catalog Configuration form, select the **Mobile** section.
3. Configure the required properties.

Now Mobile properties

Property	Description
Catalog category sort option in Now Mobile (*glide.sc.mobile.category.order_by*)	Sort option for categories in Now Mobile. ○ Title: Categories are sorted by their title. By d sorted alphabetically by their title. ○ Order: Categories are sorted by their order.
Include 'Desktop only' Items in Now Mobile (*glide.sc.mobile.include_desktop_only_items*)	Option to include the catalog item with **Availab** `only` in Now Mobile.
Catalog item classes not available in Now Mobile (comma separated list) (*glide.sc.mobile.item_class_not_supported*)	Catalog item types to exclude in Now Mobile. F `sc_cat_item_content, sc_cat_iten`
Experience for items not available in Now Mobile (*glide.sc.mobile.unsupported_discover*)	Option to define the non-availability behavior Possible options: ○ Discoverable-show message that item is not Item is discoverable in the search and brows viewable. ○ Not discoverable-do not show in search and Item is neither discoverable in the search an viewable.

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Property	Description
	Note: ○ If AI Search is enabled for Now Mobile, t applicable. ○ This property is supported only when or properties are applicable: ▪ Include 'Desktop only' Items in NOW M (*glide.sc.mobile.include_d* ▪ Catalog item classes not available in Now Mobile (comma-separated list) (*glide.sc.mobile.item_clas*
Primary color for buttons in the catalog request experience in Now Mobile (*glide.sc.mobile.primary_color*). If Next Experience is turned on, the property will be ignored.	Color for buttons in the catalog request experi

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Important:
The following properties are interdependent.

- Include 'Desktop only' Items in NOW Mobile
- Catalog item classes not available in NOW Mobile (comma separated list)
- Experience for items not available in NOW Mobile

Dependency between the Include 'Desktop only' Items in NOW Mobile property and Experience for items not available in NOW Mobile property

Availability value of the catalog item	Include 'Desktop only' Items in NOW Mobile (true)	Include 'Desktop only' Items in NOW Mobile (false) Desktop only
Desktop only	Viewable in search and browse experience	○ If set as discoverable using the *`Experience for items not available in NOW Mobile`* property, viewable in search and browse experience, but not available when you click the item. ○ If set as not discoverable, not viewable in search and browse experience
Desktop and Classic Mobile	Always viewable in search and browse experience	Always viewable in search and browse experience
Classic Mobile only	Not viewable in search and browse experience	Not viewable in search and browse experience

Dependency between the Experience for items not available in NOW Mobile property and Items excluded using the Catalog item classes not available in NOW Mobile (comma separated list) property

Experience for items not available in NOW Mobile property value	Items excluded using the Catalog item classes not available in NOW Mobile (comma separated list) property
Discoverable-show message that item is not viewable in the mobile	Item types are viewable in search and browse experience, but not available when you click them.
Not discoverable-do not show in search and browse experience)	Item types do not appear in search and browse experiences

4. Click **Save**.

Service Catalog configuration for Universal Request

You can configure a catalog item or record producer to create a universal request when a request is submitted. The associated requested item (for catalog item) or task-based record (for record producer) becomes the primary ticket for that universal request.

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Related topics

Create or edit a catalog item

Create a record producer

Configure a catalog item or record producer to create a universal request

Configure all catalog items or record producers to create a universal request

Reduce the implementation time by configuring all catalog items or all record producers at a time for universal request creation.

Before you begin

Role required: admin

About this task

For catalog items, RITM should be registered as a service in Universal Request.

For record producers, the target table should be registered as a service in Universal Request.

For information about service configurations, see Service Configuration form.

Procedure

1. Navigate to sys_properties.list.
2. Click **New**.
3. To configure all catalog items to create a universal request:

   a. On the form, fill in the fields.

   System Property form

Field	Description
Name	Unique identifier of the property. Specify *sn_uni_req.enable_ur_all_cat_items*.
Type	Type of the property. Specify **boolean**.
Value	Option to specify if all catalog items can be configured at a time to create a universal request. Possible values are **true** or **false**.

   b. Click **Submit**.

4. To configure all record producers to create a universal request:

   a. On the form, fill in the fields.

   System Property form

Field	Description
Name	Unique identifier of the property. Specify *sn_uni_req.enable_ur_all_rec_prod_items*.
Type	Type of the property. Specify **boolean**.

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Field	Description
Value	Option to specify if all record producers can be configured at a time to create a universal request. Possible values are **true** or **false**.

b. Click **Submit**.

Standard ticket page for a requested item

To display the related information, you can configure the standard ticket page for requested items on the various portals. This configuration verifies a consistent experience when viewing submitted requests in portals.

For example, in Service Portal, you can access the ticket page for a requested item using the Requests option from the main menu header.

Generative AI summarization on the standard ticket page

On the standard ticket page, requesters can quickly access a generative AI summary of the ticket and its recent activity at the top. To display this summary, make sure the **Summary fields** is set up on the Ticket configuration page and that the Now Assist in Standard Ticket Page skill is enabled.

The ticket page provides an on-demand summary. When the requester selects Summarize, a summary appears at the top, making key information quickly accessible and improving efficiency. Each summary uses a set structure for consistency, making information easy to understand and improving communication in the ticketing process.

Related topics

Now Assist in Standard Ticket Page

Configure the standard ticket page

Service Catalog Reference

Reference topics provide additional information about the lists and forms.

Service Catalog terms and roles

The Service Catalog application uses these roles to manage different aspects of the application.

Service Catalog terms

Execution Plans

Define how something gets delivered. For example, a PDA could go through procurement / activation / and installation of the desktop software.

Execution Plan Tasks

Plan Tasks represent a step in the Execution Plan, are associated with a Fulfillment Group, and have an approximate duration.

Fulfillment Groups

Fulfillment Groups work execution tasks. For example, one group can activate a cell phone while a different group installs the desktop software.

Tickets

Tickets represent work done by Fulfillment Groups as part of an Execution Plan.

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Administrator [admin]

Can manage all aspects of the Service Catalog application, including scripting functions such as creating UI macros or business rules.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Catalog administrator [catalog_admin]

Can manage the Service Catalog application, including catalogs, categories, and items, but not including scripting functions available to administrators.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Catalog manager [catalog_manager]

Can edit and update a service catalog, as well as the categories and catalog items within the catalog. The manager can assign editors and also a different manager for the service catalog. You can perform these actions only on catalogs for which you are assigned as the manager.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

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None.

Special considerations

None.

Catalog editor [catalog_editor]

Can edit and update a service catalog, as well as categories and catalog items within the catalog. The editor can assign other editors, but cannot change the catalog manager. You can perform these actions only on catalogs for which you are assigned as the editor.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Catalog builder developer [catalog_builder_developer]

Can create and maintain advanced catalog items in Catalog Builder such that they can create, edit, or delete client scripts in Catalog Builder.

Contains Roles

List of roles contained within the role.

catalog_builder_editor

Groups

A list of groups this role is assigned to by default.

None.

Special considerations

The catalog builder developer can do everything that a catalog builder editor can do. But additionally, the catalog builder developer has access to other advanced features, such that a person with this role can add or edit the following in Catalog Builder:

- Dynamic and advanced reference qualifiers in the Additional details tab of a question
- Variable attributes
- Scriptable default values
- Availability sections
- Catalog client scripts

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Also, the catalog builder developer can create a new catalog item without using a template. This behavior is managed by the *glide.sc.builder.allow_create_from_scratch* property, which is enabled by default. If the property is turned off, the catalog builder developer must use a template to create a new catalog item.

Catalog builder editor [catalog_builder_editor]

Can create and maintain items in the catalog builder using the templates that the user has access to.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Service Catalog properties

The Service Catalog application contains properties used to configure various settings in the application.

To configure Service Catalog system properties, navigate to **Service Catalog** > **Catalog Administration** > **Properties**. The properties are categorized into the following sections.

- **Homepage**: Configure settings for the Service Catalog homepage, and control the behavior of the categories and the items displayed on the homepage.
- **Catalog Items**: Configure settings for catalog items and record producers.
- **Order Guides** > **General**: Configure settings for the order guide.
- **Order Guides** > **Scriptable Order Guides**: Configure settings for scriptable order guides.
- **Cart**: Control the behavior of the shopping cart and checkout screens.
- **Request Fulfillment**: Configure settings for request fulfillment processes.
- **Search**: Configure search settings for the Service Catalog homepage.
- **Security**: Configure security settings for the Service Catalog.
- **Pricing**: Configure settings for the pricing engine and pricing display.
- **Portal**: Configure settings for catalog portal widgets.
- **Virtual Agent**: Configure settings for request submission in Virtual Agent.

  This section is visible only when you activate the Service Management Virtual Agent Topic Blocks
  plugin (com.glideapp.cs.sm_topic_blocks)
  .

- **Mobile**: Configure settings for Now Mobile.
- **Other**: Additional settings for the Service Catalog.

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Service Catalog properties

Name	Description
Homepage	
Number of Catalog Items/Categories to preview in a section (*glide.sc.max_items*)	Number of catalog iter • **Type:** integer • **Default value:** 5
Show category descriptions in the category view page (*com.glide.servicecatalog.view_includes_category_descriptions*)	Show category descri • **Type:** yes | no • **Default value:** yes
In category view display subcategories in a panel (*glide.sc.use_sub_cat_section*)	In category view, displ • **Type:** true | false • **Default value:** true
Toggle whether the expand/collapse icon is rendered for category widgets on the service catalog homepage (*glide.sc.homepage.show.collapse*)	Toggle whether the ex widgets on the service • **Type:** true | false • **Default value:** false
When browsing a category use the pop-up icon to show item details (*glide.sc.cat_view_use_popup_for_details*)	When browsing for a c to the category or cata • **Type:** true | false • **Default value:** false
Number of catalog items to expand in browsing and search when not using pop-up icons to view details (*glide.sc.auto_expand*)	Number of catalog iter using pop-up icons to • **Type:** integer • **Default value:** 2
Show the additional categories section when viewing a catalog item (*glide.sc.show_additional_cats*)	Show the additional ca • **Type:** true | false • **Default value:** true
Limit descriptions in category and item listings to two rows in the Mobile UI (*glide.sc.mobile.limit.description*)	Limit descriptions in th Classic Mobile UI: • **Type:** true | false • **Default value:** true
List of content types (comma-separated) to allow on the catalog homepage. Blank allows all content types. (*glide.sc.home.filter*)	List of content types (c homepage. Blank indi

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Service Catalog properties (continued)

Name	Description
Name of placeholder picture for items that don't have a picture defined (*glide.sc.placeholder.image*)	Name of the placehol defined. Applicable or By default, two images **sc_placeholder_imag** with a custom image: **Default value:** sc_plac
Catalog Items	
Specifies the default behavior of record producer after record generation (*glide.sc.producer.redirect_url*)	Default redirect behav Possible values: • **Generated Task rec** the record producer • **Catalog Homepage** for the record produ Override this behavio the record producer o the record producer.
Enabling this makes sure that the attachments uploaded to the attachment variable are deleted from the system if and when they are replaced/deleted on the form (*glide.sc.variable.attachment.delete.v2*)	Automatically deletes you replace or delete variable.
List of class names for catalog items that can't be added to an existing request (*glide.sc.item.cannot_add_to_request*)	List of class names for request: • **Type:** string • **Default value:** sc_ca sc_cat_item_wizard
List of class names for catalog items that don’t use the default "Try It" UI action (*glide.sc.item.cannot_try_it*)	List of class names for action: • **Type:** string • **Default value:** sc_ca sc_cat_item_wizard,
List of class names for catalog items that don’t generate a normal cart item (*glide.sc.item.not_normal_cart_item*)	List of class names for item: • **Type:** string • **Default value:** sc_ca sc_cat_item_wizard
Relationship tables which should be part of 'Copy Item' action. Table Name should be comma-separated (*glide.sc.item.copy.include_relationship*)	Specify the tables in w item are also copied w action:

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Service Catalog properties (continued)

Name	Description
	Note: Table names shou
Disables clickthrough via the info-icon on a reference variable. Set value to true to enable this functionality (*glide.sc.variable.reference.clickthrough*)	Disable clickthrough v value to true to enable
sn_now_assist_cr.llm.reference_question_choices.limit	Specifies the upper lir question beyond whic requests. • **Type:** integer • **Default value:** 2000 If a catalog item with r reference questions c this limit.
sn_now_assist_cr.llm.accept_user_input_as_is	When filling out catalo provide input to be tak (for example, single-lir determines that user i conversation, these ac these two uses cases: • A: User enters mean • B: User enter long c values • 0: reject A and B (do • 1: accept A and reje • 2: accept both A and • 3: reject A and acce It's default value is 0.
sn_now_assist_cr.llm.conversational.request.question.limit	Specifies the upper lir beyond which the item LLM. • **Type:** integer • **Default value:** 500 If the catalog item is to questions than the sp
sn_now_assist_cr.recommend_form_question_threshold	When the number of t catalog recommends form. When this value doesn't recommend fo

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Service Catalog properties (continued)

Name	Description
	• **Type:** integer • **Default value:** 10
sn_now_assist_cr.enable_question_grouping	Determines whether t it is false to turn off qu this feature which brin questions together, re requester productivity • **Type:** true/false • **Default value:** false
Order Guides	
General	
List of class names for catalog items that can't be included in an order guide (*glide.sc.item.order_guide_exclusion*)	Comma-separated list be included in an orde sc_cat_item_content.
Validate mandatory fields when switching tabs in 'Choose Options' section of Order Guides (*glide.sc.guide.tab.validate*)	Validate mandatory fie section of order guide • **Type:** true | false • **Default value:** true
Render order guide on cart preview and order status page (*glide.sc.render_order_guide_column*)	Render the order guid item is part of an orde If a user attempts to d confirmation message
On an order guide, reset cascading or assigned variable values on an item when a user goes back using the "describe needs" button (*glide.sc.reset_cascade*). **Note:** This property is supported in Platform only, not in the portal.	On an order guide, res user navigates by click
On an order guide, reset all variables when cascading variables or assigned variable values are reset on an item after a user goes back using the "describe needs" button (*glide.sc.reset_cascade_all*) **Note:** This property is supported in Platform only, not in the portal.	In an order guide, rese cascading values on a between the **Describe** **false**, only the values
Scriptable Order Guides	
During the processing of a scriptable order guide, create a failure record when the JSON payload is empty (*glide.sc.sog.empty_payload*)	If selected, creates a f during the processing
During the processing of a scriptable order guide, create a failure record when the order guide is inactive (*glide.sc.sog.inactive_order_guide*)	If selected, creates a f during the processing
During the processing of a scriptable order guide, create a failure record when the order guide sys_id is invalid (*glide.sc.sog.invalid_order_guide_id*)	If selected, creates a f invalid during the proc

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Service Catalog properties (continued)

Name	Description
During the processing of a scriptable order guide, create a failure record when there is a general JSON parsing error (*glide.sc.sog.json_parsing*)	If selected, creates a f parsing error during th
During the processing of a scriptable order guide, create a failure record when JSON parameters are missing (*glide.sc.sog.mandatory_json_parameters*)	If selected, creates a f during the processing
Cart	
Enable cloning requests during checkout. Deprecated by sc_layout; if sc_layout is enabled then this property is not used (*glide.sc.allow.checkout.clone*)	Enable cloning reques **Note:** This property is d
List of roles (comma-separated) that can use bulk ordering functionality. Blank means all users (*glide.sc.allow.clone.roles*)	Roles (comma-separa Blank value indicates
Show the 'Back to Catalog' button on the two-step checkout screen (*glide.sc.checkout.twostep.back*)	Show the **Back to Cat**
Use the two-step catalog checkout model (default false) (*glide.sc.checkout.twostep*)	Use the two-step cata **Default value:** false
Condition under which users may cancel a request (previous property must also be true). For example, current.opened_by == gs.getUserID() || current.caller_id == gs.getUserID() (*glide.sc.checkout.cancel.condition*)	Condition under whic **users the option to ca** be **True**.
Allow ess users the option to cancel their requests from the checkout screen. In conjunction with sc_layout feature, if either is set to true the cancel button becomes visible (*glide.sc.checkout.cancel*)	Enable Employee Self their requests from the
Use the two-step checkout model when placing a Catalog Order from a Wizard (default true) (*glide.expert.checkout.twostep*)	Use the two-step chec wizard: **Default value:** true
List of roles (comma-separated) that can update the "Requested for" widget in the service catalog. Blank means all users. If the user doesn't have privileges to change requested for, they will not have ability to get other user address details (*glide.sc.req_for.roles*)	List of users with the r here can request item specified, then the de *glide.sc.req_fo* about configuring the property, see Configu users. Controls access to the homepage. Users with another person. Users name only.
Ordering of matches for the "request for" service catalog widget. Choose fields in the sys_user table (*glide.sc.request_for.order_by*)	Ordering of matches f Choose fields in the u
Show the request item number for each line item on the checkout screen (default false). Deprecated by sc_layout; if sc_layout is enabled then this property is not used (*glide.sc.checkout.request.number*)	Show the request item screen: **Default value:** false

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Service Catalog properties (continued)

Name	Description
	Note: This property is d
Field name to use for the description column of the checkout form. If blank, the default (short_description) is used (*glide.sc.ess.description*)	Field name for the des the default is used: **Default value:** short_d
Additional columns for the "request for" service catalog widget. Choose fields in the sys_user table. Must be semicolon separated (*glide.sc.request_for.columns*)	Additional columns fo Choose fields in the u separated.
Automatically update the delivery address for catalog carts when the details of a users location changes (*glide.sc.auto.cart.address.reset*)	Automatically update user location details c If enabled, when chan user has an active car enabled, the old addr • **Type:** true | false • **Default value:** false
When determining the address of a user prioritize the details on an associated location record over the details on the user record itself (*glide.sc.prioritise.user.location*)	If selected, when dete details on an associat record itself.
Determines whether 'Order Now' button exhibits new or old behavior. If this property is true, clicking "Order Now" button in the service catalog, only orders the item currently selected, any items saved in user's shopping cart is left untouched for future ordering. Old 'Order Now' feature is deprecated, 'Order Item' button is deprecated too (*glide.sc.enable_order_now*)	Determines whether t behavior. If this prope catalog only orders th shopping cart are left Now feature and the **C**
List of roles (comma-separated) that can use the quantity selector in the shopping cart. Blank means all users (*glide.sc.allow.quantity*)	List of roles (comma-s the shopping cart. Bla
Enable removal of inactive catalog items from cart (*glide.sc.remove_inactive_cat_items_from_cart*)	Enable removal of ina If enabled, automatica the shopping cart. Avo cart while active and a • **Type:** true | false • **Default value:** false
Use the sc_layout driven cart macros (default: true) (*glide.sc.use_cart_layouts*)	Use the sc_layout driv Activates the new cart of cart and checkout-r own the UI macros or

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Service Catalog properties (continued)

Name	Description
	• **Type:** true | false • **Default value:** true
Show tasks related to requests on the order status page (the screen you see in the service catalog after a successful order is placed) (*glide.sc.checkout.task.display*)	Show tasks related to that you see in the ser
Round all delivery plans > 1 day to the nearest day (true) or display the precise time (false) (*glide.sc.round.delivery.times*)	Round all delivery plan precise time (false).
Request Fulfillment	
Prevent changes to requested item quantity when approved (except for catalog_admin users) (*glide.sc.restrict.quantity.changes*)	Prevent changes to th catalog_admin users).
Show the current pending approver's name in the stage widget mouseover (*glide.sc.approval.hover*)	Show the current pend mouseover.
Service catalog tasks approval engine (*glide.approval_engine.sc_task*)	Service Catalog Tasks
Audit changes to service catalog variables (*glide.sc.audit.variables*)	Audit changes to Serv
Hide the border and background in variable editor ui (*glide.sc.hide_variable_editor_background*)	If selected, hides the default value is false.
Use delivery task name instead of short_description for the delivery plan summarizer field. Default is false (uses the short_description) (*glide.sc.delivery_summary.name*)	Use the delivery task delivery plan summari **Default value:** false (u
Render variables on a request item as they appear on the order panel, followed by the delivery plan variables (true), or merge the two based on their order values (false) (*glide.sc.variable.snapshot*)	Render variables on a followed by the delive on their order values (
Service Catalog Requests approval engine (*glide.approval_engine.sc_request*)	Service Catalog reque
Search	
List of class names for catalog items that don't have the search field displayed (*glide.sc.item.cannot_show_search*)	List of class names for displayed: • **Type:** string • **Default value:** sc_ca sc_cat_item_wizard
Allow empty service catalog searches (*glide.sc.search.allow_empty_search*)	If selected, an empty query is performance-
List of roles (comma-separated) that can search the service catalog. Blank means all users (*glide.sc.can_search*)	List of roles (comma-s Blank means all users
Show breadcrumbs for the categories associated with items when they are displayed in browse and search listings (*glide.sc.show_listing_breadcrumbs*)	If selected, display bre items when they are d
Service catalog searches return items in inactive categories (*glide.sc.search.disabled_cats*)	Service Catalog searc

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Service Catalog properties (continued)

Name	Description
	Search results can inc as specified by the ac • **Type:** true | false • **Default value:** true
List of catalog sys_ids (comma-separated) that are excluded from catalog item search (*glide.sc.search.exclude_catalogs*)	List of catalog sys_ids catalog item search.
Number of service catalog matches returned for global searches (*glide.sc.search.rowcount*)	Number of the service Limits the number of r search performance.
Specify whether search suggestions should be enabled (*glide.sc.search.suggestions*)	Specify whether searc • **Type:** true | false • **Default value:** true
Security	
Use "User Criteria" to define access to catalog items and categories (*glide.sc.use_user_criteria*)	Use user criteria to de Entitlements are not h • **Type:** true | false • **Default value:** true
Enable both "User Criteria" and "Entitlement" related lists for catalog items and categories when migrating from entitlements (*glide.sc.user_criteria_migration*)	Enable User Criteria re migrating from entitler Set to **true** to display t switch to user criteria • **Type:** true | false • **Default value:** false
List of roles (comma-separated) that can override normal entitlement checking inside the catalog. A role of "itil" means that the itil role can order any catalog item, even one protected by entitlement restrictions (*glide.sc.entitlement.override*)	List of roles (comma-s checking inside the ca order any catalog item
List of roles (comma-separated) that override entitlements so that they can view any category within the service catalog (*glide.sc.category.canview.override*)	List of roles (comma-s viewing of any catego **Default value:** admin a
Pricing	
Append pricing information to option labels (*glide.sc.enhance.labels*)	Append pricing inform Service Portal.
List of class names for catalog items that don't show the price in listings (*glide.sc.item.cannot_show_price*)	List of class names fo listings.

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Service Catalog properties (continued)

Name	Description
When to show prices and sub-totals on the service catalog cart (overrides sc_layout record settings) (*glide.sc.price.display*)	When to show prices a
When set to true then the two script includes CatalogPriceCalculator and CatalogRecurringPriceCalculator are used generate prices (enabling custom functionality) (*glide.sc.use_custom_pricegenerator*)	When set to **true**, the s and *CatalogRecur* prices, which enables To use your own price edit the **calcPrice** met **CatalogRecurringPric** price calculation algor • **Type:** yes | no • **Default value:** no
Portal	
Show order confirmation pop-up in checkout process (*glide.sc.sp.twostep*)	If selected, displays th checkout process inS
Use Cart V2 widget in Header Menu widget (*glide.sc.portal.use_cart_v2_header*)	If selected, the Cart V cart-v2)) widget is ena Portal.
Mobile	
Catalog category sort option in Now Mobile (*glide.sc.mobile.category.order_by*)	Sort option for catego • Title: Categories are sorted alphabeticall • Order: Categories a
Include 'Desktop only' Items in Now Mobile (*glide.sc.mobile.include_desktop_only_items*)	Option to include the only in Now Mobile.
Catalog item classes not available in Now Mobile (comma separated list) (*glide.sc.mobile.item_class_not_supported*)	Catalog item types to sc_cat_item_con
Experience for items not available in Now Mobile (*glide.sc.mobile.unsupported_discover*)	Option to define the n Possible options: • Discoverable-show Item is discoverable viewable. • Not discoverable-do Item is neither disco viewable.

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Service Catalog properties (continued)

Name	Description
	Note: • If AI Search is e applicable. • This property is properties are a ○ Include 'Desk (*glide.sc* ○ Catalog item Now Mobile ((*glide.sc*
Primary color for buttons in the catalog request experience in Now Mobile (*glide.sc.mobile.primary_color*). If Next Experience is turned on, the property will be ignored.	Color for buttons in th
Other	
Log all client-side actions on variable (*glide.sc.log.variable_actions*)	If set to **true**, captures window: • **Type:** true | false • **Default value:** false
Use links for breadcrumbs rendered in service catalog pages accessed via a CMS site (*glide.sc.use_breadcrumb_links.cms*)	Use links for breadcru accessed via a CMS s Enables users with the choose whether servi without links for greate • **Type:** true | false • **Default value:** false
Enable the ui policies related to variable set to be run first (*glide.sc.ui_policy.variable_set_run_first*)	Enable the UI policies If enabled, UI policies policies on items: • **Type:** true | false • **Default value:** false
The maximum number of orphan sc_item_option records to delete when any sc_req_item record is deleted (*sc_orphan_item_option_delete_limit*)	Maximum number of o any sc_req_item reco

Installed with Service Catalog

Several types of components are installed with the Service Catalog.

Script includes installed with Service Catalog

Script includes are added with activation of Service Catalog.

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Service Catalog adds the following script includes.

Script include	Description
DemoSCCreateItem	Demonstrates the use of service catalog scoped API.

Domain separation and Service Catalog

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

Support level: Standard

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

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

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

Activation information

You should activate the Service Catalog - Domain Separation plugin (com.glideapp.servicecatalog.domain_separation) to enable domain separation for Service Catalog. For information on how you can request for the plugin activation, see Request for domain separation in Service Catalog.

This plugin should only be activated if there is a need for the following scenarios:

- Isolate items to requesters in a specific domain.
- Make items unavailable for request in any other domain irrespective of the domain hierarchy.

If Service Catalog has already been domain separated as a custom solution, activating this plugin may override the existing behavior to enforce the plugin-specific isolation.

How domain separation works in Service Catalog

Service providers supporting multiple customers in a single ServiceNow instance can ensure data privacy across domains using domain separation. Service providers can ensure that items created or published in a specific domain can only be requested by users in that domain without adding additional user criteria to the individual catalog items.

In Service Catalog, catalog items (catalog items, record producers, content items, and order guides) are domain-separated as data. Catalogs, categories, and variables are not domain-separated, and belong to the global domain. Also, items that need to be shared across multiple domains must be published in the global domain and restricted by user criteria.

Domain separation in Service Catalog is applicable to all requester views in the ServiceNow AI Platform, Service Portal, Agent Workspace, mobile application, as well as to all API calls requesting for items.

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Domain-separated tables

The **Domain** (sys_domain) and **Domain Path** (sys_domain_path) columns are added to the following tables that are domain-separated:

- sc_cat_item
- sc_item_option
- sc_multi_row_question_answer
- question_answer

Effective domain for a user

For users with visibility to a single domain, the effective domain is the user's domain. For users with visibility to multiple domains, the effective domain is the domain selected in the domain picker.

Visibility of catalog items - Item creation and maintenance

A catalog item can be created or published in any domain in the hierarchy. For information on creating a catalog item, see Create or edit a catalog item.The item is created in the effective domain of the user. For information on enabling the domain picker, see Enable domain selection menus in Core UI. Once the item is created in a specific domain, all future edits to the item are done in that domain itself.

If a catalog item is published using Item Designer, the domain of the item is the domain selected in the domain picker while publishing the item. Once the item is published, it can only be modified and re-published in the domain it was originally published in.

Catalog items are domain separated as data. Only for maintenance and administration, the visibility of the catalog items follows the data domain hierarchy rules. For information on domain separation hierarchies, see Domain separation hierarchies.

User criteria associated with a catalog item must be visible in the domain of the catalog item. If not visible, catalog item is considered to be not associated with that user criteria.

Visibility of catalog items - Item request flow

The catalog item created in a specific domain is available in the browse, search, and request experience only in that domain and not available in the peer domains, child domains, and parent domains irrespective of the hierarchy and visibility of the domains. So, requesters can only request for items in their domain as well as in the global domain.

For users with access to multiple domains (for example, IT fulfiller), the items are available for request based on the domain selected in the domain picker. To view or request an item of a specific domain, the user should switch to that domain. For information on enabling the domain picker, see Enable domain selection menus in Core UI.

When a requester submits a request using an order guide which has items from multiple domains, only the items in the effective domain and the global domain are ordered.

The target records such as requests, requested items, or records created by record producers are created in the effective domain.

Request fulfilment flow and reporting for a domain-separated catalog item

The target records such as requests, requested items, or records created by record producers can be accessed by a fulfiller who has visibility to the domain that the record has been

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generated in. For information on visibility in domain hierarchies, see Visibility domains and Contains domains. Even when the fulfiller modifies the requested item from a domain other than the requested item's domain, the modifications are recorded in the target record's domain. Since the target records are separated as data, the reports retrieve data based on the effective domain of the user requesting the report.

Request flow by a fulfiller from a different domain

When a fulfiller creates a request from a parent record such as an incident in Agent Workspace or in ServiceNow AI Platform, the fulfiller can only request for an item from the parent record's domain or from the global domain. Also, the corresponding target records are created in the parent record's domain.

Note:
Items from multiple domains cannot be added to the cart.

Catalog client scripts and catalog UI policies

Since the catalog client scripts and catalog UI policies are domain-separated as processes, scripts and policies in the parent domain can be overridden in the child domains. However, these scripts and policies are applicable based on the domain of the catalog item or the domain of the target record.

For example, consider that A is the parent domain and B is its child domain. A catalog item in domain B is associated with a catalog client script defined in domain A. If this catalog client script is overridden in the child domain B, the overridden script in domain B is applicable while fulfilling the requested item in domain B. Even when a fulfiller from the parent domain A fulfills the requested item in the child domain B, the overridden script in domain B is applicable.

Note:
It is recommended to not override catalog client scripts and catalog UI policies.

Catalog builder

An item can only be edited in the domain that it has been created. Catalog UI policies and actions added in catalog builder are created in the same domain as that of the item.

Related topics

Domain separation for service providers

Request for domain separation in Service Catalog

Enable domain separation in Service Catalog by requesting for the activation of the Service Catalog - Domain Separation plugin (com.glideapp.servicecatalog.domain_separation).

Before you begin

Role required: admin

About this task

There are two ways to request a plugin:

- Access the Now Support Service Catalog directly by selecting **Automation Store** > **Service Catalog** > **Activate Plugin** on Now Support.
- Access the Now Support Service Catalog through the All Applications page on your instance by following these steps.

For additional details about requesting a plugin, see Requesting a Plugin from the Service Catalog [KB0751715] article in the Now Support Knowledge Base.

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Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

4. Select **Submit**.
   After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

Sample ATF tests for Service Catalog in Service Portal

Validate the continued functionality of Service Catalog after any configuration change such as an upgrade or after developing an application. All test suites and tests should pass on a default implementation. To validate a custom implementation, copy the automated tests and configure them for your customizations.

Service Catalog sample tests require activating the Service Catalog - ATF Tests plugin (com.glideapp.servicecatalog.atf.test) along with the demo data. To run these tests using a suite, follow the procedure described in Run an automated test suite by selecting the **Service Catalog - ATF Tests** test suite. These sample tests are dependent on the demo data items.

Service Catalog Tests test suite

Test	Description
Ordering an item with a multi-row variable set (SP)	Validate ordering an item in Service Portal that needs data from a multi-row variable set

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Service Catalog Tests test suite (continued)

Test	Description
Ordering catalog items using an Order Guide (SP)	Validate ordering an item from an order guide in Service Portal
Request a catalog item (SP)	Validate requesting a catalog in item in Service Portal
Search for items, add to cart and checkout (SP)	Validate using the cart in Service Portal
Submitting requests using a Record Producer (SP)	Validate using a record producer in Service Portal
Viewing and editing catalog item variables in the Catalog Task page	Validate catalog item variables from a catalog task
Viewing and editing catalog item variables in the Requested Item page	Validate catalog item variables from a requested item
Add comment on catalog item(s) request created by user	Add comments on a ticket page for a requested item or incident
Approving requests on different catalog item ordered from end-users	Approving a request for catalog items
Catalog item(s) ordering from multiple catalogs	Order catalog items from multiple catalogs
Filter for recent records from My Request filter	Filter for recent open and closed records from the **My Requests** menu
Ordering catalog item(s) from saved bundle	Order catalog items from a saved bundle
Validate contents of 'My Recent Items'	Validate contents of the My Recent Items widget
Validating Regex for Variables	Validate variables using a regular expression
Validate Requested For variable flow for Cart Checkout	Validate the Requested For variable flows for cart checkout
Validate Requested For variable flow for Order Guide	Validate the Requested For variable flows for an order guide
Validate Requested For variable flow with Catalog Item access	Validate the Requested For variable flows based on the catalog item access

Variables to collect data for record producer fields

Use variables to collect data for record producer fields.

You can use the following variable types to collect data for the corresponding record producer fields.

Variables for record producer fields

Field type	Recommended variable type
True/False	Yes/No
Reference	Reference

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Variables for record producer fields (continued)

Field type	Recommended variable type
Date or Due Date	Date
Date/Time	Date/Time
Choice or any field with an associated choice list	Select Box
Email address	Email
URL	URL
HTML	HTML
List or UI Action List	List Collector
String with length greater than 256	Multi-Line Text
String, Integer, Decimal, Floating Point Number	Single-Line Text
File Attachment	Attachment
All other field types	Multi-Line Text

Note:

- If the record producer variable is mapped to an encrypted field of another table, then this variable value is not stored in Question Answer [question_answer] table. So, it is also not available in the variable editor of the target record.
- If the record producer variable is masked and encrypted, and also mapped to an encrypted field of another table:
  - The variable value is not stored in Question Answer [question_answer] table.
  - The decrypted value of the variable is copied to the encrypted field of the target record.

Values Returned

When you construct a record producer, be aware of the return value.

Most of these field types return a string. However, there are some exceptions. For example, a **Reference** value returns the `sys_id` of the target object, and a **List** value returns a comma-separated list of `sys_ids`.

Example 1: For a **List** value, return an array which can be iterated to retrieve the individual values submitted by your user:

```
var sys_id_string  = producer.glide_list_field;
var sys_id_list = sys_id_string.split(',');
```

Example 2: For a **Date** or **Date/Time** value, return a date which GlideDate can evaluate.

```
var glideDateTime  = new GlideDateTime(producer.date_field);
```

Service catalog variables

Service catalog variables capture and pass on information about choices a customer makes when ordering a catalog item. Variables help define the structure of a catalog item form that is displayed to the customer.

For example, you can define a variable called **Memory** to provide users with memory options at an extra cost for a PC catalog item. An Apple iPhone catalog item can use a variable called **Color**

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that allows customers to select the color when they order the phone from the catalog. You can define some variables to affect an item price, depending on the choices made.

Service Catalog provides several types of variables, which are also referred to as questions. Variables can be stored, accessed from multiple places, and passed between tasks in a process when fulfilling a request. They can be displayed on the Requested Item and Catalog Task forms after an item has been ordered.

You can define service catalog variables with the catalog_admin role.

Related topics

Scriptable service catalog variables

Use service catalog variables in a report – Report Designer

Types of service catalog variables

Variables allow you to specify questions for a catalog item. Several types of service catalog variables are provided. Some variable types accept variable attributes.

See the following sections for more details on each variable type. For details on creating a variable, see Create a service catalog variable. You can also provide help text for any service catalog variable. For information on defining help information, see Define help information for a service catalog variable.

Support in various channels

Service Catalog variables are supported in various channels. For information on their availability, see Variable support in various channels.

Attachment

When submitting a catalog item request, this variable lets you upload an attachment for a question of the item.

After you upload the attachment, you can also download, update, and delete it. Even when fulfilling the request, you can download, update, and delete the attachment in a requested item or catalog task. You can specify restrictions for file size and extensions using the *max_file_size* and *allowed_extensions* variable attributes. For information on these variable attributes, see Service Catalog variable attributes.

Important:

- You should specify only an integer value for the following:
  - The `max_file_size` variable attribute
  - The *glide.sc.variable.attachment.default_max_size* system property (catalog-level). The default value is 20.
- If the `max_file_size` variable attribute is not specified, the *glide.sc.variable.attachment.default_max_size* system property value is considered as the upper limit for the attachment file size.
- Irrespective of the file size allowed in the variable, the attachment file size cannot exceed the size specified in *com.glide.attachment.max_size* system property, which is applicable for attachments across ServiceNow AI Platform.
- The *g_form.setValue()* API is supported in catalog client scripts.

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Note:
When you edit an attachment, the existing attachment is removed and a new attachment is uploaded.

When you upload an attachment to this variable, an entry is created in the Attachment [sys_attachment] table. The variable is not updated until you submit the item request, add it to the cart, or save the record while editing it (in fulfiller flows). If you delete or update the attachment before submitting the corresponding catalog item, the entry in the Attachment [sys_attachment] table is cleared.

The attachment uploaded for this variable is copied in the following scenarios:

- In an order guide, when the variable is cascaded to a catalog item in the rule base

Important:
The individual variable attributes are not honored for the catalog items in the rule base. For example, let us consider that a variable in the **Describe Needs** section allows a .pdf attachment and the variable of a catalog item in the rule base allows a .txt attachment. When you upload an attachment of .pdf type for a variable in the **Describe Needs** section, it is initially cascaded to the variable in the catalog item as well and the variable attributes specified in the catalog item are not honored. However, if you delete this initially cascaded attachment from an individual item and try to upload a new attachment, then the individual variable attributes of the catalog item are honored.

- In a record producer, when the variable is mapped to a task table field. This variable can be mapped only to the File Attachment field type of a task table.

Important:
After an attachment is copied, the changes to the individual attachments are independent. For example, any change to an attachment in the order guide does not impact the same attachment cascaded to the catalog item in the rule base.

Warning:
Since the attachments are copied, a larger size can lead to performance issues.

If the system-wide anti-virus check is enabled, the anti-virus check is performed on the attachment when you:

- Submit a request for the corresponding catalog item
- Add the catalog item to the cart or wish list

Note:

- This variable is not supported in a multi-row variable set.
- This variable is supported in flows and workflows.
- This variable is available in condition builder
- For this variable, item variable assignment is not supported in order guide.

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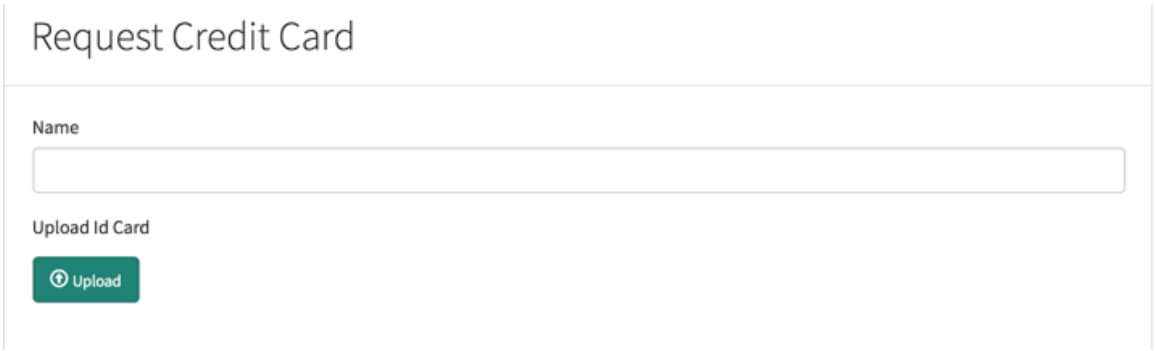
Attachment variable

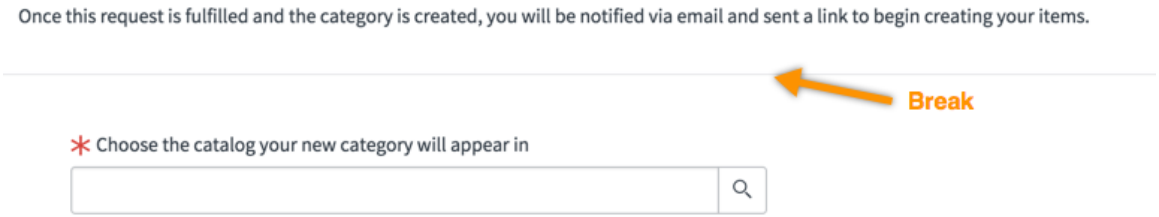


Break

The break variable displays a horizontal line across the form.

This line is a formatting element that does not collect data.

Example: break variable



Check box

The check box variable lets you enable and disable options by selecting and clearing it.

To make a check box mandatory, select the **Selection Required** option when you create the variable. For example, use this option to require users to select the **I agree** check box for an agreement form. If users try to submit the agreement form without selecting the check box, an alert message is displayed to tell users that they must select the check box.

A group of check box variables is created when you create consecutive check box variables. These check box variables are sorted by their order within the group. If you want to define a custom label for the group of check boxes, create a label variable at the start of the consecutive check box variables. The label is then considered a part of this group and acts a label of the group. If there is no custom label, check boxes are grouped under an **Options** label by the application.

In a group of check box variables:

- If any check box variable in the group is mandatory, the entire group becomes mandatory irrespective of the visibility of the mandatory check box variable. An asterisk (*) is then displayed next to the group label and you must select at least one of these check boxes.
- Hiding the label hides the entire group.
- If all other check box variables of a mandatory check box group are hidden and not selected, the following scenarios are applicable:
  - The group remains mandatory as long as there is one check box in the group that is visible and not selected.
  - The last check box of this group cannot be hidden if it is not selected.

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In Service Portal, to make a group of check box variables mandatory, set at least one of the check box variables as mandatory. While defining the label for a group of check boxes, setting a label mandatory does not make the group of check box variables mandatory.

In catalog builder, the following scenarios are applicable:

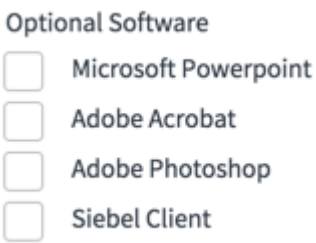
- If there are two consecutive check boxes, then a virtual container is created for a group of check boxes. Only check box variable types can be added inside the group
- Even if a check box variable is added immediately after a group of check boxes, it is automatically added to the group.

Under the **Type Specifications** tab, you can specify the price in different currency types. Also, you can configure the price in the following pricing models:

- Calculated
- Fixed
- Multiple

For information on the pricing models, see Price fields .

Example: check box variable



Container start, container split, and container end

The container start, container split, and container end variables define a layout for a container that can hold more variables.

Use the container start and container end variables to define the start and end points of a container layout. The container end must be used along with the container start to close a container.

A container layout can be split into two or three columns using the container split variable. By default, the split is calculated at the 50% mark.

A container is similar to a variable set. Unlike a variable set, containers can be used anywhere, including inside a variable set. Containers can also be nested inside each other.

For more help with selecting the appropriate container type, see the Determining if you are using the correct container variable [KB0539982] article in the HI Knowledge Base.

Note:

- The container variables are not yet supported on mobile devices.
- Container start, container split, and container end variables are supported in Service Portal. However, if the settings are done on the top-level container, a maximum of two-column layouts can be achieved.
- Variable sets are also considered as containers. So, a container start variable with a two-column layout under a variable set is not supported in Service Portal.

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To reproduce the container shown in the following figure, enter the following settings when creating a container start variable:

- Select a **Layout** with *2 Columns Wide, alternating sides*.
- Select the **Display title** check box to use a collapsible title bar.

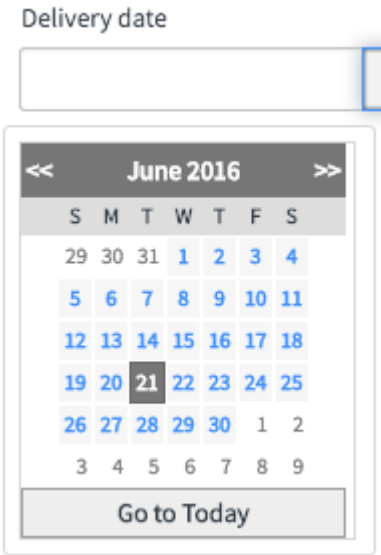
Example: container variable

Date, Date and time, and Duration

The date variable creates a widget with a field and calendar to select a date.

Date

Example: date variable



Date and time

The date and time variable creates a widget with a calendar and fields to select a date and time. The time value is stored in Greenwich Mean Time (GMT) and displayed in your time zone.

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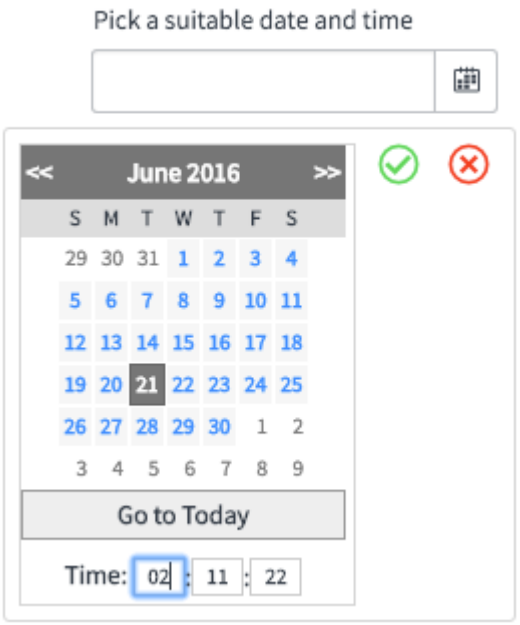
Example: date and time variable



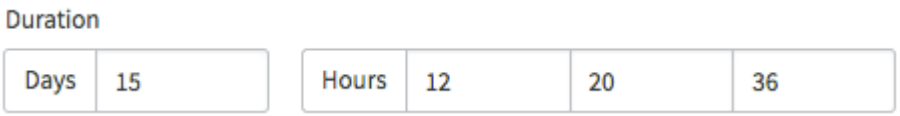
Duration

Use the duration variable to specify the duration for which a catalog item is available.

For attributes supported by this variable, see variable attributes.

Note:
Enter the duration in the DD HH:MM:SS format when setting the default value of the variable, and specifying in the g_form.getValue() and g_form.setValue() functions.

Example: duration variable



Email

The email variable creates a widget to enter and select an email address.

The variable accepts only valid email expressions containing @ and domain information.

Example: email variable

HTML

The HTML variable lets you provide content with advanced formatting, including images, for a catalog item.

Use the variable to create fields for user input. You can also use the variable for reusable content when put into a variable set, such as terms and conditions.

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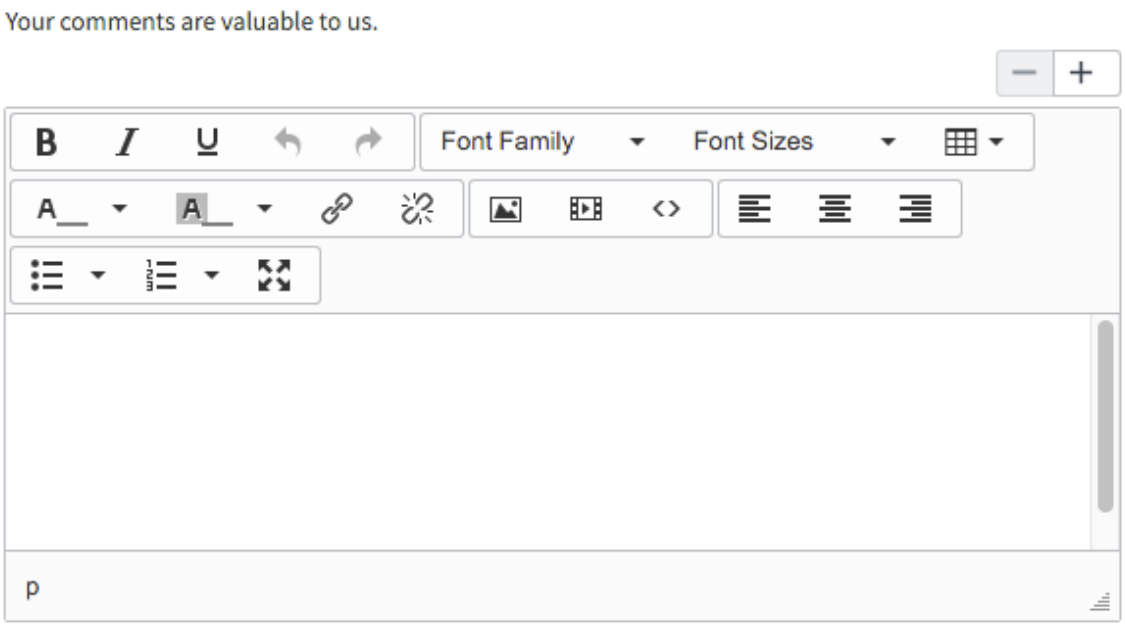
The variable is available in two modes: edit and read-only. In edit mode, a toolbar is available, and links do not work. In read-only mode, the toolbar is disabled, and links work. To switch between modes, use entitlements or create a UI policy to set the HTML field to read-only mode.

Note:
HTML variables are not supported for display on the shopping cart summary or approval summary screens.

Example: HTML variable



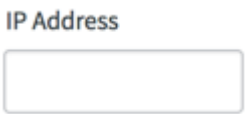
IP Address

Use the IP address variable to specify the IPv4 and IPv6 data for a catalog item.

Under the **Validation Scripts** submodule, a validation script type associated with this variable is available.

Note:
When you set the default value for the **IP Address** variable, or specify its value in the g_form.getValue() and g_form.setValue() functions, the delimiter is (.).

Example: IP address variable



Label

The label variable displays a label across the form. Labels are formatting elements. No data is collected.

You can use labels to arrange questions into sections. You can also use labels for questions with multiple options. For example, label check boxes for the different options for a question.

You cannot set a Label variable as mandatory. However, you can make mandatory, a group of check box variables preceded by a Label variable.

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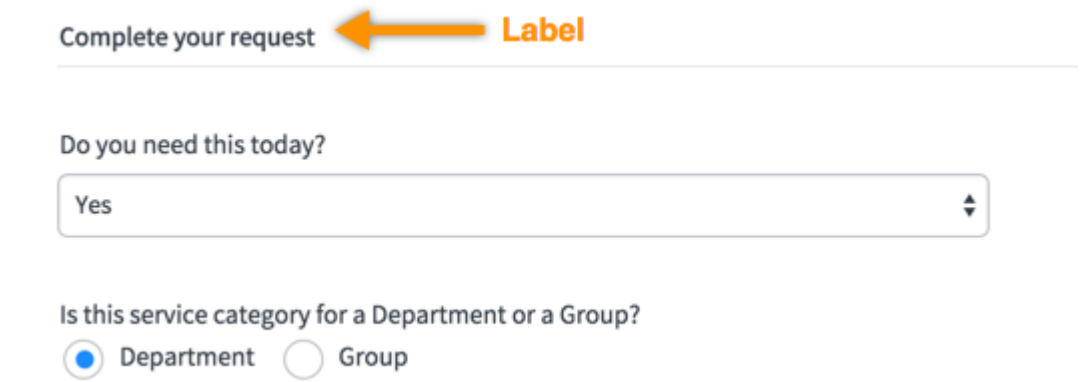
Example: label variable

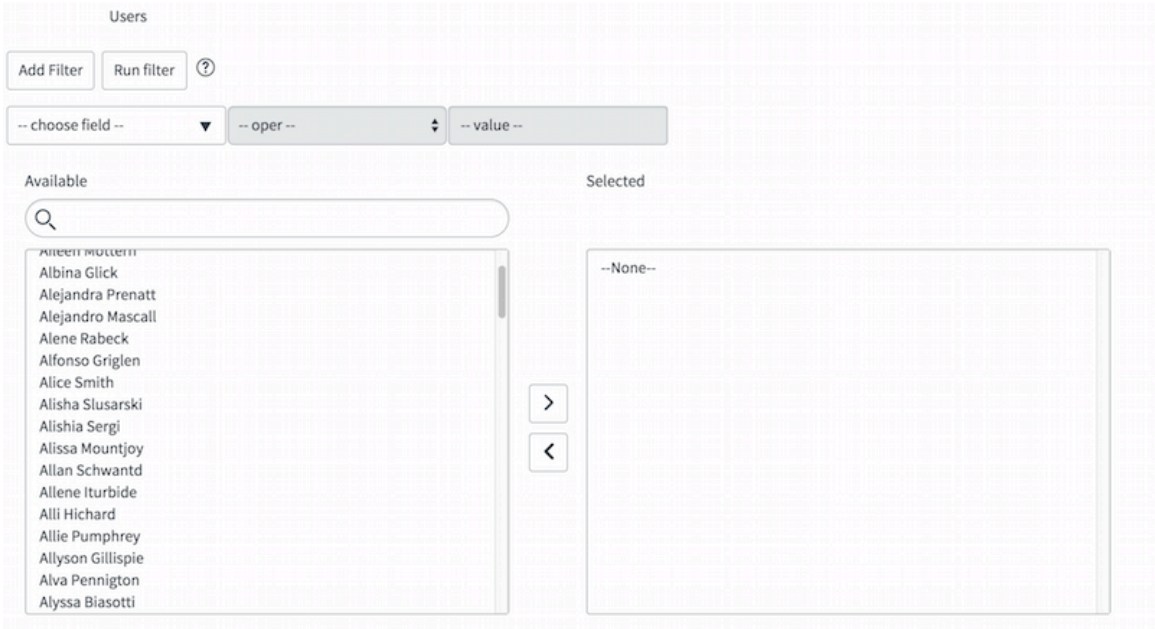


List collector

The list collector variable creates an interface that lets you select and add multiple records from a table.

For attributes supported by this variable, see variable attributes.

Example: list collector variable



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Note:

- The Reference Qualifier and glide_list attribute applies to releases from Helsinki onward only. The attribute does not apply to Geneva.
- You can set a value for this variable using the `g_form.setValue()` function in a catalog client script.
- When the glide_list attribute is not true, you can only set the value that is visible in the **Available** list using the `g_form.setValue()` function. This functionality is not applicable when the `setValue()` function is called onLoad.
- Table with large data causes performance issues when loading the page. Use reference qualifiers to reduce data or use the glide_list attribute.
- The values in the referenced table do not appear if the user is not logged in.
- The list collector displays a maximum of 100 items in a list. After moving items to the **Selected** list, you can click **Run Filter** to refresh the **Available** list. This action will add more available items to the list, to a maximum of 100 items.

Lookup multiple choice

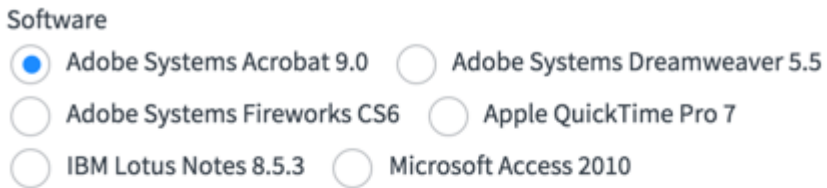
The lookup multiple choice variable creates radio buttons using data from a table. Its functionality is similar to the lookup select box variable, which creates a choice list from queried data.

For attributes supported by this variable, see variable attributes.

Note:

- Table with large data causes performance issues when loading the page. Use reference qualifiers to reduce data or use the reference type variable.
- You cannot add more than 10,000 choices.

Example: lookup multiple choice variable



Lookup select box

The lookup select box variable creates a choice list using data queried from a table. Its functionality is similar to the lookup multiple choice variable, which creates radio buttons from queried data.

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For attributes supported by this variable, see variable attributes.

To create the lookup select box, enter the following values when creating the variable:

- **Lookup from table**: `Incident [incident]`
- **Lookup value field**: `Sys ID`
- **Lookup label field**: `number, category, priority`
- **Reference qual**: `caller_id=javascript:gs.getUserID()^active=true`

Note:

- Table with large data causes performance issues when loading the page. Use reference qualifiers to reduce data or use the reference type variable.
- You cannot add more than 10,000 choices.

Custom and Custom with label

The custom variable inserts a UI macro into the catalog item. Custom with label variable inserts a UI macro with a label.

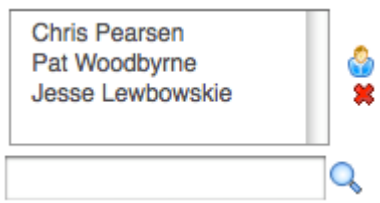
Custom

This variable inserts a UI macro into the catalog item.

UI macros in the service catalog do not support the following glide_list functions: clickthrough, slushbucket editing, and email field.

- Use phase one Jelly only for any UI macros added as variables. Phase two Jelly within the macro is not processed and appears on the page as standard content.
- This variable is not yet supported on Classic Mobile devices.
- This variable is supported in Service Portal through widgets. Create a widget with the same functionality as that of a macro and link the widget with the variable.

Example: Custom variable



Custom with label

This variable inserts a UI macro with a label.

- This variable is not yet supported on Classic Mobile devices.
- This variable is supported in Service Portal through widgets. Create a widget with the same functionality as that of a macro with label, and link it with the variable.

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Example: Custom with label variable

Masked

The masked variable inserts a field that masks the text entered.

Each character entered is displayed as an asterisk (*). Use this variable to ask users for sensitive or confidential data such as passwords.

By selecting the **Use encryption** check box, you can configure the variable to encrypt its value using various encryption algorithms before storing in the database. These values can only be decrypted by using now_GR.variables.var_name.getDecryptedValue() on RITM, Catalog Task, or any task extension record created using a record producer.

Note:
By default, the **Use encryption** field is set to true to ensure secure storage of information.

On the variable editor, you can also decrypt and encrypt the values of a masked variable using the **Show** and **Hide** buttons. These buttons are not available for a fulfiller (itil) without the catalog_view_masked role. You can only view the value that you specified while requesting.

Actions on an encrypted variable

Action	Roles		
	Requester	Fulfiller with the catalog_view_masked role	Fulfiller without the catalog_view_masked role
View or hide the encrypted value on catalog forms	Yes	Not applicable	Not applicable
Edit the encrypted value on catalog forms	Yes	Not applicable	Not applicable
View or hide the encrypted value on the variable editor	Yes	Yes	No
Edit the encrypted	Yes	Yes	No

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Actions on an encrypted variable (continued)

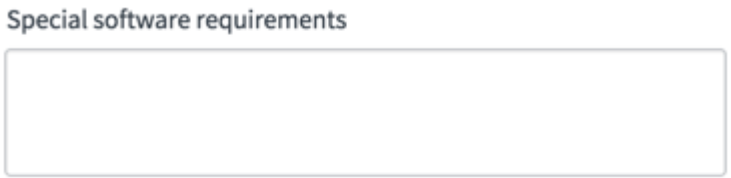
value on the variable editor	**Note:** If the masked variable is read-only on the variable editor, the variable value is not editable	**Note:** If the masked variable is read-only on the variable editor, the variable value is not editable	

Example: masked variable

Multi-line text

The multi-line text variable creates a field that lets you enter multiple lines of text.

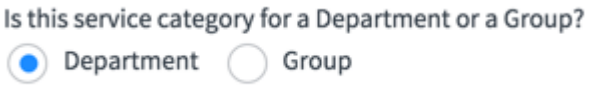
Example: multi-line text variable



Multiple choice

The multiple choice variable creates radio buttons for question choices.

Example: multiple choice variable



Numeric scale

The numeric scale variable creates a set of radio buttons for a range of options, like a Likert scale.

Example: numeric scale variable

Reference

A reference variable references a record in another table. For example, a variable named point_of_contact references the User [sys_user] table.

For attributes supported by this variable, see variable attributes.

Keep the following information in mind when you create a reference variable:

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- Reference variables use the auto-complete feature . To ensure that users have enough information to make the selection, configure the reference lookup list .
- Reference variables store the sys_id of the selected record (like reference fields). To use the display value in a script, use the same methods as for a reference field.

```
current.variables.<variable name>.getDisplayValue()
```

Example: reference variable

Requested for

Before submitting a catalog item request, this variable helps you specify who this request can be submitted for.

Requested For

You should specify this information while answering catalog item questions.

Important:

- You can only specify users from the User [sys_user] table.
- If you don't specify the default value for this variable, the current logged-in user requesting the item is considered as the default Requested For variable value.
- You can submit the request for a user based on access to a catalog item. The **Access Type** field of the catalog item can be used to specify if a request can be submitted for a user who does not have access to the catalog item.
- For this variable, item variable assignment is not supported in the rule base of an order guide. If the order guide contains the Requested For variable, the value would be cascaded to the equivalent variable of items in the rule base as read-only.

Using the **Enable also request for** field of the Requested For variable, you can request a catalog item for different users under one request.

For information about delegated request experience, see Delegated request experience.

Important:

- You can add this variable to a catalog item or variable set. However, when submitting the request, a catalog item can have only one Requested For variable.
- You can add only one Requested For variable for a variable set.
- This variable is not supported in a multi-row variable set.
- After the request is submitted, this variable value is visible in the variable editor and variable summarizer.

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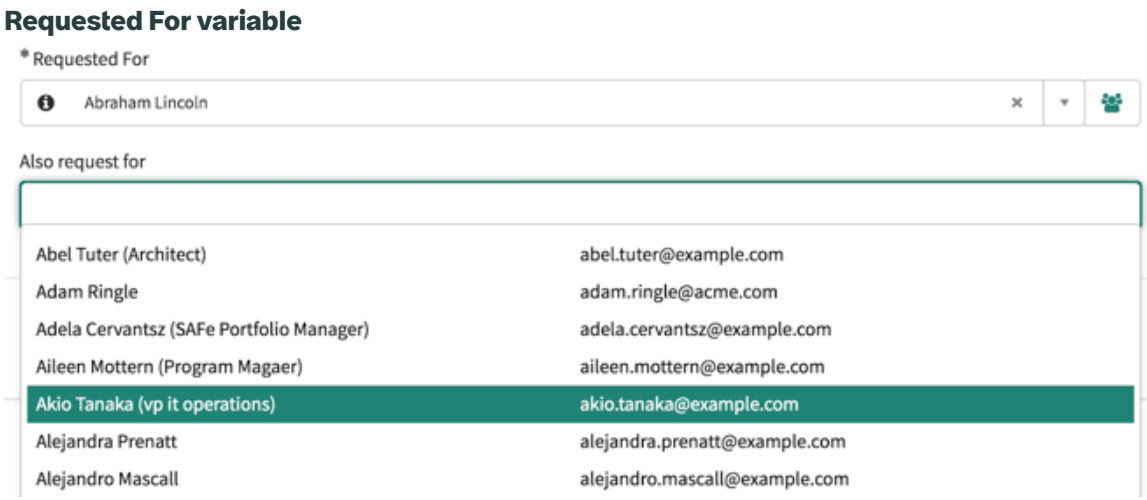

Rich Text Label

This variable displays a formatted label on a catalog item form.

In the TinyMCE rich text editor, you can format the label and add images or links. This variable supports the HTML tags.

Note:

- You can make this variable visible using catalog client scripts and catalog UI policies.
- You cannot cascade this variable in an order guide.
- You cannot set this variable as mandatory.
- In the Automated Test Framework, this variable is only supported in the Variable State Validation step to check the visibility.
- This variable is not supported in the following:
  - Variable summarizer
  - Multi-row variable set
  - Condition builders and reports
- You cannot specify the following for this variable:
  - Help text and instructions
  - Tool tip
  - Permissions
  - Variable width
  - Example text
- The `g_form.setValue()`, `g_form.setReadOnly()`, and `g_form.setMandatory()` APIs are not supported in catalog client scripts. Only the `g_form.setVisible()` API is supported.

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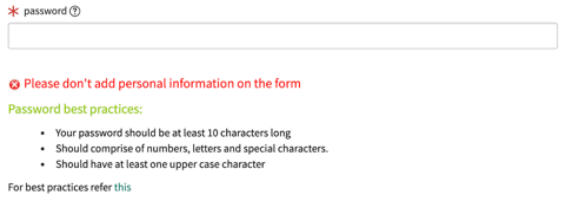
Rich Text Label variable



Select box

The select box variable creates a list from predefined question choices.

For attributes supported by this variable, see variable attributes.

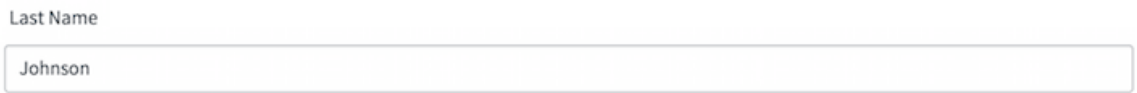
Example: select box variable

Single-line text

The single-line text variable creates a field to enter a single line of text.

For attributes supported by this variable, see variable attributes.

Example :single-line text variable



UI page

The UI page variable inserts a UI page into the catalog item.

- Use phase one Jelly only for any UI macros added as variables. Phase two Jelly within the macro is not processed and appears on the page as standard content.
- This variable is not yet supported on Classic Mobile devices and in Service Portal.

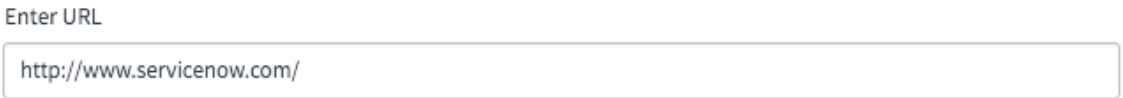
URL

The URL variable creates a widget for users to enter URLs.

URLs are validated for the following protocols: HTTP, HTTPS, FTP.

Note:
This variable is not editable on Now Mobile.

Example: URL variable



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Wide single-line text

The wide single-line text variable creates a field that spans the form, letting users enter longer lines of text.

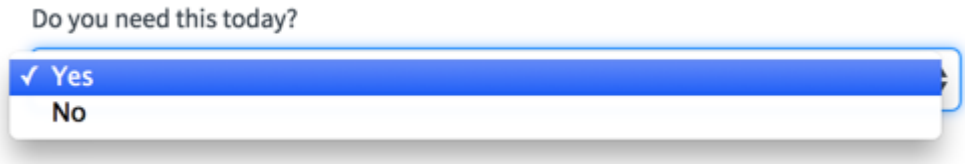
For attributes supported by this variable, see variable attributes.

Example: wide single-line text variable

Yes/No

The Yes or No variable creates a choice list with **Yes** and **No** as options.

Example: Yes or No variable



Variable support in various channels

Service Catalog variables are supported in various channels.

Variable support

Variable	ServiceNow AI Platform	Service Portal	Now Mobile	Conversational interface in Virtual Agent powered by LLM	Conversational interface in Virtual Agent powered by NLU	Variable editor in Workspace and Catalog Item UIB component
Attachment	Yes	Yes	Yes	Yes	Yes	Yes
Break	Yes	Yes	Yes	Ignored or skipped	Ignored or skipped	Yes
CheckBox	Yes	Yes	Yes	Yes	Single check box without the pricing implications is supported	Yes
Container End	Yes	Yes	Yes	Yes	Yes	Yes
Container Split	Yes	Yes	Yes	Yes	Yes	Yes
Container Start	Yes	Yes	Yes	Yes	Yes	Yes
Date	Yes	Yes	Yes	Yes	Yes	Yes
Date/Time	Yes	Yes	Yes	Yes	Yes	Yes
Duration	Yes	Yes	Yes	Yes	No	Yes
Email	Yes	Yes	Yes	Yes	Yes	Yes

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Variable support (continued)

Variable	ServiceNow AI Platform	Service Portal	Now Mobile	Conversational interface in Virtual Agent powered by LLM	Conversational interface in Virtual Agent powered by NLU	Variable editor in Workspace and Catalog Item UIB component
HTML	Yes	Yes	Yes	Yes	No	Yes
IP Address	Yes	Yes	Yes	Yes	Yes	Yes
Label	Yes	Yes	Yes	Yes	Yes	Yes
List Collector	Yes	Yes	Yes	Yes	No	Yes
Lookup Multiple Choice	Yes	Yes	Yes	Yes (Without pricing implications)	Yes (Without pricing implications and advanced reference qualifier)	Yes
Lookup Select Box	Yes	Yes	Yes	Yes (Without pricing implications)	Yes (Without pricing implications and advanced reference qualifier)	Yes
Custom	Yes	Yes	Yes	Yes (requires custom implementation)	No	No
Custom with Label	Yes	Yes	Yes	Yes (requires custom implementation)	No	No
Masked	Yes	Yes	Yes	Yes	No	Yes
Multi Line Text	Yes	Yes	Yes	Yes	Yes	Yes
Multiple Choice	Yes	Yes	Yes	Yes (Without pricing implications)	Yes (Without pricing implications)	Yes
Numeric Scale	Yes	Yes	Yes	Yes (Without pricing implications)	Yes (Without pricing implications)	Yes
Reference	Yes	Yes	Yes	Yes (Without pricing implications)	Yes (Without pricing implications and advanced reference qualifier)	Yes
Requested For	Yes	Yes	Yes	Yes (Without pricing implications)	Yes (Without pricing implications	Yes

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Variable support (continued)

Variable	ServiceNow AI Platform	Service Portal	Now Mobile	Conversational interface in Virtual Agent powered by LLM	Conversational interface in Virtual Agent powered by NLU	Variable editor in Workspace and Catalog Item UIB component
					and advanced reference qualifier)	
Rich Text Label	Yes	Yes	Yes	Yes	Yes	Yes
Select Box	Yes	Yes	Yes	Yes (Without pricing implications)	Yes (Without pricing implications)	Yes
Single Line Text	Yes	Yes	Yes	Yes	Yes	Yes
UI Page	Yes	No	No	Ignored or skipped	No	No
URL	Yes	Yes	Yes	Yes	Yes	Yes
Wide Single Line Text	Yes	Yes	Yes	Yes	Yes	Yes
Yes / No	Yes	Yes	Yes	Yes	Yes	Yes

Create a service catalog variable

Create service catalogs variables to gather information from users ordering a catalog item, for example, to ask users which options they want for the item.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Items**.
2. Select the catalog item that you want to create a variable for.
3. In the **Variables** related list, click **New**.
4. Select the variable type.
   Only the applicable fields for the variable type are then displayed.
5. In the form, fill the fields.

Variable form

Field	Description
Application	Read-only field that indicates which applications can use this variable.
Map to field	Maps the variable to a specific field on the table for the record producer. This field appears if the variable belongs to a record producer.

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Field	Description
Type	The variable type that you want to create. For more information, see Types of service catalog variables.
Catalog item	Catalog item using the variable.
Order	Order that the variable is placed on the page for the catalog item. The variables are organized from top to bottom from least to greatest order value. For example, a variable with an order value of 1 is placed above other variables with higher-order values.
Active	Check box to make the variable available for use
Mandatory	Check box to make the variable mandatory as part of the ordering process. **Note:** This behavior is applicable only on page load, and can be changed via client APIs.
Read only	Option to make a variable read only or editable.
Hidden	Option to hide a variable.
Unique	Option to disallow duplicate values for this variable within a multi-row variable set. **Note:** ○ This field appears only for a variable created in a multi-row variable set. ○ This behavior is applicable only in ServiceNow AI Platform, Service Portal, and variable editor in Agent Workspace.
Disable initial slot fill	Check box to determine whether to activate usage of caller-provided key-value pairs that pre-fill catalog item forms.
Selection Required	Check box to require users to select the check box variable. For example, use this option to require users to select an **I agree** check box for an agreement form. If users try to submit the agreement form without selecting the check box, an alert message is displayed to tell users that they must select the check box.
Global	If selected, the variable is available for all catalog tasks within service catalog workflows or execution plans by default. If deselected, the variable must be associated with individual catalog tasks.
Field	Field that the variable maps to. This field appears if the variable belongs to a record producer.
Record producer table	Table that the record producer creates a record in. This field appears if the variable belongs to a record producer.
Question	
Question	Question to ask users ordering the catalog item.
Name	A name to identify the question.

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Field	Description
	Note: If this field is empty, its value is auto-populated based on the **Question** field for all variable types except break, container split, and container end.
Tooltip	Tooltip text to display when users point to the variable. Enter a brief note to describe the purpose of the 'Question'.
Example text	Hint that is displayed in the question field before a user enters a value. Applicable for the following variables: ○ IP Address ○ Email ○ URL ○ Single Line Text ○ Wide Single Line Text ○ Multi Line Text ○ Date ○ Date/Time
Rich Text	Formatted label to be displayed on a catalog item form. Applicable for the Rich Text Label variable.
Annotation	
Show help	If selected, displays the help text and instructions for the variable. **Note:** ○ It is not available for break and check box variables. ○ Help text and instructions are not available for a variable set.
Always Expanded	If selected, the **Help text** and **Instructions** field value are expanded by default when the catalog item page loads. This check box appears only when the **Show help** check box is selected. **Note:** ○ This field is also applicable in Service Portal. ○ This field is not applicable in the variable editor in Workspace and Catalog Item UIB component. ○ If the **Expand help for all questions** check box is selected at the catalog item level, then the **Always Expanded** field setting at the variable level is overridden. ○ If the **Expand help for all questions** check box is deselected at the catalog item level, then the **Always Expanded** field setting at the variable level is applicable.

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Field	Description
Help tag	If the **Always Expanded** check box is deselected, click the value specified in this field to display the **Help text** and **Instructions** field values. This field is not applicable in the variable editor in Workspace and Catalog Item UIB component.
Help text	Help information for a service catalog variable. This field is applicable in ServiceNow AI Platform, Service Portal, and variable editor in Workspace, and Catalog Item UIB component. However, in Workspace and Catalog Item UIB component, you can view either help text or instructions. If both instructions and help text are available, you can view only the instructions. This field is not applicable for Break, CheckBox, Container End, Container Split, Macro, and UI Page variables. In Workspace and Catalog Item UIB component, this field is additionally not applicable for a Masked variable.
Instructions	Information that requires rich text formatting or adding images to support help information. This field is applicable in ServiceNow AI Platform, Service Portal, and variable editor in Workspace, and Catalog Item UIB component. However, in Workspace and Catalog Item UIB component, you can view either help text or instructions. If both instructions and help text are available, you can view only the instructions. In Workspace and Catalog Item UIB component, this field is additionally not applicable for a Masked variable. **Note:** For HTML tables, use sizes that are within the width of the variable.
Type Specifications (The fields in this section vary for each variable type)	
Variable Width	Width for the variable on the catalog item page, to specify what percentage of the screen size that it can span. For details, see Configure a default width for service catalog variables. This field appears for all variable types except for break, container end, container start, container split, container layout, and label variables.
Enable also request for	Option to allow a catalog item request to be submitted for multiple users. After you select this option, the **Also request for** field is displayed along with Requested For variable in a catalog item. ○ This functionality is only applicable in Service Portal. ○ This field is applicable only for the Requested For variable. For information about delegated request experience, see Delegated request experience.
Roles to use also request for	Option to specify the roles that can submit a catalog item request for multiple users.

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Field	Description
	○ This functionality is only applicable in Service Portal. ○ This field is applicable only for the Requested For variable. ○ This field appears only when the **Enable also request for** check box is selected. **Note:** If no role is specified, anyone who has access to the catalog item can submit the request. For information about delegated request experience, see Delegated request experience.
Choice direction	The direction in which the choice list is arranged. ○ **Across**: Arranges choices horizontally. ○ **Down**: Arranges choices vertically. This field appears for lookup multiple choice variables. **Note:** The selected direction is also applicable in Service Portal.
Choice field	Table field to populate options for the variable. If no choices are defined for a field, then the variable loads field-related distinct values from the table. This field appears for select box variables.
Choice table	Table with values to populate in the **Choice field**. This field appears for select box variables.
Do not select the first choice	Check box to leave all options for the variable cleared on the catalog item page. If this check box is selected, the first choice for the variable selected by default. This field appears for multiple choice and numeric scale variables.
Dynamic ref qual	Dynamic qualifier. Select a dynamic filter to run a query against the reference field. This field appears for reference variables when **Use reference qualifier** is set to **Dynamic**.
Include none	Check box to include the **None** option in a list of choices. This field appears for lookup multiple choice, lookup select box, multiple choice, and select box variables.
Layout	Layout for a container, whether one or two columns. This field appears for container start variables.
List table	Table with the values for the list collector. The table should have a display column specified.

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Field	Description
	This field appears for list collector variables.
Lookup source	The lookup source. Select `Table` or `Choices`. By default, Table is selected.
Lookup from table	Table from which values are obtained for users to select. The values from this table are populated in the **Lookup value field**. This field appears for lookup multiple choice and lookup select box variables, and when a **Table** lookup source is selected.
Lookup value field	Field in the lookup table that populates options for the variable. This field appears for lookup multiple choice and lookup select box variables, and when a **Table** lookup source is selected.
Lookup label field(s)	Comma-separated list of fields in the lookup table whose values are used to display options. This field appears for lookup multiple choice and lookup select box variables, and when a **Table** lookup source is selected.
Lookup price field	Field in the lookup table whose value is used to modify the price of the item being ordered. This field appears for lookup multiple choice and lookup select box variables, and when a **Table** lookup source is selected.
Lookup recurring price field	Field in the lookup table whose value is used to modify the recurring price of the item being ordered. This field appears for lookup multiple choice and lookup select box variables, and when a **Table** lookup source is selected.
Choice table	Use this field to specify the table that contains the desired choice list. It is only active when the **Lookup source** is set to `Choices`. The system queries the central choice table (sys_choice) for all choice lists associated with the table you select here.
Choice field	Use this field to select the specific field (or "element") from the Choice table whose options you want to display. For instance, if your Choice table is Incident [incident], you could select the **Priority**, **State**, or **Category** field to display the choices defined for it.
Choices depend on	Select another variable from the same catalog item to make this variable's choices dependent on it. This creates a dynamic filtering effect. The choices shown in the current variable will be filtered in real-time based on the value the user selects in the variable specified here. For example, if this field is for "City", you might select a "Country" variable here, ensuring only relevant cities are shown based on the selected country.
Macro	UI macro to insert into the catalog item.

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Field	Description
	This field appears for macro, macro with label, and UI page variables.
Summary macro	Applicable only for Marco, and Macro with Label type variables.
Widget	Applicable only for Marco, and Macro with Label type variables.
Price if checked	Price of the item. This field appears for check box variables.
Recurring price if checked	Price that increments for the item, when the user requests more than one order of the item. This field appears for check box variables. For more information about prices and recurring prices, see Using variables for price setup.
Reference	Reference table for the variable. The table should have a display column specified. This field appears for reference variables.
Reference qual	Qualifiers to restrict data that is available in the field. Supports reference qualifiers and advance qualifiers. For more information, see Reference qualifiers. Returns all matching results (no maximum). **Note:** For security reasons, the use of scripts in the **Reference qual** field is restricted to system administrators through the **Allow javascript in Default Value** business rule. This field appears for list collector, lookup multiple choice, lookup select box, reference and Requested For variables. It appears for reference variables when **Use reference qualifier** is set to **Dynamic**.
Reference qualifier condition	Options to build conditions. This field appears for reference variables when **Use reference qualifier** is set to **Simple**.
Scale max	Highest value on the scale of available options for the variable. This field appears for numeric scale variables.
Scale min	Lowest value on the scale of available options for the variable. This field appears for numeric scale variables.
Unique values only	Check box to require a unique value for the field. When this check box is selected, two records cannot have the same value for that field.

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Field	Description
	This field appears for lookup multiple choice, lookup select box, and select box variables.
Use confirmation	Check box to prompt users to reenter data to verify their entries. This field appears for masked variables.
Use encryption	Check box to store the answer in encrypted format in the database. If not encrypted, the answer is stored in plain text format. Encryption uses Triple DES with system encryption. This field appears for masked variables.
Use reference qualifier	Type of qualifier to use. This field appears for reference variables.
Validation Regex	Regular expression that validates the variable value. This field is displayed only for Single Line Text and Wide Single Line Text variable types. To define regular expressions, see Define a regular expression for a variable. **Note:** ○ This field is also applicable in Service Portal. ○ The max_length attribute value is valid even when the validation regex is set. ○ You cannot add a catalog item with regex validation errors to the wishlist.
Variable attributes	Attributes that define the behavior and restrictions for a variable. For information on variable attributes, see Service catalog variable attribute.
Topic block	Specify the topic block similar to configured UI macros or widgets used in the custom or custom with label variables to replicate the same behavior in a Virtual Agent conversation. **Note:** This field is available only for the "Custom" and "Custom with Label" variable types.
Default Value	
Default value	Default value for the variable.
Permission If no role is specified in this tab for the read, write, or create actions, all users who can access the catalog item can perform these actions irrespective of their role. For example, if no role is specified for the **Write roles** field, all users who can access the catalog item can edit the variable value in the variable editor. A user with a role that does not match any of the following roles cannot set variable values even through scripting.	

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Field	Description
These roles are not available for Label, Break, Container Split, Container End, Macro, Macro with Label, and UI Page variables.	
Read roles	Roles that can view the variable before or after requesting the catalog item or record producer. Only a user with the roles specified in this field can view the variable.
Write roles	Roles that can edit the variable in the variable editor after requesting the catalog item or record producer. If a user does not have the roles specified in this field, the variable is read-only in the variable editor.
Create roles	Roles that can create values for the variable before requesting the catalog item or record producer. If a user does not have the specified role, the variable is read-only before requesting the catalog item or record producer.
Availability	
Visible Elsewhere	If selected, the variable is visible in the item form before ordering the item, in VEditor after ordering the item, and in the cart view of the item.
Visible on Bundles	If selected, the variable is visible when the item is added to a bundle.
Visible on Guides	If selected, the variable is visible when it is added to an order guide, or when it is added to a catalog item that is included in the order guide. **Note:** If an order guide has too many items and variables, consider clearing this check box on as many items as possible, to improve loading performance on order guides.
Visible on Summaries	If selected, the variable is visible on any variable summarizer of the catalog item. In Service Portal, the variable is visible in the RITM ticket page and the Approval page. In Now Mobile, the variable is visible in the RITM and the Approval records.
Remove from Conversational Interfaces	If the catalog item has a variable that's making the item non-conversational, for example, a variable about pricing, then select the check box so that the catalog item becomes conversational. **Note:** This option doesn't apply to the a multi-row variable set (MRVS).

6. Click **Submit**.

Define help information for a service catalog variable

Enter help information for a variable to help users determine what info they must provide for a service catalog variable.

Before you begin
Role required: admin

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About this task

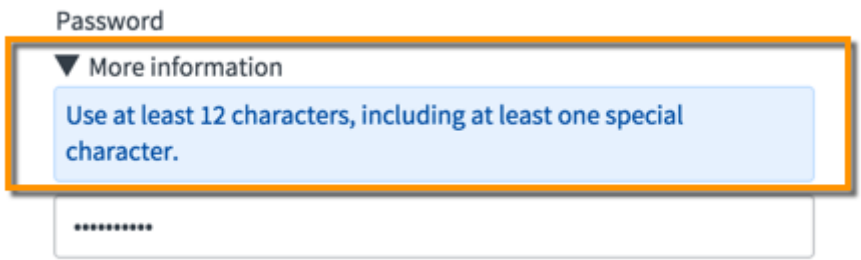
Demonstrates these options to provide help text for service catalog item variables: tooltips, help text, instructions (HTML help text), and example text.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Items** and click the catalog item with the variable that you want to provide help for.
2. In the **Variables** related list, click the variable.
3. In the **Annotation** section of the Variable form, select the **Show help** check box.
   The **Help tag**, **Help text**, and **Instructions** fields appear.
4. In the **Help tag** field, enter the short descriptive text that appears between the question and the responses.
   For example, **Click here for help** or **Preview**.
5. In the **Help text** field, enter the help text that displays for users who clicks the **Help tag** on the page for the catalog item.

Note:
The **Help** and **Help text** fields do not support HTML tags.

Example of help information



Service Catalog variable attributes

There are a few Service Catalog variables support specific attributes to define the behavior and restrictions for variables.

In the Catalog variable form, under the **Type Specifications** tab, you can specify the variable attributes in the **Variable attributes** field.

Note:

- You can enter multiple attributes for a variable type by separating each with a comma.
- You can enter multiple values for an attribute by separating each with a semicolon.
- If you don't see the **Variable attributes** field, enable the **Show attributes when Type is One of Certain Values** UI policy.
- Pre-selected values are not cleared automatically when the dependent variable value changes when using an attribute or reference qualifier. Create a client script to clear the values based on your needs and the needs of your customer.

Variable attributes

allowed_extensions

Specifies a list of allowed file types. For example, `allowed_extensions=txt;pdf`.

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Applicable variables: Attachment

barcode

Specifies if the barcode can be scanned using the mobile camera for identifying a variable value of a catalog item. For example, `barcode=true`.

Applicable variables: Single Line Text

max_file_size

Specifies the maximum file size in MB. For example, `max_file_size=2`.

Applicable variables: Attachment

glide_list

Changes the list collector interface from slushbucket to glide list.

Applicable variables: List collector

is_searchable_choice

If set to **true**, enables you to search for and select the required value for the variable. For example, `is_searchable_choice=true`.

Note:

- For Lookup select box, a default value is available at the page load itself.
- This attribute is not applicable in Service Portal.

Applicable variables: Lookup select box, Select box

max_length

Sets the maximum number of characters allowed in the field. By default, the field accepts long strings of text, several thousand characters. Set the *max_length* attribute as appropriate for the information that the variable is collecting. For example, to allow for entry of an address, set `max_length=200`, or other appropriate length.

Applicable variables: Single-line text, Wide single-line text

max_unit

Sets the maximum unit of time for the duration. Possible values are `max_unit=days`,`max_unit=hours`,`max_unit=minutes`, and `max_unit=seconds`.

For example, if `max_unit=minutes`, the duration is displayed in minutes and seconds. In this case, a duration of 2 days 3 hours 5 minutes 15 seconds is displayed as 3065 minutes 15 seconds.

Applicable variables: Duration

no_filter

Hides the filter fields that appear above a list collector.

Applicable variables: List collector

ref_ac_columns

Specifies the columns with display values that appear in an auto-completion list in addition to the name. Separate column names with a semicolon. For example, `ref_ac_columns=user_name;email;sys_created_on` allows auto-complete to match text from the user_name, email, and sys_created_on columns.

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Applicable variables: Reference, Requested For.

ref_ac_order_by

Specifies the column that is used to sort the auto-completion list. For example, `ref_ac_order_by=name` sorts the auto-completion choices alphabetically by name.

Applicable variables: Reference

ref_auto_completer

Specifies the name of a JavaScript class (client-side) that creates the list for auto-completion choices. Valid class values include:

- **AJAXReferenceCompleter**: Displays matching auto-complete choices as a drop-down list. The list only displays the display value column of the reference table. If there is no other auto-completion class specified, reference fields automatically use this class.
- **AJAXTableCompleter**: Displays matching auto-complete choices as rows in a table. The table displays the display value column of the reference table and any columns listed in the ref_ac_columns attribute.
- **AJAXReferenceChoice**: Displays matching auto-complete choices as a drop-down list. The list only displays the display value column of the reference table. The list only displays up to 25 matching choices. If there are more than 25 auto-complete choices, the reference field instead displays the choices with the AJAXTableCompleter class.

Applicable variables: Reference

ref_qual_elements

A list of fields to be sent back to the server to get an updated reference.

Applicable variables: Lookup multiple choice, Lookup select box, List Collector.

Important:
Attribute behavior is specific to the service catalog desktop.

Define a question choice for a variable

Define a question choice for a variable with service catalog.

Before you begin
Role required: admin

About this task
Some variable types present the user with a list of choices. For example, a multiple choice variable that asks how much memory you want in a computer requires you to define the available choices, such as 1 GB and 2 GB.

Procedure

1. Open the variable definition.
2. In the **Question Choices** related list, click **New**.
3. Enter the question choice details in **Question Choice** form and click **Submit** to save the record.
   - **Price** and **Recurring price**: variables can affect the item price and recurring price (if used).
   - **Order**: the number defining the order in which the price appears when displayed.

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- **Question**: the actual question being asked for that variable.
- **Text**: the choice presented to the user.
- **Value**: the value stored in the database.
- **Inactive**: Option to make a question choice inactive.

4. Repeat the steps for each available choice to define the full set of choices for that variable.

Note:
When you modify variable choices that are attached to a catalog item, the existing requested items (RITMs) are also affected. For example, if you add a variable choice for the catalog item, the value of that choice is also considered in the existing RITMs. If you delete a variable choice that is selected for a RITM, the value of that choice still persists in the RITM.

Service catalog data lookup

The Data Lookup and Record Matching Support for Service Catalog plugin offers similar features to the general Data Lookup and Record Matching Support plugin.

Use the plugin for service catalog to perform data lookups for variables. This lookup can be on service catalog item screens, on requested items, and on catalog tasks as a user fills out the values contained in variables.

Service Catalog data lookup roles

Service Catalog enables specific roles to participate in the process of creating and using Service Catalog data lookups.

Service Catalog data lookup roles

Role	Description
catalog_lookup_admin	Similar to data_lookup_admin. Can create, update, and delete catalog data lookup definitions, matcher variable definitions, and setter variable definitions.
catalog_lookup_manager	Can read catalog data lookup definitions, matcher variable definitions, and setter variable definitions. The role can be granted to anyone using catalog data lookups so they can see the definitions for which they are creating rules. As required, grant create, read, write, or delete access to the individual data lookup rules tables created to delegate maintenance.

Create a catalog lookup definition

Create a catalog data lookup definition record.

Before you begin
Role required: admin or catalog_admin

About this task

Note:
The *Run on Insert* and *Run on Update* options are not supported for catalog data lookups. Other options operate the same as for normal data lookup.

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Procedure

1. Navigate to **All** > **System Policy** > **Rules** > **Data Lookup Definitions**.
2. Click **New**.
3. Select **Catalog Data Lookup Rule**.
4. Enter a *Name*.
5. In *Applies to*, select catalog item or variable set.
6. In *Catalog item/Variable set*, select a specific item or set.
7. Select a **Matcher Table**.
8. Select other options, as required.
9. Right-click the form header and click **Save**.
10. From the *Catalog Matcher Variable Definitions* related list, click **New**.
11. Fill in the fields, as appropriate.

Catalog data lookup definitions fields

Field	Description
Name	Enter a unique name to identify the definition record.
Applies to	Select what the data lookup rule applies to: a catalog item or a variable set.
Catalog item/ Variable Set	Select the catalog item or variable set to which the data lookup rule applies.
Matcher Table	Any table within the current scope containing the lookup values. **Note:** The list shows only tables and database views that are in the same scope as the catalog data lookup definition.
Active	Select this check box to run this catalog data lookup rule. Clear the check box to ignore this catalog data lookup rule.
Run on form change	Select this check box to automatically look up values whenever a user changes a variable value on a catalog item or form. This option is the only supported method for catalog data lookup rules. **Note:** This option does not include changes automatically made by other data lookup rules, such as the priority lookup rules.

12. Click **Submit**.
13. From the *Catalog Setter Variable Definitions* related list, click **New**.
14. Fill in the fields as appropriate.

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Setter variable definition fields

Field	Description
Data Lookup	Displays the name of the parent data lookup definitions record.
Source variable field	Select the variable from the source item or variable set that the data lookup updates.
Matcher table field	Select the field from the matcher table that provides the new value for the update.
Always replace	Select this check box to replace any existing value with a value from the data lookup. Clear this check box to ignore the update if the field has an existing value.

15. Click **Submit**.
16. Click **Update**.

Add a data lookup value

The columns of a data lookup table contain both matcher and setter field data. Each data lookup is a query that searches for a row containing values that match the matcher fields.

Before you begin
Role required: catalog_lookup_admin

About this task
The data lookup then returns the value listed in the setter fields.

For example, you can define the matching settings for bronze, silver, and gold offerings as described previously.

Procedure
1. In the navigation filter, enter the name of the new custom lookup table.
2. Configure the list and create appropriate fields for the lookup table.
3. From the table list, click **New** and enter appropriate matcher and setter field values.
   For example:

Service Catalog lookup 1

Server Offering Lookups | New | Go to Order | 1 to 3 of 3

All

Order	Offering	Disk Space	Memory	Active
100	Gold	1000	32	true
100	Bronze	250	16	true
100	Silver	500	16	true

Actions on selected rows... | 1 to 3 of 3

Note:
Each row in a data lookup table must be unique.

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Custom data lookup

You can create a custom table to store lookup data.

The custom table must extend the Data Lookup Matcher Rules [dl_matcher] table.

For example, you can create a Server Offering Lookups table. It stores information about matcher offerings (bronze, silver, and gold) and associated setter values (memory and disk space) for each matcher offering.

Create a custom data lookup

Creating a catalog data lookup is similar to creating a normal, custom data lookup except when creating the catalog data lookup definition record.

1. Create a custom data lookup table. It must extend the Data Lookup Matcher Rules `[dl_matcher]` table.
2. Add data lookup values to the data lookup table.
3. Create a catalog data lookup definition record.
4. (Optional) Create a data lookup module.

Troubleshooting

If the custom data lookup definition rules are not behaving as expected, check for certain conditions.

If the custom data lookup definition rules are not behaving as expected, check for the following conditions:

- Ensure that the matcher variable is not read-only. Since users cannot change read-only variables, there cannot be an on form change event for read-only variables.
- Ensure that the data in the matcher table is correct.
- If the lookup requires an exact match, verify that there is a matcher table row for each possible combination (including blank values). The lookup fails if it cannot find a matching value.
- If the variable is an option or check box, it always has a value, so you must select **Always replace**.
- Verify that you have not created a recursive rule, such as:

  If Variable A = 1, then Variable B =2. If Variable B = 2, then Variable A = 2.

Audit service catalog variables

Audit the variables so that the audit history records all changes to the named variables.

Before you begin

Role required: admin

About this task

Auditing is enabled by default for service catalog variables.

These changes are displayed in:

- The requested item history for all variables associated with the item.
- The catalog task history for all variables that are used by the task.

This auditing allows service catalog administrators to view a full history of changes to variables that can affect the parent record, including their creation.

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Note:
Unnamed variables are not audited.

Procedure

1. Navigate to **All** > **System Properties** > **Service Catalog**.
2. Locate the line **Audit changes to Service Catalog Variables**.
3. Select the **Yes** check box to enable auditing.

Service Catalog variable editors

Variable editor displays variable values in fulfiller forms. A requester, while requesting the item, specifies these variable values in the catalog item questions.

Types of variable editors based on the catalog item type:

- For a catalog item, the VEditor (*com.glideapp.servicecatalog.VEditor*) displays the values of questions in the requested item and catalog task forms.
- For a record producer, the default variable editor (*com.glideapp.questionset.DefaultQuestionEditor*) displays the values of questions for records generated from a record producer for task-extended tables.

Warning:
The variable editor depends on the **Variables** column of the Task [task] table. By default, this column is inactive, and you should not make it active.

VEditor

The VEditor is applicable only for the requests created from catalog items.

In ServiceNow AI Platform, this editor is a formatter added on the requested item (RITM) form (Default View) and the catalog task form (Default View).

The VEditor is applicable only for RITMs and catalog tasks. It cannot be used for any other tables. To support catalog UI policies or catalog client scripts on the VEditor for the RITM and catalog task form, select the **Applies on Requested Items** and **Applies on Catalog Tasks** check boxes for the catalog UI policy or the catalog client script.

Note:
The values in the VEditor are displayed from the Options [sc_item_option] table. This is an internal table and you should not add any business rules to this table.

To make the VEditor read-only in ServiceNow AI Platform, activate the onLoad client script, *Variable Editor Readonly*, for the following tables:

- Requested Item [sc_req_item]
- Catalog Task [sc_task]

Note:
You can make the *Variable Editor Readonly* scripts conditional, by adding conditions to them.

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VEditor

Default variable editor

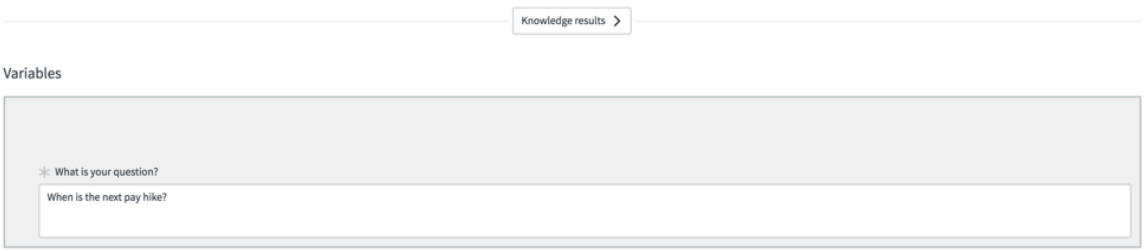
The default variable editor is applicable only for record producers. This editor is a formatter added on records that are generated by a record producer for task-extended tables. This editor displays the values of questions specified in the record producer.

By default, this editor is applicable for the Incident and Change tables. For other tables, you can configure this editor.

Catalog UI policies, catalog client scripts, catalog data lookups, reference qualifiers, and dependent reference fields are supported on the default variable editor only for task-extended tables. To support a catalog UI policy or a catalog client script on this editor, select the **Applies on the Target Record** check box for the catalog UI policy or the catalog client script.

Note:
The values in the default variable editor are displayed in the Question Answer [question_answer] table. This is an internal table and you should not add any business rules to this table.

Default variable editor



Variable editor in Agent Workspace

In Agent Workspace, the following scenarios are possible:

- If the variable editor formatter is available in the Workspace view of the form, the variable editor is automatically added to the **Variables** section in the Agent Workspace UI.
- If the variable editor formatter is added inside a section in the Workspace view of the form, that section does not display the variable editor in the Agent Workspace UI.

The following variable types are not displayed in the variable editor.

- Macro
- Macro With Label
- UI Pages

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The following variables are displayed as a select box in the variable editor:

- Multiple Choice
- Numeric Scale
- Lookup Multiple Choice

Variable editor in Service Portal

In the Service Portal UI, the variable editor is available for forms with the variable editor formatter.

Note:
Since Service Portal is only for requester use cases, it is recommended to use the Agent Workspace UI for the variable editor.

Making a variable editor read-only

The following options are available to make a variable editor read only, depending on application.

Service Catalog variable editors in the core UI

The *GlideForm* setVariablesReadOnly() method is supported for ServiceNow AI Platform and Agent Workspace forms to make the variable editor read-only. This method is intended for requested item, target record, and catalog tasks.

Note:
This method is not applicable in Service Portal and is not recommended for catalog forms.

Service Portal variable editors

To make the VEditor read-only in Service Portal, navigate to **Service Portal** > **Portals**, select **Service Portal**, and specify the following code in the **Quick start config** field.

```
"readonly_variable_editor": "true"
```

Note:
The UI Page, Macro, and Macro with Label variables are rendered even when the variable editor is read-only.

Configure the default variable editor for a task-extended table

After you configure the default variable editor for a task-extended table, you can view and edit the values of questions specified by the requester in the record producer. Applicable only for records generated by a record producer.

Before you begin
Role required: admin

Procedure

1. Create a formatter for the task-extended table.
   a. Navigate to **System UI** > **Formatters**.
   b. Click **New**.
   c. On the form, fill the fields.

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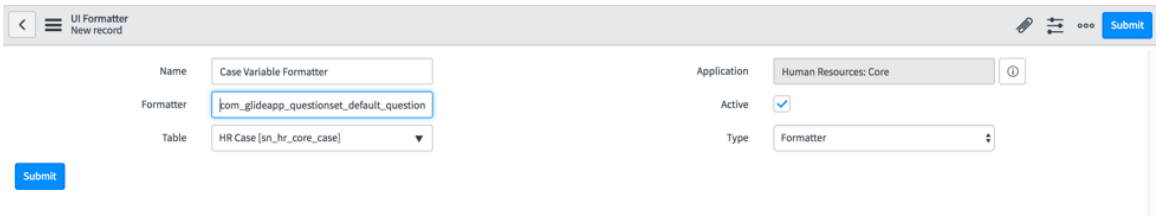
Field	Description
Name	The name of the formatter that is displayed in the form of the task-extended table.
Formatter	The file name of the formatter. In this case, specify `com_glideapp_questionset_default_question_editor`.
Table	The table that uses the formatter.
Active	Specifies if the formatter is active.
Type	The type of the formatter. In this case, specify `Formatter`.

UI formatter



d. Click **Submit**.

2. Add the formatter to the form of the task-extended table.
The formatter is displayed on the form according to your selections.

a. From the **Additional Actions** menu on the form, select **Configure** > **Form Layout**.

b. Use the list to select the display order for the formatter field.

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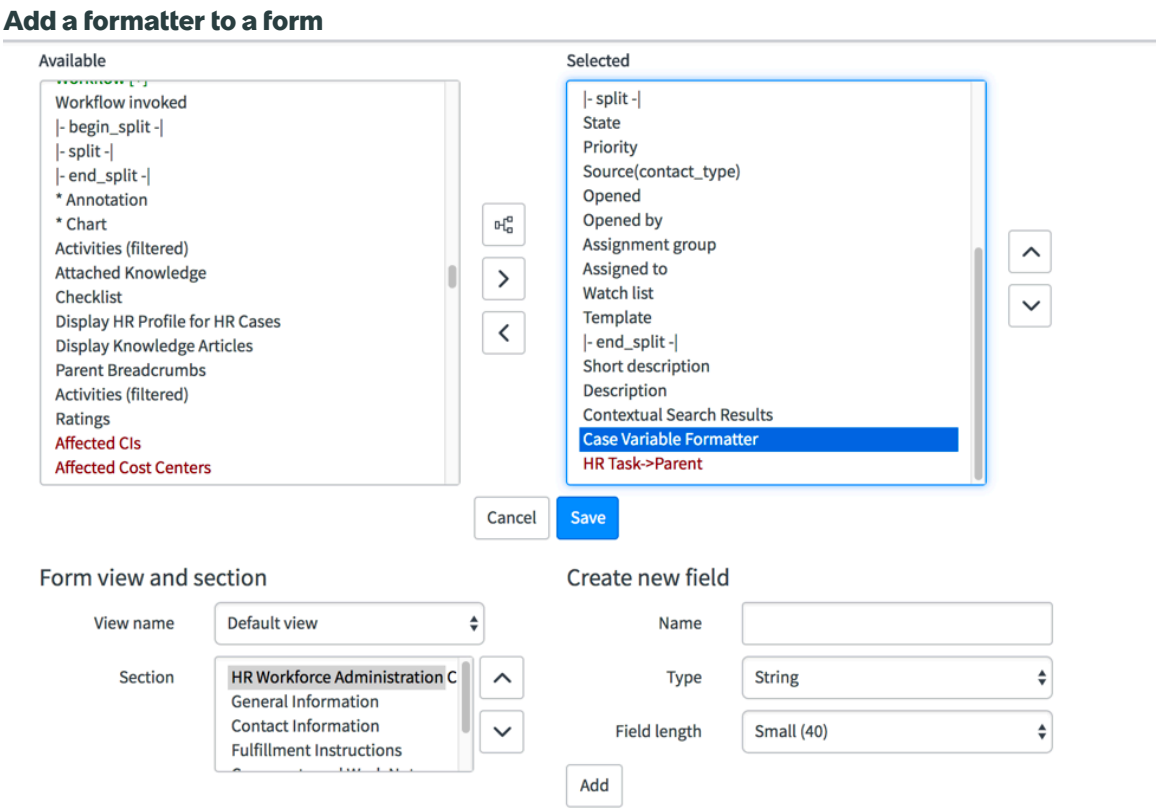
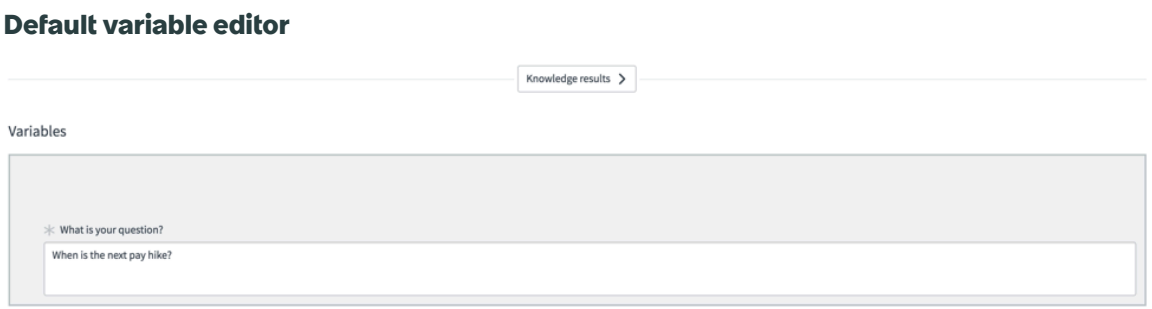


c. Click **Save**.
The default variable editor is available on the form.



Prefilling variable values on the catalog item form in the portal and Next Experience UIs

When catalog item requesters want to order items on portals or Next Experience UI, you can set the catalog items to use the key-value pairs, which prefill the variable values. The requesters can finish forms faster.

The values set by this method are applied as if they were user-given values. That means dynamic behaviors (Catalog UI policies, catalog client scripts, and so on) work for these values.

This feature is enabled by default. To turn off this feature, you can set the *`glide.sc.enable_url_prefill`* property to false.

Prefilling forms on portals

You can configure catalog items in portals like Service Portal or Employee Center to prefill forms by modifying the URL.

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Note:
In portals, you can find widget instance option called **Disable URL prefill**. This check box is turned off by default. Select this option to disable URL prefill on that specific portal.

To configure prefill, you can do the following actions:

1. Use a URL parameter, *sysparm_variable_values*, to construct the key-value pairs. In the key-value pair, key is the name of the variable and value is the value of that variable.

   Note:
   The value for a reference variable must be a sys_id.

2. Provide the value as a URL parameter of *sysparm_variable_values*. For example, if you want to set **Department** as "Sales" and **Business justification** as "employee onboarding", then use the following URL.

   ```
   /sp?
   id=sc_cat_item&sys_id=e56a7ffe41011300964ff05369414ebd&sysparm_variable_val
   onboarding", "department":"221db0edc611228401760aec06c9d929"}
   ```

3. To test the URL, you can add the URL in the browser's address bar and open it.

   You can observe that the **Department** field is prefilled with the value "Sales" and the **Business Justification** field is prefilled with the value as "employee onboarding" on load.

   The following variables aren't supported for prefill:

   - Attachment
   - Custom
   - Custom with label
   - Non-input taking variable types such as label, container
   - Masked
   - UI page
   - Multi-row variable set (MRVS)

   The order in which these variable values are prefilled is the order in which the variables are defined on the catalog item form.

Prefilling forms on Next Experience UIs

Configure key-value pairs to prefill catalog item request forms on Next Experience UIs. For the Next Experience UIs, the key-value pairs are sent directly to the component as an input property.

When the catalog item or form is rendered after the user selects the item, these key-value pairs are passed to the component as an object. The component then parses the object and prefills the form accordingly.

To configure the key-value pairs, perform these steps:

1. Navigate to **All** > **Now Experience Framework** > **Experiences**.
2. Select the UX application for which you want to set prefill values.
3. Select **Open in UI Builder**.
4. Open the page with the catalog item that you want to set the prefill values for.
5. On the catalog item macroponent, use the variableValues property.

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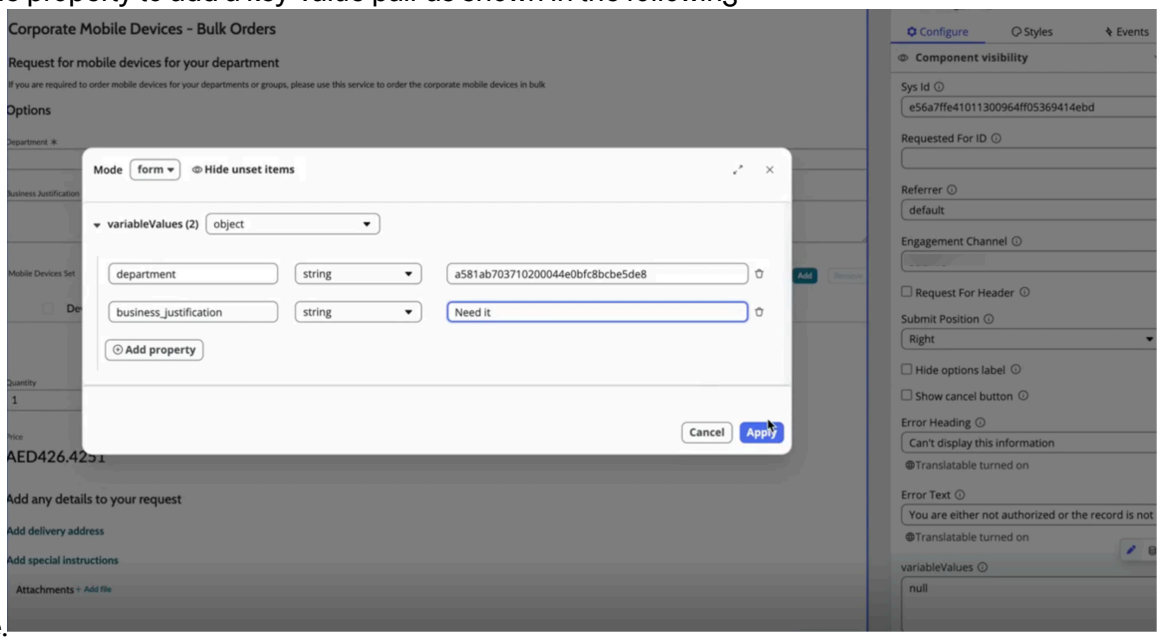
6. Edit the property to add a key-value pair as shown in the following image.



7. After providing the key-value pair, save the item and select **Preview** > **Open URL path**.

Prefilling forms for inline catalog items in Virtual Agent

You can set prefill values for the inline catalog item form used in Virtual Agent.

To configure prefilling forms for inline catalog items, perform these steps:

1. Open the topic, for example, Request Catalog Item Inline-seismic.
2. In the variableValues property, provide the key-value pairs as a stringed JSON object.

There are two ways of configuring this feature. You can provide a stringed JSON object or you can write a script.

In this example, as shown in the image, there are two variables, Department and Business justification. Set the value to true for both the variables. You can

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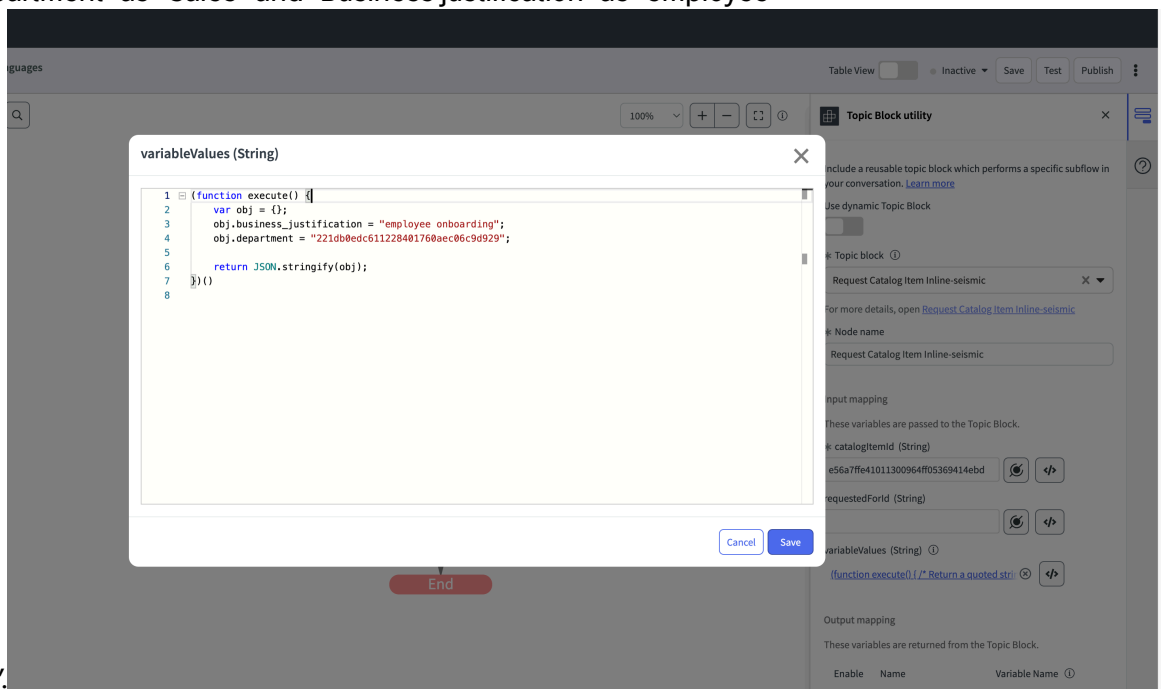
specify "Department" as “Sales” and "Business justification" as “employee onboarding”.



Once you configure this, when requesters request items, they would see the forms prefilled.

Service catalog variable sets

Administrators and catalog administrators often define multiple catalog items that use the same group of service catalog variables. Catalog managers and catalog editors can attach a variable set for items to which they are assigned. However, catalog managers and catalog editors cannot create a variable set.

For example, a catalog administrator defines 10 catalog items for types of servers. The request process for all these items asks the same five questions, using the same variables.

Associating these variables individually per catalog item is repetitive, time-consuming, and error-prone. Also, to make a single change to multiple catalog items involves manually changing each item. For example, to add a variable to 10 catalog items, you would need to manually associate the variable with each item.

Variable sets allow you to create a collection of variables that can be reused across multiple catalog items and order guides. Using variable sets saves time because you do not have to create the same variables individually for many catalog items. Also, when variables should be modified, you can modify the variable set and the changes are reflected across all the catalog items that are associated with the variable set.

Variable sets also allow you to define catalog client scripts and UI policies that are applicable to the variables in the set.

Note:
Variables in a set use the same rules as other variables to determine when the variables in a set appear on a task. For example, variables must either be global or be attached directly to an item.

A catalog administrator can provide read, write, and update roles to access a variable set. When you access variables of a variable set, a validation is first done at the variable set level, and then at the variable level. If the access is blocked at the variable set level, then the access settings on the variable are over-ridden. If the access is allowed at the variable set level, then access at the variable level is verified.

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Note:
Both single-row and multi-row variable sets are supported in ServiceNow AI Platform, Service Portal, Now Mobile, and in the Variable editor in Agent Workspace.

Single-row variable set

Use a single-row variable set to capture data from variables that are grouped together, while submitting a catalog item request for a single entity.

Multi-row variable set

Use a multi-row variable set (MRVS) to capture variable data in a grid layout while submitting a catalog item request for a group of entities. For example, for HR during the reorganization of employees, a single record producer should be able to capture the relevant information such as the department and manager for a group of employees. Also, when you request a catalog item to order virtual machines and servers, configuration options should be captured as a single request. In this case, a requester can define multiple hardware units as rows and their configuration options as columns of an MRVS.

You cannot include the following variable types in an MRVS:

- Attachment
- Break
- Container End
- Container Start
- Container Split
- HTML
- Label
- Macro
- Macro with label
- Rich Text Label
- UI Page

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Note:

- You can configure an MRVS variable to disallow duplicate values. For information about the **Unique** field, see Create a service catalog variable.
- You can hide a variable in the MRVS so that it does not appear when the dialog box is open.
- The **Map to field** functionality is not supported for variables used in an MRVS.
- Only the glide list interface is supported for the List Collector variable.
- Cascading functionality for variables in an order guide is not supported in an MRVS.
- An MRVS is not displayed when added within a container.
- You cannot add variables with read roles in an MRVS.
- When you clone a request that contains an MRVS, the information that is specified in the MRVS is available in all cloned requests. All UI policies and client scripts on the MRVS are also cloned.
- Set a limit to the number of rows that you can add to an MRVS by using the *max_rows* attribute in the **Variable Set attributes** field.
- In the RITM and request view in Now Mobile, an MRVS is not supported. A message is displayed in this view that this variable set is not viewable.
- An MRVS is supported in the variable summarizer only in Service Portal.
- You can include an MRVS in the GetCatalogVariables and CreateCatalogTask actions using Workflow Studio.
- You can iterate through individual rows and access variables using the For Each flow logic.
- You can include MRVS while creating a catalog task using a workflow.

An MRVS form changes dynamically based on the data in the catalog item form that includes the following:

- Other rows of that MRVS
- Other variables outside of that MRVS on the catalog item form.

For information about accessing data in a multi-row variable set (MRVS) when a dialog box is open, see g_service_catalog - Client.

You can define catalog client scripts, catalog UI policies, and catalog data lookups for an MRVS. Visibility is honored just on the MRVS form and not in the list.

Note:

- *onSubmit* catalog client scripts are not supported for an MRVS.
- Catalog UI policies and catalog client scripts defined at the item level are not applicable for variables in an MRVS. Only those catalog UI policies and catalog client scripts defined within the MRVS are applicable for variables in the MRVS.
- Scripts that are not included in an MRVS cannot affect variables inside the MRVS. Similarly, the scripts included in the MRVS cannot affect the variables that are not included in the MRVS.
- Variables that are not included in an MRVS cannot be used in dependent reference qualifiers for variables in the MRVS. Similarly, the variables included in the MRVS cannot be used in dependent reference qualifiers for variables that are not in the MRVS. For a reference qualifier, the current row is the one that is being edited.

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You cannot set **Global** as `True` for any variable that belongs to an MRVS. So, an MRVS is not available in catalog tasks.

If the variables included in the MRVS have price implications for a catalog item, the price of the catalog item reflects the corresponding changes when a row is added, edited, or removed from this variable set.

Note:
When you disable the *glide.sc.use_cart_layouts* property, the Order Item Widget does not reflect the price changes of the item from the MRVS. However, when you add this item to the cart, these price changes are reflected.

You cannot select variables of an MRVS when defining the following for a catalog item:

- UI policy conditions
- Unsupported ATF step configurations. You can only validate if an MRVS is visible, mandatory, or read only.
- Reporting

Create a variable set and add it to an item

Create a set of variables and add them to multiple catalog items and order guides for reuse.

Before you begin
Role required: catalog_admin, admin, catalog_editor, or catalog_manager

About this task

- Variable sets within a catalog item cannot have the same internal name.
- Within a catalog item, the name of a variable cannot be the same as the title or internal name of a variable set.
- Any catalog client script or catalog UI policy script should refer to the internal name of a variable set instead of its name or title.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Variables** > **Variable Sets**.
2. Click **New**.
   The Variable Set Creation page is displayed.
3. Select any of the following.

4. Enter details.

Field	Description
Title	Title of a variable set. Appears if the **Display title** check box is selected.
Internal name	Variable set name for internal use. For example, to access the variable set for the front-end (through the *g_form* API) and server side scripting.
Order	Order number for the variable set.
Type	Type of the variable set. Possible choices are:

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Field	Description
	○ Single Row ○ Multi Row
Application	Applications that can use this variable set.
Display title	If selected, adds a title and an expandable header to the right of the variable set. **Note:** When a user requests the item, all check box variables are grouped under a default title of **Options**. To use a custom title, insert a variable of type **Label**, with an **Order** value that puts it directly above the check box variables.
Variable Set attributes	Attributes for configuring a multi-row variable set. Use the *max_rows* attribute to set a limit to the number of rows that you can add to a multi-row variable set. For example, specify `max_rows=1` as the field value.
Layout	The layout display. Set to **1 Column Wide** or **2 Columns Wide, alternating sides** or **2 Columns Wide, one side, then the other**.
Description	Description of the variable set.

5. Right-click and select **Save**.
6. Create the variables to use in that set.
   a. In the Variables related list, click **New**.
   b. Follow the steps for creating variables.

   Note:
   For a multi-row variable set:
   - The included variables are displayed as columns of a table.
   - The column order is the order of variables defined in the variable set.

7. To create an associated catalog data lookup rule, perform the following steps.
   a. In the Catalog Data Lookup Definitions related list, click **New**.
   b. On the Catalog Data Lookup Definitions form, fill the fields.
   For information on creating a data lookup rule, see Create a catalog lookup definition.
8. Click **Submit**.

Add a variable set to a catalog item or order guide

Service Catalog enables you to add a variable set to one or more catalog items or order guides.

Before you begin
Role required: catalog_admin, admin, catalog_editor, or catalog_manager

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Procedure

1. Open a catalog item or an order guide.

2. In the **Variable Sets** related list, click **Edit**.

   You can configure the form to add the **Variable Sets** related list.

3. Select and add a variable set.

   Note:
   If the **Cascade Variables** check box is selected for an order guide, multi-row variable set data should be cascaded to the included items.

4. Click **Save**.
5. Click **Try**.

   Note:
   For a multi-row variable set:

   - The associated variables are displayed as columns of a table on a catalog item or record producer. Each row corresponds to a set of data for all variables in the variable set.
   - The column order is the order of variables defined in the variable set.

6. **Optional:** Edit a multi-row variable set.

   a. To add a row, click **Add** within the variable set, specify the variable information in the **Add Row** window, and click **Add**.

   Note:

   - A maximum of 50 rows can be added.
   - Unless default values are provided for variables or On Load scripts are used to pre-populate data, you should add variable data for each row.

   b. To edit a row, click the edit row icon in the **Actions** column, specify the variable information in the Edit Row window, and click **Save**.

   Note:
   When you add or edit an existing row, all catalog UI policies and client scripts associated with the multi-row variable set should be honored.

   c. To remove a row, click the remove row icon in the **Actions** column and click **Remove** in the confirmation window.

   d. To remove all rows of the table, Click **Remove All** within the variable set and click **Remove** in the confirmation window.

Variable set layout

Variable sets can have one of many layouts. You can define the order of the variables for each item.

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- **1 column wide**: Variables appear in a single vertical column, ordered from top to bottom. This column is a simple way to display information, but can result in empty space to the right of questions. This order is the default layout.
- **2 columns wide, alternating sides**: Variables are laid out in two columns with variables placed alternately in the left and right columns.
- **2 columns wide, one side, then the other**: The first half of the variable set is laid out sequentially in the left column and the second half is laid out sequentially in the right column.

Note:
Variables with several possible choices defined, such as multiple choice variables, are considered a single entity in layouts. All choices are displayed as a single, contiguous unit.

Variable set order

A variable set is a discrete unit with an order number by default. All variables within the set are included wherever the set is included.

For example, if you set the following order for some example variables and a variable set:

- Variable A (100)
- Variable B (200)
- Variable C (300)
- Variable Set 1 (250) - containing three variables (VS1, VS2, VS3) with incremental order values (150, 250, 350)

The variables are displayed in this order:

- Variable A (100)
- Variable B (200)
- Variable Set 1 (250): Variable VS1 (150)
- Variable Set 1 (250): Variable VS2 (250)
- Variable Set 1 (250): Variable VS3 (350)
- Variable C (300)

Additional layout options

For additional layout options, you can also add container variables to a variable set.

For example, create the following variables and orders:

Order of variables

Variable	Order
Alfa	100
Bravo	200
Charlie	300

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Order of variables (continued)

Variable	Order
Delta	400
Echo	500
Foxtrot	600

Order of variables in a layout

1 Column Wide	2 Columns Wide, alternating sides	2 Columns Wide, 1 side, then the other
Alfa	Alfa Bravo	Alfa Delta
Bravo	Charlie Delta	Bravo Echo
Charlie	Echo Foxtrot	Charlie Foxtrot
Delta		
Echo		
Foxtrot		

Set an item-specific order

You can set the order value on a per item basis.

Before you begin

Role required: admin

About this task

When a variable set is used by more than one catalog item, you can define item-specific ordering to provide more flexibility in the layout. You do this using the catalog variable set record associated with the item.
Use the **Order** field in this catalog variable set record to set this order value on a per-item basis, overriding the default value defined in the variable set.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**.
2. Open the catalog item to edit.
3. Navigate to the Variable Sets related list.
4. Click the reference icon for the variable set.

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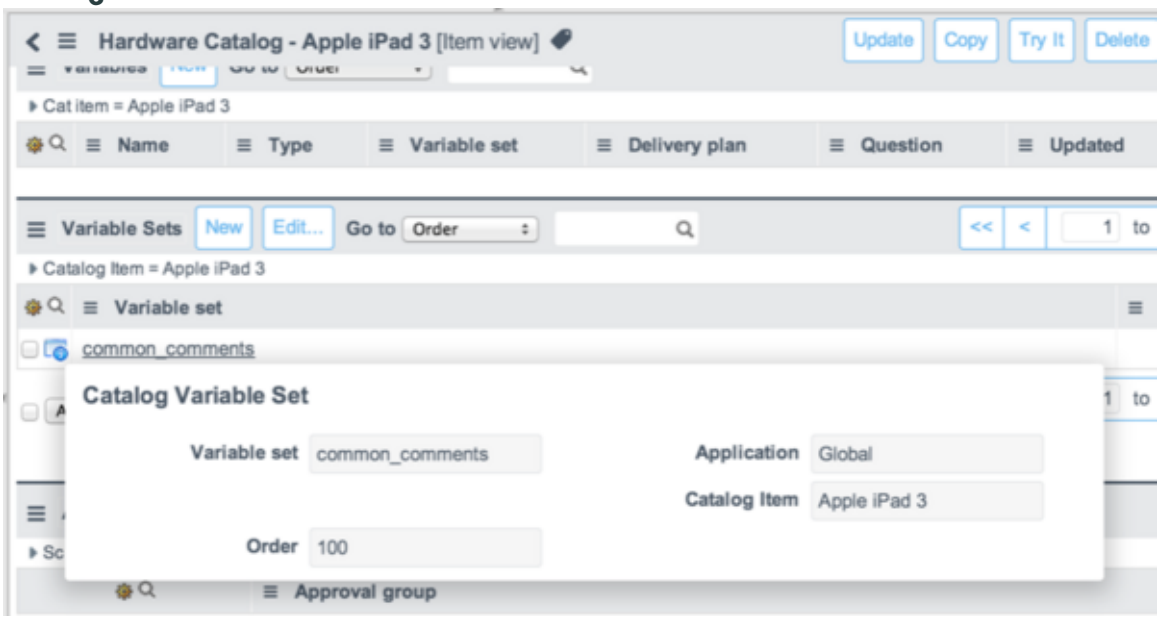
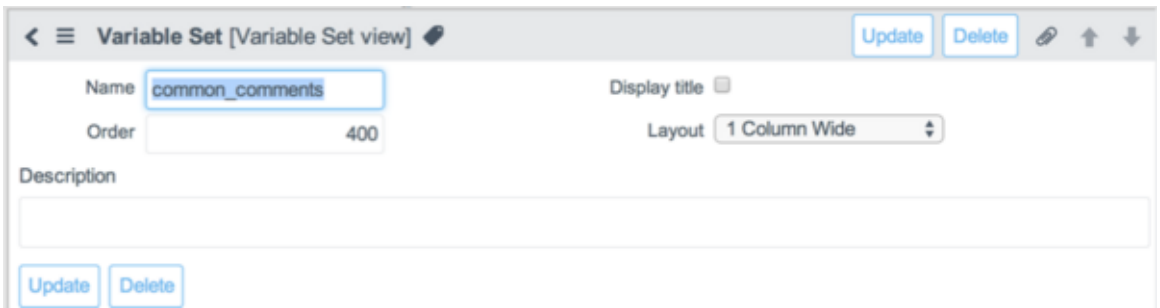
Catalog variable set



5. Set the order value as required.
   The catalog variable set order is specific to the link between the item and the variable set. It overrides the default order defined on the variable set itself.

Variable set order



Examples of variable set orders

The following example demonstrates the layout of variables when variable sets and item variables are associated with an item under different scenarios.

The order for display of the variables and variable sets is specified using the Information icon in the Related Lists.

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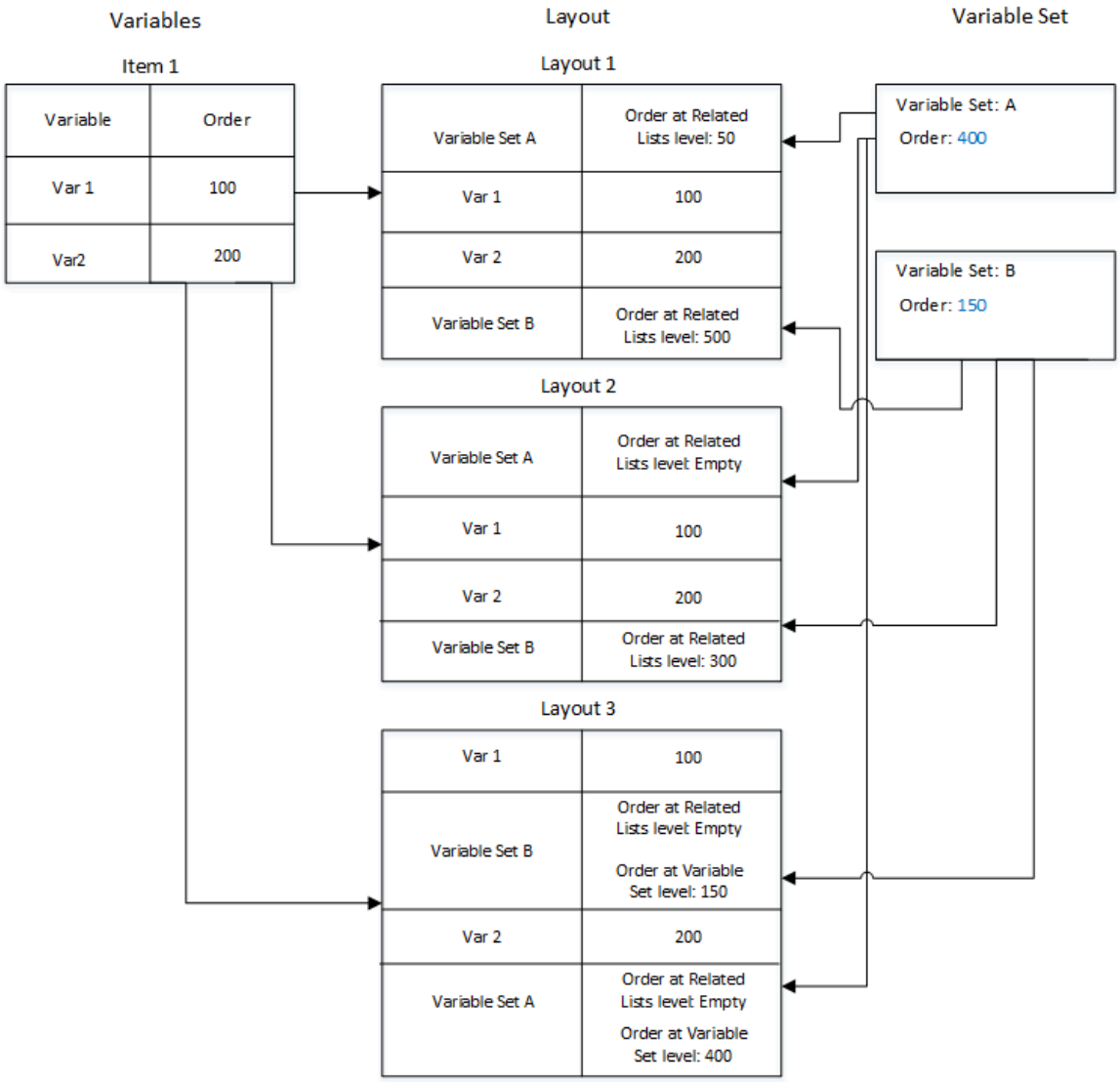
Order of variables and variable sets



- In Layout 1, order values are specified for both Variable Set A and Variable Set B at the Related Lists level and those order values always takes precedence. Hence, the layout is organized based on the order value specified for the variable sets at the Related Lists level.
- In Layout 2, an order value is not specified for Variable Set A whereas an order value is specified for Variable Set B at the Related Lists level. In this case, the empty value for Variable Set A is considered as zero. Hence, the layout is organized based on the order value of 0 for Variable Set A and 300 for Variable Set B.
- In Layout 3, order values are not specified for both Variable Set A and Variable Set B at the Related Lists level. In this case, the order values specified within the variable sets are considered. Hence, the layout is organized based on the order value of 400 for Variable Set A and 150 for Variable Set B.

Service Catalog parameters

You can use the Service Catalog parameters to identify the parent mapping configuration for a request, and join the service catalog flow from any other flow. For example, from an incident flow, you can create a request, and associate the request with the incident.

These parameters are passed in the application URL.

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Service Catalog parameters

Name	Description
sysparm_parent_sys_id	sys_id of the source record that is passed to the target record generated from it. Format is *sysparm_parent_sys_id*= <sys_id of the parent>. For example, sysparm_parent_sys_id=85071a1347c12200e0ef563dbb9a71c1.
sysparm_parent_table	Name of the parent table from which the catalog request is created. Format is *sysparm_parent_table*=<name of the parent table>. For example, sysparm_parent_table=incident.
sysparm_view	Type of the catalog view. Format is *sysparm_view*=<name of the catalog view>. For example, sysparm_view=catalog_default. **Note:** This is only applicable in Platform.
sysparm_processing_hint	Specifies a processing hint. Format is *sysparm_processing_hint*=setfield:request.parent=<incident sys_ For example, sysparm_processing_hint=setfield:request.parent=85071a1347c12200e0ef563dbb9 **Note:** If specified, this parameter overrides the configuration in the **Request Parent Mapping** sub-module.

Related topics

Create a request from an incident

Catalog Wizard form

Description of the fields for the Catalog Wizard Step, Catalog Wizard Section, Variable, and Catalog Wizard Question forms in Service Catalog wizards.

Catalog Wizard Step

Field	Description
Name	Unique name of the step.
Wizard	Wizard for which you are creating the step.
Hide on template	Option to hide the step in the catalog item template.
Custom step	Option to configure the step as a custom step.
Short description	Brief description of the step.
Feedback	Option to associate a feedback record with the step in the catalog item builder wizard or record producer builder wizard.

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Catalog Wizard Step (continued)

Field	Description
Template feedback	Option to associate a feedback text with a step in the catalog item template.
Order	Order where the step is placed in Catalog Builder.
Macroponent	Reusable seismic building blocks in the Next Experience UI Framework that can be used to create a custom step. This field appears only when the **Custom step** check box is selected. For more information, see https://developer.servicenow.com/dev.do#!/reference/now-experience/sandiego/ui-framework/getting-started/introduction

Catalog Wizard Section

Field	Description
Name	Unique name of the section.
Style	Display style of the section.
Order	Order in which the section appears inside a step.
Wizard step	Step with which the section is associated.
Short description	Brief description of the section.
Width	Width of the section in Catalog Builder.

Variable

Field	Description
Map to field	Maps the question to a specific field on the Catalog Item (sc_cat_item) table or Record Producer (sc_cat_item_producer) table.
Type	The variable type that you want to create.
Catalog item	Catalog item associated with the question.
Active	Option to make the variable available for use.
Mandatory	Option to make the variable mandatory as part of the ordering process.
Hidden	Option to hide the variable.
Read-only	Option to make the variable read only or editable.
Question	Question to ask catalog item creators in Catalog Builder.
Name	Name to identify the question.
Tooltip	Tooltip text to display when catalog item creators point to the variable in Catalog Builder. You can enter a brief note to describe the purpose of the question.

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Variable (continued)

Field	Description
Example Text	Hint that is displayed in the **Question** field before a catalog item creator enters a value. Applicable for the following variables: • IP Address • Email • URL • Single Line Text • Wide Single Line Text • Multi Line Text • Date • Date/Time

Catalog Wizard Question

Field	Description
Wizard section	Section with which the question must be associated with.
Map to set	Option to map the question to a question set. The **Set** field is enabled only when this option is selected.
Order	Order in which the question must appear inside a section.
Question	Option to associate a question to the section. **Note:** You can create a new variable to associate to a question or select an existing one. For information on creating a new variable, see Add a step, section, or question to a catalog item wizard.
Set	Option to associate a question set to the section if you have selected the **Map to set** option.

For information about adding a step, section, or question to a catalog item wizard, see Add a step, section, or question to a catalog item wizard.

Record Producer form

Description of the fields on the Record Producer form.

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Record Producers in the Service Catalog

Field	Description
Name	The descriptive name for the record producer. **Note:** The list shows only tables and database views that meet the scope protections for field styles.
Table name	The table in which the record producer creates records.
Active	A check box for making the record producer active. Only active record producers are available to users if they meet the role criteria.
Preview Link	A link that opens a preview of the item.
Post insert script	Script that operates on the submitted record, after the record is inserted in the associated table. **Note:** Post insert script overrides the target record values and record producer template values.
Accessibility	
Catalogs	The service catalog this record producer belongs to.
Category	The service catalog category this record producer belongs to. When users perform catalog searches, only items that are assigned to a category appear in search results.
View	The CMS view in which the item is visible.
Roles	The roles required to use the record producer.
Availability	The interface the record producer is available from: **Desktop and Classic Mobile**, **Desktop Only**, or **Classic Mobile Only**.
Can cancel	A check box for displaying a **Cancel** button on the record producer. Users can click **Cancel** to cancel the record producer and return to the last-viewed screen
What it will contain	
Short description	A short summary of the record producer.
Description	The full description of the record producer. You can embed videos, images, links to internal knowledge base (KB) articles, and links to external sources of information and instruction documentation. The description appears under a **More information** link on the record producer to give users any additional information they need.
Meta	Comma-separated list of tags used to search for the record producer. See Configure keyword search for catalog items.
Hide on Service Portal	If selected, the record producer is not available on Service Portal.

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Record Producers in the Service Catalog (continued)

Field	Description
Redirect To	Specifies the redirect behavior of the record producer after its generation. Possible values are: • **Generated Task record**: Redirects to the task record created using the record producer. • **Catalog Homepage**: Redirects to the service catalog where the order for the record producer is placed. The default value is based on the **Specifies the default behavior of record producer after record generation** property in the **Service Catalog** > **Catalog Administration** > **Properties** page.
Script	Scripts that are run to dynamically assign values to specific fields on the created record.
Icon	The small icon that appears on the list of service catalog items. Click the **Click to add** link and upload the photo.
Picture	The picture that appears at the top of the record producer form on the desktop view. Click the **Click to add** link and upload the photo.
Classic Mobile picture	The small picture that appears on the list of service catalog items. Click the **Click to add** link and upload the photo. This field is available when you select the **Classic Mobile** for the **Classic Mobile picture type**.
Classic Mobile picture type	The picture that the mobile interface uses on the list of service catalog items. Select one of the following: • Desktop: Uses the icon specified in the **Icon** field. Selecting this option hides the **Classic Mobile picture** field. • Classic Mobile: Uses the icon specified in the **Classic Mobile picture** field. • None: Does not use any picture on the mobile view. Selecting this option hides the **Classic Mobile picture** field.
Generated Record Data	
Template	Static assignments for fields on the created record.
Portal Settings	
Hide Attachment	If selected, the **Add attachments** button is not displayed for the record producer. **Note:** • Applicable for a catalog item and record producer. • An order guide inherits this setting from the included catalog item.
Hide 'Save as Draft'	If selected, the **Save as Draft** button isn't displayed for the record producer on the portals.

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Record Producers in the Service Catalog (continued)

Field	Description
	You can let requesters save a draft of a record producer while requesting it on the portals such as Employee Center and Service Portal, and Now Mobile app. The requesters can access the saved drafts from the My Request widget in the **Drafts** tab on the portals and edit the drafts.
Mandatory Attachment	If selected, adding an attachment is mandatory for the record producer. **Note:** Applicable for a catalog item and record producer.
Universal Request Config	
This section is available only when the Universal Request plugin (com.snc.universal_request) is activated. For information about this configuration, see Service Catalog configuration for Universal Request.	
UR certified/ enabled item	Option to specify that a universal request should also be created along with a task-based record. In the universal request, a reference is created to the associated task-based record, which becomes the primary task of the universal request.
Requires Additional Review	Option to automatically select the **Needs resolution review** check box on the corresponding universal request. For information about the universal request fields, see Universal Request form. The **Requires Additional Review** field appears only when the **UR certified/ enabled item** check box is selected.

For information about creating record producers, see Create a record producer.

Order guide form

Description of the fields on the Order guide form.

Order guide form

Field	Description
Name	Order guide name that appears in the catalog.
Active	Check box to indicate whether the order guide is active or not.
Category	Category heading under which the order guide appears in the catalog.
Two step	Check box to enable two step ordering instead of the default three-step ordering, omitting the final step. With two step ordering, selecting **Check out** submits the request immediately, then displays the order confirmation screen. This is not applicable for Service Portal.
Icon	A 16x16 pixel image to appear as an icon beside the order guide name in the catalog. If no image is uploaded, the default icon appears beside this order guide. To use your own default icon, upload an image, overwriting the image stored in images/service_catalog/generic_small.gif.

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Order guide form (continued)

Field	Description
Cascade variables	Check box to select whether the variables used cascade, which passes their values to the ordered items. If this check box is cleared, variable information entered in the order guide is not passed on to ordered items.
Ordered Item Link	Link to more information about an ordered item. Select a predefined link item to appear on the ordered item screen. Customers can click the link to access more information. This is not applicable for Service Portal.
Roles	Roles that users must have to access this order guide.
Short description	Summary of the order guide purpose.
Description	Description that appears on the first page of the order guide. Apply formatting with the HTML editor.
Meta	Comma-separated list of tags used to search for the order guide. See Configure keyword search for catalog items.
Hide on Service Portal	If selected, the order guide is not available on Service Portal.
Picture	[Optional] Image of the item.
Order to cart	Check box allowing users to add order guides to their cart, then continue shopping rather than checking out immediately. This is not applicable for Service Portal. **Note:** This setting only works when the *Two step* check box is also set to true.
Portal Settings	
Use these settings to configure the order guide behavior in Service Portal.	

Request method	Setting that controls the label displayed for the **Order Now** button and the order submission experience.
	
	• **Order**:
	  ○ Button label: **Order Now**
	  ○ Confirmation dialog box: Displayed
	  ○ Delivery information: Editable
	
	Note:
	This is the default setting.
	
	• **Request**:
	  ○ Button label: **Request**
	  ○ Confirmation dialog box: Displayed
	  ○ Delivery information: Not displayed.
	
	This setting can be used in scenarios such as a code access request where the delivery information is pre-determined.

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Order guide form (continued)

Field	Description

	• **Submit**:
	  ○ Button label: **Submit**
	  ○ Confirmation dialog box: Not displayed
	  ○ Delivery information: Not displayed
	  This setting can be used in scenarios such as reset password request where no further request information is required.

Hide 'Add to Cart'	If selected, the **Add to Cart** button is not displayed for the order guide. If the **Show Add to Cart** instance option of the widget is set to false, then this setting is ignored. This setting is selected by default if the **Request method** is **Request** or **Submit**. For upgrade scenarios, if the **No cart** field is selected in Platform, run the *CatalogPortalSettingsMigration* script include to update this setting to the **Hide 'Add to Cart'** field in the **Portal Settings** tab.
Show Include Toggle	If selected, a toggle is displayed for each catalog item in the **Choose Options** section in Service Portal. You can click this toggle to include or exclude the catalog item from the order guide request. For zBoot customers, this option is selected by default for existing order guides in the demo data and new order guides. For upgrade customers, this option is selected by default only for new order guides.

For information about creating an order guide, see Create an order guide.

Catalog Item form

Description of the fields on the Catalog Item form.

Catalog Item form

Field	Description
Name	Name to appear in the catalog.
Catalogs	Catalogs this item appears in.
Category	Category for the item. Categories can only be selected after the **Catalogs** field is populated. Catalog searches find only items that are assigned to a category in the Service Portal. For Employee Center, catalog searches find only items that are associated with a taxonomy topic. For more information, see Associate a catalog item with a taxonomy topic in Employee Center.

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Catalog Item form (continued)

Field	Description
Model	Product model to which the item is linked. This field is visible by default only for items created by publishing models. Click the reference icon to view the product model.
Active	Check box to make the item active (available to be ordered). **Note:** Inactive catalog items added to order guides do not appear in the order guide. Use **Visible On Guide**, **Visible elsewhere** to hide the item and show only in the order guide.
Fulfillment automation level	Option to specify the level of fulfillment automation for catalog item requests. The available options are: • Unspecified: Automation level of catalog item is not specified. • Manual: Catalog item is not automated. • Semi-automated: Catalog item is semi-automated. • Fully automated: Catalog item is completely automated.
Access Type	Option to specify if a request can be submitted for a user who does not have access to the catalog item. Possible options are: • Restricted: The request can only be submitted for users who have access to the catalog item. • Delegated: The request can be submitted even for users who do not have access to the catalog item. By default, this field is set to `Restricted`. For information about delegated request experience, see Delegated request experience. **Note:** This functionality is only applicable when the catalog item has a Requested For variable.
Owner	Owner of the catalog item who has edit access to it.
Template	Template using which the item is created.
Preview Link	Click **Preview Item** to preview in a new window how the current item definition would look in the catalog.
Ordered Item Link	Link to preview, as shown on the ordered item screen.
Hide on Service Portal	If selected, the catalog item is not available on Service Portal.
Availability	Devices to display the item: **Desktop and Classic Mobile**, **Desktop Only**, or **Classic Mobile Only**.

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Catalog Item form (continued)

Field	Description
	Note: Unsupported catalog item types are not displayed on Classic Mobile devices, even if **Availability** is set to show an item of this type.
Item Details	
Short Description	Text that appears on the service catalog homepage, search results, and the title bar of the order form.
Description	Full description of the item. This description appears in the catalog when a user selects the item or clicks the associated **Preview** link. You can embed videos, images, links to internal knowledge base (KB) articles, and links to external sources of information and instruction documentation.
Meta	Comma-separated list of tags used to search for the catalog item. Use commas between keywords for better results when searching. The Zing search engine removes common words from search queries that do not produce meaningful results. See Configure keyword search for catalog items.
Process Engine **Note:** You can specify a value for only one of these fields.	
Flow	Flow that defines how the item request is fulfilled.
Workflow	Workflow that defines how the item request is fulfilled.
Execution plan	Execution plan (formerly named delivery plan) that defines how the item request is fulfilled.
Picture	
Icon	Image to appear as an icon beside the item name in the catalog. Upload a 27x27 pixel image. If no image is uploaded, the default icon appears beside this item. To use your own default icon, upload an image. The uploaded image overwrites the default image stored in `images/service_catalog/generic_small.gif`.
Picture	Image of the item.
Classic Mobile	
Classic Mobile Picture Type	Type of picture to display for the item on mobile devices. Set to **Desktop** to use the standard desktop picture, **Classic Mobile** to use a specific image for the mobile device using the **Mobile picture** field, or **None** to not use a picture.
Classic Mobile Picture	Image file for the mobile picture. The field appears if **Classic Mobile picture type** is set to **Classic Mobile**.
Hide Price (classic	Check box to hide the item price on mobile devices. Clear the check box to display the price.

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Catalog Item form (continued)

Field	Description
mobile listings)	
Pricing	
Price	Price for the item. Select the currency from the choice list.
Recurring Price	Price that occurs repeatedly at a regular interval. For example, a printer maintenance service could have a $100.00 monthly recurring price.
Recurring Price Frequency	Time frame for recurrence, such as **Monthly** or **Annually**, only if the **Recurring Price** field has an entry.
Omit Price in Cart	Check box to hide the item price in the cart and the catalog listing.
Portal Settings	
Use these settings to configure the catalog item behavior in Service Portal.	

Request method	Setting that controls the label displayed for the **Order Now** button and the order submission experience.
	• **Order**:
	  ○ Button label: **Order Now**
	  ○ Confirmation dialog box: Displayed
	  ○ Delivery information: Editable
	Note: This is the default setting.
	• **Request**:
	  ○ Button label: **Request**
	  ○ Confirmation dialog box: Displayed
	  ○ Delivery information: Not displayed.
	This setting can be used in scenarios such as a code access request where the delivery information is pre-determined.
	• **Submit**:
	  ○ Button label: **Submit**
	  ○ Confirmation dialog box: Not displayed
	  ○ Delivery information: Not displayed
	This setting can be used in scenarios such as reset password request where no further request information is required.

Hide 'Add to Cart'	If selected, the **Add to Cart** button is not displayed for the item. If the **Show Add to Cart** instance option of the widget is set to false, then this setting is ignored. This setting is selected by default if the **Request method** is **Request** or **Submit**.

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Catalog Item form (continued)

Field	Description
	For upgrade scenarios, if the **No cart** field is selected in Platform, run the *CatalogPortalSettingsMigration* script include to update this setting to the **Hide 'Add to Cart'** field in the **Portal Settings** tab. **Note:** Applicable for a catalog item and order guide.
Hide 'Save as draft'	If selected, the **Save as Draft** button isn't displayed for the item on the portals. You can let requesters save a draft of a catalog item while requesting it on the portals such as Employee Center and Service Portal, and Now Mobile app. The requesters can access the saved drafts from the My Request widget in the **Drafts** tab on the portals and edit the drafts.
Hide Quantity	If selected, the **Quantity** list is not displayed for the catalog item. This is selected by default if the **Request method** is **Request** or **Submit**. For upgrade customers, if the **No quantity** field is selected in Platform, run the *CatalogPortalSettingsMigration* migration script to update this setting to the **Hide Quantity** field in the **Portal Settings** tab. **Note:** • Applicable for a catalog item. • An order guide inherits this setting from the included catalog item.
Hide Delivery time	If selected, the **Delivery Time** field is not displayed for the catalog item. This is selected by default if the **Request method** is **Submit**. **Note:** • Applicable for a catalog item. • An order guide inherits this setting from the included catalog item.
Hide 'Add to Wish List'	If selected, the **Add to wish list** button is not displayed for the catalog item. If the wish list is disabled for the catalog item or the portal widget instance option is set to false, then this setting is overridden for the item. **Note:** Applicable for a catalog item and record producer.
Hide Attachment	If selected, the **Add attachments** button is not displayed for the catalog item. **Note:** • Applicable for a catalog item and record producer. • An order guide inherits this setting from the included catalog item.

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Catalog Item form (continued)

Field	Description
Mandatory Attachment	If selected, adding an attachment is mandatory for the catalog item. **Note:** Applicable for a catalog item and record producer.
Universal Request Config	
This section is available only when the Universal Request plugin (com.snc.universal_request) is activated. For information about this configuration, see Service Catalog configuration for Universal Request.	
UR certified/ enabled item	Option to specify that a universal request should also be created along with a requested item. In the universal request, a reference is created to the associated requested item, which becomes the primary task of the universal request.
Requires Additional Review	Option to automatically select the **Needs resolution review** check box on the corresponding universal request. For information about the universal request fields, see Universal Request form. The **Requires Additional Review** field appears only when the **UR certified/ enabled item** check box is selected.
Fields that can be added by configuring the form	
Expand help for all questions	Check box to expand and display help information for all questions on loading the page. **Note:** • This field is also applicable in Service Portal. • If the **Expand help for all questions** check box is selected at the catalog item level, then the **Always Expanded** field setting at the variable level is overridden. • If the **Expand help for all questions** check box is deselected at the catalog item level, then the **Always Expanded** field setting at the variable level is applicable.
Template	Template to populate the generated record with predefined values. The field is available for **Record Producer** items only.
No Quantity	Check box to hide the quantity selector for the item.
No Cart	Check box to hide the shopping cart for the item.
No search	Check box to prevent this item from being listed in search results and also in the Service Catalog widget on the Service Portal. If this is selected: • In Service Portal, you can neither browse nor search for the item. • In Platform, you can browse to find the item.

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Catalog Item form (continued)

Field	Description
Order	Controls the ordering of items in category lists.
Domain	Domain in which the catalog item is created. Applicable when the domain separation is enabled in Service Catalog. For information about domain separation, see Domain separation and Service Catalog.
Domain Path	Series of three-character codes separated by a slash (/) delimiter to identify a domain. This path string is unique in the domain hierarchy. Applicable when the domain separation is enabled in Service Catalog.
Related Links	
Item Diagnostic	Generates a diagnostic report and score to identify possible issues within the Service Catalog data and configuration.
Edit checked out item in advanced view	Allows you to edit the catalog item in the advanced view. To add a catalog client script to a checked out item in the Draft state, you can click this related link and add the catalog client script using the Catalog Client Scripts related list. **Note:** This option is available only after you click **Edit in Catalog Builder** to edit an item in catalog builder.
Related Lists	
Variables	Variables for the item to provide options for ordering the item.
Variable Sets	Variable Set linked to the item. Link an existing variable set to the item to provide multiple options for ordering the item.
Approved By Group	Groups that must approve requests for this item.
Approved By	Users who must approve requests for this item.
Categories	Additional categories associated with this item.
Catalogs	Additional catalogs associated with this item.
Catalog Data Lookup Definitions	Catalog data lookup rules associated with the catalog item. For information on creating a data lookup rule, see Create a catalog lookup definition.
Catalog UI Policies	Catalog UI policies associated with this item.
Catalog Client Scripts	Catalog client scripts associated with this item.
Related Items	Related items for a catalog item to provide alternatives. These items are displayed in the catalog item page in Service Portal and Now Mobile.
Related Articles	Related articles for a catalog item to provide additional information. These articles are displayed in the catalog item page in Service Portal and Now Mobile.

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Catalog Item form (continued)

Field	Description
Service Fulfillment Steps	Associated service fulfillment steps.
Assigned Topics	Associate a catalog item to a taxonomy and topic. For information about how to add an item to a taxonomy, see Associate a catalog item with a taxonomy topic in Employee Center. **Note:** This field becomes available when you activate the Employee Experience Taxonomy plugin (sn_ect).

For information about creating or editing a catalog item, see Create or edit a catalog item.

Service Catalog topic blocks in Virtual Agent powered by NLU

You can design a topic conversation in the Virtual Agent powered by Natural Language Understanding (NLU) by including reusable topic blocks to perform request submission tasks.

Search Catalog Item

You can use this topic block to search for a catalog item based on the search criteria. If there are multiple search results, you can select one from a carousel view.

Input parameters

Parameter	Description
query_term	Keyword to search for a catalog item. For information on configuring keyword search for a catalog item, see Configure keyword search for catalog items.
catalogs	Comma-separated list of catalogs where a catalog item should be searched for.
result_limit	Number of search results that should be displayed. By default, this number is set to 5.

Output parameters

Parameter	Description
catalog_item_id	If a catalog item is selected, sys_id of the item is returned. If no catalog item is selected, that is, **None of these** option is selected, -1 is returned.
item_type	sys_class_name of the catalog item that the user selected.
is_conversational	Specifies if the catalog item can be requested in the conversation mode in Virtual Agent.

Request Catalog Item

You can use this topic block to request for a catalog item.

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Input parameters

Parameter	Description
catalog_item_id	sys_id of the catalog item that should be requested.
execute_contextual_search	Option to specify if the contextual search should be run for a record producer based on its configuration. For information on defining contextual search for a record producer, see Define contextual search for record producer.
confirm_catalog_item	Option to specify whether the user must confirm the catalog item before continuing with the next step. If this is set to `false`, user can answer the catalog items questions by skipping the confirmation.
show_end_state_card	Option to display the end state card information about the generated record to the user.

Output parameters

Parameter	Description
record_id	sys_id of the record that is generated after the item submission. If the catalog item is not supported in the conversation mode or if the user does not have access to the item, -1 is returned.
record_table	Name of the table in which the record is generated.
variables	Questions related to the catalog item.

Virtual Agent render types

A catalog item can be rendered in Virtual Agent as a conversation, window, pop-up, or inline.

Catalog item request using a conversation render type

A user can submit a request in the conversation mode (by answering the questions in line).

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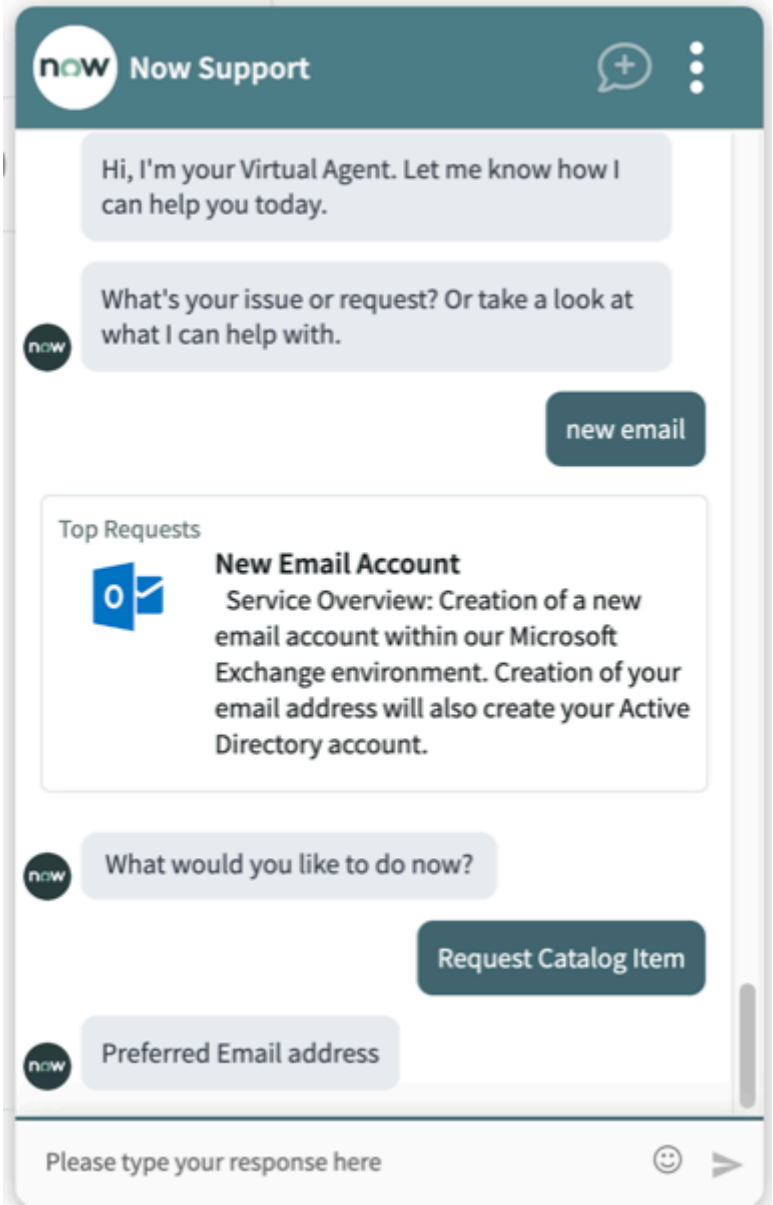

The following conditions must be met when a user requests a catalog item in the conversation mode in Virtual Agent powered by NLU.

- A catalog item cannot have more than the number of questions specified in the *glide.sc.conversational.request.question.limit* property. By default, this number is set to 10. For more information about this property, see Service Catalog properties.
- A catalog item can have non-scripted catalog UI policies. These UI policies should be defined such that variables are affected sequentially, that is, only a variable with the lower order affects a variable with the higher order.
- A catalog item cannot have catalog client scripts that are defined for Now Mobile or Service Portal.
- Only the following variables are supported:
  - Attachment
  - Check box (A group of check box variables isn't supported)
  - Date
  - Date/Time

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- Email
- IP Address
- Label
- Lookup Multiple Choice (without pricing implications and advanced reference qualifier)
- Lookup Select Box (without pricing implications and advanced reference qualifier)
- Multiple Choice (without pricing implications)
- Multi Line Text
- Numeric Scale (without pricing implications)
- Reference (without pricing implications and advanced reference qualifier)

  Note:
  Reference type variables that correspond to a table that has more than 7000 records are not supported. The upper limit for the number of records can be specified in the *glide.sc.va.reference_question_choices.limit* property. By default, it is set to 7000.

- Requested For (without pricing implications and advanced reference qualifier)
- Rich Text Label
- Select Box (without pricing implications)
- Single Line Text
- URL
- Wide Single Line Text
- Yes / No
- Container variables

- The following variable attributes are supported:
  - ref_ac_order_by
  - allowed_extensions
  - max_file_size

  Note:
  All the other variable attributes are ignored in Virtual Agent.

- A catalog item can have a single-row variable set but not a multi-row variable set.
- If a catalog item has a default value configured for a question, the default value is displayed in Virtual Agent, which enables the user to proceed with the default value without having to select it manually. The user can also choose a different value other than the default value.
- If a catalog item has a data lookup configured for a question, the setter value is displayed in Virtual Agent, which enables the user to proceed with the setter value or choose a different value. A catalog item with data lookup is not supported as a conversational item when the setter question precedes the matcher question.
- User cannot skip the following type of questions for a catalog item:
  - Lookup Multiple Choice
  - Select Box
  - Lookup Select Box

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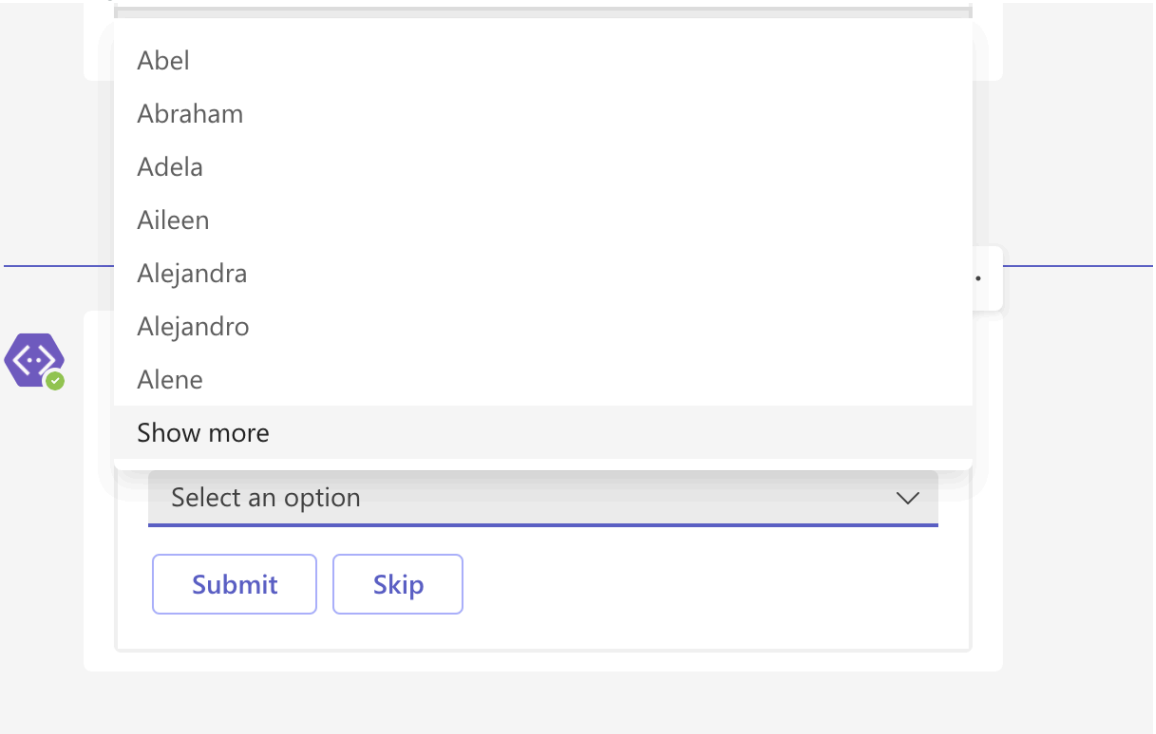
- Yes/No
- Numeric Scale (If **Do not select first choice** configuration is not selected)
- Multiple Choice (If **Do not select first choice** configuration is not selected, or **Include none choice** configuration is selected)

- If the user is using Virtual Agent in a different supported collaboration tool like Microsoft Teams:
  - Searching for a value using the search icon in choice type of fields is not supported.

Choice type fields in Microsoft Teams



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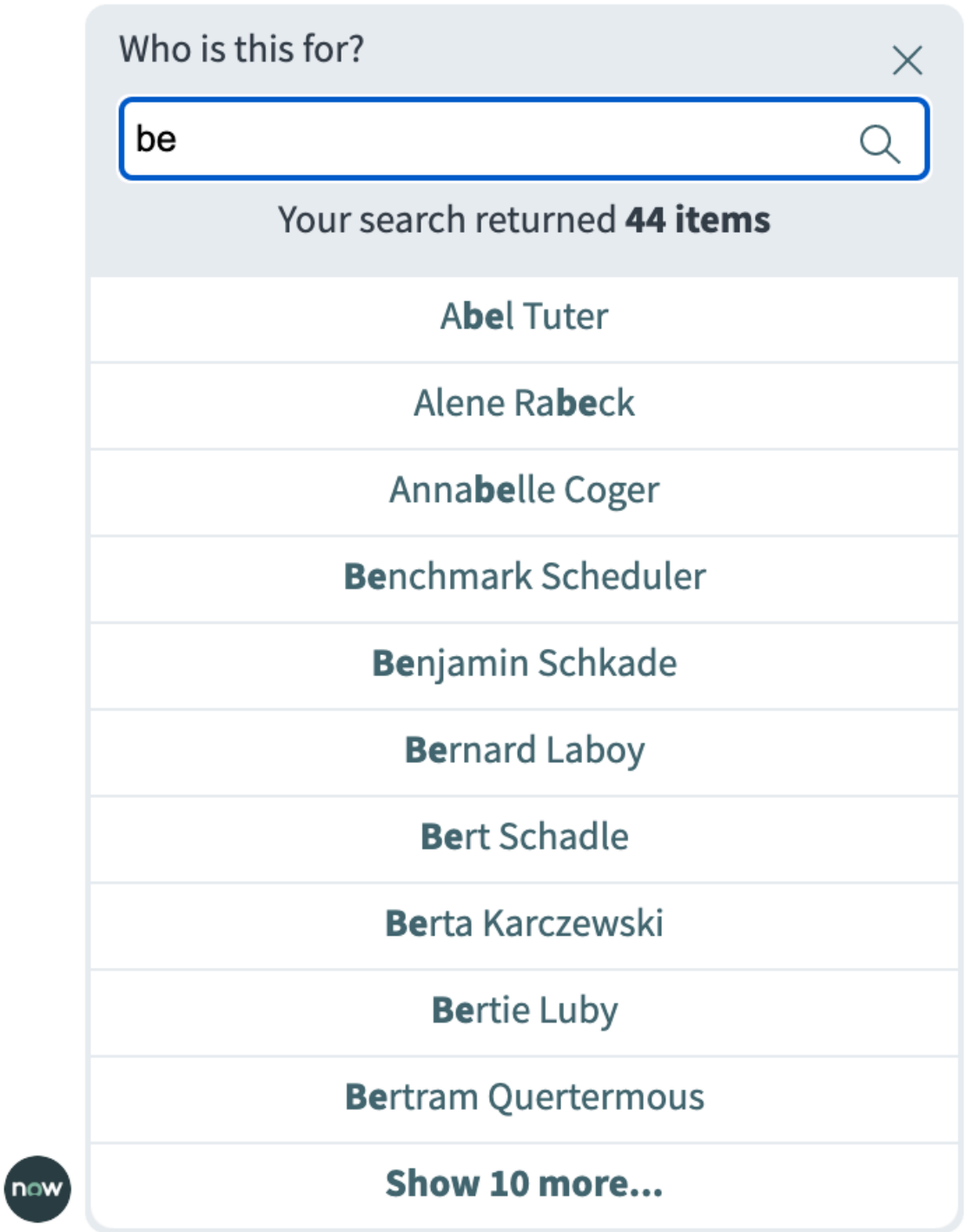
Choice type fields in Virtual Agent



- Searching for a value in reference type of fields is performed in the form of a question.

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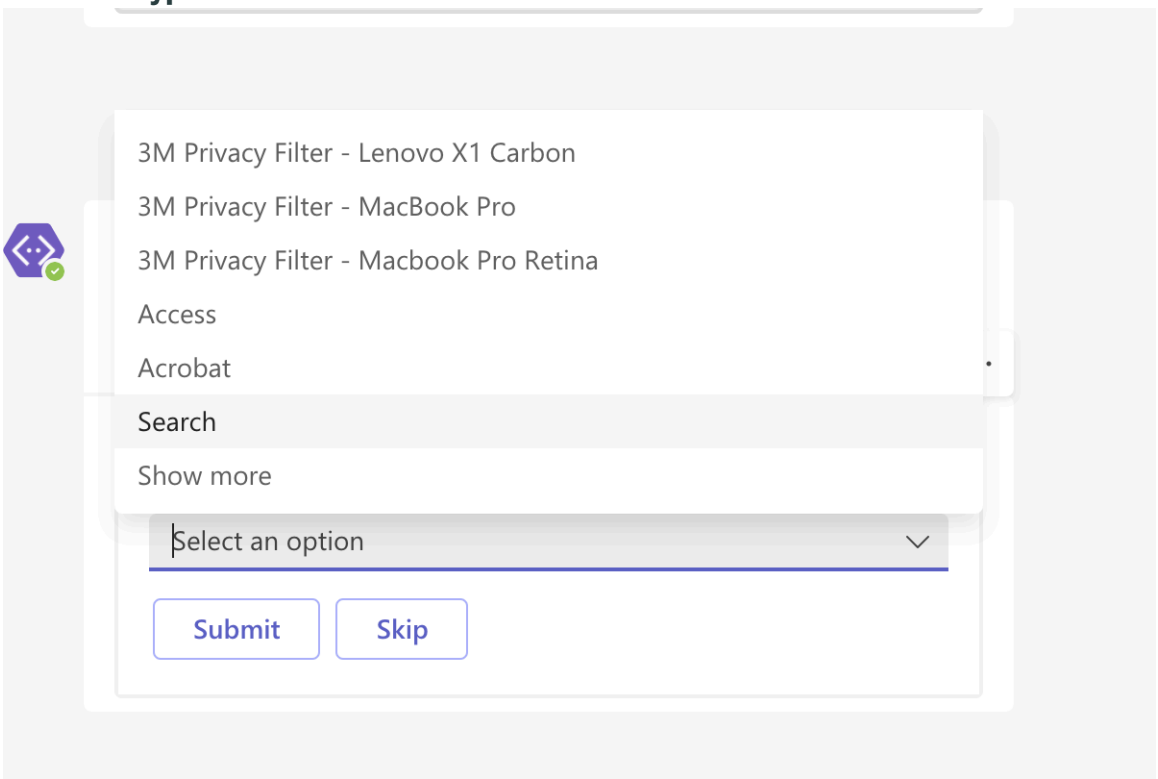
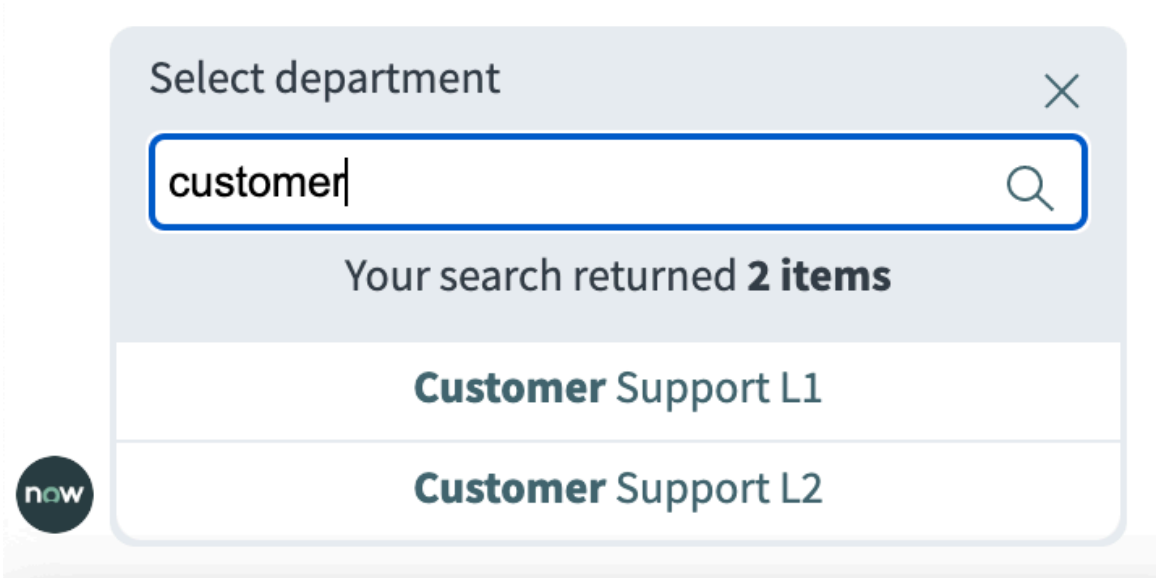
Reference type fields in Microsoft Teams



Reference type field in Virtual Agent



If the catalog item is non-conversational, the request form can appear as any of these render types:

- Inline
- Pop-up
- Window

The conditions determine whether the catalog item form for the non-conversational catalog item will appear as inline, pop-up, or window.

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Note:
Based on the number of questions, a *glide.sc.va.inline_render.question.limit* property determines whether the catalog item form appears as inline or pop-up. By default, the property's value is 20.

The catalog item form appears as	Conditions
Inline	• The catalog item doesn't contain custom or UI page variables. • If the catalog item contains 20 or fewer questions, the item form appears as inline. The default value of the *glide.sc.va.inline_render.question.limit* property is 20. • The catalog item doesn't contain multi-row variable set (MRVS).
Pop-up	• The catalog item doesn't contain custom or UI page variables. • If the catalog item contains more than 20 questions, the item form appears as a pop-up. The default value of the *glide.sc.va.inline_render.question.limit* property is 20.
Window	• The catalog item contains custom or UI page variables. • The *glide.sc.va.render_type.legacy* property is set to true.

Catalog item request using an inline render type

Catalog item requesters can submit a catalog item by filling the form inline in the Virtual Agent powered by NLU. While requesting a catalog item that's marked with inline render type, the requester can fill the item and its options within the Virtual Agent conversation.

For example, a requester can fill a form inline in the Virtual Agent conversation and submit the item.

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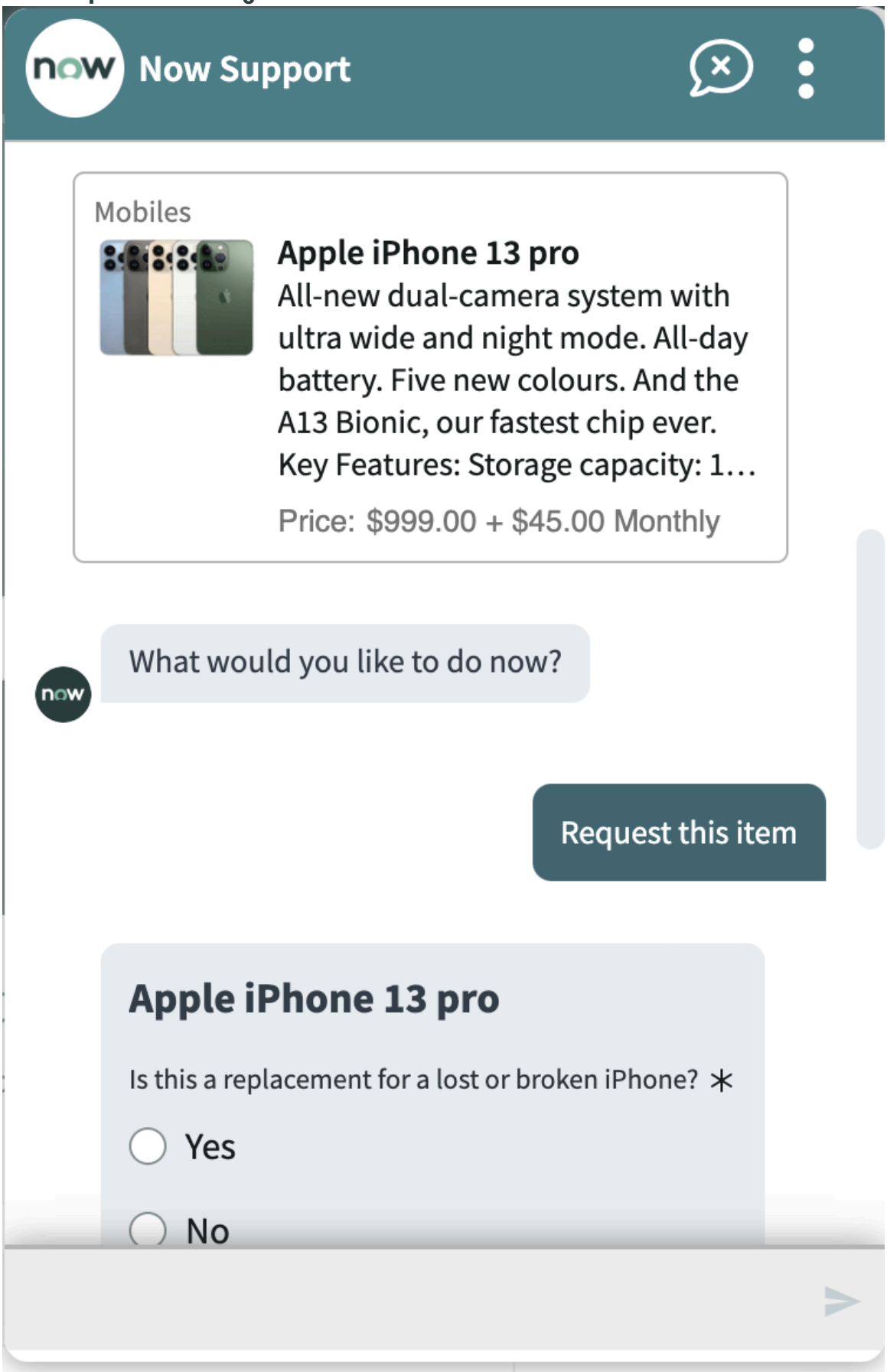
Inline request of a catalog item



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Catalog item request using a pop-up render type

A user can submit a catalog item request as a pop-up for items, which are not conversational. In a pop-up, Virtual Agent provides a link for the user to submit the request in a pop-up without navigating to a new tab. A non-conversational catalog item can be rendered as a pop-up only if it does not have any Custom, Custom with label, or UI Page variables.

Note:
If you do not want to render your Virtual Agent conversation as a pop-up, set the *glide.sc.va.render_type.legacy* property to true, which renders all non-conversational catalog items in the configured portal in a new tab.

Apple iPhone 13

Request for Apple iPhone 13

All-new dual-camera system with ultra wide and night mode. All-day battery. Six new colours. And the A13 Bionic, our fastest chip ever.

Key features:

- Storage capacity: 128 GB, 256 GB, 512 GB
- Network generation: 4G
- Style: Smartphone
- Camera: 12.0 MP
- Operating System: iOS

Is this a replacement for a lost or broken iPhone? *

Yes

No

Monthly data allowance *

-- None --

Catalog item request using a window render type

A user can submit a catalog item request in a window. In a window, Virtual Agent provides a link for the user to submit the request in the Service Portal defined in the *sn_itsm_va.com.snc.itsm.virtualagent.portal_url* property. A non-conversational item is rendered as a window if it has a Custom, Custom with label, or UI Page variable.

A catalog item is rendered as a window if it is of the following types:

- Content Item
- Order Guide
- Wizard Launcher
- Standard Change Template

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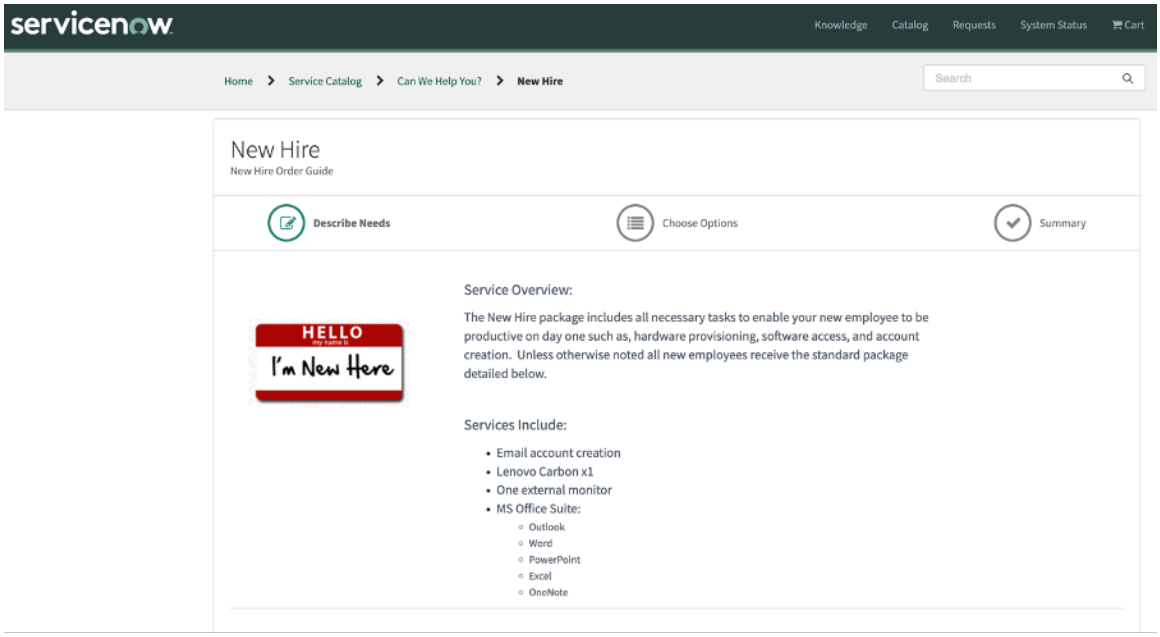


Related topics

Catalog builder preview topic conversation

Submit a request topic conversation

Users can submit a request in a Virtual Agent conversation.

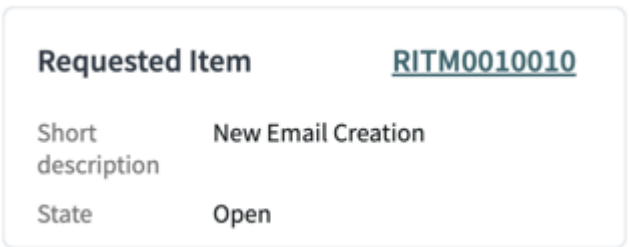
The Submit a request topic conversation uses the following topic blocks:

- Search Catalog Item
- Request Catalog Item

Using the Submit a request topic conversation, users can submit a request by choosing from all available options. For example, when a user is requesting an item, the Virtual Agent prompts the user to enter a search keyword. After the user enters the keyword, the Virtual Agent responds with available choices in a carousel view.

When the user selects the required item, the following scenarios are possible:

- A user can submit a request in the conversation mode (by answering the questions in line). After the request submission, a requested item card is displayed with the request number as a link to the request page.



Note:
In Now® Mobile, the URL opens the native screen.

- A user can submit a request in a popup or a window.

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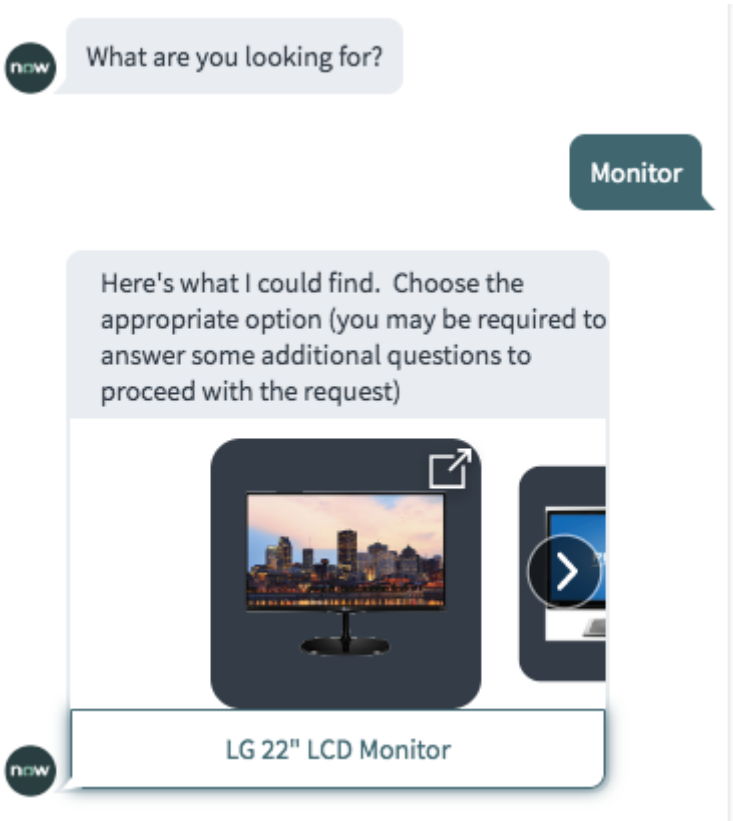
- In case of a popup, Virtual Agent provides a link for the user to submit the request in a popup without navigating to a new tab. A non-conversational catalog item can be rendered as a popup only if it does not have any Custom, Custom with label, or UI Page variables. For more information, see Service Catalog topic blocks in Virtual Agent.
- In case of a window, Virtual Agent provides a link for the user to submit the request in the Service Portal defined in the *sn_itsm_va.com.snc.itsm.virtualagent.portal_url* property. A non-conversational item will be rendered as a window it has a Custom, Custom with label, or UI Page variable. For more information, see Service Catalog topic blocks in Virtual Agent.

Note:
Now Mobile opens the item in Mobile Employee Service Portal (mesp).



Related topics

Service Catalog topic blocks in Virtual Agent powered by NLU

Debugging Service Catalog

Debug user criteria of catalog items, UI customizations for Service Catalog pages, actions on catalog item variables, performance diagnostics of a catalog item, and so on.

Debug actions on catalog item variables

Analyze the client-side actions affecting the state and values of all variables. You can also get insights into the performance of each script working on the variables.

Before you begin
Role required: admin, catalog_admin, catalog_manager, or catalog_editor.

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Note:
You can perform this task with the catalog_manager or catalog_editor role only if you are assigned as the manager or editor of the catalog.

About this task

The variable action logger displays the chronology of actions that happen on all variables of a catalog item before it is submitted. These actions can happen due to catalog client scripts, catalog UI policies, or catalog data lookups. This client-side logger does not store any data in the database. Also, the information displayed is applicable only while you work on the catalog form. Features available for debugging Service Catalog issues including UI macro customization debugging; variable action logger; variable watcher; item diagnostic report

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Enable Variable Action Logger**. The UI Page Customization Diagnostics logger is enabled.

   Note:
   Perform this step before you run the logger.

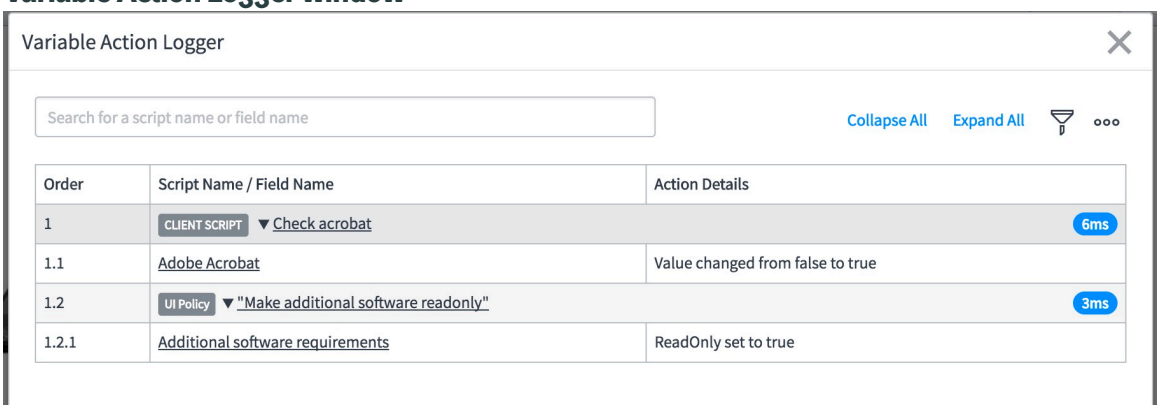
2. Navigate to **Service Catalog** > **Catalog Definitions** > **Maintain Items**.
3. In the Catalog Items list, select an item that you want to log .
4. On the Catalog Item form, click **Try it**.
5. On the catalog page for the item, right-click the header and select **Show Variable Action Logger**.

   Note:
   The variable logs are grouped by catalog UI policies, catalog client scripts, and data lookups.

   The following information is displayed in the Variable Action Logger window:

   - Order in which scripts and actions are executed. When a new action is triggered from an existing action, the order of the new action is tracked at a sublevel under the order of the existing action. For example, the order of a new action triggered from step 1.2 is 1.2.1.
   - Source of the action taken on a variable and the variable name.
   - Details of the action taken on the variable.

   Variable Action Logger window

6. Review the results of the variable action logger.

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Option	Description
Search	To search for a variable or script, use the **Search** field.
Collapse All	To collapse variable logs within a group, click **Collapse All**.
Expand All	To expand variable logs within a group, click **Expand All**.
Filter	To filter variable logs, click the Filter icon ( ) and select the required options.
Clear Logs	To clear variable logs, click the Actions icon ( ) and select **Clear Logs**.
Export to CSV	To export the variable logs to a .csv file, click the Actions icon ( ) and select **Export to CSV**.
Print Logs	To print variable logs, click the Actions icon ( ) and select **Print Logs**.

Debug user criteria of a catalog item

Debug whether a user can access a catalog item based on the matched user criteria and fix any issues.

Before you begin

Role required: catalog_manager, catalog_admin, or admin

About this task

You can only debug access issues based on user criteria, but not based on access control list rules (ACLs). For information about user criteria, see Set security for items and categories.

For any scripted user criteria that uses a session api such as `gs.getUserID()`, the session of the logged-in user is used. Edit the behavior of the scripted user criteria using the pre-defined `user_id` variable in the **Script** field of a user criteria. For information about the Script field, see Create a user criteria record in Service Catalog.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **User Criteria Diagnostics**.
   The User Criteria Diagnostics form is displayed.
2. In the **Select user** field, select the user whose access you want to debug.
3. In the **Select catalog item** field, select the required catalog item.
4. Click **Diagnose**.

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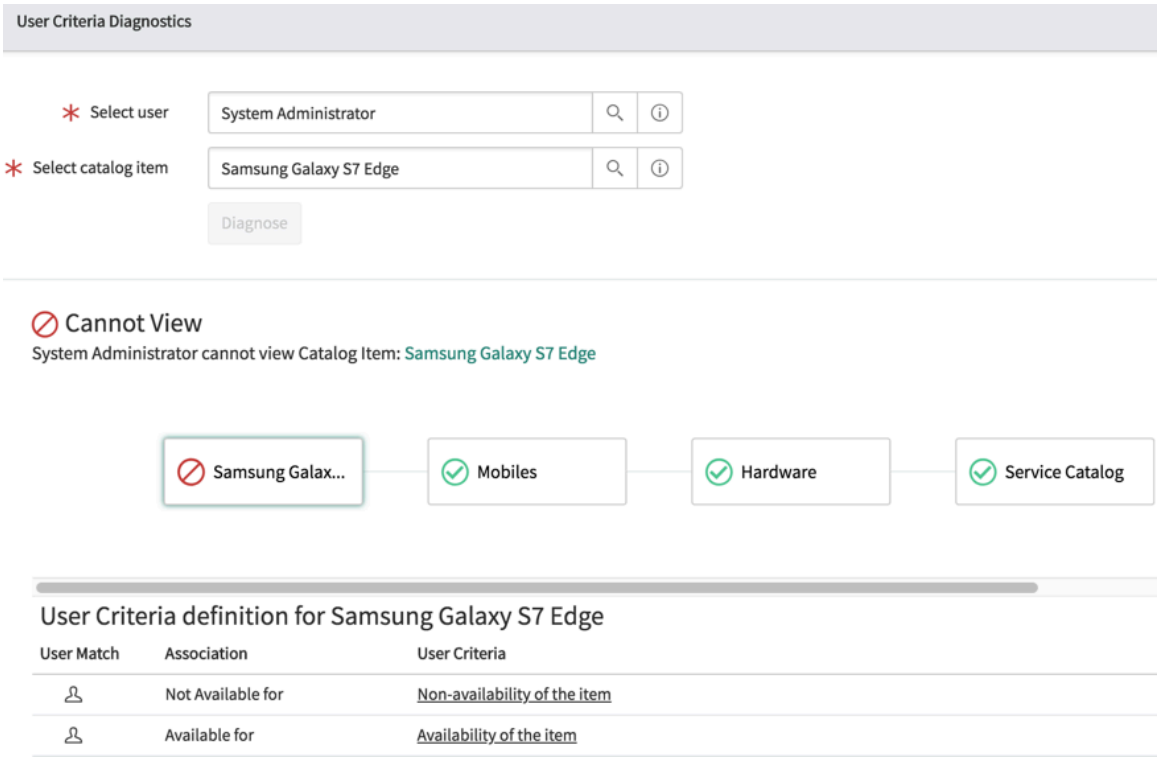

- The item hierarchy is displayed along with an indication of the user's access to each node (catalog, category, or catalog item) based on the user criteria associated with the node.

  Note:

  - If the item is available in multiple catalogs or nested categories, the corresponding catalogs and categories are displayed as nodes in a tree format.
  - If the user matches multiple user criteria associated with the node, then the user can access the node only if the following conditions are met:
    - The user matches at least one of the user criteria in the **Available For** list.
    - The user does not match any user criteria in the **Not Available For** list.

- All user criteria defined for the item is displayed. For each user criteria, the following information is available:

  User Match

  is displayed if the selected user matches the user criteria.

  Association

  Association of the node with the user criteria, that is, **Available for** or **Not Available for**.

  User Criteria

  Name of the user criteria.

5. To verify if the user can view a node of the hierarchy, click the node.
   User criteria defined at the node is displayed. For example, when you click a node representing a category, the user criteria defined for the category is displayed.
6. To edit the configuration of a user criteria, click its name under the **User Criteria** column.

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Debug UI customizations for a Service Catalog page

Perform the health check of a Service Catalog page. The UI Page Customization Diagnostics window displays the UI macros applicable for the Service Catalog page and their corresponding states. For issues on a Service Catalog page due to customized UI macros, you can identify the source of broken functionality.

Before you begin

Role required: admin or catalog_admin.
Watch this seven-minute video to learn more about UI customization debugging, variable action logger, variable watcher, and the Item Diagnostic report. Features available for debugging Service Catalog issues including UI macro customization debugging; variable action logger; variable watcher; item diagnostic report

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Debug UI Customization**.
   The UI Page Customization Diagnostics window is enabled.
2. Navigate to a Service Catalog page that you want to debug.
3. Review the information in the UI Page Customization Diagnostics window at the bottom of the page.

   To maximize the UI Page Customization Diagnostics window, click . The following information is displayed:

   - Name of the current Service Catalog page.
   - State of the Service Catalog page.
   - All UI macros applicable for the Service Catalog page.
   - State of each UI macro. For details on possible states, click the Help icon ( ).
   - Number of occurrences of each UI macro in the Service Catalog page.

Possible states for a UI macro and a Service Catalog page

State	Color indicator	Description
Unchanged	Green	Created by ServiceNow and one of the following scenarios is applicable: ○ It has never been customized by the customer. ○ It has been customized by the customer and then reverted to the latest ServiceNow upgrade.
Skipped	Red	Created by ServiceNow and then customized by the customer, and hence skipped the latest ServiceNow upgrade. The customer should resolve a skipped update after an upgrade.
Customized	Orange	Created by ServiceNow, and then customized by the customer after the latest ServiceNow upgrade. The customer can revert a customization to implement the latest ServiceNow upgrade.
New	Blue	Created by the customer. The top element of the UI macro should have the following attribute: `data-sn-macro-sys-id="${jvar_macro_sys_id}"`

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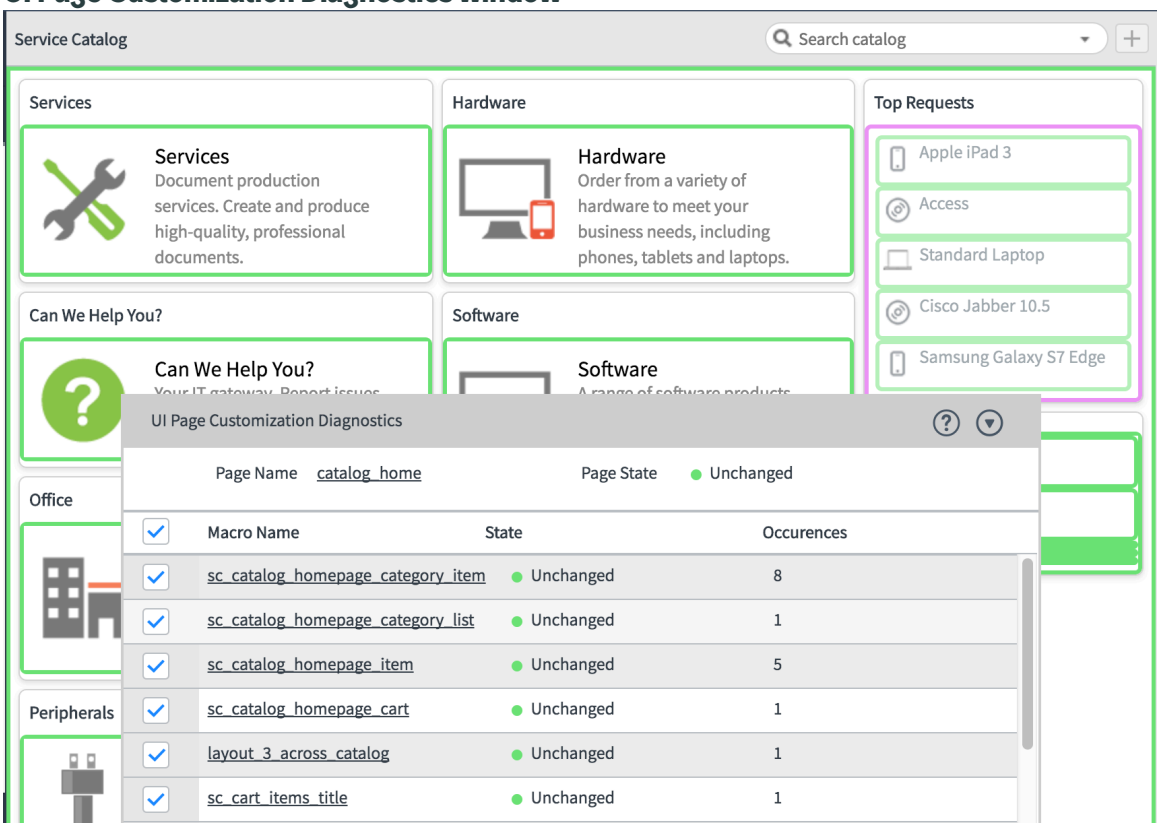
State	Color indicator	Description
		Note: The top element can be a div, span, or table.

Note:

- When you click the Service Catalog page name or the UI macro name, the corresponding UI page or the macro page is displayed.
- When you point to a macro in the UI Page Customization Diagnostics window, the corresponding UI elements are displayed with a pink border.
- The state-based color indication is applicable only for UI macros that have a visible UI.

UI Page Customization Diagnostics window



4. To minimize the UI Page Customization Diagnostics window, click .

Related topics

UI macros

Upgrade History module: Track every upgrade

Debug performance diagnostics of a catalog item

Analyze the impact of the variable setup in a catalog item on its runtime performance, and identify any issues. You can review the processing time of the catalog item and its variables based on the triggered SQL queries.

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Before you begin
Role required: admin or catalog_admin

About this task
The variable SQL debugger is not applicable for the following variables:

- Container Start
- Container End
- Container Split
- Break

Procedure
1. Enable the variable SQL debugger by navigating to **Service Catalog** > **Catalog Variables** > **Enable Variable SQL Debugger**.

   Note:
   - The variable SQL debugger is applicable for catalog items and record producers.
   - After you enable the variable SQL debugger, if you disable the display of the troubleshooting information on a catalog page by navigating to **System Diagnostics** > **Session Debug** > **Disable All**, the variable SQL debugger is still active.
   - To disable the variable SQL debugger, navigate to **Service Catalog** > **Catalog Variables** > **Disable Variable SQL Debugger**.

2. Navigate to **Service Catalog** > **Catalog Definitions** > **Maintain Items**, select a catalog item that you want to debug, and click **Try It**.
3. Click the more options icon (⋮) and select **Show Variable SQL Debugger**.
   The following information is displayed in the Variable SQL Debugger window:
   - Number of variables included in the catalog item.
   - Number of SQL queries triggered for the catalog item.
   - Time taken to process and load the catalog item page.
   - Time taken to run all SQL queries of the catalog item.

   Variable SQL debugger fields

Field	Description
Variable	Catalog item variable for which the performance diagnostics are displayed.
Processing Time	Time taken to process and load the variable.
SQL Count	Number of SQL queries triggered for the variable.
SQL Time	Time taken to run SQL queries for the variable.
SQLs	Details of the SQL queries triggered for the variable.

4. To sort by any field, click the field name.

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Note:

- By default, variables are sorted in descending order by their processing time.
- Variables within a single-row or multi-row variable set are displayed in hierarchical order.

5. To view the configuration of a variable, click the variable name.
6. To view a detailed summary of all SQL queries triggered for a variable, click **View Details** in the **SQLs** field of the variable.
7. To change the sort order, Use the **Sort By** list.

Note:
By default, triggered SQLs are sorted in descending order by their execution order.

Debug a Service Catalog variable

Monitor changes in the state and the value of a Service Catalog variable due to catalog client scripts, catalog UI policies, and catalog data lookups. You can diagnose and resolve issues related to such changes, and track client-side scripting errors on this tab.

Before you begin

Role required: admin or catalog_admin Features available for debugging Service Catalog issues including UI macro customization debugging; variable action logger; variable watcher; item diagnostic report

Procedure

1. Enable the JavaScript log and field watcher..

   a. In the banner, click the settings icon ( ).

   b. In the System Settings window, click the **Developer** tab.

   c. Enable the **JavaScript Log and Field Watcher** option.
   The **JavaScript Log** and **Field Watcher** tabs are displayed in a pane at the bottom of the page. For information about JavaScript logs and fields watcher, see JavaScript log and Field Watcher .

   d. Close the System Settings window.

2. Navigate to **Service Catalog** > **Catalog Definitions** > **Maintain Items**.
3. In the Catalog Items list, select a catalog item to debug its variables, and click **Try it**.
4. On the form, right-click a variable field label and select **Watch Variable**.

   The debug icon ( ) is displayed next to the variable, and the **Field Watcher** tab in the bottom pane is replaced with the **Variable Watcher** tab.
5. Edit the fields on the **Variable Watcher** tab.

Field	Description
Item	Current catalog item.

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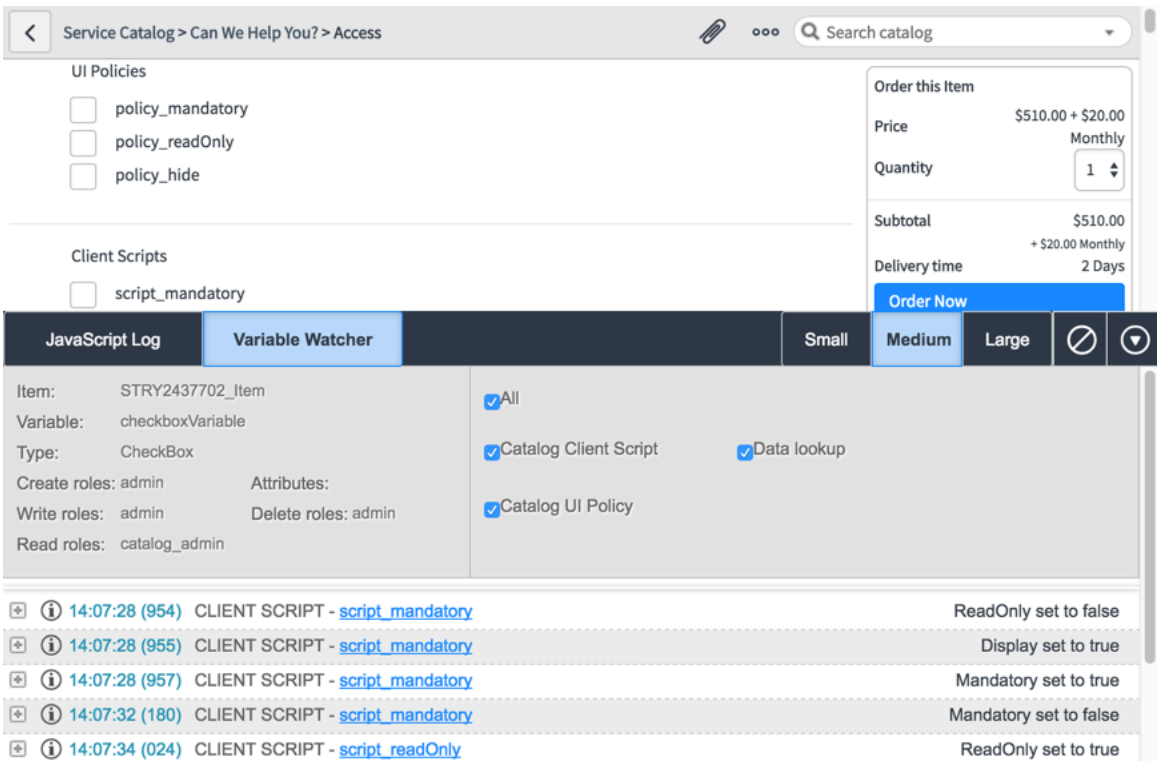
Field	Description
Variable	Variable that is being watched.
Type	Type of the variable.
Create roles	User type that can create values for the variable.
Write roles	User type that can edit values for the variable.
Read roles	User type that can read values for the variable.
Reference	Reference table for the variable. Applicable for reference variables.
Reference Qual	Qualifiers to restrict data that is available in the field. Applicable for list collector, lookup multiple choice, lookup select box, and reference variables.
Attributes	Attributes of the variable.
Delete roles	User type that can delete values for the variable.
All	If selected, displays the action log of the variable due to catalog client scripts, data lookups, and catalog UI policies.
Catalog Client Script	If selected, displays the action log of the variable due to catalog client scripts.
Data lookup	If selected, displays the action log of the variable due to data lookups.
Catalog UI Policy	If selected, displays the action log of the variable due to catalog UI policies.

Variable Watcher tab



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6. To watch another variable, right-click that variable and select **Watch Variable**.

   Note:
   You can watch only one variable at a time.

7. To stop watching a variable, right-click the variable and select **Unwatch Variable**.
8. To clear the logs, click the Clear log icon ( ).
9. To resize the pane, click **Small**, **Medium**, or **Large**.
10. To close the pane, click the Close icon ( ).

Item diagnostic report

For a catalog item data and configuration, you can identify possible violations from the ServiceNow recommended practices.

The item diagnostic report includes a score that measures the health of the item, and a list of diagnostic result entries. These entries consist of a rule, a document (record that violates the rule), and a count (the number of violations in the record).

Correct violations for best performance and to maintain expected behavior.

The lower the score, the better (0 is ideal). A higher score means that an item has more violations from the ServiceNow recommended practices. Each rule has a different weight and level of importance. For example, a violation of duplicate variables is more likely to result in user issues. An AJAX usage violation is less likely to cause issues since the result could simply cause a delay in the UI.

Default diagnostic rules

These diagnostic rules are designed according to ServiceNow recommended practices.

Default diagnostic rules

Rule	Description
checkUserCriteriaUsage	Identifies if the item is using entitlements instead of user criteria
checkBalancedContainers	Checks if the Container Start and Container End variables are balanced.
checkDuplicateVariables	Identifies variables with the same name associated to a catalog item (or an associated variable set).
checkDOMManipulation	Identifies any DOM violation in catalog client scripts. The DOM is not guaranteed to be the same between releases and can affect catalog client scripts during upgrades. Therefore, it is not recommended for customers to do any kind of DOM manipulation. You can view detailed information for each client script by clicking the information icon.

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Default diagnostic rules (continued)

Rule	Description
checkLookupVariableRowCount	Checks if the Lookup variable is run on tables with many records as it can lead to slower load times.
checkAJAX	Identifies all AJAX calls in catalog client scripts because, although AJAX calls in catalog client scripts are allowed, they must be asynchronous. All AJAX calls are listed because even asynchronous calls can cause some delay. You can view detailed information for each client script by clicking the information icon.
checkSelectBoxUnique	Identifies Select Box type variables that have the attribute enabled to show only unique entries in the select box.
checkOrderGuideRuleBaseCount	Checks for high number of active rule bases in an order guide as higher number of rule bases can lead to slower load times
checkFormatterVariablesUsage	Checks if the item has the following variable types: • Macro • Macro with label • UI Page For information on the variable availability across various channels, see Variable support in various channels.

Run the Item Diagnostic Results report

Identify the catalog items that are not designed per ServiceNow recommended practices to run your catalog efficiently.

Before you begin

Role required: admin or catalog_admin

About this task

This report runs every weekend on all catalog items of all types.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Request Reports**.
2. Select the [Catalog] Item Diagnostics Results report.
   A report is displayed with all active catalog items with a non-zero score. These catalog items are grouped by score and each score has a different color.
3. Click the score to diagnose the associated catalog items.

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Note:

- Any item with a score greater than zero indicates a recommended practice rule violation.
- The higher the score, the more is the catalog item deviating from ServiceNow recommended practices.

4. Click the score of the required catalog item.
   Diagnostic results are displayed for the catalog item with violated rules. For information on default diagnostic rules per ServiceNow recommended practices, see Item diagnostic report.
5. To understand details of each violated rule, click the **Count** value for that rule.

Service catalog UI policy

UI policies can be used to define custom process flows for tasks.

Catalog UI policies control the behavior of catalog item forms when presented to your users. Catalog UI policies can be applied to a catalog item or a variable set.

UI policies are useful when applied to service catalog items. Keep the following points in mind when creating service catalog UI policies:

- A catalog UI policy applies to either a specific catalog item or any item that uses a specific variable set.
- A catalog UI policy can only contain and reference variables that are defined for the catalog item or variable set.
- Like UI policy conditions, the variables in a service catalog UI policy condition must be visible (even if hidden by UI policy or read-only) on the form for the condition to be tested. Also, ensure that the variables have names. For more information, see Create a catalog client script.
- Limited UI policy functionality applies to following variables:
  - The Mandatory and Read Only policy do not apply to the following variable types: Break, Container Split, Container End, UI Macro, UI Macro with Label, Label, UI Page.
  - The Set visible policy does not apply to the following variable types: Break, Container Split, Container End.
- Service catalog UI policies are applied to variables and variable sets of catalog items ordered in the service catalog. Policies can also be applied when the variables are present in a Requested Item or Catalog Task form.

  Note:
  The **Clear the variable value** UI policy action is not applicable on variable sets and containers.

- Catalog UI policy actions can be applied on a variable set. The actions on a variable set are applied on all variables within the variable set. If different catalog UI policy actions are applied on a variable or a variable set, the action with the lowest order is considered.
- The priority order for UI actions types is:
  1. Mandatory (highest)
  2. ReadOnly/Display

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If a variable is set to mandatory and does not have value, readonly or hide do not work on that variable. If a variable is hidden or readonly, and then set to mandatory, the variable field becomes visible or editable.

This priority order is also applicable for variable sets and containers. If a variable set or container has a mandatory variable without any value, then the container or variable set cannot be hidden.

- Catalog UI policies are supported for catalog items viewed in a service catalog wizard.

Note:
The UI policy for catalog items always takes precedence over UI policy for variable sets. You can change this behavior by editing the *glide.sc.ui_policy.variable_set_run_first* property.

Create a UI policy for catalog items

You can apply UI policies for catalog items ordered in the service catalog.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Administration** > **Catalog UI Policies**.
2. Select **New**.
3. In the **Applies to** field, select **A Catalog Item**.
4. Fill in the remaining fields.

Field	Description
Applies to	Select the type of item this UI policy applies to: ○ **A Catalog Item**: enables the **Catalog item** field. ○ **A Variable Set**: enables the **Variable set** field.
Catalog Item or Variable Set	Select the catalog item or a variable set this UI policy applies to. The field name and options available depend on the **Applies to**selection.
Short description	Enter a brief description (example, Out-of-state move).
Active	Select the check box to enable the UI policy. Clear the check box to disable it.
When to Apply	
Catalog Conditions	Create conditions for the UI policy using catalog item variables. The policy is applied if the conditions evaluate to be true. For example, a catalog item of **Schedule a Move** may have a condition of **move_from > is > San Diego**. The UI policy is applied when an employee schedules a move from San Diego to any other company location.

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Field	Description
	Note: The label of a variable associated with a variable set reflects the variable set name. The format is *variable_set_name » variable_name*.
Applies on a Catalog Item view	Select the check box to apply the UI policy to catalog items within the order screen. Available in the requester view.
Applies on Catalog Tasks	Select the check box to apply the UI policy on a Catalog Task form. Available in the fulfiller view. See VEditor.
Applies on Requested Items	Select the check box to apply the UI policy on a Requested Item form. Available in the fulfiller view. See VEditor.
Applies on the Target Record	Select the check box to support the catalog UI policy on a record created for task-extended tables via record producers. See Default variable editor.
On load	Select the check box to apply the UI policy when the form is loaded. Clear the check box to apply the policy only when the form is changed.
Reverse if false	Select the check box to reverse the UI policy if the **Catalog Conditions** statement evaluates to false.
Script	
Run scripts	Select the check box to use the **Execute if true** and **Execute if false** scripting fields. Scripts are necessary to apply a UI policy other than **Read Only**, **Mandatory**, or **Visible**. For example, you must create a script to apply a UI policy to a specific role.
Other fields	
Order	Enter the sequence in which this UI policy is evaluated if more than one matching UI policy exists. The order is evaluated from the lowest value to the highest value.
Global	This field isn't used for the service catalog.
Inherit	This field isn't used for the service catalog.
Catalog UI Policy Actions	
Variable name	Select the variable or variable set that belongs to the catalog item. When you apply catalog UI policy actions on a variable set, the actions are applied on all variables within the variable set. If different catalog UI policy actions are applied on a variable or a variable set, the action with the lowest order is considered.

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Field	Description
	Note: ○ The set value UI policy action isn't applicable for the attachment and masked variables. Use the **Clear the variable value** option to clear the value for the attachment and masked variables. ○ For multi-row variable set, you can apply a UI policy action on the complete variable set but not on individual variables inside it. ○ The label of variables associated with a variable set reflects the variable set name. The format is *variable_set_name » variable_name*.
Order	Sequence in which the UI policy action is evaluated. The order is evaluated from the lowest value to the highest value. This is also applicable in Service Portal.
Mandatory	Choice list for specifying how the UI policy affects the mandatory state of the field. Choices are: ○ Leave alone ○ True ○ False
Visible	Choice list for specifying how the UI policy affects the visible state of the field. Choices are: ○ Leave alone ○ True ○ False
Read Only	Choice list for specifying how the UI policy affects the read-only state of the field. Choices are: ○ Leave alone ○ True ○ False
Value action	Choice list for specifying whether to set a value for the question, clear the value, or set nothing for the question. Here are the choices. ○ Leave alone ○ Set value: Option to set a value for the question in the catalog item. ○ Clear value: Option to clear the variable value.
Value	Enter a value for the question. This field appears only when you select **Set value** from the Value action list.
Field message type	Select any of the message types that you want to show for the question.

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Field	Description
	○ Info ○ Warning ○ Error **Note:** If you don't want any message, select **None**.
Field message	Enter a message that you want to show for the question when a specified condition is met. This field appears only when you select a value from the Field message type list.

5. Select **Submit**.

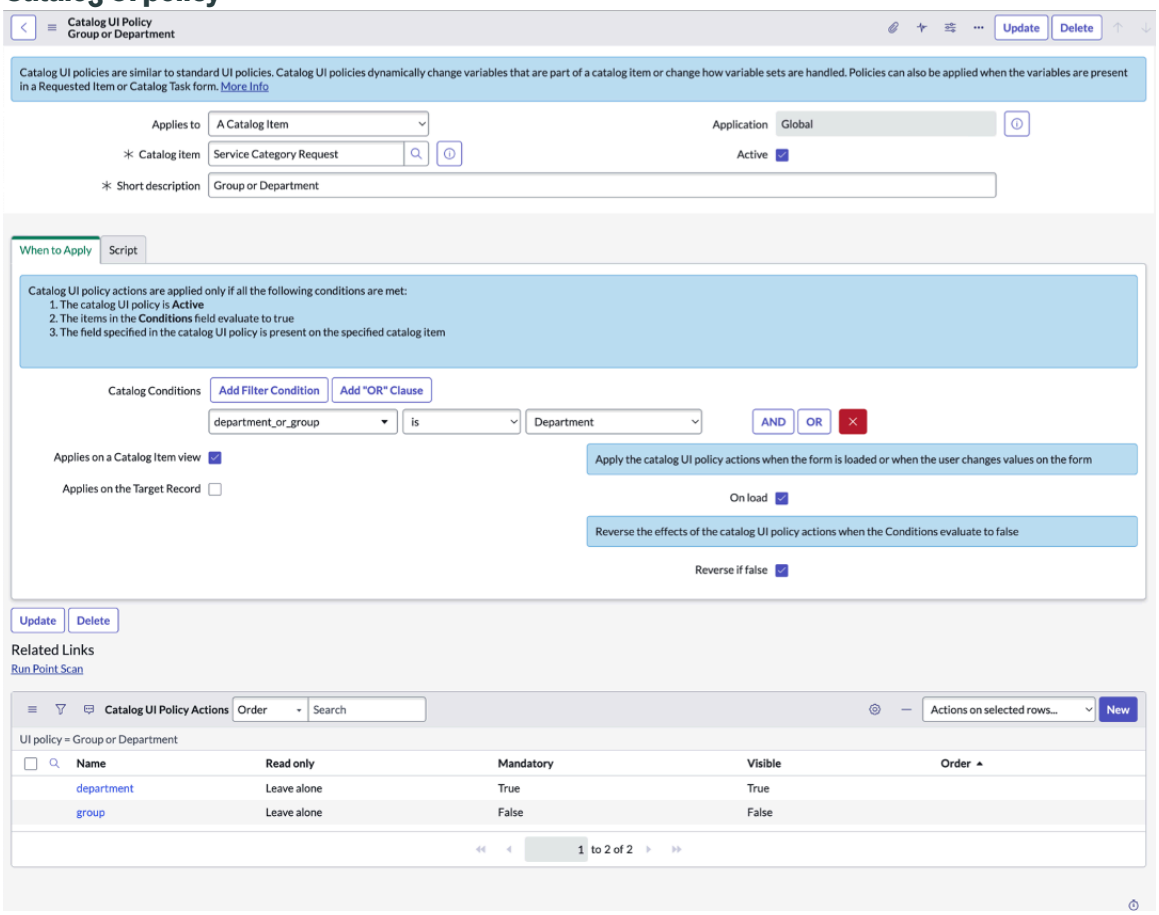
Note:
Configure the variable form to display all fields.

Service Catalog UI policy examples

The following is an example of how Service Catalog UI policies work.

The following UI policy makes it mandatory for any department to specify the name of the department if **Department** is selected for the question **Department or group?**.

Catalog UI policy



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Catalog Builder

You can create or edit a catalog item (catalog item or record producer) using a visual and guided experience along with specified restrictions. The Catalog Builder experience enables you to delegate the creation and maintenance of the catalog.

You can also create a template that can be used to create catalog items. While creating the template, you can specify values or restrictions for items created using the template, for example, restrictions to catalogs, categories, variable types, and portal settings.

From the home page of the Catalog Builder, you can do the following:

- Create a catalog item
- Create a catalog item template
- View the available catalog items
- View the available catalog item templates
- View catalog items that are recently updated
- View the configured content that describes the catalog building process in your organization.

How does the Catalog Builder work

Catalog administrator creates templates for a business or service group. The business owner or service owner gathers catalog requirements and creates catalog items from these templates. All advanced capabilities are added by the catalog administrators or developers.

Catalog item states

A catalog item goes through various states during the item creation and maintenance process.

Catalog item states

State	Description
Draft	A catalog item is in the Draft state in one of these scenarios: • A new item is being created in Catalog Builder. • An existing published item has been checked out for editing in Catalog Builder. When the item is being edited, Catalog Builder checks out the item and creates a copy of the item and its associated records(variables, UI policies, client scripts). The item copy is in the Draft state. The published item remains in the Published state and the **Checked out** field is set to **True**. Once the editing is done and the item is submitted, the edits to the draft item are merged with the associated published item and the draft item is deleted. **Note:** • You can only edit a draft item but not a published item that has been checked out. • A draft item is always inactive and does not show up in the search or browse experience. • You cannot modify the **Active** flag of a draft item. • Any changes to the draft item are not available until it is submitted.

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Catalog item states (continued)

State	Description
Publishing	A catalog item is in this transient state for a while just after its submission and before its state changes to Published. You cannot check out an item in the Publishing state.
Published	When a new item is submitted, the item finally moves to the Published state. This state indicates that it is the item version being used by the application and available in the catalog. When you edit a published item, it is checked out in Catalog Builder and the item's draft copy is created.

Limitations

Catalog Builder is designed to support the most common and simple use cases so that it can easily be used by business users, while the complex functionality can be added to the item in ServiceNow AI Platform by catalog administrators.

When creating a record producer in a specific scope, you can select tables in that scope and tables in other scope if the objects from the other application scope are given read and create access for selecting a record submission table. For more information on making a table accessible to other applications, see Table design and runtime settings.

Catalog Builder does not allow creation and editing of the following entities, but they can be set in ServiceNow AI Platform either for a draft item or a published item that has not been checked out.

- Catalog item
  - Meta tags
  - Execution plans. If an item is assigned an execution plan, the process engine cannot be changed in the Catalog Builder.
  - Price settings
- Variable settings
  - Tool tips
  - Advanced and dynamic reference qualifiers. If a variable has advanced or dynamic reference qualifiers, then the reference qualifier cannot be edited in the Catalog Builder.
  - Attributes
  - Permissions
  - Availability
  - Lookup label field (defaults to lookup value field)
  - Lookup price fields
  - Unique values only
  - Always expanded help
  - Help text
  - Advanced reference qualifiers

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- Question types. The following questions are supported in Catalog Builder, and they are grouped into types and subtypes. For the unsupported question types, you can view the questions but not edit them:
  - Text
    - Single-line. This is the Single-line text variable type in ServiceNow AI Platform.
    - Multi-line. This is the Multi-line text variable type in ServiceNow AI Platform.
    - Rich text. This is the HTML variable type in ServiceNow AI Platform
  - Option
    - Check box. This is the Check box variable type in ServiceNow AI Platform.
    - Yes/No. This is the Yes/No variable type in ServiceNow AI Platform.
  - Choice
    - Dropdown (fixed values). This is the Select Box variable type in ServiceNow AI Platform.
    - Dropdown (values from a table). This is the Lookup Select Box variable type in ServiceNow AI Platform.
    - Record reference. This is the Reference variable type in ServiceNow AI Platform.
    - Radio. This is the Multiple Choice variable type in ServiceNow AI Platform.
    - Multi-select. This is the List Collector variable type in ServiceNow AI Platform.
  - Date/Time
    - Date. This is the Date variable type in ServiceNow AI Platform.
    - Date &Time. This is the Date and time variable type in ServiceNow AI Platform.
  - Display label
    - Plain text. This is the Label variable type in ServiceNow AI Platform.
    - Rich text. This is the Rich Text Label variable type in ServiceNow AI Platform
- Catalog UI policy
  - **On Load** field (defaults to true)
  - **Script** field. When a catalog UI policy has a script, it does not show up in the question's behavior settings list in the Catalog Builder.
  - **Reverse if false** field. By default, it is set to true.
  - Multiple actions. When a catalog UI policy has multiple actions, it does not show up in the question's behavior settings list in the Catalog Builder.
- For a catalog item, the questions cannot be viewed and edited in the Catalog Builder in the following scenarios:
  - It has more than two levels of containers.
  - It has a two-column question set or two-column container within a container.
- Catalog client scripts
- Data lookup rules

Related topics

Set up a service catalog

Setting up the Catalog Builder

Set up the catalog item building process.

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Before you begin

Role required: admin

Procedure

1. To direct users from the Catalog Builder homepage to your organization-specific catalog building process documentation, perform the following steps.

   a. Navigate to sys_properties.list.

   b. Select the *glide.sc.builder.content_url property*.

   c. On the System Property form, in the **Value** field, specify the URL for the documentation of your choice.

      You can include both absolute and relative URLs. Following are the examples:

      - Absolute URL: https://www.youtube.com
      - Relative URL: sp?id=kb_article&sysparm_article=KBXXXXXX

   d. Click **Update**.

2. **Optional:** To preview a catalog item in a specific portal, perform the following steps.

   a. Navigate to sys_properties.list.

   b. Select the *glide.sc.builder.preview_portal_id*.

   c. On the System Property form, in the **Value** field, specify the portal name.

      (Optional) The default value is `swp`.

   d. Click **Update**.

3. Create or duplicate catalog item templates.

   For information on creating a template, see Creating or editing catalog item template.

4. **Optional:** To allow users with access to a catalog item template to edit all items created using that template, perform the following steps.

   a. Navigate to sys_properties.list.

   b. Select the *glide.sc.builder.template_access*.

   c. On the System Property form, in the **Value** field, set the value to `true`.

      (Optional) The default value is `false`.

   d. Click **Update**.

5. **Optional:** Define and configure a pre-publish subflow that is triggered after submitting the catalog item in Catalog Builder.

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(Optional) This subflow is run after the catalog item has been submitted but before it gets published. For example, an approval flow after submitting the edited catalog item in Catalog Builder.

a. Create a pre-publish subflow by specifying the following input and output parameters.

(Optional) You can also copy the Template: Catalog Builder - Item review subflow and then define your subflow. For information about subflows, see Subflows.

Template: Catalog Builder - Item review subflow input parameters

Parameter	Type	Description
catalog_item	String	sys_id of the draft version of the catalog item.

Template: Catalog Builder - Item review subflow output parameters

Parameter	Type	Description
state	String	State of the pre-publish subflow. Possible values are: ▪ completed: Publishing process is triggered for the item in the **In review** state. ▪ failed: Reverts the state of the item from **In review** to **Draft**. **Note:** The **completed** and **failed** values are case sensitive and must be selected the same way.

For information about subflow field types, see Field types.

b. Create the *glide.sc.builder.item_review_flow* property.

i. Navigate to sys_properties.list.

ii. Click **New**.

iii. On the form, fill in the fields.

System Property form

Field	Description
Name	Unique identifier of the property. Specify *glide.sc.builder.item_review_flow*.
Type	Type of the property. Specify **string**.
Value	sys_id of the review subflow.

iv. Click **Submit**.

6. **Optional:** To modify the content in feedback panels for Catalog Builder steps, perform the following steps.

a. Navigate to sc_wizard_feedback.list.

b. From the list of catalog wizard feedbacks, select the feedback panel content that you want to edit.

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c. On the Catalog Wizard Feedback form, in the **Content** field, edit the content.

d. Click **Update**.

7. **Optional:** To determine which users can view and edit catalog items, specify a value in the *glide.sc.builder.item_filter_mode* property.

a. Navigate to sys_properties.list.

b. Select the *glide.sc.builder.item_filter_mode* property.

c. On the System Property form, in the **Value** field, specify one of the following values:

- **default**: All the catalog items for which the user has read access will be displayed. When set to **default**, the user cannot edit a catalog item unless the user has write access for that item.
- **catalog_editor**: All the items where the user is the catalog editor or catalog manager are displayed and can be edited.
- **owner_only**: All the items for which the user is the owner are displayed and can be edited.

Note:
If the user has the catalog_admin role, the user can view and edit all catalog items irrespective of what is selected in the property.

Configure a step-based service fulfillment flow

Define service fulfillment steps while creating a catalog item in Catalog Builder.

Before you begin

Role required: admin, catalog_builder_editor, or catalog_admin

About this task

In the base system, the Step-based request fulfillment flow is available. It includes the Service Fulfillment Steps base flow subflow that runs all steps defined in the service fulfillment flow. Following are the input and output parameters of the subflow.

Service Fulfillment Steps base flow input parameters

Parameter	Type	Description
task	Reference	RITM record

Service Fulfillment Steps base flow output parameters

Parameter	Type	Description
state	String	State of the subflow. Possible values are: • completed: All steps are complete. • failed: At least one step failed because of invalid configurations such as missing subflow or step configurations.

For information about subflow field types, see Field types.

If your organization has processes to be run before or after the service fulfillment steps, create a flow and ensure that it is configured as a step-based service fulfillment flow.

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Procedure

1. Create a Workflow Studio flow (With the trigger type as Service Catalog).
   Ensure that the Service Fulfillment Steps base flow subflow is called from this flow.

   For information about creating a flow with Service Catalog trigger type, see Create a flow with a Service Catalog trigger.

2. Register the flow as service fulfillment flow.

   a. Navigate to **Service Catalog** > **Catalog Administration** > **Service Fulfillment Steps Registry**.

   b. Click **New**.

   c. On the form, fill in the fields.

   Service Fulfillment Flow Registry form

Field	Description
Service Fulfillment Flow Registry	Workflow Studio flow for which you want to enable service fulfillment steps.
Application	Application scope in which the flow is supported for service fulfillment.
Active	Option to enable the service fulfillment support for the flow.

   d. Click **Submit**.

Create a service fulfillment step type

Expand the coverage of service fulfillment use cases beyond those supported by step types in base system. Using a service fulfillment step type, catalog item owners can define multiple steps that are part of the request fulfilment process.

Before you begin
Role required: admin

About this task
The following step types are available in the base system.

- Task
- Custom approval
- Manager approval

Procedure

1. Set up a data store to store information needed for running the step. This information is provided by a catalog item owner while defining the request fulfillment process. Do one of the following.

2. Create a record producer to store the values provided by the catalog item owner to the data store (base table or extended table) of that step. For information about creating a record producer, see Create a record producer.

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Note:

- The Service Fulfillment Steps - Properties set variable set is automatically added to the record producer and it should not be removed from the record producer.
- All additional columns defined in the extended table should have corresponding variables mapped in the record producer.
- Configure the Record Producer form to display the **Allow edit** option and **Save Options** field. Also, select the **Allow edit** option and set the value of the **Save Options** field to **Save in Destination**.
- Ensure that the record producer is not restricted for the users with catalog_builder_editor role.

3. Create a subflow to perform a sequence of actions by copying the Template: Service Fulfillment Steps subflow and then defining your subflow. For information about subflows, see Subflows.

Template: Service Fulfillment Steps subflow input parameters

Parameter	Type	Description
requested_item	Reference	RITM record
service_fulfillment_step_data	Reference	Step data record. Update the state to one of the following values before ending the subflow: ○ canceled ○ failed ○ completed
service_fulfillment_step	Reference	Step defined on a catalog item. It must refer to a table in which the record producer defined in the step configuration inserts a record. Do not update the step record.

For information about subflow field types, see Field types.

4. Create a step configuration to define the behavior and display of a service fulfillment step type.

   a. Navigate to **Service Catalog** > **Catalog Administration** > **Service Fulfillment Step Configurations**.

   b. Click **New**.

   c. On the form, fill in the fields.

Service Fulfillment Step Configuration form

Field	Description
Name	Name of the step configuration.
Application	Application scope in which the step configuration is supported.
Active	Option to enable the service fulfillment support for the flow.

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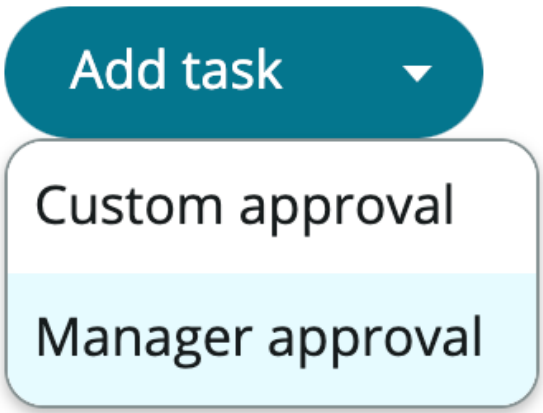
Field	Description
Order	Order of the step configuration. Based on the order of step configurations, the corresponding service fulfillment step types are displayed in the list in the **Steps** region of the **Fulfillment** step. The step type corresponding to the step configuration with the least order is displayed beside the list and step types for all other step configurations are included in the list based on their order. **Order of service fulfillment step types** 
Hide	Hides the step type corresponding to this step configuration in the list in the **Steps** region of the **Fulfillment** step. No impact on existing steps.
Short description	Description of the step configuration.
Producer	Record producer that creates an instance of the step type in the step's data store.
Service fulfillment subflow	Subflow triggered during the request fulfillment process.
Dynamic title	Text that should be displayed for the corresponding service fulfillment step in the **Steps** region of the **Fulfillment** step. If you don't provide any value, the step configuration name is displayed. To display dynamic text, you can include the field name from the step's data store (base table or the extended table) where the associated record producer creates a record. For example, in the base system, the **Dynamic title** field for the Custom approval step configuration contains the following value:`Approval from ${approval_title}` Here, *`approval_title`* is the field from the Service Fulfillment Approval Step [sc_service_fulfillment_approval_step] table where the associated record producer, Add custom approval, creates a record.

d. Click **Submit**.

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Add a step, section, or question to a catalog item wizard

Add a step, section, or question to a catalog item wizard so catalog item editors can enter custom details while creating catalog items.

Before you begin

Role required: catalog_admin

About this task

This video shows you how to add a step, section, or question to a catalog item wizard. This video demonstrates how to add a step, section, or question to a catalog item wizard.

Procedure

1. Navigate to **All** > **Service Catalog Wizards** > **Maintain Wizards**.
2. Indicate the wizard you want to modify by selecting either **Create catalog item** or **Create record producer**.
3. Add steps, sections, or questions to the Catalog Builder wizard.

   For more information about the fields and their descriptions of the Catalog Wizard form, see Catalog Wizard form.

Creating or editing catalog item template

Pre-specify values or provide restrictions for attributes such as catalogs, categories, variable types, and portal settings, which are applicable during the catalog item creation or editing process. You can create a template for a catalog item or record producer.

Before you begin

Role required: admin or catalog_admin

Create a catalog item template in catalog builder

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the **Dashboard** tab and select **Create a catalog item template**.
3. Select any of the following options.
   - **Standard** for a catalog item.
   - **Record Producer** for a record producer
4. In the wizard, specify the information for each step.

Catalog item template creation wizard

Step	Description
Template Details	○ Basic info: Contains the template name, short description, and an option to use the template scope for creating records. If you select the **Use template scope for creating records** check box, the record producers or catalog items created using this template would be created in the scope of the template.

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Step	Description
	○ Template Available for: Specifies the user criteria for users who can use the template. Users matching the criteria must have the catalog_builder_editor role. **Note:** You can add up to a maximum of 50 user criteria.
Details	○ Basic info: Suggestions for the item name and short description. ○ Item details: Suggestions for the description of the item.
Destination	Destination table in which a record producer creates records. **Note:** This step is available for a record producer template.
Location	Catalogs, categories, and topics that the item can be associated with. Configure catalogs and categories to make the catalog item discoverable on the Service Portal. In the Topics card, select the taxonomy and its associated topics for a catalog item to make the catalog item discoverable on the Employee Center. **Note:** You can add up to a maximum of 50 catalogs or categories.
Questions	Question sets (variable sets) that should be included in the item. You can also restrict question types that can be used for items using the template by selecting the define owner permissions icon ( ).
Settings	Settings to configure the catalog item behavior in portals, such as Employee Center and Service Portal. Determine whether to display the following buttons or options on the portals: ○ Add to cart ○ Save as draft ○ Quantity selector ○ Delivery time ○ Attachment ○ Make the attachment mandatory For example, if you don't want to display the **Save as draft** button on the portal for the catalog item, select the **Hide 'Save as draft'** option.
Access	User criteria to specify users for whom the item is available or not available.
Fulfilment	Flow or workflow that you want to associate with the item using this template.
Overrides	Restrictions that apply while creating the catalog item.

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Step	Description
	○ Can Edit: Only the attributes specified here can be edited. ○ Must specify: Editable attributes that should be answered. The following attributes must be made mandatory: ▪ Item name ▪ Record submission table ○ Restricted selections: For the attributes that enable selection of multiple values (for example, catalogs, categories, Available For, Not Available For), the user creating the item can only select or deselect the options from within the values specified in the template.
Review and submit	Review the template information and submit it.

Note:
For each step, you can review the information in the feedback panel to know more about that step.

5. Select **Submit**.
6. To edit the catalog item template, select the **Catalog item templates** tab, select the required template, and perform any of these actions.

   a. To edit the item, make the necessary changes, and select **Save**.

   Note:
   - The changes to the template don't automatically apply to existing items.
   - While editing an existing catalog item, the new values in the template aren't automatically updated in the item but the new restrictions apply. For example, if a new category is added to the template, that category isn't automatically added to the catalog item. However, the restrictions to the categories apply.
   - When question sets are added to the template, they don't have any impact on the existing catalog items using the template.

   b. To duplicate the catalog item template, select **Duplicate**.

Note:
You can't delete a catalog item template in the catalog builder, but it can be deleted in ServiceNow AI Platform. After a template is deleted, it's disassociated from all catalog items using the template and the restrictions no longer apply to those items.

Create a catalog item using a template

Make an item available in service catalog for catalog item requests.

Before you begin
Role required: catalog_builder_editor, catalog_admin, or admin

About this task
You must create a catalog item using one of the available catalog item templates.

Demonstrates how business owners can create catalog items in Catalog Builder.

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Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the **Dashboard** tab and click **Create a new catalog item**.
3. Review the steps involved in the creation process and click **Continue**.
4. Select a template from the list and click **Use this item template**.

   Note:
   - After you select the template, the preview of this template is available.
   - You can only view templates assigned to you.
   - Based on the template configuration, during the item creation or editing, few attributes have pre-specified values, are not editable, have limited options to select, and are mandatory.
   - When selecting a record submission table for record producers, you can only select tables in that scope.

5. Select **Build on your own**.

   By default, the **Build with Now Assist** option is selected, enabling you to leverage automated assistance for catalog generation. Alternatively, you can choose to create the item manually from scratch if you prefer a hands-on approach.

6. Select **Build**.
7. Based on how each step is defined in the template, specify the required information.

Catalog builder steps

Step	Description
Details	○ Basic info: Item name and short description. ○ Item details: Description of the item.
Destination	Destination table in which a record producer creates records. **Note:** This step is available when using a record producer template.
Location	Catalogs, categories, and topics that the item can belong to. You can only view the catalogs, categories, and topics specified in the template. Configure catalogs and categories to make the catalog item discoverable on the Service Portal. In the Topics card, select taxonomy and its associated topics for a catalog item to make the catalog item discoverable on the Employee Center.
Questions	Question sets (variable sets) or questions for the item. By default, the question sets included in the template are added and cannot be removed. Available question types are restricted to those specified in the template.

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Step	Description
	From the **Insert new question** list, you can include additional question sets, questions, deactivated questions, single-column container, two-column container, and line break. For information on creating a question and supported question types, see Create a question for a catalog item in Catalog Builder. You can also add dynamic form behavior for a question. For information on adding dynamic form behavior, see Edit a question in Catalog Builder. **Note:** ○ The questions within a question set cannot be edited. The question sets can be reordered by dragging and dropping them. ○ Question sets specified in the template cannot be removed, while the ones added by the user can be removed. ○ Removal of question sets simply removes the association with the item and does not delete the question set. ○ A single-column question set can be added to a single-column or a two-column container. Two-column question set cannot be added to a container. ○ The questions for a catalog item are available as options on which a condition can be applied for a step when you create service fulfillment steps for that catalog item.
Client Script	Use catalog client scripts to control the behavior of the catalog items after publishing them for catalog item requesters.
Settings	Settings to configure the catalog item behavior in portals, such as Employee Center and Service Portal based on the request method. For example, you can determine whether to display buttons or options for adding attachments, making them mandatory, or saving the draft of the items while requesting them.
Access	User criteria to specify users for whom the item is available or not available. **Note:** You can add up to a maximum of 50 user criteria.
Fulfilment	Flow or workflow that you want to associate with this item. It defines how this catalog item can be fulfilled. When a catalog item is associated with a Workflow Studio flow that supports service fulfillment steps, the catalog item owner creating the item can configure steps within the flow. By default, the Step based request fulfillment flow is available in the base system. For information about defining service fulfillment steps, see Define a service fulfillment step.

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Step	Description
	For information about Workflow Studio flows, see Flows.
Review and submit	Review the item and submit it.

Note:
A dot beside the step name indicates it has a mandatory field.

8. To save your changes in each step, click **Save**.
   All edits to the item attributes are automatically saved when you navigate to the next step.
9. To preview a catalog item in Portal, Now Mobile, or a Virtual Agent conversation, click **Preview**.

   Note:
   When you preview an item, you can interact with it but not submit it.

   a. To preview the item in Portal, select **Portal** for the **View within** field.

      Note:
      Portal preview is based on portal URL configured for the catalog builder.

   b. To view an item representation in Now Mobile, select **Now Mobile** for the **View within** field.

   c. To preview a catalog item in a Virtual Agent conversation, select **Virtual Agent** for the **View within** field.

      The Service Management Virtual Agent Topic Blocks plugin (com.glideapp.cs.sm_topic_blocks) and one of these plugins must be installed.

      - Glide Virtual Agent (com.glide.cs.chatbot)
      - Glide Virtual Agent Lite (com.glide.cs.chatbot.lite)

      A Virtual Agent conversation whose sys_id is specified in the *glide.sc.builder.va_preview_topic_id* property is opened. By default, the property has the sys_id of the base system Catalog builder preview topic. For information about this topic, see Catalog builder preview topic conversation. If the base system topic is used, the following scenarios are possible:

      - If the item is supported in the conversation mode, you can preview the item in the Virtual Agent conversation by answering the questions but cannot submit a request for the item. For information about when a catalog item is supported in the conversation mode, Service Catalog topic blocks in Virtual Agent powered by NLU.
      - If the item is not supported in the conversation mode, a link is provided for the portal preview of the item.
      - When the required plugins are not installed, an illustration displaying a sample conversational experience for the catalog item submission appears.

   d. To open the preview in a new tab, click **Open preview in a new tab**.

      Note:
      When you make any changes to the item and save it, the preview is dynamically refreshed in the opened tab.

10. To delete an unpublished draft item, click **Delete**.

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Note:
You cannot delete a published item but can make it inactive.

11. Click **Submit**.

Note:
Until you submit the item, it is in the Draft state and is not available in the catalog.

Define a service fulfillment step

Define how a catalog item request should be fulfilled by creating simple service fulfillment steps.

Before you begin

Role required: catalog_builder_editor or catalog_admin or admin

About this task

To configure fulfillment steps while creating a catalog item, associate it with a Workflow Studio flow that supports service fulfillment steps.

Fulfillment process can contain multiple steps. These steps can run sequentially or can be grouped to run in parallel.

The following video demonstrates how business owners can define the fulfillment process of catalog items using service fulfillment steps.

Demonstrates how business owners can define the fulfillment process of catalog items using service fulfillment steps.

Procedure

1. In the **Fulfillment** step of creating a catalog item, for the **Selected flow** field, select a flow that supports service fulfillment steps.
2. In the **Steps** region, perform one of the following:

   a. To create a task, click **Add task**.

      i. On the form, fill in the fields.

Task form

Field	Description
Task	
Short description	Brief description of the task. It appears in the **Steps** region.
Description	Detailed description of the task.
Assignment group	User group that the task should be assigned to.
Assigned to	User for which the task is assigned.
Priority	Priority of the task.
When to run	
Sequence	Sequence of this step relative to the previous step. Possible options are:

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Field	Description
	▪ With previous step: This step is grouped with the previous step or group. All grouped steps run simultaneously. ▪ After previous step: This step is placed after the previous step **Note:** This field is not editable if it is the first step.
Condition	Condition that defines whether the step must run. The options on which a condition can be applied are the questions that are available on the catalog item for which you're creating the service fulfillment steps. For information on questions, see the Create a catalog item using a template topic.

ii. Click **Add**.

b. To create a custom approval and define who can approve the step, perform the following:

i. From the list beside **Add task**, click **Custom approval**.

ii. On the form, fill in the fields.

Custom approval form

Field	Description
Custom approval	
Users	Users that can approve this step.
Groups	User groups that can approve this step.
Approval type	Type of the required approval. ▪ All approve: The step is approved only when all assigned users and user groups approve. ▪ Anyone approves: The step is approved when any of the assigned users or any user from the assigned user groups approve.
When to run	
Sequence	Sequence of this step relative to the previous step. Possible options are: ▪ With previous step: This step is grouped with the previous step or group. All grouped steps run simultaneously. ▪ After previous step: This step is placed after the previous step **Note:** This field is not editable if it is the first step.
Condition	Condition that defines whether the step must run. The options on which a condition can be applied are the questions that are available on the catalog item for which you're creating the service fulfillment steps. For information on questions, see the Create a catalog item using a template topic.

iii. Click **Add**.

c. To create a manager approval and define who can approve this step, perform the following:

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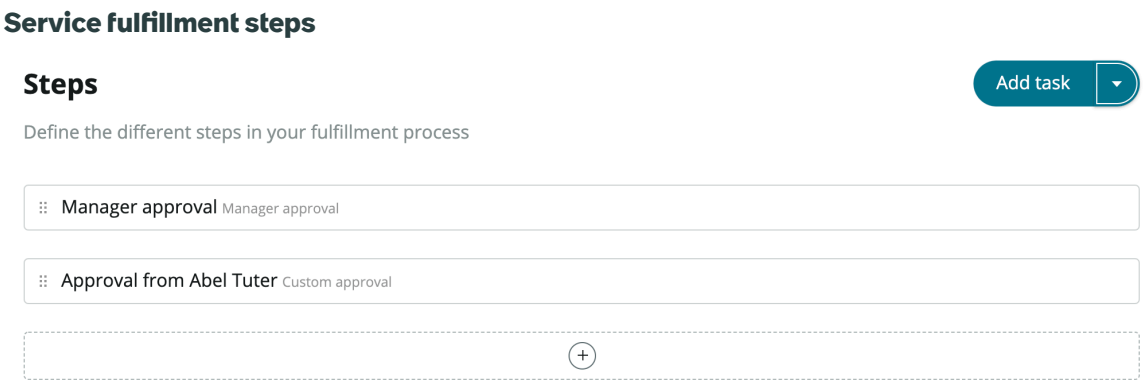
i. From the list beside **Add task**, click **Manager approval**.

ii. On the form, fill in the fields.

Manager approval form

Field	Description
When to run	
Sequence	Sequence of this step relative to the previous step. Possible options are: ▪ With previous step: This step is grouped with the previous step or group. All grouped steps run simultaneously. ▪ After previous step: This step is placed after the previous step **Note:** This field is not editable if it is the first step.
Condition	Condition that defines whether the step must run. The options on which a condition can be applied are the questions that are available on the catalog item for which you're creating the service fulfillment steps. For information on questions, see the Create a catalog item using a template topic.

iii. Click **Add**.



3. In the **Estimated time to deliver** region, for the **Days** field, specify the time by which the RITM should be fulfilled.

   The due date is calculated based on when the service fulfillment flow is triggered.

4. **Optional:** To edit a step, click the edit icon ( ).
5. **Optional:** To delete a step, click the delete icon ( ).
6. **Optional:** To rearrange steps, drag the steps.
7. **Optional:** To group steps together, perform one of the following tasks.
   - Drag a step and drop it on another step or group of steps.
   - To group this step with the previous step or group, click the merge icon ( ).

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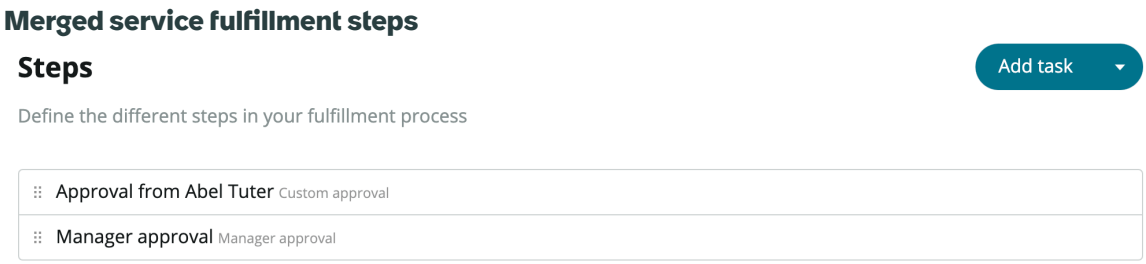

8. **Optional:** To separate a step from a group of steps, perform one of the following tasks.
   - Click the separate icon ( ). The step is placed after the group.
   - Drag a step out of the group and drop it at a location of your choice.

Catalog builder preview topic conversation

From the catalog builder, a user can preview a catalog item in a Virtual Agent conversation.

This conversation uses the Request Catalog Item topic block. For information on this topic block, see Service Catalog topic blocks in Virtual Agent powered by NLU.

The Service Management Virtual Agent Topic Blocks plugin (com.glideapp.cs.sm_topic_blocks) and one of these plugins should be installed.

- Glide Virtual Agent (com.glide.cs.chatbot)
- Glide Virtual Agent Lite (com.glide.cs.chatbot.lite)

In catalog builder, when the user selects the required item and navigates to preview it, the following scenarios are possible:

- If the item is supported in the conversation mode, you can preview the item in the Virtual Agent conversation by answering the questions but cannot submit a request for the item. For information about when a catalog item is supported in the conversation mode, see Service Catalog topic blocks in Virtual Agent powered by NLU.
- If the item is not supported in the conversation mode, a link is provided for the portal preview of the item.
- When the required plugins are not installed, an illustration displaying a sample conversational experience for the catalog item submission appears.

Related topics

Service Catalog topic blocks in Virtual Agent powered by NLU

Create a question for a catalog item in Catalog Builder

Specify a question that the requester should answer before submitting the catalog item.

Before you begin

Role required: catalog_builder_editor, catalog_admin, or admin

About this task

If allowed in the template by the template owner (catalog_admin) while configuring the template, the following question types can be used in the item creation process in the catalog builder. These question types are grouped into types and subtypes:

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- Text
  - Single-line. Single-line text variable type in ServiceNow AI Platform.
  - Multi-line. Multi-line text variable type in ServiceNow AI Platform.
  - Rich text. HTML variable type in ServiceNow AI Platform.
- Option
  - Check box. Check box variable type in ServiceNow AI Platform.
  - Yes/No. Yes/No variable type in ServiceNow AI Platform.
- Choice
  - Drop down (fixed values). Select Box variable type in ServiceNow AI Platform.
  - Drop down (values from a table). Lookup Select Box variable type in ServiceNow AI Platform.
  - Record reference. Reference variable type in ServiceNow AI Platform.
  - Radio. Multiple Choice variable type in ServiceNow AI Platform.
  - Multi-select. List Collector variable type in ServiceNow AI Platform.
  - Requested for
- Date/Time
  - Date. Date variable type in ServiceNow AI Platform.
  - Date &Time. Date and time variable type in ServiceNow AI Platform.
  - Duration
- Display label
  - Plain text. Label variable type in ServiceNow AI Platform.
  - Rich text. Rich Text Label variable type in ServiceNow AI Platform.
- Attachment

For detailed information about these question types, see Types of service catalog variables.

Procedure

1. Navigate to **Catalog Builder** > **Create a new catalog item** > **Question** and click **Insert new question**.
2. On the Create question form, specify the required details.

Note:

- The fields on the form vary based on the question type and subtype.
- While you configure each question, its preview is available.
- The question preview doesn't show interactions for the following questions types until the question is saved and then edited.
  - Record reference
  - Multi-select
  - Drop down (values from a table)
- The question preview doesn't show annotations.

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a. Specify the details on the **Question** tab.

Question tab

Field	Description
Type	
Question type	Group under which the question type is categorized.
Question subtype	Subtype of the question. Only the question types allowed in the template are available.
Details	
Map to field	Maps the question to a specific field on the table for the record producer.
Question label	Question for a requester while ordering the catalog item. For the Rich text question subtype, you can specify a formatted label to be displayed on a catalog item form.
Name	Internal name to identify the question. The name should not contain spaces or special characters. Only the underscore character is allowed.
Mandatory	Option to specify if the question is mandatory.
Hidden	Option to specify if the question is hidden.
Read-only	Option to specify if the question is read-only.
Conversational label	Option to specify the text that you want to ask in the conversation for the question of your catalog item.

b. Specify the details on the **Annotation** tab.

This tab is available for the following question subtypes:

- Single-line
- Multi-line
- Rich text
- Yes/No
- Drop down (fixed values)
- Drop down (values from a table)
- Record reference
- Radio
- Date
- Date &Time
- Multi-select

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Annotation tab

Field	Description
Instructions	
Show instructions	Option to specify if instructions should be displayed for the question.
Instructions label	Instruction for the requester while ordering the catalog item.
Instructions	Detailed instruction content.

c. Specify the details on the **Additional Details** tab.

This tab is available for the following question subtypes:

- Single-line
- Drop down (values from a table)
- Record reference
- Multi-select

Additional Details tab

Field	Description
Validation	
Available for the Single-line question type	
Text validation	Option to validate the specified text value based on the regular expression validations that have been set up in the system.
Source	
Available for the Dropdown (values from a table), Record reference, and Multi-select question subtypes	
Table	Table from which the choices are retrieved.
Field	Field that should be displayed as a choice. This field is not available for the Record reference and Multi-select subtypes.
Filter conditions	Conditions to filter the choices.

d. Specify the details on the **Choices** tab.

This tab is available for the following question subtypes:

- Drop down (fixed values)
- Drop down (values from a table)
- Yes/No
- Radio

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Choices tab

Field	Description
Settings	
Include none choice	Option to include **None** as a choice for the question.
Choice direction	Direction in which the choices should be displayed. Possible options are **Down** and **Across**. This option is available only for the Radio question subtype.
Do not select first choice	Option to ignore the first choice. This option is available only for the Radio question subtype.
Available Choices	
Available for the Drop down (fixed values) and Radio question subtypes. You can add a name-value pair for each choice.	
Display name	Label for a choice.
Value	Value of the choice.

e. Specify the details in the **Default Value** tab.

The default value specified here is pre-selected as the answer for the question when a requester opens the catalog item form for the item. This tab is available for the following question subtypes:

- Single-line
- Multi-line
- Yes/No
- Radio
- Date
- Date &Time
- Multi-select

f. Specify the question details on the **Auto-populate** tab.

For more information about configuring auto-populate value, see Configure an auto-populate value for a question in Catalog Builder.

3. Click **Insert Question** to add the question to the item.

Note:

- If there are two consecutive check boxes, then a virtual container is created for a group of check boxes. Only check box variable types can then be added inside that group.
- Even if a check box variable is added immediately after a group of check boxes, it's automatically added to the group.

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Configure an auto-populate value for a question in Catalog Builder

Configure the value of a question to populate automatically whenever the value of another question of the reference type changes.

Before you begin

Role required: catalog_builder_editor, catalog_admin, or admin

About this task

In a catalog item, for example, you can set up the value of the “Name of the manager” question to auto-populate whenever the value of the “Select the requester” question changes.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the **Catalog items** tab.
3. Select a catalog item and navigate to the **Questions** tab.
4. Select **Insert new question**.
5. On the **Questions** tab, do the following:
   a. In the **Question type** field, select **Choice**.
   b. In the **Question subtype** field, select **Record reference**.
   c. In the **Question label** field, enter `Name of the manager`.
   d. **Optional:** Select the **Read-only** option.
6. On the **Additional details** tab, in the Source table field, search for and select `User (sys_user)`.
7. On the **Auto-populate** tab, do the following:
   a. In the **Select the question this depends on** field, select the reference question that this question depends on.

      For example, select **Select the requester**.

      The list displays all the Reference and Requested For question types that belong to the current catalog item and the associated single-row variable sets.
   b. To select the field that contains the value that you want to set, select the Select the lookup field icon ( ).

      The list shows all the values in the sys_user table.
   c. From the list, select **Manager**.

      Note:
      To search any value, enter what you're looking for, for example, `manager` or dot-walk to get the required value.

      For more information about dot-walking, see Dot-walking to data in related tables.
8. Select **Insert question**.

Edit a question in Catalog Builder

Edit an existing question if you want to improve it by adding dynamic form behavior.

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Before you begin
Role required: catalog_builder_editor, catalog_admin, or admin

About this task
Set values for the fields and condition-based field messages. Make the question mandatory, visible, or read-only based on your requirements. You can also deactivate the question.

You can't edit the questions that belong to single-row and multi-row variable sets.

- If the question is used in a published catalog item, you can't delete it but you can mark it as inactive. You can include such questions again in the catalog item by using the **Insert Deactivated questions** option.
- Removing a new question that has never been published deletes the question.
- You can't remove questions of types that aren't allowed in the template or supported in the Catalog Builder.

Procedure
1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the **Catalog items** tab.
3. Select a catalog item and navigate to the **Questions** tab.
4. Deactivate a question.
   a. Point to the question and select the deactivate icon (⊗).
   b. In the dialog box, select **Deactivate**.
5. Edit a question.
   a. Point to the question and select the edit icon (⚙).
   b. Make the required changes and select **Save**.

Note:
If you want to add UI policies to the question, use UI Policy tab to add them.

Edit a catalog item in Catalog Builder

Make changes to an existing catalog item if you have permissions to edit the item.

Before you begin
- You can edit a catalog item if you are a catalog admin.
- If you have the catalog_builder_editor role and you are the owner of the catalog item, you can edit it. If the template access property, *`glide.sc.builder.template_access`*, is set to **true** (which is **false** by default), any user with the catalog_builder_editor role with access to the template used for creating the catalog item can edit the item.
- Role required: catalog_builder_editor, catalog_admin, or admin

About this task
When you edit a published item in the catalog builder, the system creates a draft copy of the item and its associated records such as variables, UI policies, and client scripts. The draft version is inactive until published. The published item remains in the published state and the **Checked out** field is set to **True**.

After you edit the item and submit it, the following scenarios are possible:

When a pre-publish subflow isn't configured

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- The edits to the draft version are merged with the associated published item.
- The draft item and the associated records are deleted.
- The **Checked out** field of the published item is set to **False**.

When a pre-publish subflow is configured

- The state of the draft item is changed to **In review**.
- If the *state* variable of the subflow output returns **Completed**:
  - The state of the draft item is changed to **Reviewed** and edits made to the draft version are merged with the associated published item.
  - The state of the published item changes to **Publishing**, then to **Published**, and the **Checked out** field of the published item is set to **False**. The state change from **Publishing** to **Published** may not happen instantaneously.
  - The reviewed draft item and the associated records are deleted.
- If the *state* variable of the subflow output returns **Failed**, the state of the draft item is reverted to **Draft**, and the item is ready for editing.

For information about configuring a review subflow, see Setting up the Catalog Builder.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the **Catalog items** tab.

   Note:
   In the catalog item list view of the catalog builder, you can view items based on the value set in the *glide.sc.builder.item_filter_mode* property.

3. Select the item that you want to edit and select **Edit**.

   Note:
   - To edit an item in the **In review** state, you must cancel the review. After you cancel the review, the state of the item is reverted to **Draft**.
   - To view the conversational details of the catalog item, select **View conversational details**.

   To edit an item in the **In review** state, you must cancel the review. After you cancel the review, the state if the item is reverted to **Draft**.

4. Make the required changes and select **Save**.

   For information on editing a question and catalog item fields, see Edit a question in Catalog Builder and Create a catalog item using a template.

5. To make an item inactive, clear the **Item is active** check box in the **Basic info** section of the **Details** step.
6. To publish the modified item, navigate to the **Review and submit** step and select **Submit**.

Related topics

View the conversational catalog overview dashboard using Catalog Builder

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Add advanced capabilities to a catalog item

Add advanced capabilities, such as catalog client scripts, data lookup rules, and advanced reference qualifiers to a catalog item.

Before you begin

Role required: catalog_admin or admin

Procedure

1. Add advanced capabilities to a catalog item using any of these methods.
   - Using the **Edit in advanced view** button.
     a. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
     b. Select the **Catalog items** tab.
     c. Select the catalog item for which you want to add advanced capabilities or features.
     d. Select **Edit in advanced view**.

     Note:
     If you have the catalog item wizard open, and you want to edit it in advanced view, select the more actions icon ( ) on the wizard, and select **Edit in advanced view**.

   - Using the **Edit checked out item in advanced view** related link.
     a. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Items**.

     Note:
     - The checked out item icon ( ) for the checked out item beside a catalog item indicates that it's the published version of the item that has been checked out for editing in the catalog builder.
     - A draft item icon ( ) for the draft item mark beside the item indicates that it's the draft version of the item that can be directly edited in ServiceNow AI Platform.

     b. Open the published item that you want to edit.
     c. Select the **Edit checked out item in advanced view** related link.

     Note:
     - When a published item is checked out for editing, you can't edit the published version of the item in ServiceNow AI Platform, unless you cancel the checkout in ServiceNow AI Platform. Canceling the checkout cancels all changes made after the item was checked out.
     - To edit an item in the **In review** state, you must cancel the review. After you cancel the review, the state of the item is reverted to **Draft**.

2. Make the required changes and select **Update**.
3. To edit the same item in the catalog builder, select **Edit in Catalog Builder**.
   If the item has not already been checked out, this step checks out the item.

Create UI policies in Catalog Builder

Configure catalog UI policies with scripts and multiple catalog UI policy actions in Catalog Builder to facilitate the creation of complex catalog items.

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Before you begin

Role required: catalog_builder_editor, catalog_admin, or admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Create a new catalog item or edit an existing one.
3. Navigate to the UI Policy tab.
4. Select **Add new behavior**.
5. Define dynamic behavior for your catalog item using conditions, actions, or scripts.
   For more information about the fields and their description, see UI policy form in Catalog Builder.
6. After you fill the required information, select **Add behavior**.

UI policy form in Catalog Builder

Refer to the fields and their descriptions on the UI Policy form in Catalog Builder.

Field	Description
Details	
Active	Enable this option to activate and apply the UI policy or dynamic behavior to the catalog item.
Applies to	Selected by default; this is the name of your catalog item that this UI policy applies to. It's a read-only field.
Short description	Specify the purpose of this behavior.
Order	Enter the sequence in which this UI policy is evaluated if more than one matching UI policy exists. The order is evaluated from the lowest value to the highest value.
On Load	Select the check box to apply the UI policy when the form is loaded. Clear the check box to apply the policy only when the form is changed.
Reverse if false	Select the check box to reverse the UI policy if the catalog conditions statement evaluates to false.
Conditions	
Conditions	Define the conditions that must be met to trigger and run this behavior.
Actions	
Add new action	Configure field behavior for the selected question like mandatory, hidden, read-only, value changes, and messages.
Variable name	Question affected when the condition is met.
Order	Sequence in which the UI policy action is evaluated. The order is evaluated from the lowest value to the highest value.
Mandatory	Define if the field is required when the condition is met. The choices are:

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Field	Description
	• Leave alone • True • False
Read only	Set the field to read-only when the condition is met. The choices are: • Leave alone • True • False
Visible	Set to show or hide the field when the condition is met. The choices are: • Leave alone • Set value • Clear value
Field message type	Show an info, warning, or error message. Choices are: • None • Info • Warning • Error
Scripts	
Run scripts	Select the check box to use the execute scripting fields. Scripts are necessary to apply a UI policy other than **Read Only**, **Mandatory**, or **Visible**. For example, you must create a script to apply a UI policy to a specific role.
UI Type	Appears if you select the Run scripts check box. Choose the UI type from the choices, where this script will be applied. • Desktop • Mobile/Service Portal • All
Execute if true	Use this script to define behavior when the conditions of this policy are met. Appears if you select the **Run scripts** check box.
Execute if false	Use this script to define behavior when the conditions of this policy are not met. Appears if you select the **Run scripts** check box.
Applies to	
Applies when the item is being requested	Select the check box so that the UI policy applies when the item is being requested.
Applies while viewing the catalog tasks after the request is submitted	Select the check box so that the UI policy applies while viewing the catalog tasks after the request is submitted.

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Field	Description
Applies while viewing the requested item record after the request is submitted	Select the check box so that the UI policy applies while viewing the requested item record after the request is submitted.

Related topics

Create UI policies in Catalog Builder

Create client script in Catalog Builder

You can create client scripts to customize the catalog item, such as to control the behavior of the catalog items after they're published.

Before you begin
Role required: admin and catalog_builder_developer

Procedure

1. Navigate to **All** > *Service Catalog* > *Catalog Builder*.
2. Select the Dashboard tab, and then select **Create a new catalog item**.
3. Review the information to get started, and then select **Continue**.
4. Select a template that you want to use to create a catalog item, and then select **Use this item template**.
5. Review and fill information in the required steps, and continue until you reach the step for creating client scripts for that catalog item you're creating.
6. Select **New**.
7. On the Catalog client script form, select the Actions tab, and add your script.
8. Give a name to your client script, set whether to make it active or not, and choose the script type.
9. Continue to the Settings tab, and specify the scenarios where the client script applies.
10. Select **Add script**.
    For more information about the fields in the Actions and Settings tabs, see Catalog client script form.

Related topics

Catalog builder developer [catalog_builder_developer]

Catalog client script form

Use client-side scripts to define dynamic behavior or validations on this catalog item.

Client script form in Catalog Builder

Field	Description
Actions	
Name	Unique name for the catalog client script.
Active	Check box to enable the client script. Clear the check box to disable the script.

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Client script form in Catalog Builder (continued)

Field	Description
Select client script type	Select when the script runs, such as `onChange`, `onLoad`, or `onSubmit`.
Select question	Select a required question. This field is available only when you select `onChange` client script type.
Script	Enter the client script to run on the catalog item.
Settings	
UI Type	Whether to apply this field to Desktop, Mobile or Service Portal, or all.
Order	Number representing a sequence.
Applies when the item is being requested	Check box to apply the catalog client script to catalog items displayed within the order screen on the portals. Available in the requester view.
Applies while viewing the requested item record after the request is submitted	Check box to apply the catalog client script on a Requested Item form, after the item is requested. Available in the fulfiller view. See VEditor.
Applies while viewing the catalog tasks after the request is submitted	Check box to apply the catalog client script when a Catalog Task form for the item is being displayed. Available in the fulfiller view. See VEditor.

Related topics

Create client script in Catalog Builder

Catalog builder developer [catalog_builder_developer]

Discard a catalog item

Discard a catalog item that's in the Draft state in Catalog Builder.

Before you begin

Role required: catalog_builder_editor, catalog_admin, or admin

About this task

If you no longer want a draft item, you can discard it in Catalog Builder. When you discard a draft item that doesn't have a published item associated with it, that draft item is deleted. If a draft item has a published item associated with it, the draft item is deleted while the published item remains intact. The data of the catalog item is reverted to the state that it was in before you started editing it.

Procedure

1. Navigate to **All** > *Service Catalog* > **Catalog Builder**.
2. Select the **Catalog items** tab.
3. Select the catalog item that you want to discard.

Note:
You can discard only those catalog items that are in the **Draft** state. After you select any draft item, the **Discard draft** button becomes active.

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4. Select **Discard draft**.

> **Note:**
> If a catalog item wizard is already open for editing, and you want to discard it, select the more actions icon (...) on the wizard, and select **Discard draft**.

Transfer catalog items using update sets

Transfer catalog items published through Catalog Builder from one instance to another easily by using update sets automatically created for the catalog item. For example, you can transfer catalog items created by a business user from a non-production to production instance.

Before you begin

You can access update sets for a catalog item only if it is created or modified in Catalog Builder.

For information on creating a catalog item in Catalog Builder, see Create a catalog item using a template.

For information on editing a catalog item in Catalog Builder, see Edit a catalog item in Catalog Builder.

Role required: catalog_admin, catalog_builder_editor

Procedure

1. Access an update set for a catalog item by navigating to **All > System Update Sets > Local Update Sets**.
2. Search for the update set by the name, `CB_<Template Name>_<Catalog Item Name>_<Date and Time Stamp>`.

> **Note:**
> If a catalog item contains related records such as Variables, Variable Sets, Available For, or Not Available For in a scope other than the current item scope, then such items are transferred in a batch where the related record update set's parent field is set as the update set of the parent catalog item. For more information, see Update set batching.

3. Transfer the completed update sets from the source instance to the target instance. For more information, see Update set transfers.

Localization Framework integration with Catalog Builder

The **Translation Status** tab in the Catalog items tab on the Catalog Builder dashboard enables you to view the translation status of catalog items, and translate catalog items on the fly using manual or machine translation methods.

Confirm that the following plugins are installed before you start using Localization Framework in Catalog Builder:

1. Localization Framework Installer plugin for Service Catalog: The plugin enables the Localization Framework capabilities in Service Catalog and Catalog Builder.
2. Dynamic Translation plugin: Enables on-the-fly machine translation capabilities.

Translate catalog items information using one of the following modes:

- Request Translation mode
- Self-translation (ad hoc) mode

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Request translation mode for new catalog items

Set the glide.sc.catalog_builder.localization.enable_request_translation_mode property to **True**, to enable the Request translations mode.

When you create item, the **Request translations** step appears in the wizard steps region. Select **Browse** to view and select the languages you want to translate the catalog item information to.

For more information, see Request translations for Service Catalog items.

Request translation mode for existing items

Set the glide.sc.catalog_builder.localization.enable_request_translation_mode property to **True**, to enable the Request translations mode is enabled.

On the **Catalog Items** tab, select the existing item that you want translated, then select the **Translation status** tab on the right pane (next to the **Item details** tab). You would see the list of languages configured in the system along with the state of that language for the catalog item and a **Request translations** link to request for a translation.

Select the **Request translations** link below the language you want the translations for. A dialog appears prompting you to confirm the translation request. When you confirm the translation request on the **Translation status** tab, a localization task gets generated and its corresponding Localization item record ("LRITMXXXXXXX") shows up in place of the **Request translations** link. The state for that specific language changes to **Translations requested**.

When the localization task completes in Localization Framework, the **Request translations** link comes back which you can use to request for translations again. The state changes to **Translated**, **Partially translated**, or **Not translated** on the **Translation status** tab, depending on whether the translations occur for all fields, some fields, or no fields in the table.

For more information, see Request translations for Service Catalog items.

Self-translation (ad hoc) mode

Set the glide.sc.catalog_builder.localization.enable_request_translation_mode property to **False** to enable self-translation mode. The default value for this property is **False**.

In the **Catalog Items** tab, select the existing item you want translated, then select the **Translation status** tab on the right pane (next to the **Item Details** tab). The list of languages configured in the system is displayed, along with the state of that language for the catalog item and an **Edit translations** link to edit the translation.

Select the **Edit translations** link to open another tab that contains two comparison UI regions: The left region is the source language, and the right region is the target or translated language. You can compare the language translation side by side in the page, and make changes if required.

For more information, see Request ad hoc translation for Service Catalog items.

Translation States

Translation states for both modes

State	Mode	Description
Not available	Request translation and Self-translation	If the Localization Framework Insights record is not

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Translation states for both modes (continued)

State	Mode	Description
		available, the translation state displayed by the system is **Not Available**, and the state appears near the language name.
Not translated	Request translation and Self-translation	If there are no translations in the system for that specific catalog item for that language, the state **Not Translated** appears near the language name.
Translations requested	Request translation	If there is an active LRTIM associated with a language for the item, the state **Translations requested** appears near the language name.
Partially translated	Request translation and Self-translation	If there are partial translations in the system for that specific catalog item for that language, the state **Partially Translated** appears near the language name.
Translated	Request translation and Self-translation	If all translations for that specific catalog item for that language exist in the system, the state **Translated** appears near the language name.

Now Assist in Catalog Builder

Use ServiceNow® Now Assist in Catalog Builder to create catalog items of your choice in Catalog Builder by giving text inputs.

Get started

Explore

Learn about catalog generation by Now Assist.

Configure

Learn how to configure catalog item generation.

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Generate

Learn how to create a catalog item using Now Assist.

Reference

Get details about form fields, roles, and more.

Important:
Some Now Assist products/features are currently unavailable for customers in the FedRAMP, NSC DOD IL5, or Australia IRAP-Protected data centers, self-hosted customers, or in other restricted environments. For more information, see the KB0743854 article in the Now Support Knowledge Base. Please check for availability updates in future releases.

Important:
Some Now Assist products/features are currently available only for customers in some regions. Be sure to check for availability updates in future releases.

Troubleshoot and get help

- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

AI limitations

This application uses artificial intelligence (AI) and machine learning, which are rapidly evolving fields of study that generate predictions based on patterns in data. As a result, this application may not always produce accurate, complete, or appropriate information. Furthermore, there is no guarantee that this application has been fully trained or tested for your use case. To mitigate these issues, it is your responsibility to test and evaluate your use of this application for accuracy, harm, and appropriateness for your use case, employ human oversight of output, and refrain from relying solely on AI-generated outputs for decision-making purposes. This is especially important if you choose to deploy this application in areas with consequential impacts such as healthcare, finance, legal, employment, security, or infrastructure. You agree to abide by ServiceNow's AI Acceptable Use Policy, which may be updated by ServiceNow.

Data processing

This application requires data to be transferred from ServiceNow customers' individual instances to a centralized ServiceNow environment, which may be located in a different data center region from the one where your instance is, and potentially to a third-party cloud provider, such as Microsoft Azure. This data is handled per ServiceNow's internal policies and procedures, including our policies available through our CORE Compliance Portal.

Data collection

ServiceNow collects and uses the inputs, outputs, and edits to outputs of this application to develop and improve ServiceNow technologies including ServiceNow models and AI products. Customers can opt out of future data collection at any time, as described in the Now Assist Opt-Out page.

Exploring Now Assist in Catalog Builder

Learn how the Now Assist in Catalog Builder application helps you to create catalog items by simply describing them. Now Assist generates catalog items with more detailed descriptions and question labels.

Now Assist in Catalog Builder overview

In Catalog Builder, you can describe the catalog item you want, and Now Assist generates the catalog item for you.

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The application uses the Catalog item generation skill to create catalog items. For more information about the skill, see Catalog item generation.

Note:
You must be assigned the catalog_builder_editor role to create catalog items using Now Assist.

Now Assist in Catalog Builder benefits

Benefit	Feature	Roles
• Catalog items of your choice: Describe your item, and it's generated for you by Now Assist. • Tailored catalog items: Provide specific details, and Now Assist tailors catalog items to your needs. It's customizable, so you can ensure every items fits the specifications you need. • Professional descriptions: Get descriptions and question labels automatically. Now Assist crafts compelling narratives, enhancing your catalog's professionalism.	Create catalog items using Now Assist	catalog_builder_editor

Note:

Now Assist generates only the entities that Catalog Builder supports. The limitations of Catalog Builder apply to Now Assist in Catalog Builder as well. For more information about the limitations of Catalog Builder, see Limitations of Catalog Builder.

Related topics

Configuring Now Assist Admin features

Install Now Assist in Catalog Builder

Install the Now Assist for Creator application from the ServiceNow® Store to get Now Assist in Catalog Builder.

Before you begin

- Review the Now Assist for Creator application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility. Now Assist for Creator installs the Now Assist for catalog generation application (com.snc.text2catalog).
- Role required: admin

About this task

Now Assist in Catalog Builder is a capability within the Now Assist for Creator application and to start using this capability, you must to first install the application.

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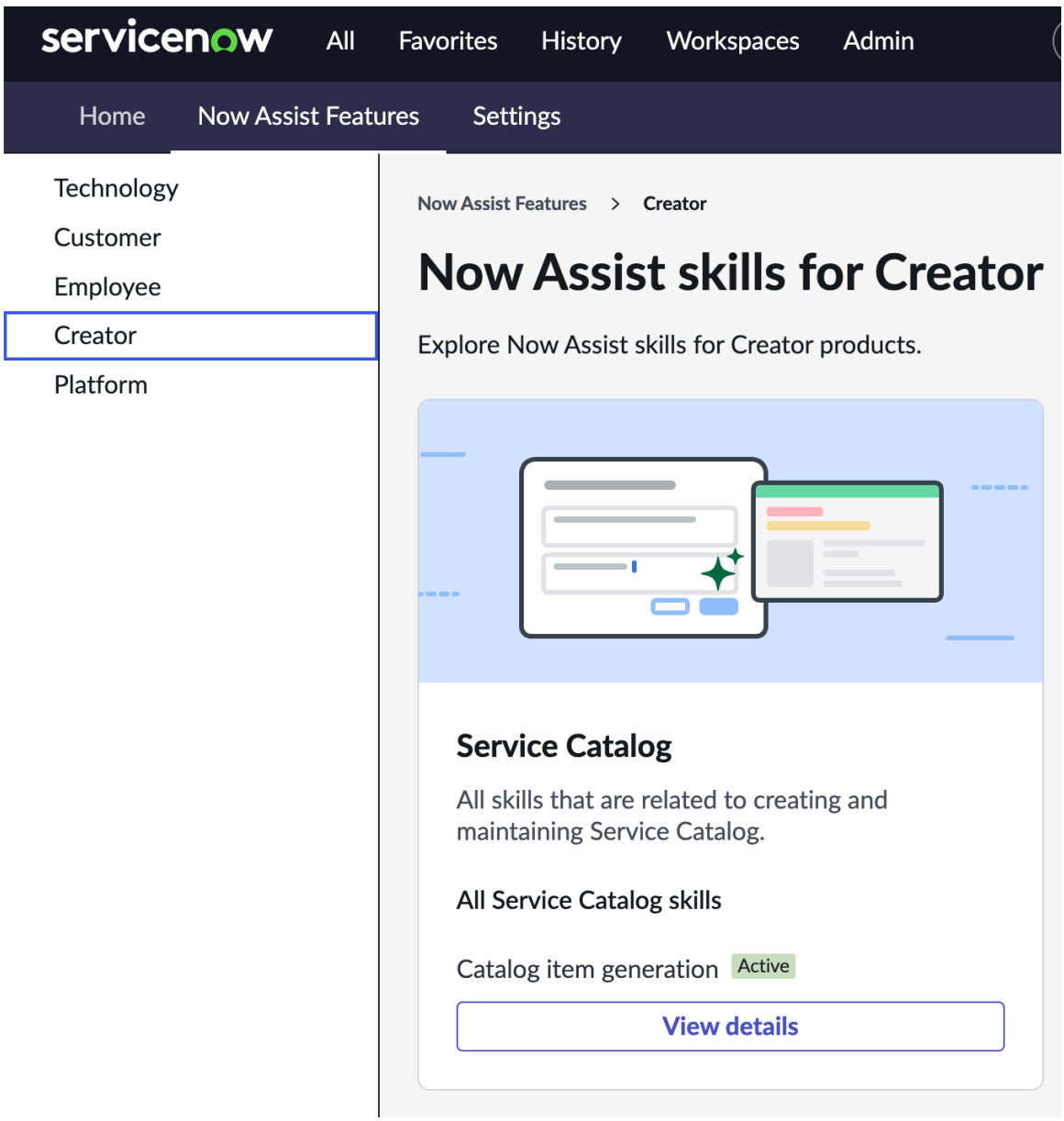
Procedure

1. From the Now Assist for Creator application page on the ServiceNow Store, select **Request App**.
2. After approval has been granted, on your instance, navigate to **All** > **System Applications** > **All Available Applications** > **All**.
3. Using the search bar, search for the Now Assist for Creator application (sn_now_creator).
4. Select **Install**.
5. Verify that Now Assist for Creator is installed:

   a. Navigate to **All** > *Now Assist Admin* > **Features**.

   b. In the workflow list, select **Creator**.

   c. On the Service Catalog card, verify that the Catalog item generation skill is active.



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Note:
If the skill isn't active, select **View details**. Then on the Service Catalog page, turn on the Catalog item generation skill.

For more information about Now Assist Admin, see Now Assist.

What to do next

Grant the catalog_builder_editor role to enable users to create catalog items using Now Assist.

Configuring Now Assist in Catalog Builder

Install and configure Now Assist in Catalog Builder.

Configuration overview

Along with the installation of Now Assist in Catalog Builder application, you must activate the Catalog item generation skill.

Related topics

- Install Now Assist plugins
- Activate a Now Assist skill

Using Now Assist conversation to create and edit catalog items

Now Assist provides a conversational interface that enables you to create catalog items, making these items available in the Service Catalog for users to request.

To use Now Assist for creating catalog items, you must have the catalog_builder_editor role and ensure that the Now Assist for Creator is installed in your environment.

To streamline the catalog creation process, you can use plain language input through Now Assist within Catalog Builder. This approach allows you to generate values for various steps simply by describing what you need in natural language.

By responding directly to your prompts, Now Assist can generate a catalog item and its details where possible.

What Now Assist can generate for you and what it can't

Can generate	Can't generate
• Item details, such as title and description • Variables • UI policies • Location • Access • Fulfillment • Portal settings	• Image of your catalog item • Variable attributes • Advanced reference qualifiers • Client scripts • UI policy scripts • Scripted default values • Container variables

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Sample prompts and customization

When creating catalog items using Now Assist, three sample prompts are provided in the chat for your reference. You can review these examples and develop a custom description tailored to your catalog item's requirements.

Catalog item preview

After receiving a response from Now Assist regarding catalog item creation, you can view a preview of the catalog item.

AI tag

The fields with values generated by Now Assist show the AI sparkle (✨) icon. If you make any changes in these fields, the icon is removed.

Creating a catalog item conversationally using Now Assist

Create a catalog item conversationally using Now Assist and make the item available in Service Catalog for catalog item requests. You can also define dynamic behavior for your catalog item and apply auto-populate settings.

Before you begin
Role required: catalog_builder_editor

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the **Dashboard** tab and select **Create a new catalog item**.

   Note:
   If you have a catalog_builder_developer role, you can select **Build from scratch**.

3. Review the steps involved in the creation process and select **Continue**.
4. Select a template from the list and select **Use this item template**.

   Note:
   If you chose Build from scratch, you don't get this step.

5. Select **Build with Now Assist**.
6. Select **Build**.
7. In the Now Assist chat, describe the catalog item you want.
8. Review the item's preview, and if you want changes, describe the changes in chat.
9. View the preview of the item, and when you get what you want, select **Continue to the next step**.

   If you want to preview your catalog item in portal or mobile, select **Preview**.

10. If you want Now Assist to generate your catalog item again, select **Ask Now Assist**.

    You're redirected to the Now Assist chat, where you can describe your changes to get the desired catalog item.

11. After you've all the details in your catalog item, submit it.

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Related topics

Suggestions to describe catalog items

Edit already published catalog items using Now Assist

You can edit published catalog items conversationally using Now Assist. If you've already started editing a published catalog item, you can still use Now Assist to edit the draft of that published catalog item. You can edit variables and UI policies in this mode.

Before you begin
Role required: catalog_builder_editor

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the Catalog items tab.
3. Select a published catalog item that you want to edit.
4. Select **Edit**.
5. Select **Edit with Now Assist**.

> **Note:**
>
> If you've already started editing a published catalog item, and that's in a draft state, and if you want Now Assist to generate your catalog item again, select **Ask Now Assist**.

6. Give prompts in the Now Assist chat, you can generate the catalog item.
7. After you've completed your edits, publish the catalog item.

Catalog item generation reference

Reference topics provide additional information about configuration properties, roles, and more.

Now Assist: Location, catalog, category, and topic functions

When creating or editing a catalog item, you can use plain language to assign values for catalog, category, or topic. If the value you provide matches an existing entry, Now Assist automatically applies it to the item. This streamlines the process and reduces manual data entry.

Content generation by Now Assist within Catalog Builder is limited to Topic, Catalog, and Category fields. It does not generate values for Location or other fields outside this set. Users can only select a Catalog, Category, or Topic from the list that already exists.

When you enter a value, Now Assist searches for an exact match. The system handles the different scenarios as follows:

- Exactly one match found: The value is applied automatically, and no further action is needed.
- Multiple matches or no match found: Now Assist does not guess. Instead, it notifies you and displays available options in the chat, allowing you to select the correct value yourself.

> **Note:**
> While you resolve any ambiguity in the chat, the rest of your conversation with Now Assist remains active. You can continue making other changes or asking questions at the same time.

Categories are always associated with a catalog, creating a close relationship between the two. Now Assist manages different input scenarios as follows:

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Providing both catalog and category together

If you specify both a catalog and a category, Now Assist checks whether the category belongs to the selected catalog.

- Valid combination: Both values are applied.
- Invalid combination: You are notified and prompted to select the correct and available values from the list.

Providing only a category

When only a category is provided, Now Assist searches under any catalogs already assigned to the item for a matching category.

- Exactly one match found: The category is applied automatically.
- Multiple matches found: Now Assist asks to select the correct and available value from the list.

If no catalog has been assigned yet

If no catalog is assigned when you specify a category, Now Assist asks you to add a catalog first since a category must always be linked to a parent catalog.

Assigning topics

You can assign topics to a catalog item simply by mentioning them in your prompt. After Now Assist recognizes valid topics, it adds them to the item automatically. Also, when a user tries to add a topic, Now Assist searches in the attached taxonomies. If there is no taxonomy attached to the item, then user would be prompted to add a taxonomy first and then a topic.

Assigning multiple values

A catalog item can belong to more than one catalog, category, or topic. Now Assist supports assigning multiple values for these fields in a single interaction, making it efficient to update or create complex catalog items.

- When a template controls values:

  In cases where a catalog item is based on a template with pre-set values for catalog, category, or topic, those template values take priority and cannot be changed. If you attempt to modify a locked field, Now Assist informs you that the value is controlled by the template and cannot be edited.

- When some fields are locked and others are not:

  If you request updates to multiple fields at once, and some of those fields are locked by a template while others are not, Now Assist will:

  - Apply the changes to any fields that are allowed to be updated.
  - Notify you about which fields could not be changed due to template control.

Now Assist: Fulfillment, access, and portal setting functions

In addition to catalogs, categories, and topics, Now Assist allows you to set three other key fields for a catalog item: Access, Fulfillment flow, and Portal settings. You can configure these simply by describing your requirements in plain language.

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Setting access

Access controls are managed through two lists: "Available for," which specifies who can view and request the item, and "Not available for," which defines who is excluded. Both lists rely on User Criteria (UC) records. You can add multiple UC records to either list. Now Assist processes your input as follows:

- Exact match found: The user criteria record is applied to the appropriate list automatically.
- Multiple matches or no match found: Now Assist doesn't guess. It displays a prompt in the chat for you to search for and select or enter the correct user criteria record.

Note:
User criteria records define groups of users based on conditions such as role, department, or location. These records manage who can view or request a catalog item.

Setting the fulfillment flow

Each catalog item is limited to one fulfillment flow, which defines the process executed when a request is submitted. Now Assist handles fulfillment flow selection as follows:

- Exact match found: The fulfillment flow is set automatically.
- Multiple matches or no match found: Now Assist prompts you to select or enter the correct fulfillment flow in the chat.
- Item uses an execution plan: If the catalog item already has an execution plan, Now Assist prevents a fulfillment flow from being added and explain why this field can't be changed.

Setting portal settings

Portal settings for a catalog item can be updated using Now Assist, following the same process as for any other field.

When a template is in control

If Access, Fulfillment, or Portal settings are locked due to template enforcement, these values can't be changed. When you attempt to update a locked field, Now Assist notifies you that the value is controlled by the template and is not editable.

When some fields are locked and some are not

If you request updates to multiple fields and some are locked by a template while others remain editable, Now Assist will:

- Apply updates to the fields that can be changed.
- Notify you about which fields were not updated because they are controlled by the template.

Note:
User criteria records define groups of users based on conditions such as role, department, or location. These records manage who can view or request a catalog item.

Now Assist: UI policy functions

Now Assist can generate UI policies with multiple actions from simple natural language.

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What you can do with UI Policies using Now Assist

As a Catalog Builder editor, you can use Now Assist to create new UI policies, update existing ones, and deactivate them, all through simple, conversational prompts. Each UI policy can include multiple actions, and Now Assist can create that for you.

Making targeted changes

You don't have to recreate a UI policy from scratch every time you need to tweak something. Now Assist lets you make specific, focused changes to an existing UI policy, such as updating its name or description, changing the conditions that trigger the policy, and adding, modifying, or removing individual actions within the policy.

Managing UI policy actions

UI policy actions are the individual rules that tell the system what to do when the policy's conditions are met, for example, making a field mandatory or hiding a variable. You can add new actions, update existing ones, or delete actions you no longer need, all through Now Assist.

Confirmation after every change

After Now Assist generates or updates a UI policy, it will send you a confirmation message letting you know what was done and prompting you to review the behavior. This gives you a chance to verify the output before moving on.

Multiple actions in a single instruction create one UI policy

If a user provides multiple condition–action statements in one message. For example: “If RAM is 8GB, set storage to 2TB and set color to red.” The Now Assist creates one UI Policy with:

- Condition: RAM = 8GB
- Actions: storage = 2TB, color = red

Adding to an existing UI policy

- If you give Now Assist a new instruction that uses the same condition as a UI policy that was already created, the system doesn't create a duplicate. Instead, it adds the new action to the existing UI policy.
- For example, if you previously said "If RAM is 8GB, set storage to 2TB" and later say "If RAM is 8GB, set color to red", Now Assist recognizes that both instructions share the same condition and simply adds the new action to the existing policy rather than creating a separate one.

Using conversational cues to group actions

Now Assist also picks up on natural conversational phrases to understand when you want to keep adding to the same policy. If you use phrases like "also", "add one more thing", or "add to the same policy", the system treats your new instruction as an addition to the UI policy that is currently being worked on.

Creating a new UI policy for a different condition

- If your instruction involves a condition that is different from any existing UI policy, Now Assist automatically creates a new, separate UI policy for it.
- For example, if you say "If RAM is 16GB, hide the processor field" and no policy with that condition exists yet, a new UI policy is created specifically for that condition.

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What happens when there is a conflict

If a new instruction contradicts an existing UI policy, for example, one policy says "If RAM is 8GB, set color to red" and you now ask it to "set color to blue" under the same condition, Now Assist flags the conflict rather than overwriting silently. It will ask you to confirm how you want to proceed, for example: "There is an existing UI policy with a conflicting action for this condition. Do you still want to proceed with creating this action?" This ensures that changes are always intentional and nothing gets overwritten by mistake.

Suggestions to describe catalog items

Now Assist uses the description that you write to generate a catalog item for you. If you're using Now Assist for creating a catalog item, use these suggestions to describe your catalog item.

- Provide the necessary details of the catalog item that you want to build.
- If you want, you can add details of one or more questions that you want to include in the catalog item. For accurate results, describe all aspects of the question, including type, properties such as mandatory, choices, and default value.
- Specify the exact table name for reference questions.
- For a record producer, provide the exact field name to which you want to map the question.

Defining dynamic behavior

You can add dynamic behavior by specifying actions and conditions in the Now Assist prompt. While generating the item, Now Assist creates dynamic behavior for the catalog item based on the text input.

Let's see an example. Specify the text in the prompt as "`Create a catalog item for a standard mobile; color (Black, Space Grey, Silver); storage (512 GB and 256 GB) If color is Black or Silver, then set the storage to 256 GB and make it read only.`" Generate the item. For the storage question, Now Assist creates a dynamic behavior that sets the field to 256 GB and makes it not editable if Black or Silver is specified as the color.

Configuring auto-populate

Using Now Assist, you can configure the value of a question to populate automatically whenever the value of another question of the reference type changes. For more information about auto-populate, see Configure an auto-populate value for a question in Catalog Builder.

```
Create a catalog item requesting for replacement of access card with the following questions: - Who is it for?: (The question type should be "Requested for") - Manager: (Reference type on the sys_user table. This field should auto-populate based on the value of the Requested for question.) - Upload your profile picture: (Attachment, mandatory)
```

After generating the catalog item, you can verify the **Auto-populate** tab. It's configured based on your text input.

Related topics

Creating a catalog item conversationally using Now Assist

Catalog item generation

Use the Catalog item generation skill to create catalog items of your choice using Now Assist.

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The Catalog item generation skill helps reduce the time needed to create catalog items. While creating a catalog item, you can describe the catalog item you want, and Now Assist generates the catalog item for you.

Note:
Verify that you have activated the skill before creating a catalog item by using Now Assist.

Availability

This skill is available in the following workflow and product.

Now Assist products and workflows

Workflow	Product
Creator	Now Assist for Creator

Related topics

Now Assist in Catalog Builder

Refine content

Use the refine content skill to shorten, elaborate, rephrase, or generate content in the fields by using Now Assist.

The refine content skill helps users shorten, elaborate, rephrase, or generate content in the **Short description** and **Description** fields in the Details step while creating or editing a catalog item.

You can also elaborate or shorten the content in the **Instructions** field and the **Conversational label** field in the Questions step.

Note:
Verify that you have activated the skill before refining the information in the fields for a catalog item.

Availability

This skill is available in the following workflow and product.

Now Assist products and workflows

Workflow	Product
Creator	Now Assist for Creator

Related topics

Now Assist in Catalog Builder

Now Assist in Conversational Catalog Request

Speed up and provide a conversational and streamlined experience based on generative AI while submitting a catalog item request in Virtual Agent. Your organization can increase self-service and reduce operating costs.

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Get started

Catalog Conversational Coverage

Learn about conversational catalog request.

Conversational catalog overview dashboard

Learn about conversational catalog dashboard and how to view the dashboard.

Important:
Some Now Assist products/features are currently unavailable for customers in the FedRAMP, NSC DOD IL5, or Australia IRAP-Protected data centers, self-hosted customers, or in other restricted environments. For more information, see the KB0743854 article in the Now Support Knowledge Base. Please check for availability updates in future releases.

Important:
Some Now Assist products/features are currently available only for customers in some regions. Be sure to check for availability updates in future releases.

AI limitations

This application uses artificial intelligence (AI) and machine learning, which are rapidly evolving fields of study that generate predictions based on patterns in data. As a result, this application may not always produce accurate, complete, or appropriate information. Furthermore, there is no guarantee that this application has been fully trained or tested for your use case. To mitigate these issues, it is your responsibility to test and evaluate your use of this application for accuracy, harm, and appropriateness for your use case, employ human oversight of output, and refrain from relying solely on AI-generated outputs for decision-making purposes. This is especially important if you choose to deploy this application in areas with consequential impacts such as healthcare, finance, legal, employment, security, or infrastructure. You agree to abide by ServiceNow's AI Acceptable Use Policy, which may be updated by ServiceNow.

Data processing

This application requires data to be transferred from ServiceNow customers' individual instances to a centralized ServiceNow environment, which may be located in a different data center region from the one where your instance is, and potentially to a third-party cloud provider, such as Microsoft Azure. This data is handled per ServiceNow's internal policies and procedures, including our policies available through our CORE Compliance Portal.

Data collection

ServiceNow collects and uses the inputs, outputs, and edits to outputs of this application to develop and improve ServiceNow technologies including ServiceNow models and AI products. Customers can opt out of future data collection at any time, as described in the Now Assist Opt-Out page.

Configure Now Assist in Conversational Catalog Request

Speed up and provide a conversational and streamlined experience based on generative AI while submitting a catalog item request in Virtual Agent. Your organization can increase self-service and reduce operating costs.

Before you begin

Role required: admin or catalog_admin, and flow_designer (to edit the subflow)

About this task

Generative AI capabilities are leveraged to provide a human-like and efficient catalog request experience over the Virtual Agent conversational interface. It reduces the turnaround time for the request submission.

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When the generative AI experience is configured for catalog item request submission, the following experience is available for a requester:

- Contextual question prompts that enable a more human-like conversation based on answers to previous questions.
- Slot filling that recognizes answers to 1 or more questions on the requester's input. For example, if the search keyword is `I'd like to request for a Windows Virtual Machine with 1TB disk space` and if the catalog item has questions about operating system and hard disk space, then the requester doesn't have to answer these questions again.
- Ability to answer multiple catalog item questions at the same time.
- Multi-turn catalog ordering where requesters can change answers at any point. For example, while answering a question about a phone's memory size, the requester can mention about changing the phone model selected in the previous question.
- Validation of questions' answers.
- Ability to exit the request submission process at any point.

Note:

- Read-only questions, questions with pre-filled answers, and questions that are already answered in the requester's search keyword are skipped.
- Though the following catalog item question types are supported in the conversation mode, natural language responses aren't supported for them:
  - Attachment
  - Masked

Procedure

1. To configure the Now Assist for Virtual Agent application that installs the Now Assist in Conversational Catalog Request application, see Configuring assistants overview.
   With this configuration, the *sn_now_assist_cr.llm.conversational.request.question.limit* system property value is set to 500 by default if that property wasn't edited earlier.
2. Enable the generative AI experience for a catalog item request submission in Virtual Agent.
   a. Navigate to **All** > **Service Catalog** > **Catalog Definition** > **Maintain Items**.
   b. Select a catalog item that must be requested in the conversation mode.
   For information about catalog items that are supported in the conversation mode, see Topic blocks to request catalog items through conversational experience.
   c. On the catalog item form, confirm that the **Make the item non-conversational in VA** check box isn't selected.
   d. On the catalog item form, confirm that the **Turn off Now Assist (LLM)** check box isn't selected.
   If you select this check box, LLM isn't used and the data isn't sent to LLM. The item might become non-conversational.

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Note:

- If you want the catalog item non-conversational, then select the **Make the item non-conversational in VA** check box. But if the catalog item contains some sensitive information that you don't want to send to LLM, then select the **Turn off Now Assist (LLM)** check box.
- If you clear the **Make the item non-conversational in VA** check box, the item will become conversational only if all the conditions are met for making an item conversational. For more information about such conditions, see Topic blocks to request catalog items through conversational experience.

e. Select **Update**.

3. Confirm that the fallback record producer is configured in the **Fetch generic ticket producer for conversational catalog request** subflow.

   In a few cases, when a requester is searching for a catalog item, AI Search might not be able to return any results. For example, when the catalog item isn't available or when the requester has no access to view the catalog item. In such cases, the fallback mechanism is activated for the Virtual Agent conversation. Virtual Agent tries to connect the requester to a live agent. If a live agent isn't available, then the **Create a generic ticket** record producer, which creates an incident to resolve the issue, is triggered.

   - The **Now Assist Fallback** topic controls the fallback mechanism. This topic triggers the record producer returned by the **Fetch generic ticket producer for conversational catalog request** subflow.
   - This subflow returns the value of the *sn_nowassist_va.now.assist.generic.ticket.fallback.record.producer* property. By default, this property's value is the sys_id of the **Create a generic ticket** record producer.

   Note:
   Both the *sn_nowassist_va.now.assist.generic.ticket.fallback.record.producer* property and the **Create a generic ticket** record producer are available in an instance when the Now Assist for Virtual Agent application is installed.

   Additionally, you can customize the fallback process by configuring your own record producer or by building additional logic in a new subflow.

4. **Optional:** Configure URL navigation settings to specify where the generated ticket link in the Virtual Agent chat opens, see Configure URL navigation for chat links.

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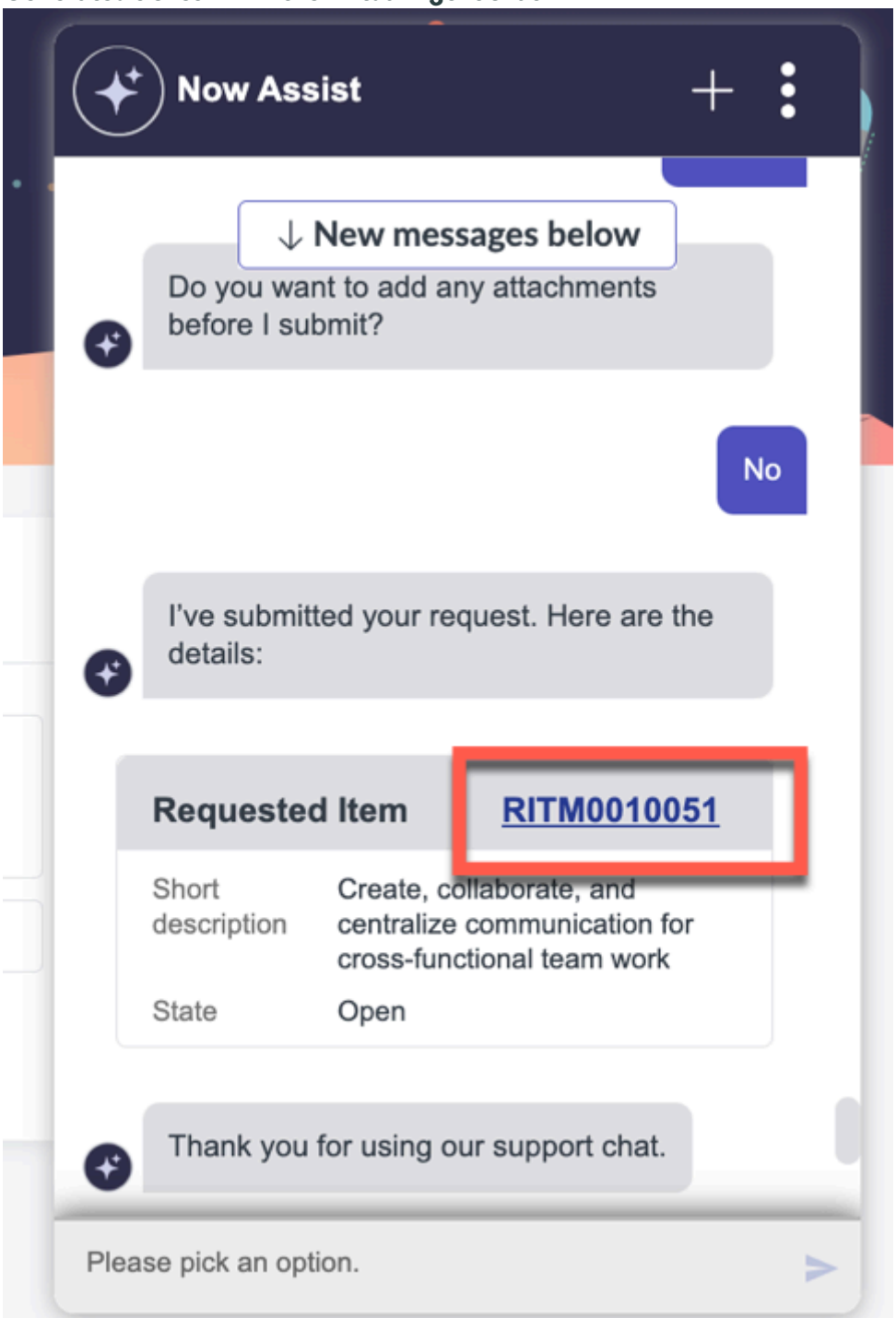
(Optional) For information about URL navigation in Virtual Agent, see URL navigation in Conversational Interfaces. For information about Virtual Agent scripts, see Virtual Agent scripts.

Generated ticket link in the Virtual Agent chat



Catalog Conversational Coverage

ServiceNow® Catalog Conversational Coverage provides a dashboard to view a high-level overview of the conversational and non-conversational catalog items.

You can view this information in the Conversational catalog overview dashboard. The dashboard displays a graphical representation of various reports, such as the number of conversational and non-conversational catalog items, reasons that make the items non-conversational, and popular

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request channels. It also shows a list of the catalog items, their conversational status, and other details.

Note:
You can access the conversational catalog dashboard only if you've installed the Now Assist in Conversational Catalog Request app. Conversational catalog dashboard can't be installed separately as it's bundled with Now Assist in Conversational Catalog Request.

Drilling down the catalog items, you can view the details, for example, whether they're conversational or non-conversational and why the items are non-conversational. Explore the potential suggestions for non-conversational items that might help you make items conversational.

If you have any of the following roles, you can view the dashboard:

- Catalog administrator [catalog_admin]
- Catalog manager [catalog_manager]
- Catalog editor [catalog_editor]

To access and view the dashboard, you must install and activate the Catalog Conversational Experience plugin (sn_catalog_con_cov). You can find the plugin in the ServiceNow® Store.

Note:
If you've installed Now Assist for conversation request submission plugin, you get the Catalog Conversational Experience plugin (sn_catalog_con_cov) by default.

The **Update catalog items conversational status** scheduled job pulls conversational data of catalog items. This scheduled job updates the reasons for the catalog items. The scheduled job runs once in three days automatically. But to get the latest data when you need, run this job manually.

Related topics

Configure Now Assist in Conversational Catalog Request

View the conversational catalog overview dashboard using Catalog Builder

Conversational catalog overview dashboard

The dashboard shows the information that you need in graphs and a table.

You can view the data of only those catalog items you have edit access to.

Note:
You can access the conversational catalog dashboard only if you've installed the Now Assist in Conversational Catalog Request app. Conversational catalog dashboard can't be installed separately as it's bundled with Now Assist in Conversational Catalog Request.

In the graphical representation of reports, you can view the following information:

Graphical representation of reports	Description
Conversational and non-conversational item count	The number of catalog items that are conversational and non-conversational.

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Graphical representation of reports	Description
Reasons that make items non-conversational	Reasons for catalog items to be non-conversational. For example, having unsupported questions or scripted UI policies make the item non-conversational.
Popular request channels - last 6 months	The channel distribution of catalog item requests that have been submitted in the last six months.

The Catalog items section shows the following information:

Column name	Description
Catalog item	Name of the catalog item. You can select the name to open the catalog item details page.
Conversational status	Conversational or non-conversational status of the catalog item.
VA render type	Type of catalog item rendering. Based on the configuration of the catalog item, the render type is determined to be conversation, window, or popup.
Number of requests	Number of requests that corresponds to the requests submitted in the last six months.
Number of recommendations	The recommendations to enable or further improve the catalog item to target the conversational channel.
State	The status of the catalog item.
Owner	Name of the owner of the catalog item.
Updated	Date and time when the catalog item was last edited.

Related topics

- View the conversational catalog overview dashboard using Catalog Builder
- View the conversational catalog overview dashboard using the ServiceNow AI Platform
- Catalog item conversational details page overview
- Catalog Conversational Coverage

Catalog item conversational details page overview

View the details page for your catalog item. If your item is non-conversational, view why your catalog item isn't conversational and review the suggestions to know what you can do to make the item conversational.

You can view this page only if you have any of the following roles:

- Catalog administrator [catalog_admin]
- Catalog manager [catalog_manager]
- Catalog editor [catalog_editor]
- Catalog builder editor [catalog_builder_editor]

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Note:
The catalog manager, catalog editor, and catalog builder editor can view the details page only if they have edit access to the catalog item.

The page displays the following information related to conversational or non-conversational catalog items:

- Name of the catalog item
- Conversational status and render type
- Date and time when the catalog item was last updated
- The **Conversational readiness** and **Item details** tabs

  The **Conversational readiness** tab shows the Recommended Actions and the Required Actions (If required actions are available) sections. The recommended actions are useful to improve your catalog item for conversational channel. Required actions are useful to make your catalog items conversational.

  The **Item details** tab shows the details, such as a short description, description, and image of the item if available.

  Note:
  If any action is required to make a catalog item conversational, the action is displayed in the Required Actions section.

After going over the recommendations to make the item conversational, select **Edit in advanced view** if you want to make changes. The catalog item opens in the ServiceNow AI Platform for editing.

Note:

- Only the catalog admin, catalog manager, and catalog editor can view the **Edit in advanced view** button.
- If you're viewing a catalog item that's in the checked out state, you view its data that corresponds to the published version of the item. Any changes to the draft of the catalog item won't be reflected here until it's published.

By default, all catalog items are conversational. To make the catalog item non-conversational, select the **Make the item non-conversational in VA** check box in ServiceNow AI Platform®.

Important:
Select the **Turn off Now Assist (LLM)** check box if you don't want the data of the catalog item (and user responses) to be sent to the LLM for security reasons, in case the catalog item contains sensitive data. Selecting this option ensures that this item will invoke the NLU topic block if it's compatible, otherwise, it will show up either as a pop-up or as a link depending on the item's configuration. Restrictions on the NLU topic block are stricter than the LLM topic block and therefore a conversational item in the LLM topic block (as shown in the Conversational Catalog Overview dashboard) may not be conversational in the NLU topic block.

Related topics

Conversational catalog overview dashboard

View the conversational catalog overview dashboard using Catalog Builder

View the conversational catalog overview dashboard using the ServiceNow AI Platform

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Catalog Conversational Coverage

Topic blocks to request catalog items through conversational experience

View the conversational catalog overview dashboard using the ServiceNow AI Platform

Use the ServiceNow AI Platform to view the dashboard that shows the catalog items that are conversational or non-conversational. Understand why catalog items aren't conversational, and explore the potential suggestions that might help make the items conversational.

Before you begin

Verify that you've installed the Catalog Conversational Experience plugin (sn_catalog_con_cov).

Role required: catalog_admin, catalog_manager, and catalog_editor

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Items**.
2. On the Catalog Items list page, select **Conversational Overview**.

   The Conversational catalog overview dashboard opens, and you can view only those catalog items you own or can edit.

Note:

- To view the dashboard, you can also navigate to **All** > **Service Catalog** > **Catalog Administration** > **Conversational catalog overview**.
- On a specific catalog item page, select **View conversational details** to open the catalog item's details page, which shows the reasons and suggestions.

View the conversational catalog overview dashboard using Catalog Builder

Use Catalog Builder to view the dashboard that shows the catalog items that are conversational or non-conversational. Understand why catalog items aren't conversational, and explore the potential suggestions that might help make the items conversational.

Before you begin

Verify that you've installed the Catalog Conversational Experience plugin (sn_catalog_con_cov).

Role required: catalog_admin

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Builder**.
2. Select the **Dashboard** tab.
3. In the Conversational Coverage in VA section, select **View conversational coverage**.

   The Conversational catalog overview dashboard opens. To view the conversational details page for a specific catalog item, on the dashboard, select the catalog item name. The details page opens.

Note:

You can also open a catalog item details page to view its conversational details. To do so, select the **Catalog items** tab, select an item that you want to view the details for, and select **View conversational details**.

Related topics

Edit a catalog item in Catalog Builder

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Request for catalog items: conversation or form

Catalog items can be requested in two different ways: through a conversation using Now Assist or by filling out a traditional web form. The method depends on each catalog item is configured.

When requesters want to request something from the service catalog—like a new laptop, software access, or office supplies, they can interact with the system in two main ways. Some items use conversational requests, while others use traditional web forms.

Conversational requests (AI chat)

With conversational requests, requesters can chat with Now Assist instead of filling out a form. Now Assist asks them questions one at a time, understands their answers, and automatically fills in the request details.

After requesters answer all the questions and confirm their request, they can submit it by selecting the **Submit** button in the chat.

Web form requests

With web form requests, they fill out a traditional online form with fields, dropdown lists, and check boxes. This is the standard way most people are familiar with when requesting items online.

This method gives requesters full control over the form and lets them see all available options at once. They can fill out the fields in any order and submit the request when they're ready.

Related topics

Virtual Agent render type

Use agentic support for a chat assistant

Prefill in conversational catalog request

The generalized prefill capability for conversational catalog request automatically populates catalog item form fields using data sourced from the requesting user's profile and from the active chat conversation history. This reduces manual data entry for requesters, improves form completion accuracy, and accelerates time-to-submission for service requests raised through the conversational interface.

Prefill functionality works similarly across both conversational and traditional form-based catalog experiences, automatically populating fields to reduce manual data entry and improve accuracy. The same underlying prefill sources and behavior apply whether requesters use Now Assist conversations or standard web forms.

User profile prefill

System fields on the catalog item form are automatically populated from the requester's sys_user and related tables. This includes, but is not limited to:

- Identity fields: First name, last name, display name, email address
- Organizational fields: Department, cost center, company, location, building, floor
- Managerial fields: Manager, secondary approver Role or group-based fields: Primary assignment group, business unit

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Conversation context prefill

In conversational catalog requests, the system extracts contextual information surfaced during the ongoing chat conversation and uses it to pre-populate relevant catalog item variables. For example, if a requester:

- Mentioned an affected asset ("my laptop with serial number X"), that value prefills the appropriate configuration item field.
- Stated an urgency or preferred resolution date, those values prefill date or priority fields on the catalog item.
- Described a business justification or request reason earlier in the conversation, that text prefills a description or justification variable.

Related topics

Prefilling variable values on the catalog item form in the portal and Next Experience UIs

Virtual Agent render type

A catalog item can be rendered in Virtual Agent as a conversation, window, or pop-up.

Catalog item request using Conversational-agentic render type

The Conversational-agentic render type uses agentic AI to let users submit catalog item requests using a guided and natural language chat that means through conversations. Rather than showing all fields at once, a Now Assist collects user information step by step.

Catalog item request using Web render type

TheWeb render type is the default and most widely used rendering mode for catalog items. When a catalog item is set to this render type, its request form is rendered as a standard web page inside a portal or the Now Platform UI.

Catalog item request using a conversation render type

A user can submit a request in the conversation mode (by answering the questions in line) in Virtual Agent.

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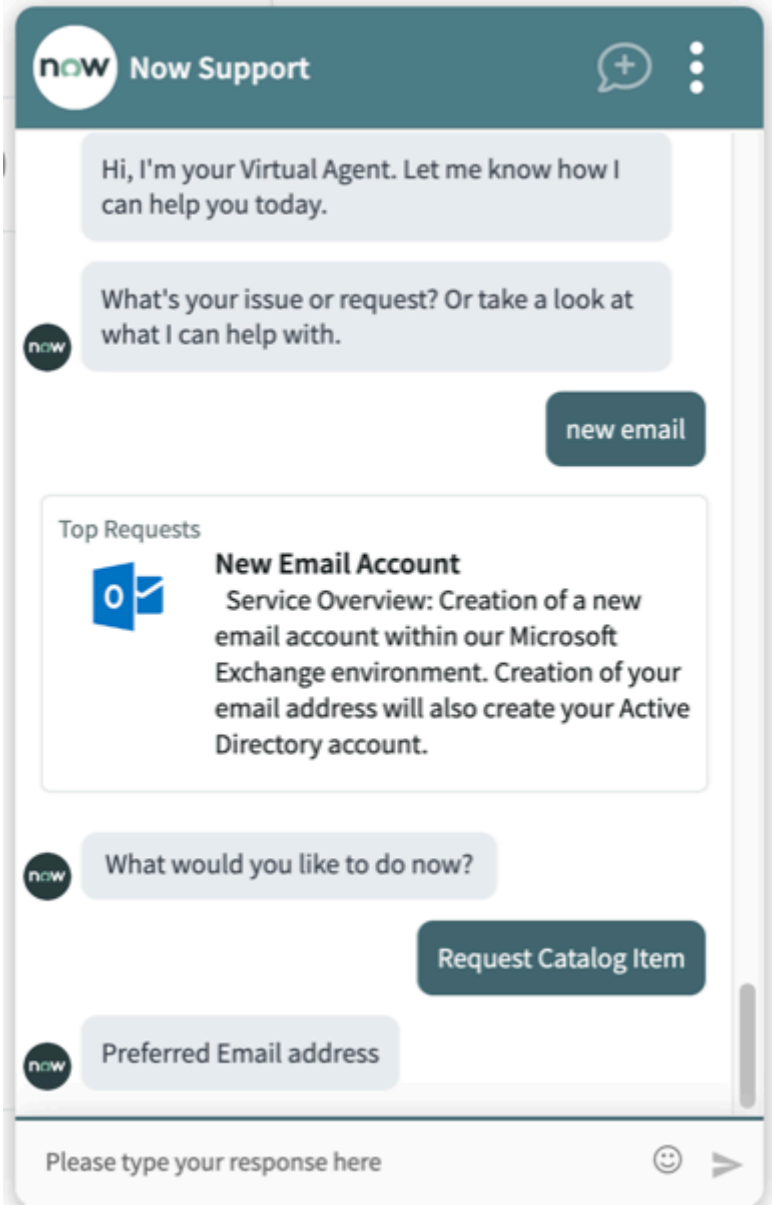

Catalog item request using a pop-up render type

A user can submit a catalog item request as a pop-up for items, which are not conversational. In a pop-up, Virtual Agent provides a link for the user to submit the request in a pop-up without navigating to a new tab. A non-conversational catalog item can be rendered as a pop-up only if it does not have any Custom, Custom with label, or UI Page variables.

Note:
If you do not want to render your Virtual Agent conversation as a pop-up, set the *glide.sc.va.render_type.legacy* property to true, which renders all non-conversational catalog items in the configured portal in a new tab.

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Apple iPhone 13

Request for Apple iPhone 13

All-new dual-camera system with ultra wide and night mode. All-day battery. Six new colours. And the A13 Bionic, our fastest chip ever.

Key features:

- Storage capacity: 128 GB, 256 GB, 512 GB
- Network generation: 4G
- Style: Smartphone
- Camera: 12.0 MP
- Operating System: iOS

Is this a replacement for a lost or broken iPhone? *

Yes

No

Monthly data allowance *

-- None --

Catalog item request using a window render type

A user can submit a catalog item request in a window. In a window, Virtual Agent provides a link for the user to submit the request in the Service Portal defined in the *sn_itsm_va.com.snc.itsm.virtualagent.portal_url* property. A non-conversational item is rendered as a window if it has a Custom, Custom with label, or UI Page variable.

A catalog item is rendered as a window if it is of the following types:

- Content Item
- Order Guide
- Wizard Launcher
- Standard Change Template

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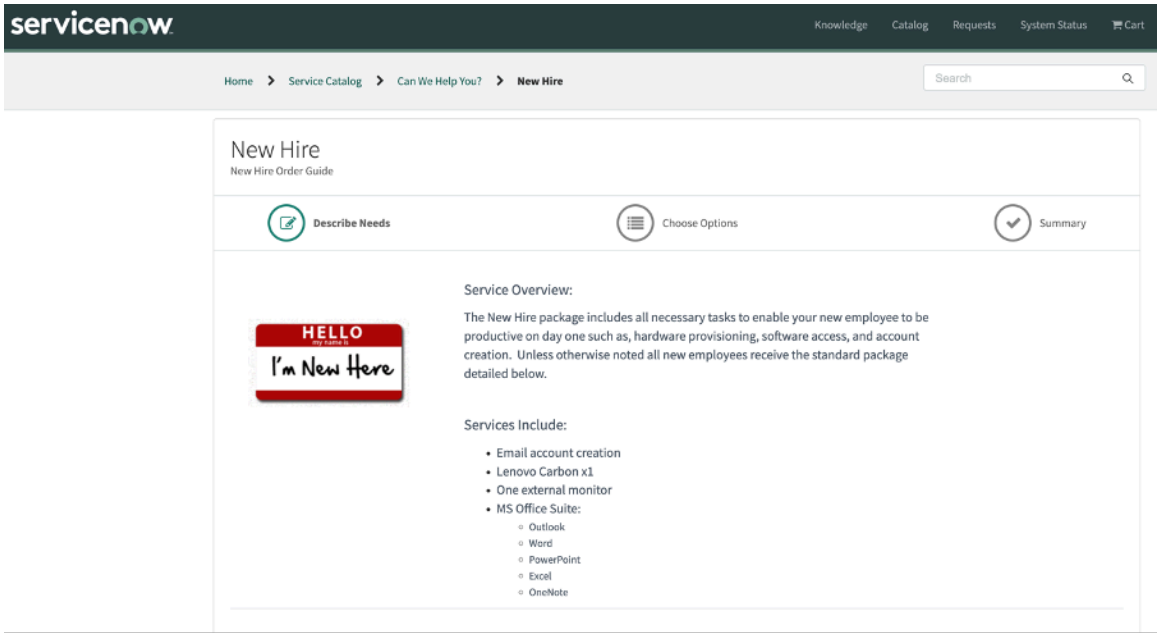

Fulfillers can request catalog items for others

The experience for fulfillers streamlines the process of making catalog requests on behalf of others. This tailored workflow leverages parent context, such as incidents or cases, to improve efficiency, accuracy, and traceability of requests.

- Tailored request flow: Fulfillers can initiate catalog requests from Now Assist chat for others, utilizing the parent context to automatically prefill key information.
- Request linking: After a request is submitted on behalf of others, the request is automatically linked to the originating parent record, enabling seamless tracking and association.

The workflow works as follows

1. Initiation: A fulfiller initiates a catalog request from an incident or case using a Now Assist chat.
2. Association Confirmation: The fulfiller confirms the association between the request and the relevant parent record.
3. Automatic Prefill: The system pre-fills the requestor information based on the parent context.
4. Question Rephrasing: Questions within the request are reworded to reference the requestor for greater specificity.
5. Submission and Linking: The request is submitted and, where applicable, linked to the originating incident or case for comprehensive record-keeping.

For example, fulfillers are able to enter specific requests, such as ordering a phone, using Now Assist, which subsequently displays a selection of relevant catalog items. The platform automatically retrieves pertinent details, including the number and caller information from the associated incident, thus streamlining the workflow and facilitating efficient record creation.

Now Assist reformulates questions with precision tailored to fulfillers. Because requests originate from a parent record, this rephrasing serves to maintain clarity and relevance for the fulfiller responsible for managing the task.

Once a request is submitted, all details and associated information are automatically linked to the parent record, completing the fulfiller's workflow and ensuring thorough documentation.

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Conversational catalog request reference

Reference topics provide additional information about configuration properties, roles, and more.

Topic blocks to request catalog items through conversational experience

You can design a topic conversation in Virtual Agent powered Now LLM by including reusable topic blocks to perform request submission tasks.

Request catalog item through Now LLM

You can use this topic block to request for a catalog item through a conversational and streamlined experience based on generative AI. For information about configuring Now Assist in conversational catalog request, see Configure Now Assist in Conversational Catalog Request.

Input parameters

Parameter	Description
catalog_item_id	sys_id of the catalog item that should be requested.
context_json	Context of the conversation in JSON format.
execute_contextual_search	Option to specify if the contextual search should be run for a record producer based on its configuration. For information on defining contextual search for a record producer, see Define contextual search for record producer.
confirm_catalog_item	Option to specify whether the user must confirm the catalog item before continuing with the next step. If this is set to `false`, user can answer the catalog items questions by skipping the confirmation.
show_end_state_card	Option to display the end state card information about the generated record to the user.

Output parameters

Parameter	Description
record_id	sys_id of the record that is generated after the item submission. If the catalog item is not supported in the conversation mode or if the user does not have access to the item, -1 is returned.
record_table	Name of the table in which the record is generated.
status	Status of the request. Possible options are success or error.
variables	Questions related to the catalog item.
message	Message that gives additional information in case of any failure.
used_LLM	Option that indicates if Now LLM was used while requesting the item, that is, if slot filling was done for questions defined in a catalog item using generative AI.

Things to remember that make items conversational or non-conversational

The following conditions must be met when a user requests a catalog item in the conversation mode in Virtual Agent powered by Now LLM.

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- A catalog item cannot have more than the number of questions specified in the *sn_now_assist_cr.llm.conversational.request.question.limit* property. By default, this number is set to 500. For more information about this property, see Service Catalog properties.
- Lookup select box variables can't have an advanced reference qualifier, such as a reference qualifiers containing JavaScript. If a catalog item with the Lookup select box contains such advanced reference qualifiers, the item becomes non-conversational. Also, if a catalog item contains the Lookup select box variable with more than 20 choices, the item becomes non-conversational. This behavior is managed by a value of the *sn_now_assist_cr.llm.lookup_select_choice_limit* system property, which has a default value as 20.
- A catalog item can have scripted catalog UI policies. But when a catalog item has scripted UI policies containing unsupported methods or functions, the catalog item becomes non-conversational.
- The following methods or classes are supported in the catalog client scripts or scripted UI policies for a catalog item to be conversational:
  - moment
  - window.location.href
  - top.location.href
  - top.window.open
  - window.open
  - open
  - Array
  - Boolean
  - Date
  - Error
  - GlideAjax
  - GlideRecord
  - JSON
  - Math
  - Number
  - Object
  - RegExp
  - String
  - alert
  - console.info
  - console.error
  - console.debug
  - console.warn
  - console.log
  - console.clear
  - console.count

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- console.countReset
- console.dir
- console.dirxml
- console.table
- decodeURI
- decodeURIComponent
- encodeURI
- evalexec
- g_form.addErrorMessage
- g_form.addInfoMessage
- g_form.addOption
- g_form.clearMessages
- g_form.clearOptions
- g_form.clearValue
- g_form.getActionName
- g_form.getDisplayValue
- g_form.getEditableFields
- g_form.getIntValue
- g_form.getReference
- g_form.getSysId
- g_form.getTableName
- g_form.getUniqueValue
- g_form.getValue
- g_form.hasField
- g_form.hideAllFieldMsgs
- g_form.hideErrorBox
- g_form.hideFieldMsg
- g_form.isMandatory
- g_form.isNewRecord
- g_form.isReadOnly
- g_form.isVisible
- g_form.removeOption
- g_form.save
- g_form.setDisabled
- g_form.setDisplay
- g_form.setLabel
- g_form.setLabelOf
- g_form.setMandatory
- g_form.setReadOnly

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  - g_form.setReadonly
  - g_form.setValue
  - g_form.setVariablesReadOnly
  - g_form.setVisible
  - g_form.showErrorBox
  - g_form.showFieldMsg
  - g_form.submit
  - g_user
  - ga.addParam
  - ga.getXML
  - indexOf
  - isLoading
  - isNaN
  - newValue
  - oldValue
  - onChange
  - parseFloat
  - parseInt
  - this
  - toFixed
  - trim
  - undefined
  - escape
  - unescape
- A catalog item can have catalog client scripts. But when a catalog item has catalog client scripts containing unsupported methods or functions, the catalog item becomes non-conversational.
- The variables containing pricing implications aren't supported.
- You can specify the upper limit for the number of records of reference type variables corresponding to a table in the *sn_now_assist_cr.llm.reference_question_choices.limit* property. By default, the limit is 2000000. If you specify the value more than 2000000, then it might impact the response time.
- The UI page variable type is ignored in Virtual Agent like the UI page is ignored in Service Portal. For more information, see Types of service catalog variables.
- To support the custom variables, users must associate topic blocks with the custom variables to represent them in the conversational interfaces. If the users don't associate topic blocks, the catalog item containing the custom variables, becomes non-conversational.
- If you know that a variable makes a catalog item non-conversational, you can remove such variable from the conversational interfaces by selecting **Remove from Conversational Interfaces** option. Find the option in the Availability tab of the question form in ServiceNow AI Platform.

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- Use the *sn_now_assist_cr.enable_question_grouping* property to group semantically related questions and prompt them together to reduce conversation turns. The property is inactive by default.

- The field messages aren't shown to the requester in the following scenarios:
  - If the field message appears for the question that's already answered.
  - If the question is not shown to the requester because the question is read-only, hidden, or already auto-filled.
- The following variable attributes are supported:
  - ref_ac_order_by
  - allowed_extensions
  - max_file_size

  Note:
  All the other variable attributes are ignored in Virtual Agent.

- A catalog item can have a single-row variable set but not a multi-row variable set.
- If a catalog item has a default value configured for a question, the default value is displayed in Virtual Agent, which enables the user to proceed with the default value without having to select it manually. The user can also choose a different value other than the default value.
- User can't skip the following type of questions for a catalog item:
  - Lookup Multiple Choice
  - Select Box
  - Lookup Select Box
  - Yes/No
  - Numeric Scale (If **Do not select first choice** configuration is not selected)
  - Multiple Choice (If **Do not select first choice** configuration is not selected, or **Include none choice** configuration is selected)
- If the user is using Virtual Agent in a different supported collaboration tool like Microsoft Teams:

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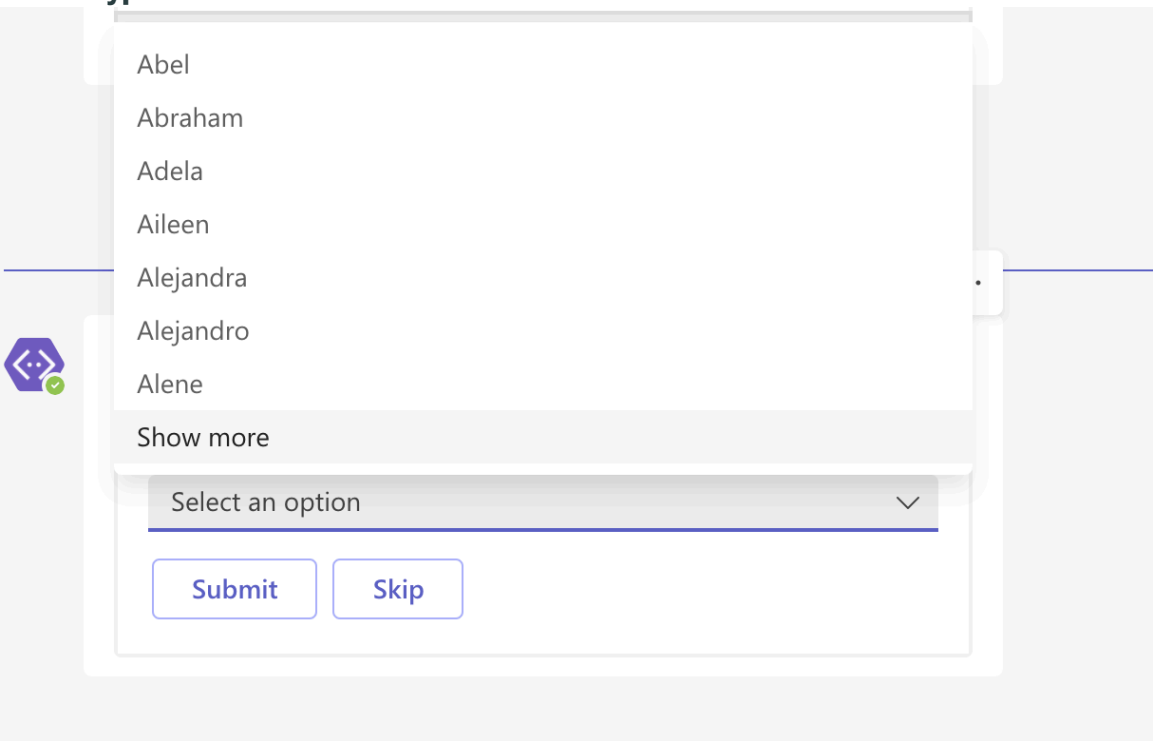
- Searching for a value using the search icon in choice type of fields is not supported.

Choice type fields in Microsoft Teams



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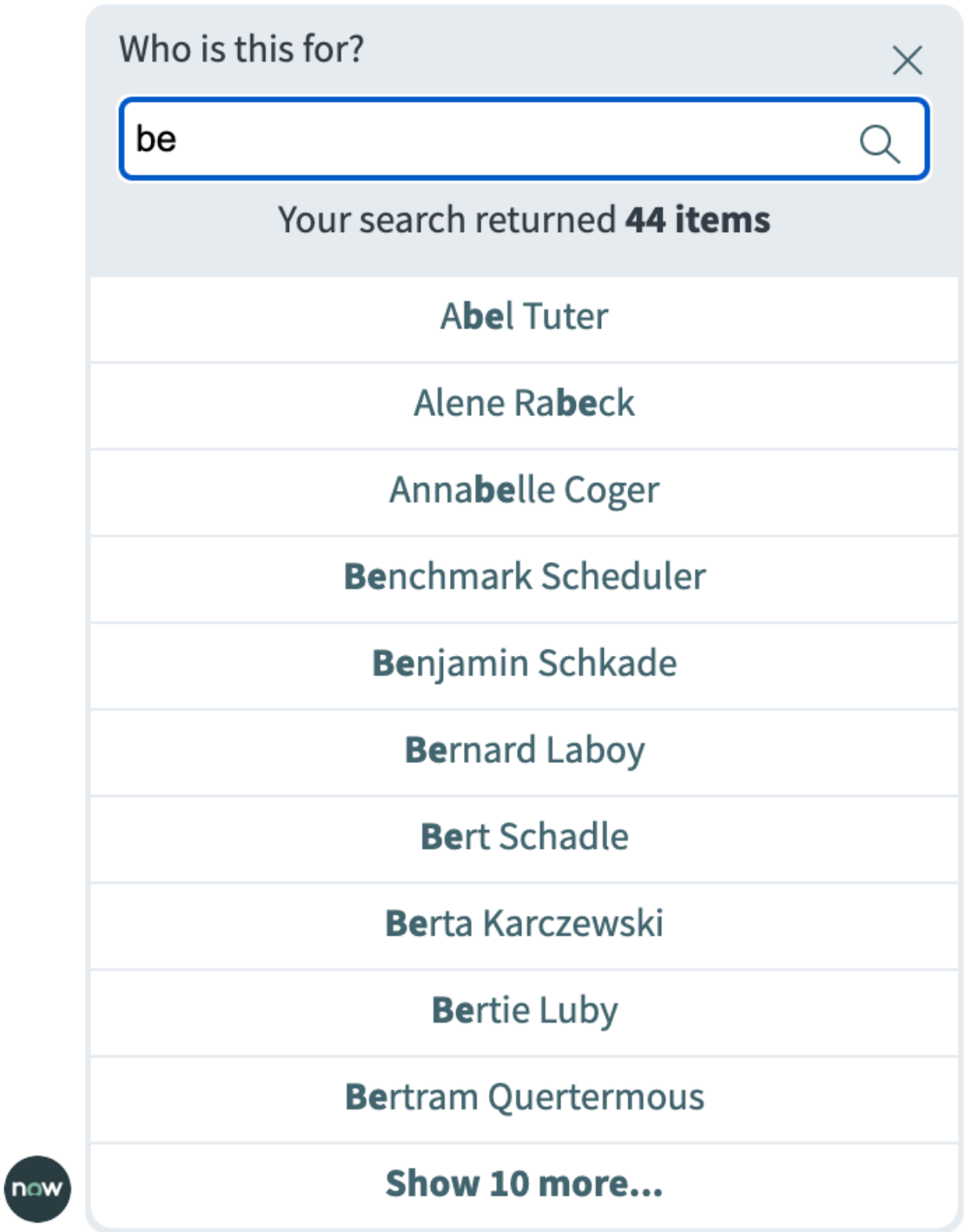
Choice type fields in Virtual Agent



- Searching for a value in reference type of fields is performed in the form of a question.

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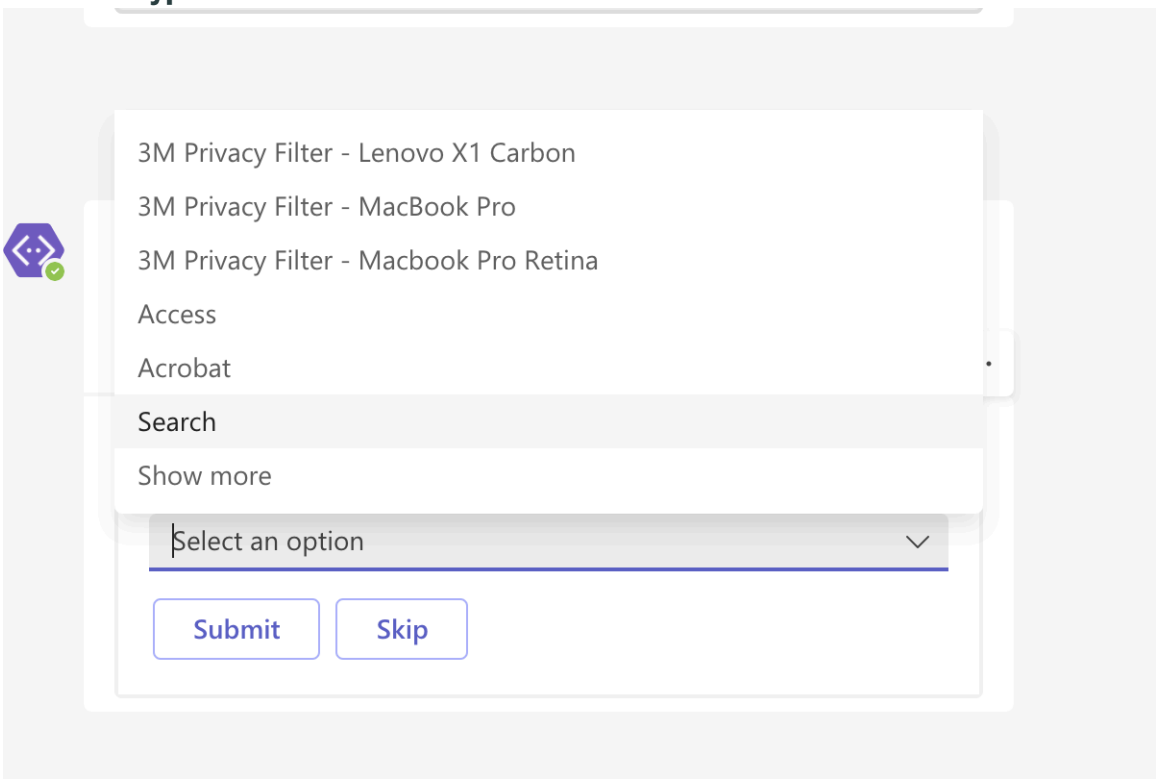
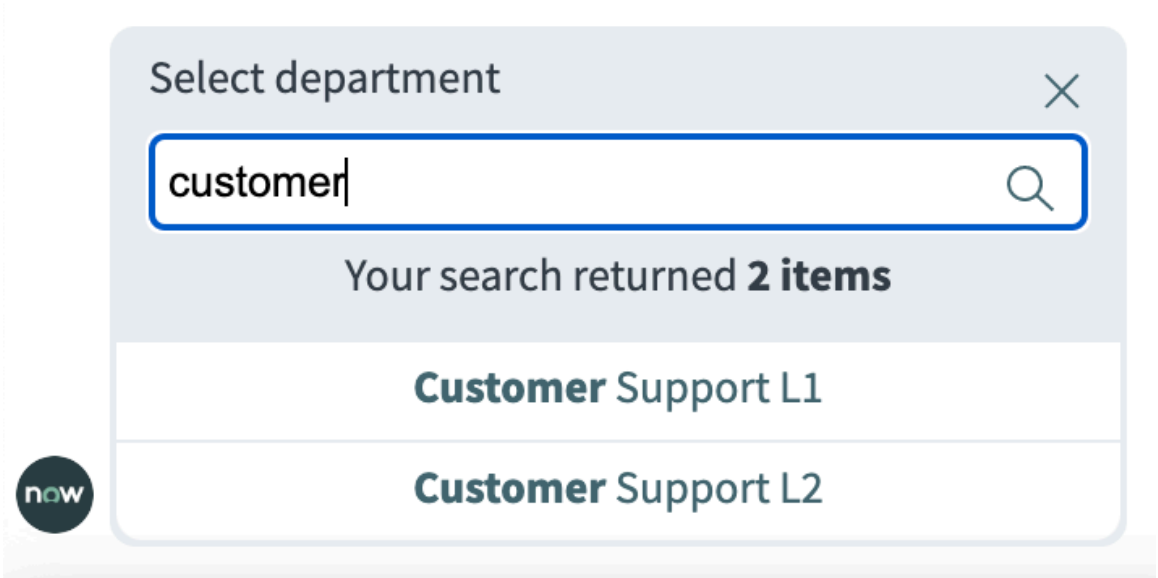
Reference type fields in Microsoft Teams



Reference type field in Virtual Agent



Note:
If you've installed the Now Assist in Conversational Catalog Request application, these conditions corresponds to the catalog item's conversational mode in the Virtual Agent powered by Now LLM.

Translation of Now LLM

You can use the enable_alternative_translation property to enable translation of Now LLM. By default, the translation is turned off.

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Note:

When the user profile language and session language differ, the Now LLM translated_text call doesn't appear. However, if the system property is enabled, the Now LLM call displays and translation occurs.

The following conditions must be met when a user requests a catalog item in the conversation mode in Virtual Agent powered by Now LLM.

Note:
If you've installed the Now Assist in Conversational Catalog Request application, these conditions corresponds to the catalog item's conversational mode in the Virtual Agent powered by Now LLM.

Related topics

Configuring assistants overview

Catalog builder preview topic conversation

Now LLM Service updates

What makes catalog items non-conversational in premium chat

Let's understand what determines whether a catalog item can deliver a fully conversational experience in the Premium Chat interface.

Premium chat is a conversational interface powered by Now Assist. Instead of filling out a traditional form, requesters can request catalog items through conversations. For a catalog item to work in this mode, it needs to meet certain conditions.

- Conversation turned off using the *turn_off_nowassist_conversation* property, preventing the item from appearing in Premium chat mode, regardless of how the item is designed.
- The catalog item has been flagged to open as a form and not a chat using the *make_item_non_conversational* property. This is used for complex items where a structured form is preferred over a guided conversation.
- When a catalog item has more than the configured maximum number of questions (Using the *sn_now_assist_cr.og.question_threshold* property, which has a default value as 4), it can be complex to handle as a natural back-and-forth conversation.
- Catalog items use client-side scripts that change the form dynamically as the user fills it in. For example, hiding certain fields based on earlier answers, or running a calculation. These scripts only work in a traditional browser form and can't be replicated inside a chat window, so the item can't be made conversational while these scripts are active.
- Similar to scripts, UI policies are rules that change what requesters see on the form based on their inputs. Because these rules depend on the form rendering in a browser, they aren't compatible with the step-by-step chat approach.
- Every field on the catalog item is either hidden from the user, pre-filled with a default value, or set to read-only. Since there are no questions left, there is nothing for a conversational experience to do.
- Some questions types, such as check box, Custom, Render UI Page, Custom with Label, Lookup Select Box, List Collector, Lookup Multiple Choice, Masked, Table Question, Requested For, Attachment Question, Table Name aren't supported.
- Some fields let users pick a value from a list (for example, choosing a specific laptop model from a catalog). Items with this kind of advanced filtering fall back to the traditional form.

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- If any question on the catalog item influences the cost or pricing of what is being requested, the item can't be handled conversationally. Pricing implications aren't yet supported in the chat interface.
- Some catalog items include a section where the user can add multiple rows of information. For example, ordering accessories for several employees at once. This kind of repeating, table-style input is not yet supported in a Premium chat interface.
- Certain catalog item types, such as order guides, wizard, content items, or standard change templates, have a structure that is more complex than a simple request. These types are not eligible for the conversational experience and open as a traditional form.

Note:

- Conversational catalog items that don't support agentic AI may be discoverable, but they don't appear within conversation in the Premium chat experience. These catalog items open as forms that requesters can fill out and submit.
- Meeting these requirements doesn't require rebuilding a catalog item from scratch. Often, small adjustments, such as reducing the number of visible questions, removing an unused client script, or switching a field type, are enough to make an item eligible for the full agentic AI experience.

Hermes Messaging Service

The Hermes Messaging Service enables you to integrate your Apache Kafka environment with your ServiceNow® instance.

Get started

Explore Learn about Hermes Messaging Service benefits, use cases and limitations.	**Configure** Learn about activation and set up a secure connection.	**Produce and consume messages** Learn about producing and consuming Kafka messages.
Manage namespaces and topics Manage namespaces and topics in Hermes.	**Administer** View diagnostics and inspect topics.	**Reference** Learn about Hermes Messaging Service components and the security model.

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Exploring Hermes Messaging Service

Learn about the Hermes Messaging Service and how it helps you manage the flow of data between your Kafka environment and your instance.

Hermes Messaging Service overview

Apache Kafka is an open-source data streaming platform that provides a single integration point for exchanging data across business systems in your organization. The Hermes Messaging Service enables you to integrate your Apache Kafka environment with your ServiceNow® instance to exchange data with these business systems.

The Hermes Messaging Service is a multi-tenant, multi-cluster, data transport, and queuing service built on Apache Kafka that enables your instance to produce and consume large volumes of Kafka events.

- Simplify and standardize asynchronous data transport between your Kafka environment and your ServiceNow instance.
- Publish and process Kafka events at scale. Publish events to your Kafka environment from your ServiceNow instance and consume Kafka events from your external systems at a high volume with low latency.
- Effectively process spikes and bursts in message volume to minimize performance impacts on your instance.
- Manage the health and performance of message delivery using Hermes diagnostic tools.

Components

Hermes uses the following components.

Event

A record of something that happened, such as the creation of a log entry. Kafka uses events to transmit data between systems in near real time. An event includes a key and a value.

Topic

A logical group of events. In Kafka, these events are transmitted as messages. Topics are used to group related events together. Events in a topic are organized using partitions.

Partition

A topic is divided into partitions to support scalability and parallel processing. Each event is assigned to a partition based on its key. Events with the same key are always written to the same partition in order of arrival.

Namespace

A logical grouping of topics. You can organize topics by namespace to indicate which Kafka cluster they come from. In a domain-separated instance, you can create a namespace for each domain to control access to specific topics.

Hermes Kafka cluster

A Kafka cluster hosted in a ServiceNow data center. Hermes uses Kafka clusters to manage the delivery of messages between producers and consumers.

Producer

A system or component that creates and sends events to a topic in the Hermes Kafka cluster. The producer sets the event key, which determines the partition where the event is stored.

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Consumer

A system or component that reads events from one or more topic partitions. Consumers process events in the order they appear within each partition. Consumers can read from multiple partitions simultaneously.

Hermes Messaging Service users

Users

User	Description
Hermes administrator	The Hermes admin defines namespaces for each Kafka cluster or domain and creates topic records in the instance or through the command-line interface (CLI). The Hermes admin monitors topics and views the payload of a message in a Hermes topic using the Hermes Messaging Service topic inspector.

Hermes Messaging Service workflow

1. In a domain-separated instance, the Hermes admin creates namespace records for different domains.
2. The Hermes admin creates topic records in the instance or through the CLI.
3. The Hermes admin updates or rescans topic records as needed in the instance.
4. The Hermes admin monitors topics and views message payloads using the Hermes Messaging Service topic inspector.

Benefits

Different integration points and applications in the ServiceNow platform can use the Hermes Messaging Service to publish and ingest events.

The Hermes Messaging Service is a ServiceNow AI Platform capability that is available as part of Stream Connect, Log Export Service (LES), and Instance Data Replication (IDR).

Benefit	Application	Users
Export data from your ServiceNow instance to an external application using the Hermes Messaging Service with Workflow Studio.	Flow Designer	Administrator
Export log data securely from your instance to your external data lake for reporting, auditing, or regulatory purposes by using the Hermes Messaging Service with the Log Export Service.	Exploring Log Export Service (LES)	Administrator
Trigger flows from incoming Kafka events and trigger outgoing messages to your Kafka environment using the Hermes Messaging Service with Stream Connect.	Using Stream Connect for Apache Kafka	Administrator
Improve the performance and processing efficiency of Instance Data Replication (IDR) by upgrading replication sets that you created prior to the Utah release to use the Hermes Messaging Service.	Instance Data Replication	Administrator

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Limitations

- Maximum message size: 2 MB
- Maximum message size per second: 2 MB (produced or consumed)
- Number of topics: 30 topics per instance
- Maximum number of partitions: 32 partitions per topic
- Retention policy: 36 hours
- Supported compression types for producing messages to Hermes: GZIP, LZ4, and NONE.

What to explore next

To learn more about configuring and using the Hermes Messaging Service, see:

- Configuring Hermes Messaging Service
- Exchanging data using Hermes
- Managing namespaces and topics in Hermes
- Administering Hermes Messaging Service
- Hermes Messaging Service reference

Exchanging data using Hermes

Produce and consume Kafka messages in your ServiceNow instance using the Hermes Messaging Service.

There are several methods for exchanging data between your ServiceNow instance and your Kafka environment using the Hermes Messaging Service. In all cases, data is produced from one entity and consumed by another.

Using Stream Connect

With Stream Connect, you can produce messages from your ServiceNow instance using a Producer step from a flow action or the Producer API, and then consume the messages in your external application.

You can also produce messages from an external application and then consume the messages in your ServiceNow instance via any of the following methods:

- Kafka flow trigger
- ETL consumer
- Transform map consumer
- Script consumer

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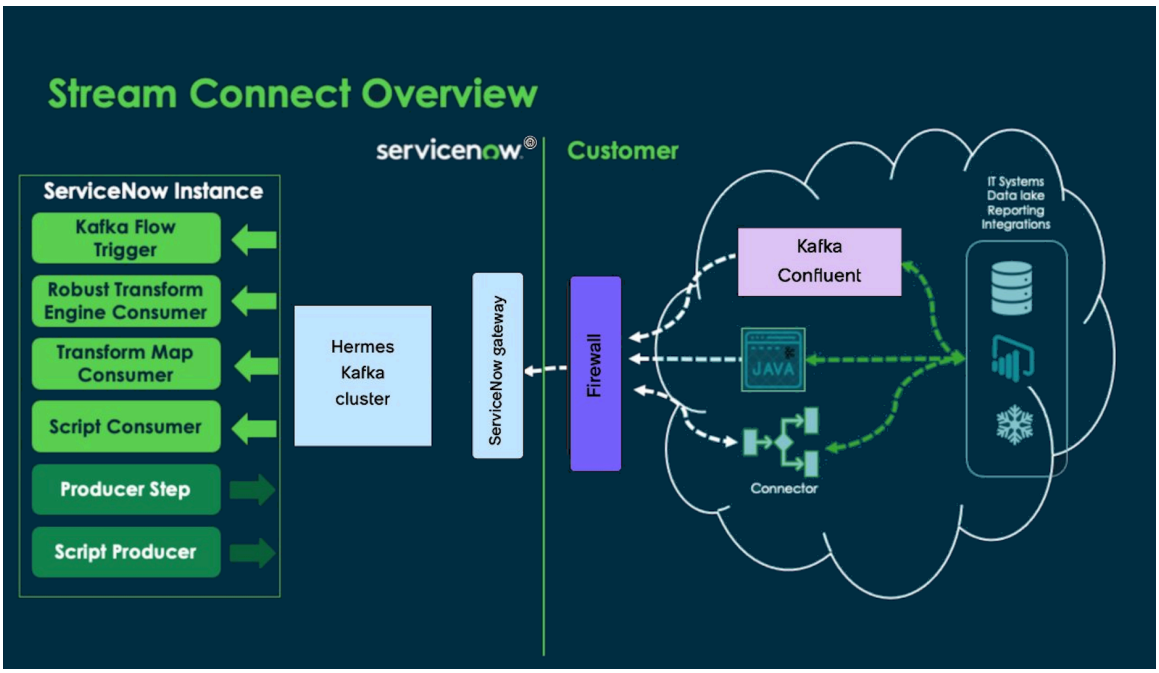
Stream Connect overview

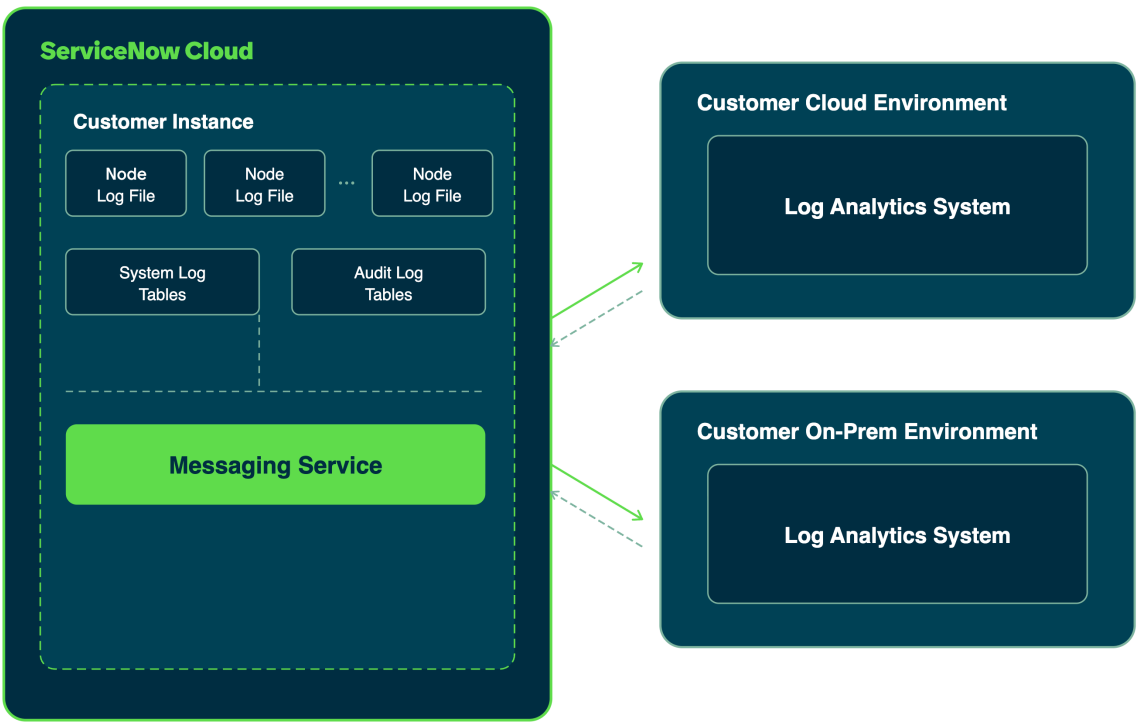


For details, see Stream Connect for Apache Kafka.

Using Log Export Service

With the Log Export Service, you can produce logs from your ServiceNow instance, and then consume the logs in your external application.

Log Export Service architecture



For details on producing and consuming logs for Log Export Service, see Exploring Log Export Service (LES).

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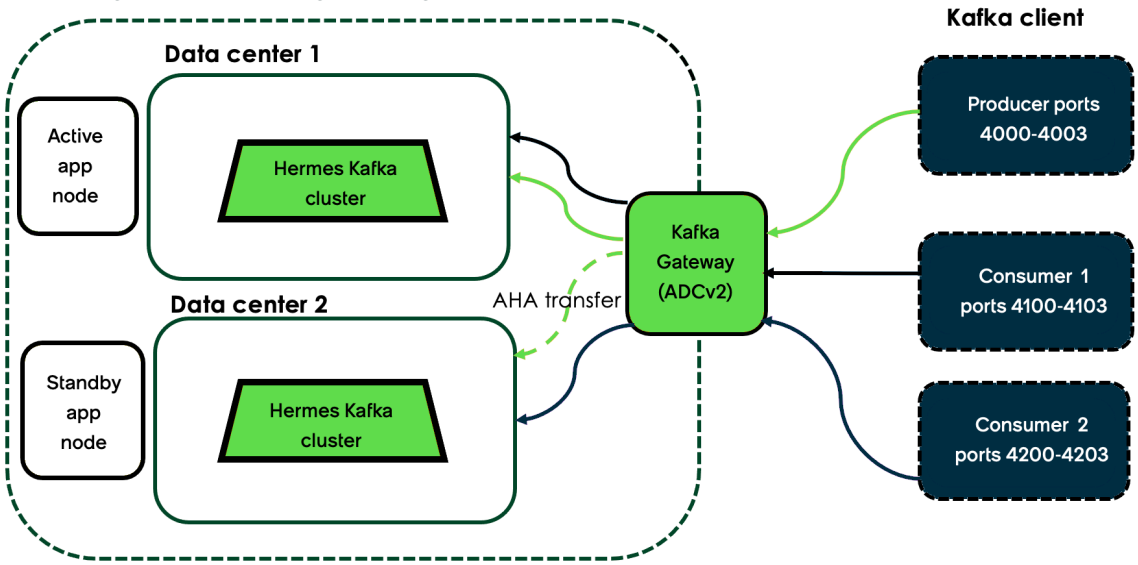
Using a Kafka client

With the Kafka standard protocol, you can exchange messages with any application that produces messages. For example, you can produce messages from a Java application using the standard Kafka protocol and then consume them in your ServiceNow instance and vice versa.

Producing and consuming messages



For details on exchanging data using a Kafka client, see Producing and consuming messages from a Kafka client.

Advanced High Availability transfer with Hermes

Learn how messages are produced and consumed in Hermes during normal operation, Advanced High Availability (AHA) transfer, and failover scenarios.

ServiceNow production instances operate in geographically separate data centers. Each data center is paired with another data center to provide redundancy with failover support. One data center is designated as the active side and the other as standby. For example, your instance might be configured in the DC1 and DC2 data centers, with DC1 as the active side.

With the activation of StreamConnect, LES, or IDR, a new Hermes Kafka cluster is provisioned in both data centers. To confirm high availability and provide failover support, Hermes uses a pair of active/active Kafka clusters, one in each data center.

Near cluster

The Hermes Kafka cluster located in the same data center as the instance is the near cluster.

Far cluster

The cluster running in the other data center is the far cluster. The opposite is true for the other instance. Its near cluster is in its data center, and its far cluster is running in the other data center.

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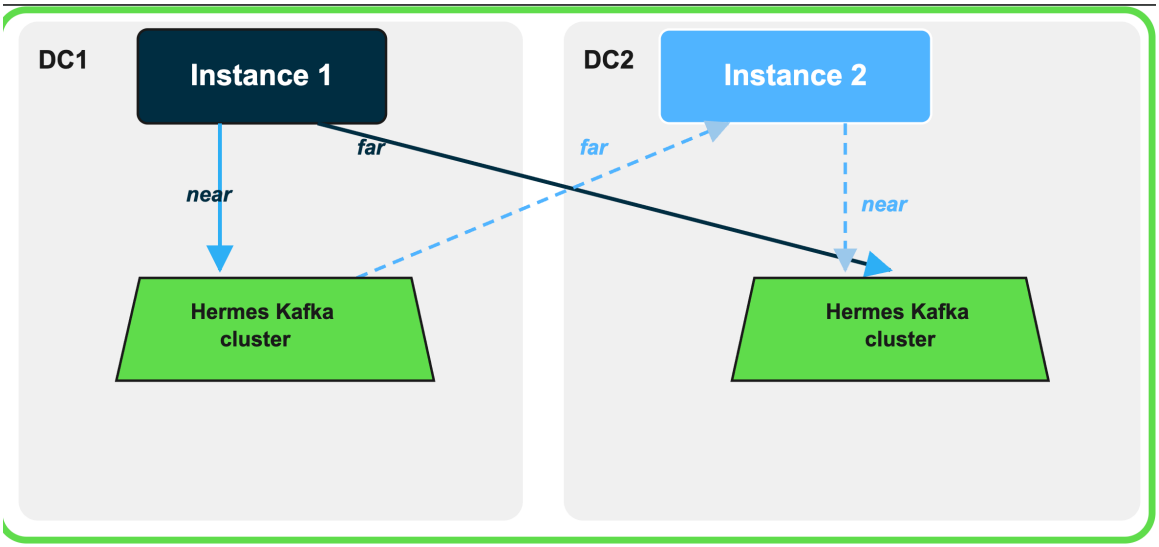
Near and far Hermes Kafka clusters



Normal operation

Under normal operating conditions, messages are produced by the instance or an external client to the near Hermes cluster. For example, if your instance is running in the DC1 datacenter, messages are produced to the near Hermes cluster in DC1. Messages sent from an external client are produced to the cluster using a port in the 400x range as defined in the producer bootstrap URL.

When a topic is created in Hermes, its created in both clusters. Two consumer processes are used for consuming messages from both clusters, but only a single consumer is actively consuming under normal circumstances. Each consumer must use distinct bootstrap URLs, one in the 410x range and the other in the 420x range.

Failover process

Under the following circumstances, the cluster where messages are produced can change.

Instance Advanced High Availability (AHA) Transfer

When an instance undergoes an AHA transfer, the standby instance is set to active, and the previously active instance is set to standby. In this scenario, the instance switches to using the Hermes cluster on the newly-active side.

For example, if the instance is running in DC1 and DC2 datacenters with DC1 as the current active side, and an AHA transfer occurs, the instance switches to using the Hermes cluster in DC2.

Hermes failover

The instance actively monitors the health of the Hermes cluster. If it detects any issues with the cluster, it enters failover mode. In this case, until the instance detects that the near Hermes cluster has recovered, it uses the Hermes cluster near the standby instance.

For example, if the instance is running in DC1 and DC2 datacenters with DC1 as the active side, it uses the Hermes cluster in DC1. If it detects an issue with the Hermes cluster in DC1, it enters Hermes failover mode and starts producing messages to the DC2 cluster until the DC1 cluster is healthy again. After recovery, it resumes using the Hermes cluster in DC1.

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When failover occurs, if consumers are lagging, both consumers can potentially consume messages until one of the consumers finishes processing. For example, if the current active side is DC1, the consumer consuming from DC1 is actively processing messages. If a problem occurs in the DC1 cluster resulting in failover to the DC2 cluster, the consumer consuming from the DC2 cluster starts processing messages. If the consumer consuming from the DC1 cluster was lagging, both consumers continue to consume messages until the DC1 consumer catches up.

Maintaining order

If maintaining message order is required, it's the responsibility of the consumer application to manage this. Note that the global ordering of messages is dependent on how the topic in Kafka is defined.

Configuring Hermes Messaging Service

Learn how the Hermes Messaging Service is activated. Set up a secure connection to the Hermes Messaging Service.

Configuration overview

The Hermes Messaging Service is a ServiceNow AI Platform capability that is available as part of Stream Connect, Log Export Service (LES), and Instance Data Replication (IDR).

To successfully set up and configure Stream Connect or Log Export Service, you must complete the steps in Set up a secure connection to the Hermes Messaging Service.

Activating the Hermes Messaging Service

The Hermes Messaging Service is enabled when the Glide Hermes Message Queue plugin (com.glide.hermes) is activated.

This plugin isn't activated directly. Instead, the plugin is activated by any of the following actions:

- Activation of the ServiceNow Stream Connect Installer (com.glide.hub.stream_connect.installer) plugin
- Installation of the Log Export Service application
- Activation of the IDR plugin (com.glide.idr) in Utah or higher
- Activation of the IDR plugin (com.glide.idr), and then a subsequent upgrade to Utah or higher

Note:
Stream Connect requires Workflow Data Fabric and Stream Connect subscriptions. For more information, see https://www.servicenow.com/products/automation-engine.html.

Set up a secure connection to the Hermes Messaging Service

Secure your Kafka topics by generating a ServiceNow® instance-signed certificate.

Before you begin

Setting up the Hermes Messaging Service requires coordination with your network administrator and with your Kafka administrator. Work with your network administrator to obtain required security certificates and open the required ports. Work with your Kafka administrator to ensure that your Kafka environment is configured correctly and that your applications can connect to the Hermes Messaging Service using the standard Kafka protocol.

Make sure the following setup is in place:

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- The Hermes Messaging Service is activated. See Activating the Hermes Messaging Service.
- The Key Management Framework plugin (com.glide.kmf.global) is activated.
- The Certificates [sys_kmf_certificate] table contains a ServiceNow instance root CA certificate.
- The instance isn't configured with a Custom URL. Custom URLs are not supported with the Instance PKI Certificate Generator.

Role required: hermes_admin, sn_kmf.cryptographic_manager, or admin

For details on assigning KMF roles, see Roles installed with Key Management Framework.

Procedure

1. Navigate to **All** > **Certificate Generator** > **Instance PKI Certificate Generator**.
2. **Optional:** Control access to topics by configuring Access Control Lists (ACLs) at the namespace or topic-level.
   The bearer of the certificate is granted read or read/write access to the topics in the namespace or the existing topic that you selected.
3. Set up security for the Hermes Messaging Service.
   a. Navigate back to the Instance PKI Certificate Generator page.
   b. Enter a keystore password in the **Certificate Password** field.
   c. Select **Generate**.
   The system generates an instance-signed certificate in the Certificates [sys_kmf_certificate] table, creates a keystore, and creates a truststore.

   If Restricted Caller Access isn't allowed for the IPKI Certificate Generator, a cross scope access error appears. Contact Customer Service and Support for assistance with allowing Restricted Caller Access. To resolve this issue, Customer Service and Support can reference source_scope=76f9d51369115083f4ea77aab1677cc0 in the Restricted Caller Access Privileges [sys_restricted_caller_access] table.
4. Save a copy of the keystore by selecting **Download Keystore**.
5. Save a copy of the truststore by selecting **Download Truststore**.
6. Copy the keystore and truststore files to each producer and consumer client that will connect to the Hermes Messaging Service.

Result

You can now create a secure connection to the Hermes Messaging Service.

Note:
You must use the keystore that you generated using the Instance PKI Certificate Generator to connect to Hermes. Custom-generated keystores that aren't created according to the ServiceNow documentation aren't supported.

What to do next

- Review the guidance in Exchanging data using Hermes.
- Prepare your Apache Kafka client environment
- Configure the SSL connection to Hermes in the producer and consumer properties files using the truststore and keystore files that you generated. For more information, refer to the following topics:

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- Create a test topic in Hermes using the Kafka client
- Produce test messages to a Hermes topic using the Kafka client
- Consume test messages from a Hermes topic using the Kafka client

Revoke a Hermes certificate

Revoke a ServiceNow® instance-signed certificate so that it can't be used in secure connections to the Hermes Messaging Service.

Before you begin

Role required: hermes_admin or sn_kmf.cryptographic_manager

Procedure

1. Navigate to **All** > **Certificate Generator** > **Instance PKI Certificate Generator**.
2. Select **Manage Certificates**.
3. In the **Hermes IPKI Certificates** dialog box, select one or more certificates that you want to revoke.
4. Select **Revoke**.
5. Select a reason for the revocation and then select **OK**.

Result

The certificates are revoked and can no longer be used in secure connections to Hermes. You can view the revocation date and the reason it was revoked in the Certificates [sys_kmf_certificate] table.

Producing and consuming messages from a Kafka client

Learn how to produce and consume messages to Hermes from a Kafka client.

To begin exchanging messages from a Kafka client, start by creating a topic in the Hermes Kafka cluster. After you successfully create the topic, you must create a total of three processes to communicate with Hermes.

- One process is required to produce messages to Hermes.
- Two processes are required to consume messages from Hermes. Two processes are required because Hermes uses a pair of Kafka clusters for failover purposes. If one cluster goes down, data is produced to the other Hermes Kafka cluster.

> **Important:**
> You must configure two distinct consumer bootstrap addresses, one for each consumer client.

One consumer process uses ports in the 410x range and the other uses ports in the 420x range. This means you must define two distinct clients, one for each port range. Within each client configuration, you can define consumer group IDs.

Required port ranges

Work with your network administrator to ensure that the following port ranges are open before you begin exchanging messages using Hermes:

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- Producer: 4000-4050
- Consumer1: 4100-4150
- Consumer2: 4200-4250

To confirm that the ports are accessible through the firewall, run the following command:

```
openssl s_client -connect <instance_name>.service-now.com:<port>
 -servername <instance_name>.service-now.com
```

- Change the service-now.com domain if your instance uses a different domain name.
- Complete the test using ports from each of the three port ranges. For example: test 4000-4003, 4100-4103, and 4200-4203.

If the command fails internally but succeeds from a client outside the network, consult your network administrator to gain access through the network firewall.

Bootstrap addresses

Use the following port mappings to connect producers and consumers to the Kafka cluster bootstrap addresses. All Application Delivery Controllers used by Hermes follow this same convention.

Important:
The following Hermes bootstrap address examples use ports 4000-4003, 4100-4103, and 4200-4203. However, you must open the following port ranges to ensure connectivity as additional clusters are added to the Hermes Messaging Service.

- Producer: 4000-4050
- Consumer1: 4100-4150
- Consumer2: 4200-4250

Producer clients use ports ranging from 4000 to 4050. For example:

```
Producers
 = "<instance_name>.service-now.com:4000,<instance_name>.service-now.com:4001,<inst
ance_name>.service-now.com:4002,<instance_name>.service-now.com:4003"
```

Because Hermes uses a pair of Kafka clusters, you must configure two consumer clients with separate consumer bootstrap addresses.

Important:
You must configure two distinct consumer bootstrap addresses, one for each consumer client.

- The first consumer client uses ports ranging from 4100 to 4150. For example:

  ```
  Consumer A
   = "<instance_name>.service-now.com:4100,<instance_name>.service-now.com:4101,<ins
  tance_name>.service-now.com:4102,<instance_name>.service-now.com:4103"
  ```

- The second consumer client uses ports ranging from 4200 to 4250. For example:

  ```
  Consumer B
   = "<instance_name>.service-now.com:4200,<instance_name>.service-now.com:4201,<in
  stance_name>.service-now.com:4202,<instance_name>.service-now.com:4203"
  ```

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When you configure producer and consumer properties for your own Kafka client, use this string pattern.

Using the command-line interface (CLI)

When using the `list` command to view a list of topics, a list of current topics are returned from one or both clusters. Topics might be returned from only one cluster, depending on when the last synchronization occurred. Topics created for failover purposes are differentiated by a three-letter cluster identification prefix.

When accessing the Hermes clusters using the CLI, internal topics appear in addition to any topics you've created. For details, see KB1705399.

You can't delete a topic from both Kafka clusters using a single command in the command-line interface (CLI). However, you can delete the topic from both clusters by deleting the topic record in your instance. See Delete a topic in Hermes.

Prepare your Apache Kafka client environment

Install the Apache Kafka binaries on your Unix or Windows client machine.

Before you begin

Confirm that you have Java 11.0 or higher installed by running the following command:

```
java --version
```

Role required: admin

Procedure

1. Download and install Apache Kafka.

   a. Download the Apache Kafka binaries.
   Ensure that you download the binaries, not the source code, from the Apache Kafka website.

   b. Unzip the Apache Kafka package.
   For example:

   ```
   tar -zxvf kafka_2.13-3.2.0.tgz
   ```

2. Navigate to the parent directory where you extracted the Apache Kafka package.
   - For example, on Unix:

     ```
     cd /home/user/Software
     ```

   - For example, on Windows:

     ```
     cd C:\Software
     ```

3. Simplify the Apache Kafka directory name by renaming it to `kafka`.
   - For example, on Unix:

     ```
     mv kafka_2.13-3.2.0 kafka
     ```

   - For example, on Windows:

     ```
     rename kafka_2.13-3.2.0 kafka
     ```

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Result
The Apache Kafka client is installed in a simplified directory on your local machine.

What to do next
Create a test topic in Hermes using the Kafka client

Create a test topic in Hermes using the Kafka client

Create a topic for sending and receiving test messages in the Hermes Kafka cluster.

Before you begin

- Secure your Kafka topics by generating a ServiceNow® instance-signed certificate and keystore. You must provide truststore and keystore details when you configure a producer to create a topic in Hermes. See Set up a secure connection to the Hermes Messaging Service.
- Download and install Apache Kafka. See Prepare your Apache Kafka client environment.

Role required: admin

About this task
The full Hermes Kafka topic name is composed of the following elements:

```
snc.<instance_name>.<namespace>.<app_id>.<topic_name>
```

where:

- `<instance_name>` is the name of your instance
- `<namespace>` is the namespace of the domain your Kafka topic belongs to (optional)
- `<app_id>` is your application ID

  The topic you create belongs to this application. Specify either of the following:

  - `sn_logstoanalytics` for Log Export Service topics
  - `sn_streamconnect` for Stream Connect topics
- `<topic_name>` is the unique name for your topic

Note:
The full topic name is case-sensitive and limited to 200 characters.

Procedure

1. Navigate to the `config` directory where you extracted Kafka.
   - For example, on Unix:

     ```
     cd /home/user/Software/kafka/config
     ```

   - For example, on Windows:

     ```
     cd C:\Software\kafka\config
     ```

2. Configure a producer.

   a. Open the `producer.properties` file.

   b. Configure the following SSL properties:

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```
security.protocol=SSL

ssl.truststore.password=<truststore password>

ssl.truststore.location=<path to truststore.p12>

ssl.truststore.type=PKCS12

ssl.keystore.password=<keystore password>

ssl.keystore.location=<path to keystore.p12>

ssl.keystore.type=PKCS12

ssl.key.password=<keystore password>
```

Replace the following placeholder variables:

- `<truststore password>` with your truststore password
- `<path to truststore.p12>` with the path to your truststore file
- `<keystore password>` with your keystore password
- `<path to keystore.p12>` with the path to your keystore file

c. Save your changes in plain text.

3. Navigate to your Kafka directory.

4. Create a test topic by running the following command:

- Unix:

```
./bin/kafka-topics.sh --create --topic
 snc.<instance_name>.<namespace>.sn_<app_id>.<topic_name>
 --command-config ./config/producer.properties
 --bootstrap-server
 <instance_name>.service-now.com:4000,<instance_name>.service
-now.com:4001,<instance_name>.service-now.com:4002,<instance_
name>.service-now.com:4003
```

- Windows:

```
bin\windows\kafka-topics.bat --create --topic
 snc.<instance_name>.<namespace>.sn_<app_id>.<topic_name>
 --command-config config\producer.properties
 --bootstrap-server
 <instance_name>.service-now.com:4000,<instance_name>.service
-now.com:4001,<instance_name>.service-now.com:4002,<instance_
name>.service-now.com:4003
```

Replace the following placeholder variables:

- `<instance_name>` with your instance name (case-sensitive)
- `<namespace>` with the namespace of the domain your Kafka topic belongs to (optional)
- `<app_id>` with the application ID (case-sensitive)
- `<topic_name>` with the unique topic name you want to use (case-sensitive)

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Result
A test topic is created in the Hermes Kafka cluster.

What to do next
Produce test messages to a Hermes topic using the Kafka client

Produce test messages to a Hermes topic using the Kafka client

Produce test messages to a Hermes topic by configuring a producer client.

Before you begin

- Secure your Kafka topics by generating a ServiceNow® instance-signed certificate and keystore. You must provide truststore and keystore details when you configure the Hermes producer. See Set up a secure connection to the Hermes Messaging Service.
- Download and install Apache Kafka. See Prepare your Apache Kafka client environment.
- Create a test topic to store the test messages that you produce. For details, see Create a test topic in Hermes using the Kafka client.

Role required: admin

About this task
The following steps describe how to configure a producer client and send test messages to the Hermes Kafka cluster. Refer to these steps when you're ready to produce messages to Hermes for business or production purposes.

Procedure

1. Navigate to the `config` directory where you extracted Kafka.
   - For example, on Unix:
     ```
     cd /home/user/Software/kafka/config
     ```
   - For example, on Windows:
     ```
     cd C:\Software\kafka\config
     ```
2. Configure a producer.
   a. Open the `producer.properties` file.
   b. Configure the following SSL properties:
     ```
     security.protocol=SSL

     ssl.truststore.password=<truststore password>

     ssl.truststore.location=<path to truststore.p12>

     ssl.truststore.type=PKCS12

     ssl.keystore.password=<keystore password>

     ssl.keystore.location=<path to keystore.p12>

     ssl.keystore.type=PKCS12

     ssl.key.password=<keystore password>
     ```

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Replace the following placeholder variables:

- `<truststore password>` with your truststore password
- `<path to truststore.p12>` with the path to your truststore file
- `<keystore password>` with your keystore password
- `<path to keystore.p12>` with the path to your keystore file

c. Save your changes in plain text.

3. Produce a test topic.

a. Navigate to the Kafka directory.

b. Run the following command:
Unix:

```
./bin/kafka-console-producer.sh --topic
 snc.<instance_name>.<namespace>.sn_<app_id>.<topic_name>
 --producer.config ./config/producer.properties
 --bootstrap-server
 <instance_name>.service-now.com:4000,<instance_name>.service
-now.com:4001,<instance_name>.service-now.com:4002,<instance_
name>.service-now.com:4003
```

Windows:

```
bin\windows\kafka-console-producer.bat --topic
 snc.<instance_name>.<namespace>.sn_<app_id>.<topic_name>
 --producer.config config\producer.properties
 --bootstrap-server
 <instance_name>.service-now.com:4000,<instance_name>.service
-now.com:4001,<instance_name>.service-now.com:4002,<instance_
name>.service-now.com:4003
```

Replace the following placeholder variables:

- `<instance_name>` with your instance name
- `<namespace>` with the namespace of the domain your Kafka topic belongs to (optional)
- `<app_id>` with the application ID
- `<topic_name>` with a unique test topic name

Note:
Each part of the topic name is case-sensitive.

c. Send test messages to the test topic.
For example:

```
test1
test2
test3
```

Result
Test messages are produced to the test topic in the Hermes Kafka cluster.

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What to do next
Consume test messages from a Hermes topic using the Kafka client

Consume test messages from a Hermes topic using the Kafka client

Consume test messages from a Hermes topic by configuring two consumer clients.

Before you begin

- Secure your Kafka topics by generating a ServiceNow® instance-signed certificate and keystore. You must provide truststore and keystore details when you configure the Hermes consumers. See Set up a secure connection to the Hermes Messaging Service.
- Download and install Apache Kafka. See Prepare your Apache Kafka client environment.
- Create a topic and produce test messages in the Hermes Kafka cluster before you can consume messages. For details, see Create a test topic in Hermes using the Kafka client and Produce test messages to a Hermes topic using the Kafka client.

Role required: admin

About this task

The following steps describe how to configure two consumer clients and receive test messages from the Hermes Kafka cluster. Because Hermes uses a pair of Kafka clusters, you must configure two consumer clients with separate consumer bootstrap addresses. This ensures messages are consumed from both clusters without dropping any messages.

Important:
You must configure two distinct consumer bootstrap addresses, one for each consumer client.

Refer to these steps when you are ready to consume messages from Hermes for business or production purposes.

Procedure

1. Navigate to the `config` directory where you extracted Kafka.
   - For example, on Unix:
     ```
     cd /home/user/Software/kafka/config
     ```
   - For example, on Windows:
     ```
     cd C:\Software\kafka\config
     ```
2. Configure the consumers.
   a. Open the `consumer.properties` file.
   b. Configure the following SSL properties:
     ```
     security.protocol=SSL

     ssl.truststore.password=<truststore password>

     ssl.truststore.location=<path to truststore.p12>

     ssl.truststore.type=PKCS12

     ssl.keystore.password=<keystore password>
     ```

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```
ssl.keystore.location=<path to keystore.p12>

ssl.keystore.type=PKCS12

ssl.key.password=<keystore password>
```

Replace the following placeholder variables:

- `<truststore password>` with your truststore password
- `<path to truststore.p12>` with the path to your truststore file
- `<keystore password>` with your keystore password
- `<path to keystore.p12>` with the path to your keystore file

c. Save your changes in plain text.

3. Consume a message using each consumer.

a. Run the following command for the first consumer client:
Unix:

```
./bin/kafka-console-consumer.sh
 --consumer.config ./config/consumer.properties --topic
 snc.<instance_name>.<namespace>.sn_<app_id>.<topic_name>
 --group snc.<instance_name>.<consumer_group_id>
 --from-beginning --bootstrap-server
 <instance_name>.service-now.com:4100,<instance_name>.service
-now.com:4101,<instance_name>.service-now.com:4102,<instance_
name>.service-now.com:4103
```

Windows:

```
bin\windows\kafka-console-consumer.bat
 --consumer.config config\consumer.properties --topic
 snc.<instance_name>.<namespace>.sn_<app_id>.<topic_name>
 --group snc.<instance_name>.<consumer_group_id>
 --from-beginning --bootstrap-server
 <instance_name>.service-now.com:4100,<instance_name>.service
-now.com:4101,<instance_name>.service-now.com:4102,<instance_
name>.service-now.com:4103
```

Replace the following placeholder variables:

- `<instance_name>` with your instance name
- `<namespace>` with the namespace of the domain your Kafka topic belongs to (optional)
- `<app_id>` with the application ID
- `<topic_name>` with a test topic name
- `<consumer_group_id>` with a label of your choice for the group that the consumer belongs to

Note:
Each part of the topic name is case-sensitive.

b. Open a new terminal window.

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c. Navigate to the Kafka directory.

d. Run the following command for the second consumer client:
Unix:

```
./bin/kafka-console-consumer.sh
 --consumer.config ./config/consumer.properties
 --topic snc.<instance_name>.<namespace>.<topic_name>
 --group snc.<instance_name>.<consumer_group_id>
 --from-beginning --bootstrap-server
 <instance_name>.service-now.com:4200,<instance_name>.service
-now.com:4201,<instance_name>.service-now.com:4202,<instance_
name>.service-now.com:4203
```

Windows:

```
bin\windows\kafka-console-consumer.bat
 --consumer.config config\consumer.properties
 --topic snc.<instance_name>.<namespace>.<topic_name>
 --group snc.<instance_name>.<consumer_group_id>
 --from-beginning --bootstrap-server
 <instance_name>.service-now.com:4200,<instance_name>.service
-now.com:4201,<instance_name>.service-now.com:4202,<instance_
name>.service-now.com:4203
```

Replace the following placeholder variables:

- `<instance_name>` with your instance name
- `<namespace>` with the namespace of the domain your Kafka topic belongs to (optional)
- `<topic_name>` with a test topic name
- `<consumer_group_id>` with a label of your choice for the group that the consumer belongs to

Note:
Each part of the topic name is case-sensitive.

Result
Test messages are consumed from the Hermes Kafka cluster.

Managing namespaces and topics in Hermes

Organize and manage namespaces and topics in the Hermes Kafka cluster using the Hermes Messaging Service.

Managing namespaces in Hermes

Group Kafka topics together for simplified topic management and access control specification using namespaces.

In ServiceNow, all Kafka topics link to a namespace. You can use namespaces to organize topics in logical ways. For example, you can group topics together based on their Kafka cluster. You can also use namespaces to configure which domains can access which topics on a domain-separated instance. You assign topics to ServiceNow domains using the topic's namespace.

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Namespace records

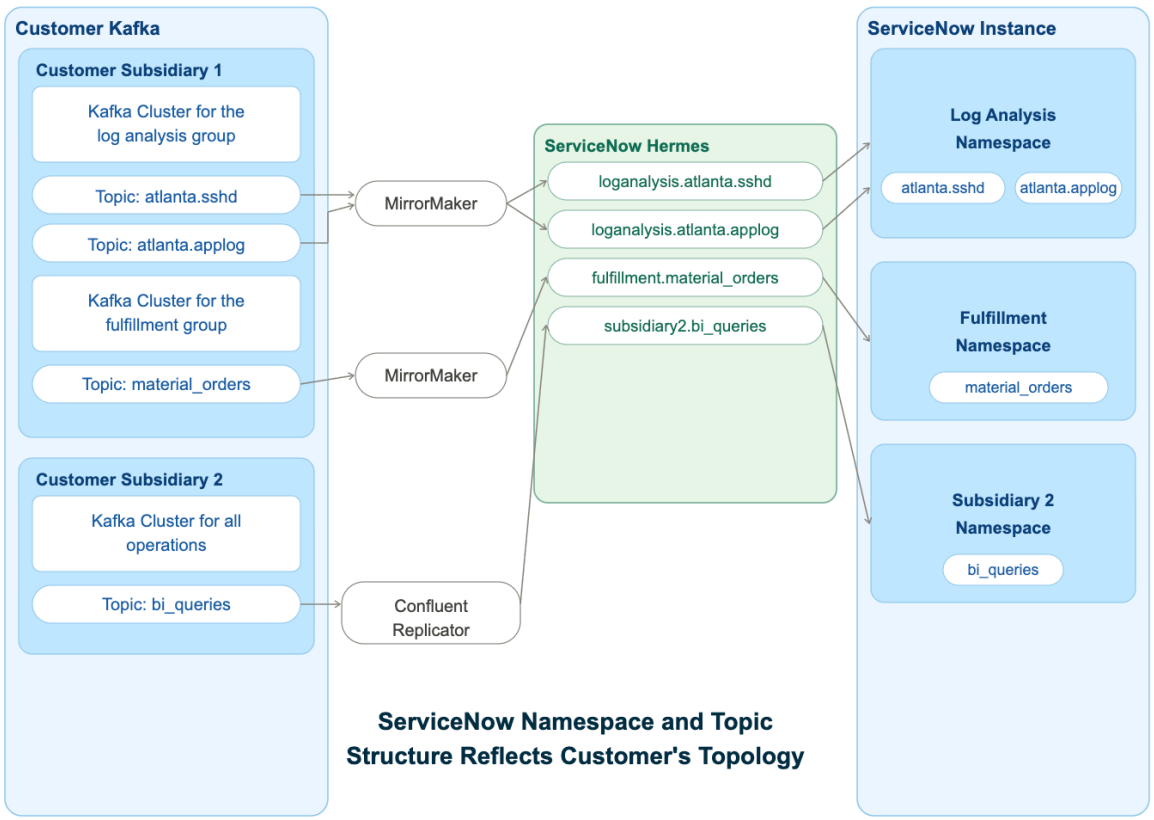
Namespace records are stored in the Kafka Namespaces [sys_kafka_namespace] table. This table shows a list of namespace records with each namespace's related topic prefix. An administrator with the kafka_namespace_admin role creates namespace records in the Kafka Namespaces [sys_kafka_namespace] table.

Namespaces and topic prefixes

A topic is assigned to a namespace based on the topic name's prefix. A scheduled job regularly checks Hermes for new topics. When it finds one, it creates a ServiceNow topic record for the topic and links the topic to a namespace. The prefix assigned to the topic is the basis for its namespace assignment in ServiceNow.

This image shows an example of using the Kafka cluster name prefix to organize topics into different namespaces in ServiceNow.

Kafka prefixes and topic namespaces



In this example:

1. An instance administrator with the kafka_namespace_admin role creates namespace records for the Log Analysis group, the Fulfillment group, and another subsidiary in the ServiceNow instance.
2. The instance administrator works with the Kafka administrator to replicate topics to Hermes using the Kafka cluster name as the namespace prefix.
3. The Kafka cluster for the fulfillment group has a topic named `material_orders`. The topic is replicated to Hermes using `fulfillment` as the namespace prefix. A new topic is created in Hermes called `fulfillment.material_orders`.
4. A scheduled job finds the `fulfillment.material_orders` topic in Hermes, creates a topic record, and assigns the record to the Fulfillment namespace to match its prefix.

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Prefix matching rules

Topic name prefixes are matched to namespaces according to the following rules.

- The namespace is selected based on the longest matching namespace prefix. If there's a matching namespace, the topic record is assigned to that namespace and that namespace's domain.
- If there isn't a longer namespace prefix that matches, the zero-length prefix of the Default Namespace will match. The topic record is assigned to the Default Namespace in the global domain.
- If the Default Namespace has been deleted or modified, so there’s no matching namespace at all, then no topic record is created.

Namespace design considerations

Plan how want to organize your namespaces and topics before you start creating them. Once you add a topic to a namespace, you can't delete the namespace without deleting the topics that are associated with it.

Have a namespace for each domain on a domain-separated instance

Create one namespace per ServiceNow domain.

Use namespaces to organize topics by domain and Kafka installation

Use namespaces to separate both topics that belong in separate ServiceNow domains and topics from separate Kafka installations.

After you've configured your namespaces, consider deleting or deactivating the Default Namespace

Keeping the Default Namespace could lead to configuration issues, such as a mismatched topic prefix. This mismatch could result in a topic that should have been created in one domain being created in the global domain.

You can enforce tighter constraints on where topics are created by deleting the Default Namespace. For example, if you decide that all topics must have a prefix that matches a namespace, deleting the Default Namespace ensures that topics without a matching prefix aren't created.

For details on using domain separation with namespaces in Hermes, see Hermes Messaging Service domain separation.

Create a namespace in Hermes

Organize your Kafka topics by creating a namespace.

Before you begin

Role required: hermes_admin or kafka_namespace_admin

About this task

Use namespaces to organize Kafka topics in logical ways. For example:

- Create namespace records for each Kafka cluster that replicates messages to Hermes.
- Create namespace records for each domain in a domain-separated instance. For more information, see Hermes Messaging Service domain separation.

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Procedure

1. Navigate to **All** > **Hermes Messaging Service** > **Namespaces**.
2. Select **New**.
3. On the form, fill in the fields.

Kafka namespace form

Field	Description
Name	Name of the namespace.
Topic Prefix	Prefix assigned to all topics in this namespace. Topics are assigned to namespaces based on the topic prefix. A scheduled job checks for new topics in Hermes. When it finds one, it creates a topic record and links the topic to the namespace. **⚠ Warning:** To avoid conflicts between the app ID and the namespace that could result in unexpected behavior, don't specify a topic prefix beginning with `sn_` when creating a namespace record.
Allowed Application Scopes	List of application scopes that have access to this namespace.

4. Select **Submit**.

Result
A namespace record is created in the Kafka Namespace [sys_kafka_namespace] table. Topics created in or replicated to Hermes are assigned to the namespace based on the topic prefix.

What to do next
- Organize topics yourself by creating one or more topic records and linking them to this namespace. See Create a topic in Hermes.
- Manage access to Kafka topics in the Hermes Kafka cluster by configuring Access Control Lists (ACLs) for this namespace in the certificate generator. See Set up a secure connection to the Hermes Messaging Service.

Delete a namespace in Hermes

Prevent topics from being added to a namespace by deleting the namespace in Hermes.

Before you begin
Role required: hermes_admin or kafka_namespace_admin

About this task
You can't delete a namespace if any active topics belong to it. You must delete or deactivate the topics in a namespace before you can delete the namespace.

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Procedure

1. Navigate to **All** > **Hermes Messaging Service** > **Namespaces**.
2. Select a namespace that you want to delete.
3. Select **Delete**.

Result

The namespace record is deleted from the Kafka Namespace [sys_kafka_namespace] table.

Managing topics in Hermes

Manage topic records in your instance and Kafka topics in the Hermes Kafka cluster using the Hermes Messaging Service.

Topic records

Messages are organized and stored in Kafka topics in the Hermes Kafka cluster. Topic records are stored in the Kafka Topics [sys_kafka_topic] table in your instance. This table shows a list of topics records with a reference to each topic's namespace. Each topic record has a field for the topic's name, related namespace, and whether the topic is active.

Values in the Name column of the Kafka Topics [sys_kafka_topic] table aren't inherently unique. For example, topic records might have the same Name value when they belong to different namespaces or exist in different clusters. However, values in the Full Name column are always unique.

A scheduled job runs regularly to synchronize topic records with the topics found in Hermes. This job performs the following functions:

- Creates topic records for any discovered topics, assigning them to the appropriate namespace based on the prefix for the topic name.
- Synchronizes topics created from external sources, such as the Kafka command-line interface (CLI). For example, when a topic is created from an external source on the near cluster, the job runs and creates the topic on the far cluster as well.
- Logs a warning message if a topic can't be matched to any namespace. If a topic can't be matched to any namespace, the topic record isn't created. There's a default, prefix-less namespace called the Default Namespace that matches all topics. The only time a topic doesn't match any namespace is when the Default Namespace has been deleted or modified.
- Marks topics as inactive if no Kafka topic was found for them.

You can monitor and view topics in the Hermes Kafka cluster using the topic inspector. For more information, see Monitoring topics in the Hermes Kafka cluster.

Kafka topics are specific to a particular instance. This means you can't migrate a topic record from the Kafka Topics [sys_kafka_topic] table to another instance using an update set. Instead, you must manually create the topic in the target instance.

Creating topics

You can create topics in the Hermes Kafka cluster using either of the following methods:

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- Create the topic from your instance. This creates a record the Kafka Topics [sys_kafka_topic] table and creates a Kafka topic in the Hermes Kafka cluster. See Create a topic in Hermes.
- Create the topic externally. For example, create the topic using the Kafka command-line interface (CLI).

> **Note:**
> To avoid syncing issues between the cluster and your instance, include the application ID when creating topics externally. For example, without the application ID, a topic created from the CLI with a name like `snc.instancename.fulfillment.topicname` is created in the default namespace instead of the `fulfillment` namespace. To ensure the topic is created in the `fulfillment` namespace, include the application ID in the name using the format `snc.instancename.fulfillment.app_id.topicname`. Replace `app_id` with the application ID of your choice.

If, for some reason, a topic can't be created in the Hermes Kafka cluster, it won't be created in the Kafka Topics [sys_kafka_topic] table either.

Updating topics

If necessary, you can change the number of partitions in a topic. Note that you can only increase the number of partitions in a topic. For more information, see Update a topic in Hermes.

After it's created, the namespace assigned to a topic record is permanent. If you create a namespace record and want to move existing topics to it, you must delete the topics and recreate them in the Hermes Kafka cluster with the new namespace prefix. If the topics weren't created through the instance, new topic records will be created and assigned to the matching namespace record after a rescan.

Deleting topics

You can delete topics from the Hermes Kafka cluster using either of the following methods:

- Delete the topic directly from the Kafka Topics [sys_kafka_topic] table in your instance. This method automatically deletes the topic from all the Hermes Kafka clusters in one action. See Delete a topic in Hermes
- Delete the topic externally. For example, delete the topic using the Kafka command-line interface (CLI).

> **Important:**
> Deleting the topic externally requires that you delete the topic from both Hermes clusters manually by specifying each set of ports (410x and 420x). If possible, delete the topic through the instance instead.

You can't delete a topic if it has subscriptions in Stream Connect.

Rescanning topics

Rescanning creates topic records for any topics in the Hermes Kafka cluster that don't already have corresponding topic records. For example, if you create topics in Hermes using the CLI, you can rescan to create corresponding topic records in the Kafka Topics [sys_kafka_topic] table immediately instead of waiting for the scheduled job to create them.

- The rescan occurs automatically every ten minutes.
- Created topic records are assigned to existing namespaces based on prefix matching rules.

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Sometimes topic records in your instance don't match what's in Hermes. This situation can happen in the following cases:

- When the ServiceNow Integration Hub Kafka Consumer (com.glide.hub.kafka_consumer) plugin is enabled after there are already topics in Hermes.
- When topic records are deleted accidentally.
- When namespace definitions are changed, and you want to assign existing topics to the new namespaces.

Create a topic in Hermes

Create a topic from within ServiceNow. Creating a topic from your instance adds a topic record to the Kafka Topics [sys_kafka_topic] table and adds a Kafka topic to Hermes.

Before you begin

Role required: kafka_admin

Procedure

1. Navigate to **All** > **Hermes Messaging Service** > **Topics**.
2. Select **New**.
3. On the form, fill in the fields.

Kafka Topic Form

Field	Description
Name	Name of the topic. The string that you enter is combined with the application ID and namespace to create the full Kafka topic name. **Note:** Don't include the `snc.<instance_name>` prefix with the topic name.
Application ID	Application associated with the topic. Default is Stream Connect.
Namespace	Namespace associated with the topic. You can either select a namespace created by the Kafka namespace administrator or select the Default Namespace if separate namespaces aren't configured for your instance. In ServiceNow, all Kafka topics link to a namespace. Namespaces are used to organize topics and, on a domain-separated instance, for domain separation. When a namespace is assigned to a particular domain, all the topics created in that namespace have the same domain.

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Field	Description
Partitions	Number of partitions to create for the topic. ○ Minimum value: 1 ○ Maximum value: 32 ○ Default value: 1
Active	Option to activate the topic.

4. Select **Submit**.

Result
The topic appears in both the Kafka Topics [sys_kafka_topic] table and in Hermes. If, for some reason, a topic can't be created in Hermes, it won't be created in the Kafka Topics [sys_kafka_topic] table either.

Update a topic in Hermes

Update a Kafka topic in Hermes by modifying the topic record.

Before you begin
Role required: kafka_admin

Procedure
1. Navigate to **All** > **Hermes Messaging Service** > **Topics**.
2. Select the topic record that you want to update.
3. **Optional:** Change the number of partitions in the topic.
   Note the following restrictions:
   - You can only increase the number of partitions.
   - A topic can have up to 32 partitions.
4. **Optional:** Change the topic's activation status.
5. **Optional:** Synchronize the partition count in this topic between clusters by selecting **Synchronize Partition Count**.
6. Select **Update**.

Result
The topic record and the Kafka topic in the Hermes Kafka cluster are updated.

If an error occurs when updating the partition count, you can synchronize the topic's partition count across Hermes Kafka clusters by selecting **Synchronize Partition Count**.

Delete a topic in Hermes

Remove a topic and its messages by deleting it from Hermes. Deleting a topic record deletes it from your instance and from the Hermes Kafka cluster.

Before you begin
Role required: kafka_admin

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Procedure

1. Navigate to **All** > **Hermes Messaging Service** > **Topics**.
2. Select the topic that you want to delete.
3. Select **Delete**.

Result

The topic record is deleted from the Kafka Topics [sys_kafka_topic] table. The corresponding Kafka topic is deleted from the Hermes Kafka cluster.

Rescan topics in Hermes

Synchronize topic records in your instance with topics in the Hermes Kafka cluster by rescanning.

Before you begin

Role required: kafka_admin

Procedure

1. Navigate to **All** > **Hermes Messaging Service** > **Rescan Topics**.
2. Synchronize topics by selecting **Confirm**.
3. **Optional:** After the rescan finishes, view the script execution history.

Result

Topic records are added to the Kafka Topics [sys_kafka_topic] table for each topic discovered in the Hermes Kafka cluster. The topic refresh date and time that appears in **All** > **Hermes Messaging Service** > **Topics** is updated.

Monitoring topics in the Hermes Kafka cluster

Monitor message processing and view topics in the Hermes Kafka cluster that belong to you using the Hermes Messaging Service topic inspector.

Topics partitions

Events are stored in one or more partitions within a topic. Dividing a topic into partitions helps distribute the processing load across multiple brokers in the Hermes Kafka cluster. Each broker can handle messages from different partitions of the same topic, ensuring that no single broker is responsible for processing all the messages for a single topic. This distribution improves scalability and fault tolerance.

Events in a partition are immutable. One event can't overwrite another event in the same partition. If the same event is sent to a partition more than once, it is appended to the list of events in the partition.

Tracking messages in partitions

You can track messages in the Hermes Kafka cluster by viewing partition information.

- Determine whether your messages are reaching the Hermes Kafka cluster by checking whether the end offset value changes when you produce messages to a topic.
- Determine whether messages have expired by noting the beginning offset value, which increases as messages expire. If you send messages to a topic but the beginning offset is higher than you expect, some of the messages have already expired. Messages expire in the Hermes Kafka cluster after 36 hours.

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Tracking consumer progress

You can track the progress of processing messages for each consumer by viewing consumer information.

- View the consumers for each partition in a topic, including the group ID and consumer ID for each consumer.
- Determine which message a consumer is processing by viewing the **Current Offset** column.
- Determine whether the consumer is delayed by checking the **Lag** column. The lag is the difference between the current offset and the end offset that indicates how many messages remain.

Inspecting message details

You can detect problems with consuming messages using the topic inspector. For example, if a message that you produced isn't consumed from the Hermes Kafka cluster, you can validate the payload and message key by inspecting the topic. You can also download the full payload and save it as a file on your local machine.

You can view messages as binary data in base-64 encoding instead of UTF8 strings by adding a system property. See Hermes Messaging Service system properties.

View a message in a Hermes topic

View the payload of a message in a Hermes topic using the Hermes Messaging Service topic inspector.

Before you begin

Role required: hermes_admin, kafka_namespace_admin, or admin

Important:
Administrators with the kafka_namespace_admin role can view message data across different domains.

About this task

Note:
Messages expire after 36 hours.

Procedure

1. Navigate to **All** > **Hermes Messaging Service** > **Topic inspector**.
2. Select a cluster set with topics that you want to view in the **Select Service** drop-down list.
3. Select **List Topics**.
   The primary cluster, the secondary cluster, and the number of topics on the instance are listed above the table of topics.
4. **Optional:** View messages from all partitions.
   a. Select a topic row in the table.
   b. **Optional:** Retrieve messages from all clusters or a specific cluster using the **Select Data center** drop-down list.
   c. **Optional:** Retrieve messages received in a specific date range using the **Message start date (UTC)** and **Message end date (UTC)** fields.

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d. **Optional:** Search for a specific message in the partition by entering a keyword or regular expression in the **Message body filter** field.

> **Note:**
> The message filter only supports string searches of text data. You can't search for messages with binary payloads.

e. Select **Inspect Topic**.

5. **Optional:** View messages in a specific partition.

a. View the list of partitions by selecting **Load Partition Info**.

b. Select a partition with messages that you want to retrieve in the **Read from Partition** drop-down list.

c. **Optional:** Retrieve messages from all clusters or a specific cluster using the **Select Data center** drop-down list.

d. **Optional:** Retrieve messages received in a specific date range using the **Message start date (UTC)** and **Message end date (UTC)** fields.

e. **Optional:** Search for a specific message in the partition by filtering the **Message body filter** field using a keyword or regular expression.

> **Note:**
> The message filter only supports string searches of text data. You can't search for messages with binary payloads.

f. Select **Inspect Topic**.

6. **Optional:** Track message processing for each consumer by selecting **View Consumer Info**.
7. **Optional:** View audit history for a topic by selecting **Audit Info**.
The Hermes Topic Audit Records [hermes_topic_audit_records] table displays an audit trail of topic changes, including the type of operation performed, the originating instance as Principal Name, and the timestamp for each change. Audit history is refreshed every 30 minutes.
8. View the message details and payload.

> **Note:**
> To view headers, keys, or messages that are greater than 20 characters, select the **View** link or download the data.

Message details

Field	Description
Offset	The Hermes Kafka cluster's datacenter identifier and the position of the message in the partition.
Partition	Partition of the topic where the message is stored.

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Field	Description
Timestamp	Date and time when the message was created.
Headers	Message header.
Key	Message key.
Payload	Message body contents. Note the following information about the message payload: ○ The topic inspector automatically replaces some characters with escape characters in message payload text data. ○ The message size that is displayed is the size of the payload as viewed in the topic inspector and not necessarily the size of the message as it exists in the Hermes Kafka cluster.

Administering Hermes Messaging Service

Monitor the Hermes Messaging Service by viewing diagnostics and inspecting topics.

Check the status of and connection to the Hermes Kafka cluster

Check the status of and test the connection to the Hermes Kafka cluster by sending and receiving test messages.

Before you begin

Role required: hermes_admin or admin

Procedure

1. Navigate to **All** > **Hermes Messaging Service** > **Diagnostics**.
   The dashboard loads and Hermes diagnostic tests are run automatically verifying instance public key infrastructure (PKI) configuration, external port status, and Glide Hermes Message Queue plugin (com.glide.hermes) activation.

   If any of the tests fail, contact Customer Service and Support.

2. Monitor the health of the Hermes components over time by viewing the charts in the Hermes Component Tests section.

   a. Track the number of successful and failed diagnostic tests for all Hermes services over the last seven days.
   If a component test fails, determine when the failure started and whether the failure coincides with any recent configuration changes.

   b. View the number of messages successfully sent and received by selecting a cluster set in the **Service** drop-down list and entering a date range.
   Determine whether failures occurred with sending or receiving messages.

3. View the producer and consumer bootstrap addresses that you can use to connect to Hermes in the Setup Information section.
   Use these port mappings to connect producer and consumer clients to the Kafka cluster bootstrap addresses, as described in Exchanging data using Hermes.

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Note:
When configuring consumer clients, you must configure two clients using ports in separate ranges: one in 4100-4150 and another in 4200-4250.

4. Verify that the instance can act as an issuer in an x.509 trust hierarchy.
   a. Expand the **Instance PKI** container.
   b. View the configuration status.
   c. View additional instance PKI details on the Key Management Framework Health page by selecting **View more**.

   The instance PKI configuration status is displayed. If the configuration is valid, you can secure connections to Hermes by following the steps in Set up a secure connection to the Hermes Messaging Service. If the configuration is invalid, contact Customer Service and Support.
5. Confirm availability of the external ports used to connect to the Hermes Kafka cluster.
   a. Expand the **Bootstrap Connectivity** container.
   b. Select **Run Test**.

   In the range of ports required for Hermes, the following ports are checked:
   - 4000, 4001, 4002, 4003 producer client ports
   - 4100, 4102, 4102, and 4103 consumer client ports
   - 4200, 4201, 4202, and 4203 consumer client ports

   If the ports aren't open, contact Customer Service and Support.
6. Confirm that the instance is able to send messages to and receive messages from the Hermes Kafka cluster.
   a. Expand the **Instance Connectivity** container.
   b. Select the set of clusters that you want to connect to in the **Hermes Service** drop-down list.
   c. Select **Run Test**.

   Test Message Send and Test Message Receive results are displayed including the elapsed time, datacenter, and bootstrap information for each operation. If the tests fail, contact Customer Service and Support.
7. Verify the timestamp of the most recent message from a topic in the Hermes Kafka cluster.
   a. Expand the **View Topics** container.
   b. Select the set of clusters that you want to connect to in the **Hermes Service** drop-down list.
   c. Select **Get Topic List**.
   d. View the timestamp for an external topic's last known message by selecting the topic name in the **External Topics** column.
   e. View the timestamp for an internal topic's last known message by selecting the topic name in the **Internal Topics** column.

   The message's timestamp is displayed. To view full details for a topic, use the Hermes Topic Inspector. See Monitoring topics in the Hermes Kafka cluster.

Monitoring data usage in Hermes

Monitor data usage in Hermes over time.

Monitor the amount of data that is produced to the Hermes cluster over time in the Hermes Usage Dashboard.

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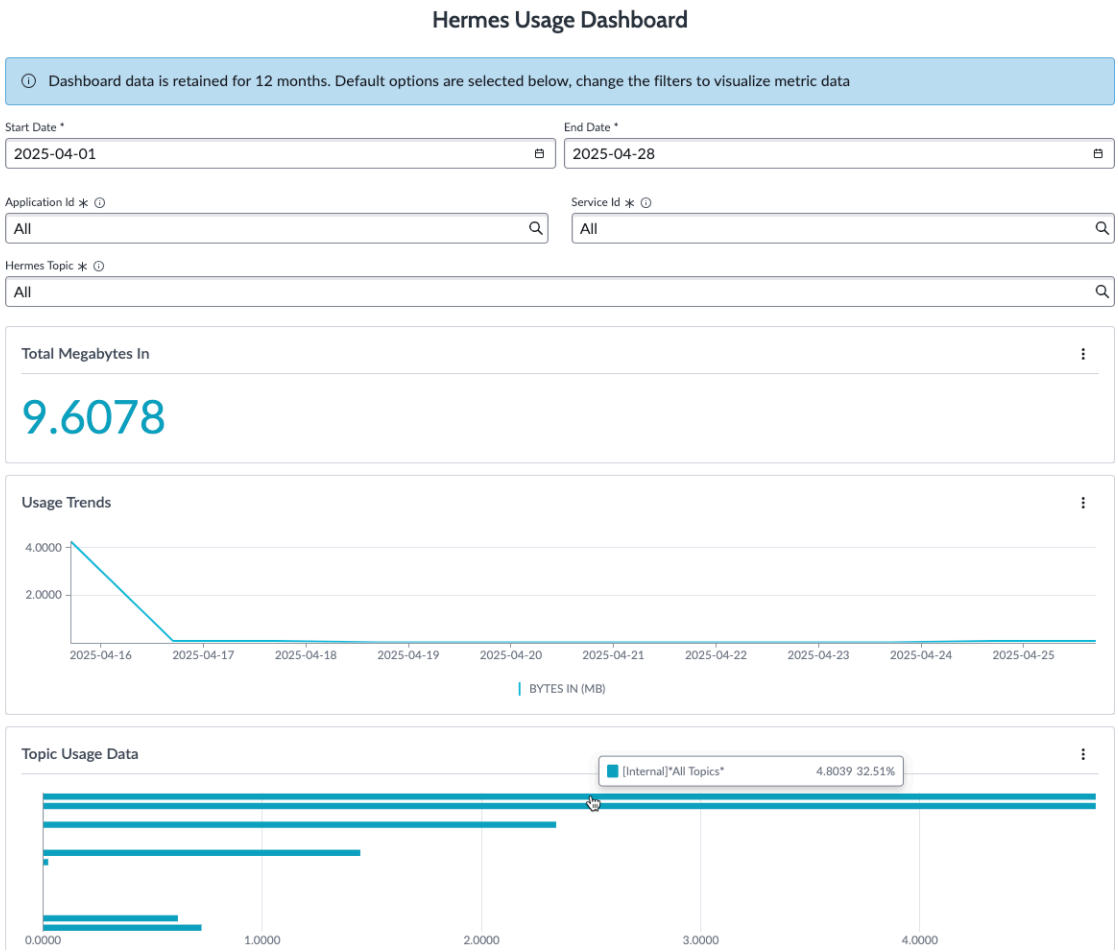
Usage data is calculated by aggregating the size of all messages sent to the cluster. The size for each message is determined by combining the key size, if present, and the actual size of the message sent to the Hermes cluster. For example, if a 100 MB message is sent to the cluster with a 2 MB key size, 102 MB usage is recorded for the message.

Key benefits

- Monitor Hermes performance with insights into data inflow in megabytes for a specified time period.
- Visualize data usage over time for all topics or a single topic.
- Compare data usage for topics that belong to an application.

Hermes Usage Dashboard



Required roles

Either the hermes_admin or admin role is required to view the Hermes Usage Dashboard.

Accessing the Hermes Usage Dashboard

View usage by navigating to **All** > **Hermes Messaging Service** > **Usage Dashboard**.

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Use cases

- Monitor data usage for an application. Determine if usage has increased or decreased over time.
- View data usage for a specific topic. Determine if usage patterns changed by looking for spikes or drops in usage.
- Look for decreased usage over time to determine if your application is producing data that isn't supported by Hermes.
- Compare data usage for topics in a single application or all applications that belong to you.

Reports

Data displayed in the Hermes Metrics Dashboard is collected from the Hermes usage metrics [hermes_usage_metrics] table.

- Metric data is captured hourly, with each collection point reflecting the latest value recorded within that hour.
- Metric data is aggregated and displayed over time. This means the dashboard enables you to view an overall trend rather than precise moment-to-moment traffic.
- Metric data displayed on the dashboard is initially aggregated daily. Depending on the date range you select, the dashboard dynamically adjusts its view. For example, for ranges greater than 60 days, it presents the data in monthly summaries. For ranges less than 60 days, it displays daily summaries.
- Metric data is retained for 12 months.

Title	Type	Source table	Description
Total Megabytes In	Single score	Hermes usage metrics [hermes_usage_metrics] table	View the aggregated total of data produced to Hermes in megabytes.
Usage trends	Trend	Hermes usage metrics [hermes_usage_metrics] table	Monitor data usage in terms of bytes in for selected topics over time.
Topic Usage Data	Bar	Hermes usage metrics [hermes_usage_metrics] table	Compare data usage for each topic over time.

Tracking message usage in Hermes

Message usage through the Hermes Messaging Service is tracked for monitoring and management purposes through the Kafka topic name.

You access the Hermes Messaging Service exclusively through integrations with other applications, such as Stream Connect and Log Export Service.

You can access Kafka topics in your namespace using the following naming convention:

```
snc.<instance_name>.<namespace>.sn_<app_id>.<topic_name>
```

where:

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- `snc.<instance_name>` is your namespace prefix
- `<namespace>` is the namespace of the domain your Kafka topic belongs to (optional)
- `sn_<app_id>` is your application ID
- `<topic_name>` is your unique topic name

Note:
The full topic name is case-sensitive and limited to 200 characters.

Kafka message usage and licensing impact vary by application. License usage is tracked at the application level.

Cloning with Hermes Messaging Service enabled

To clone your database from one instance to another successfully with Hermes enabled, you must ensure that certain Hermes tables are preserved and excluded. The list of tables in the preserve list should match those in the exclude list and vice versa.

Before you request a clone, verify the Hermes tables in the preserve and exclude lists. For example, make sure the sys_kafka_topic table is in the preserve list to maintain the current Hermes topics in the target instance. If the sys_kafka_topic table is not preserved, it is overwritten when the clone operation occurs.

The following sections assume that Hermes is installed on both the source and target instances before the clone. For example, if Hermes is not installed on the target instance, there are no Hermes tables to preserve.

Important:
If you clone an instance without Hermes installed to an instance with Hermes installed, the Hermes tables in the target instance are removed.

To avoid losing this data, capture the data in the following Hermes tables using an update set:

- hermes_cluster_config
- hermes_topics_state
- hermes_topic_location
- hermes_topics_metrics
- hermes_metrics

You must ensure the hermes_cluster_config and hermes_topic_location tables are preserved to ensure the Hermes Messaging Service is functional.

Hermes tables to preserve

Add the following Hermes tables to the Clone Data Preservers list if they're missing. Remove any Hermes tables that aren't in this list.

- hermes_app_services
- hermes_audit_operational_metadata
- hermes_audit_records
- hermes_client_metrics
- hermes_cluster_config

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- hermes_ip_filtering_audit
- hermes_metrics
- hermes_metrics_collection
- hermes_operation_metadata
- hermes_shared_topic_acl
- hermes_shared_topic_connection
- hermes_system_status
- hermes_topic_audit_records
- hermes_topic_location
- hermes_topics_metrics
- hermes_topics_state
- hermes_usage_metrics
- sys_kafka_namespace
- sys_kafka_topic

Hermes tables to exclude

Add the following Hermes tables to the Clone Exclude Tables list if they're missing. Remove any Hermes tables that aren't in this list.

- hermes_app_services
- hermes_audit_operational_metadata
- hermes_audit_records
- hermes_client_metrics
- hermes_cluster_config
- hermes_ip_filtering_audit
- hermes_metrics
- hermes_metrics_collection
- hermes_operation_metadata
- hermes_shared_topic_acl
- hermes_shared_topic_connection
- hermes_system_status
- hermes_topic_audit_records
- hermes_topic_location
- hermes_topics_metrics
- hermes_topics_state
- hermes_usage_metrics
- sys_kafka_namespace
- sys_kafka_topic

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View Hermes Messaging Service log messages

Review Hermes event details by viewing log messages.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **System Log** > **All**.
   The Log [syslog] table displays all system log messages.
2. View logs only related to Hermes by adding a filter.

   a. Select the filter icon ( ).

   b. Set a condition with a field, operator, and search string.

   Example
   For example, **[Source] [contains] [Hermes]**.

   c. Select **Run**.

Result
The Log [syslog] table displays only the Hermes Messaging Service log messages.

Hermes Messaging Service reference

Reference topics provide details on the Hermes Messaging Service components and the security model.

Hermes Messaging Service components

The Hermes Messaging Service architecture is built on the following components.

Hermes Messaging Service components

Component	Description
Hermes Message Queue	A dedicated multi-tenant message queue in the ServiceNow Hermes Kafka cluster for managing the flow of data to and from the instance. The message queue uses certificate-based authentication that supports bi-directional traffic. The Hermes Message Queue is available to ServiceNow applications via the Hermes Glide API.
Hermes Gateway	Part of the ServiceNow datacenter that enables you to connect to a ServiceNow endpoint to read and write data to the Hermes Message Queue.
Hermes Glide connector	Connector that integrates instance functionality (for example, flows, data export, and data replication) with the Hermes Message Queue via the API.

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Hermes Messaging Service security model

The Hermes Messaging Service security model relies on the following capabilities.

Hermes Messaging Service security model

Capability	Description
Namespaces and data isolation	All Kafka topics are namespaced per customer. You can only view topics that belong to you and your topics aren't visible to anyone else.
Authentication and authorization	The Hermes Messaging Service requires certificate-based authentication using mTLS endpoint authentication with trusted identities and authorization based on identity.
Domain separation	Domain separation is supported with the Hermes Messaging Service. See Hermes Messaging Service domain separation.
High-availability	Failover is provided by multiple Kafka clusters running in separate ServiceNow datacenters.

Hermes Messaging Service system properties

These system properties control the behavior of the Hermes Messaging Service.

To set Hermes Messaging Service system properties, navigate to the System Properties [sys_properties] table and add the property.

System properties

Encoding format for message payload in the Hermes Messaging Service topic inspector `glide.hermes.topic.inspector.payload.format`	By default, messages in the **Payload** column are displayed as strings in UTF8. You can display binary data using base-64 encoding by adding this system property and setting the value to binary. • string: display message payload in UTF8 • binary: display message payload in base64
Encoding format for message keys in the Hermes Messaging Service topic inspector `glide.hermes.topic.inspector.key.format`	By default, identifiers in the **Keys** column are displayed as strings in UTF8. You can display binary data using base-64 encoding by adding this system property and setting the value to binary. • string: display keys in UTF8 • binary: display keys in base64

Hermes Messaging Service roles

Hermes Messaging Service is installed with these roles.

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To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Hermes Messaging Service administrator [hermes_admin]

Enables users to access the Hermes Messaging Service Topic Inspector.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Kafka administrator [kafka_admin]

Enables users to manage the integration with Apache Kafka, including topics and settings related to Kafka subscriptions.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Kafka namespace administrator [kafka_namespace_admin]

Enables users to manage Kafka namespace definitions.

Contains Roles

List of roles contained within the role: kafka_admin.

Groups

List of groups this role is assigned to by default.

None.

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Special considerations

Stream Connect administrators with the kafka_namespace_admin role can view message data across different domains.

For example, in a Managed Service Provider (MSP) instance with Kafka integrations in multiple domains, managing namespace definitions properly is important to maintain separation between domains, so don't grant this role to administrators within a single domain.

Hermes Messaging Service domain separation

Domain separation is supported for the Hermes Messaging Service. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Basic

- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

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

Overview

On a domain-separated instance, you can use namespaces to configure which domains can access specific topics in the Hermes Kafka cluster. You assign topics to ServiceNow domains using the topic record's namespace.

How domain separation works with the Hermes Messaging Service

On a domain-separated instance, a user with the kafka_namespace_admin role can assign namespaces to specific ServiceNow domains. When the Kafka namespace admin assigns a namespace to a particular domain, all the topics created in that namespace will have the same domain. Users can only see and interact with the topics and namespaces they have access to, based on domain visibility and access control lists (ACLs). Topics created with the Default Namespace are created in the global domain.

Both the Kafka Topics [sys_kafka_topic] table and the Kafka Namespaces [sys_kafka_namespace] table are domain-separated tables. Domain separation rules filter which records are available in each domain. In addition to being domain-separated, these tables can also be protected with ACLs, just like any other table.

All domain support features require the Domain Support - Domain Extensions Installer (com.glide.domain.msp_extensions.installer) plugin.

Related topics

Domain separation for service providers

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Password Reset

The ServiceNow® Password Reset application enforces strong and secure passwords by enabling end users to reset or change their passwords either by using the self-service process or by requesting the assistance of a service desk agent.

Overview of the ServiceNow Password Reset application, as well as the Password Reset for Virtual Agent, Password Reset Windows Application, and Password Reset Interactive voice response (IVR).

Password Reset for Virtual Agent

Augment an end-user experience with Password Reset for ServiceNow® Virtual Agent that handles common support issues, using pre-built conversations.

Password Reset Windows Application

The Password Reset Windows Application enables a user, who forgets the password or is locked out of a Windows computer, to reset the password directly from the Windows login screen.

Get started

Explore

Learn about Password Reset concepts and features.

Set up and configure

Set up and configure Password Reset for your users.

Enroll for Password Reset

Enroll for Password Reset.

Reference

Get details about components like fields and properties.

Exploring Password Reset

Get an overview of Password Reset, Password Reset Windows Application, and Password Reset for Virtual Agent.

Understand how to set up, configure, and use Password Reset and Password Reset Windows Application for your organization.

Password Reset The Password Reset application enforces strong and secure passwords by enabling end users to reset or change their passwords either by using the self-service process or by requesting the assistance of a service desk agent.

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Password Reset for Virtual Agent Augment an end-user experience with Password Reset for Virtual Agent that handles common support issues, using pre-built conversations.

Password Reset Windows Application The Password Reset Windows Application enables a user, who forgets the password or is locked out of a Windows computer, to reset the password directly from the Windows login screen.

Request to reset the default admin password ServiceNow® has implemented an automated workflow to streamline the default instance admin password reset process. When a customer needs to reset their default instance admin password, they can initiate the request through a specific Service Catalog item. This request automatically creates a change record, which is then processed end-to-end using automation. This ensures that the password reset is handled efficiently and securely, without the need for manual intervention.

Related topics

Installed with Password Reset

Domain separation and the Password Reset application

Password Reset

The Password Reset application enforces strong and secure passwords by enabling end users to reset or change their passwords either by using the self-service process or by requesting the assistance of a service desk agent.

Password Reset application features

Manage enrollment

Automatically enrolls end users or allows manual enrollment.

Verification types

Validates user authenticity with the help various verifications.

Integrated plugins

Resets passwords directly from the Windows application and Microsoft Azure active directory (AD).

Enrollment types

Enables end users to enroll in different password reset programs at their convenience.

Homepages with a dashboard view

Password Reset has a new, modernized look and feel. For more information, see Next Experience UI.

Password Reset processes

Users with the password_reset_admin role configure how the process of resetting a password works for an end user.

- Self-service process:

  Users reset passwords over the internet using a browser on any supported interface, including mobile devices.

- Service Desk assisted process:

  Users request the assistance of a service desk agent, over the phone or in person. In this process, users don't reset passwords.

For more information, see Configuring Password Reset and Plan your Password Reset processes.

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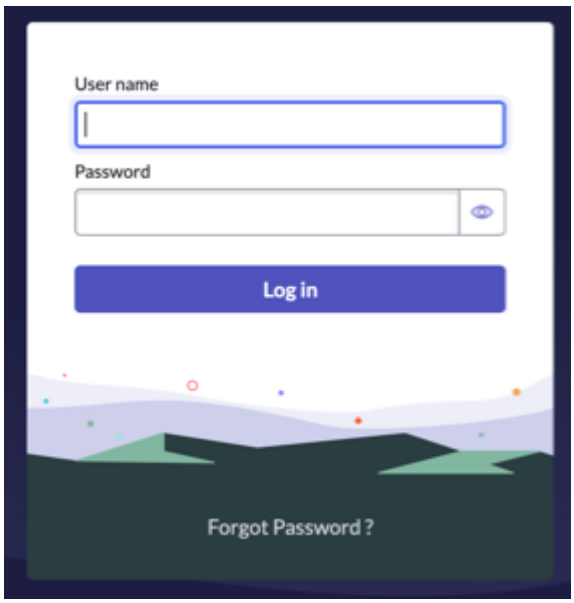
Self-service and Service Desk - assisted processes

In addition to configuring the connections, user groups, and verifications, you can specify one of the following operational methods for the organization:

Self-service process

End users reset passwords using a browser on any supported interface, including mobile devices. They can provide the identifying information and answer questions or submit a securely delivered code number. The following example shows the default self-service process Password Reset flow:

1. If a user doesn't remember their password, the user clicks **Forgot Password** on the Login page.



2. The Password Reset application starts. On the Identify page, the user enters their identifying information (generally the user name or email address). The example includes the default CAPTCHA security feature. The user provides identification by entering a user name and CAPTCHA, and clicks **Next**.

Note:
Users can hear characters displayed in CAPTCHA by clicking the Speak the CAPTCHA icon ( ) displayed in the pop-up window for the Identify step.

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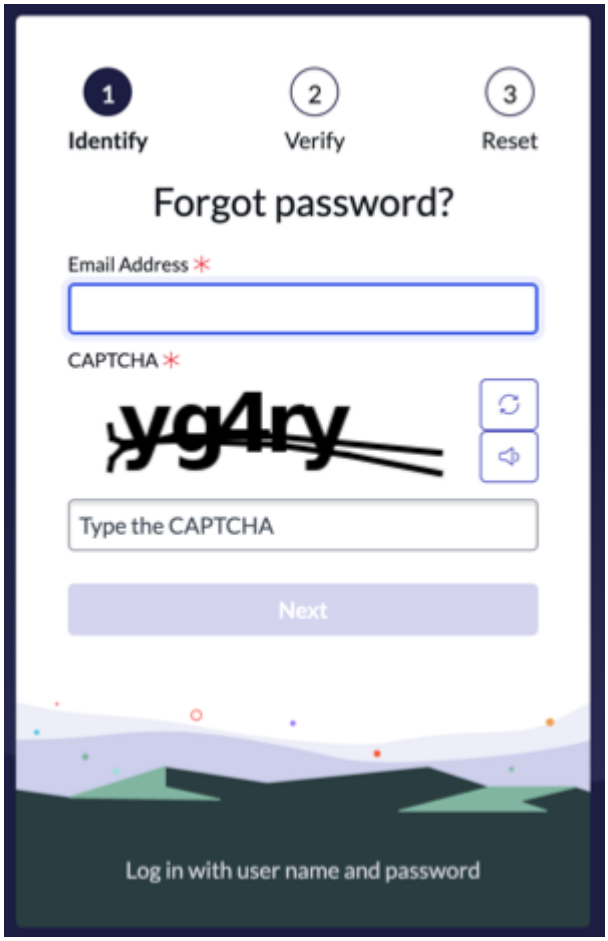

3. On the **Verify** tab, the user provides personal data associated with their user name. For example, the user can either enter the email address associated with the user profile or answer the security question that an administrator has configured. This information is specified while enrolling in the Password Reset process. The administrator can configure a different verification method. For example, a personal question that only the user can answer.

   Note:
   Other possible verifications require the user to enter a code number that was sent to a mobile device by SMS text, through the Google Authenticator app, or by email.

4. The Reset page tells the user to check email for instructions.
5. The user opens the email and clicks the link in the email to reset the password. The link is valid for a period of time that an administrator specifies by using the **password_reset.request.expiry** property.
6. The Reset Password page guides the user to reset the password.
7. The system checks the credential store to verify the identity and then displays the new password on the Reset page.

Service desk-assisted process

An end user requests the assistance of a Service Desk agent, over the phone or in person. The agent processes the request. Each Service Desk agent has the Password Reset admin Service Desk role. The Reset request form that the agent

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contains a **Select user** field and a **Select process** field. On the form, the agent can view all processes in the end user's domain.

Next steps

Based on your role, do these steps:

- If you're an administrator, start configuring Password Reset for your users.
- If you're an end user who wants to reset a password, start enrolling to reset your password.

Password Reset for Virtual Agent

Augment an end-user experience with Password Reset for Virtual Agent that handles common support issues, using pre-built conversations.

For more information about the Virtual Agent, see Virtual Agent.

Your end users can perform the following actions through the Virtual Agent conversations:

- Reset a password
- Change a password
- Unlock an account
- Enroll to reset passwords

The end users can reset passwords and unlock accounts even if they aren't logged in. When the users are logged in, they can do all the actions including changing passwords. After changing or resetting a password, the users can't change or reset the password for the next 24 hours.

Related topics

Password management topics for ITSM Virtual Agent

Password Reset Windows Application

The Password Reset Windows Application enables a user, who forgets the password or is locked out of a Windows computer, to reset the password directly from the Windows login screen.

How the Password Reset Windows Application works

Administrators download and run an EXE or MSI file to install or distribute the application to user computers. The application installs a link on the Windows login screen. The user clicks the link (**Forgot Password** as depicted in the examples on various Windows versions) and is then guided through the process of resetting the password.

If your user is using Windows, 8.1, 10, or 11 operating system on the computer, a pop-up window opens after the user clicks the **Forgot Password** link. On the pop-up window, the user enters the user name. For the multi-identification type, the user enters a user name and email address and enters the displayed CAPTCHA if enabled for the process. If the CAPTCHA is incorrect, the user gets an error message.

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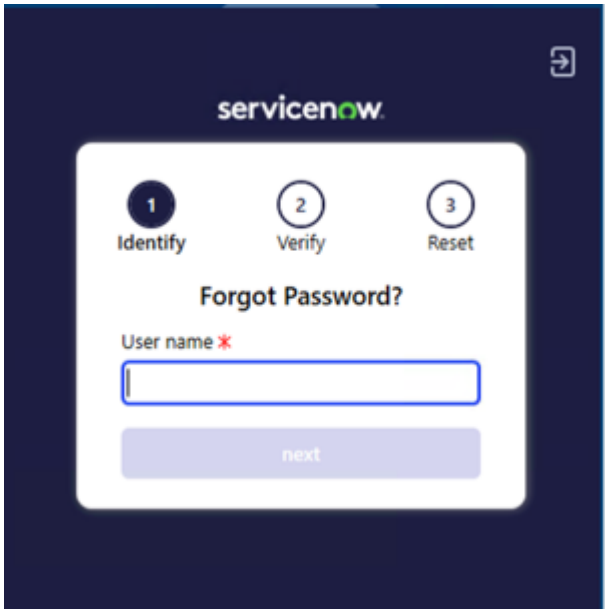

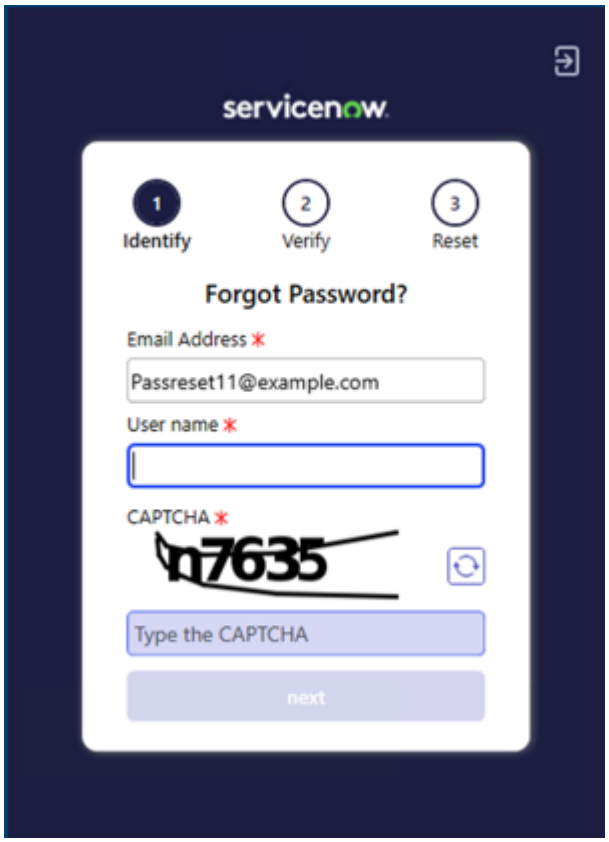

This is an identification step, which takes the user to the verification step after clicking **next** on the pop-up window.

In the Verify step, the users can verify themselves using one of the following configured verification types for security:

- Personal data: The user enters a user name or email. The personal data verifications compare the user's answers with the available details. For example, the email address entered by the user must match with the available registered email address.
- Authenticator app: The user enters the code generated by an authenticator app.
- Security Questions: The user enters the answers to the security questions.

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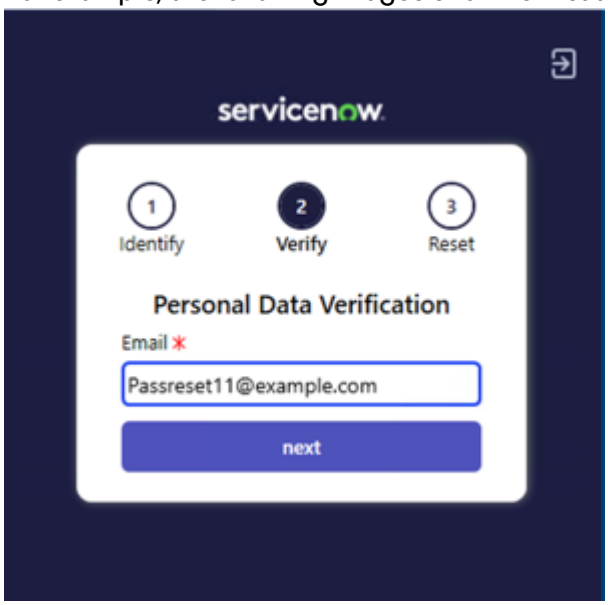
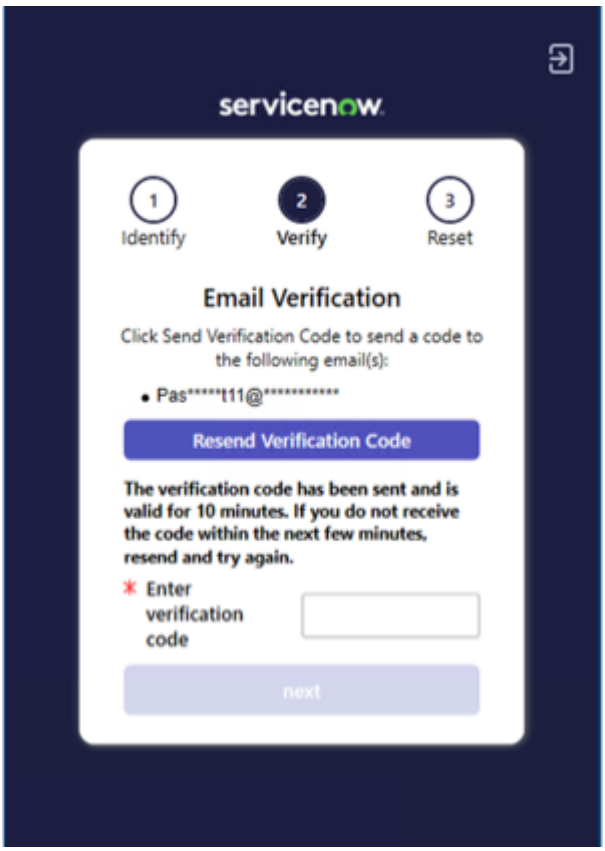
- SMS: The user enters the verification code sent to the registered mobile number.
- Email: The user enters the verification code sent to the registered email address.
- Soft PIN: The user enters a soft PIN.

For example, the following images show verification using email.





After the successful verification, the users go to the Reset step. Based on the status of the user account and email provided, the reset step contains various types.

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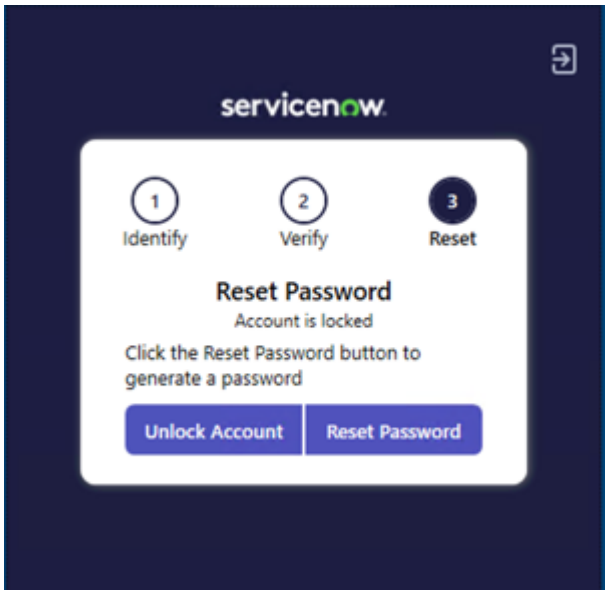
- If the user account isn't locked, the user enters a new password, enters the same password again in the **Retype password** field, and clicks **Reset Password**.
- If the user account is locked, the user gets a message stating the account is locked, and if enabled, the user can view an option to unlock the account, or the user can continue resetting the password. For example, the following image shows both the **Unlock Account** and **Reset Password** buttons.



- After the reset password process is complete, based on the configured type, the user either gets the auto-generated password on the pop-up window or an email containing the instructions to reset the password is sent to the user.

Related topics

Installing and configuring Password Reset Windows Application

Request to reset the default admin password

You can request a default instance admin password reset via the Service Catalog, which triggers an automated process to securely complete the reset.

Users with the customer_admin or partner_admin roles on Now Support can request to reset the admin account password.

For more information, refer How to request default admin password reset via Now Support Service Catalog.

Setting up Password Reset

The Password Reset application is active by default and includes example verifications. The base system enables connections only to the local ServiceNow instance credential store types.

Requirements

Role required: password_reset_admin

Note:
The Password Reset application is not available during an upgrade.

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Active and available plugins

- To enable connections to Active Directory (AD) and Remote (SOAP) ServiceNow Instance credential store types, activate the Password Reset Windows App (Password Reset Orchestration) (com.glideapp.password_reset_desktop) plugin and Microsoft AD for Password Reset store app. No other components are installed. Orchestration is available as a separate subscription. See Request the Password Reset Windows App plugin.
- To enable connections to Microsoft Entra ID Integration for Password Reset, Integrate Microsoft Entra ID Integration with Password Reset and Configure the connection to Microsoft Entra ID Credential Store.

Next steps

Plan and configure the Password Reset processes for your organization. See the Configuring Password Reset.

Set up Microsoft Entra ID for Password Reset

Set up Microsoft Entra ID for Password Reset by activating the plugin and configuring the Microsoft Entra ID instance. The Microsoft Entra ID plugin is activated with the help of this plugin. Microsoft Entra ID for Password Reset is also available in the ServiceNow store.

Related topics

Request the Microsoft Entra ID Integration for Password Reset app

Request the Microsoft Entra ID Integration for Password Reset app

Microsoft Entra ID users can reset passwords with the Microsoft Entra ID Integration for Password Reset app.

Before you begin

Role required: password_reset_admin

About this task

You can request the plugin from Now Support (HI) or from your instance.

In Now Support, navigate to **Service Catalog Activate Plugin**.

Or you can complete the following procedure.

Procedure

1. In your instance, navigate to **System Applications** > **All Available Applications** > **All**.
2. On the All Applications page, select **Request Plugin** to open the request form on Now Support.
3. On Now Support, select to be redirected to the HI Service Portal Service Catalog.
4. On the Activate Plugin request form, fill in the fields.

Field	Description
Target Instance	Instance on which to activate the plugin.
Plugin Name	Name of the plugin to activate.
Specify the date and time you would like this plugin to be enabled	The date and time must be at least two business days from the current date.

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Field	Description
	Note: By default, plugins are activated in two batches each business day: once in the morning and once in the evening, Pacific (U.S.) time. If you need your plugin activated at a specific time, enter a request for this in the Reason/Comments field.
Reason/Comments	Information that would be helpful for ServiceNow personnel who will activate the plugin. For example, if you need the plugin activated on a specific day or time instead of during one of the default activation windows, specify it in the comments.

5. Click **Submit**.
   The Microsoft Entra ID Integration for Password Reset app is activated.

What to do next

Plan, create, and customize the Password Reset process for your organization.

Set up Microsoft Active Directory for Password Reset

Enable connections to Active Directory (AD) by activating the Password Reset Windows App and Microsoft AD for Password Reset available in the ServiceNow Store.

Request the Password Reset Windows App plugin

Request the Password Reset Windows App (Password Reset Orchestration) (com.glideapp.password_reset_desktop) plugin that enables connections to the Active Directory (AD) credential store types. No other components are installed.

Before you begin

Role required: password_reset_admin

About this task

There are two ways to request a plugin:

- Access the Now Support Service Catalog directly by selecting **All** > **Service Catalog** > **Activate Plugin** on Now Support. For more information about the list of plugins, see List of Plugins.
- Access the Now Support Service Catalog through the All Applications page on your instance by following these steps.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. On the All Applications page, select **Request Plugin** to open the Request form on HI.

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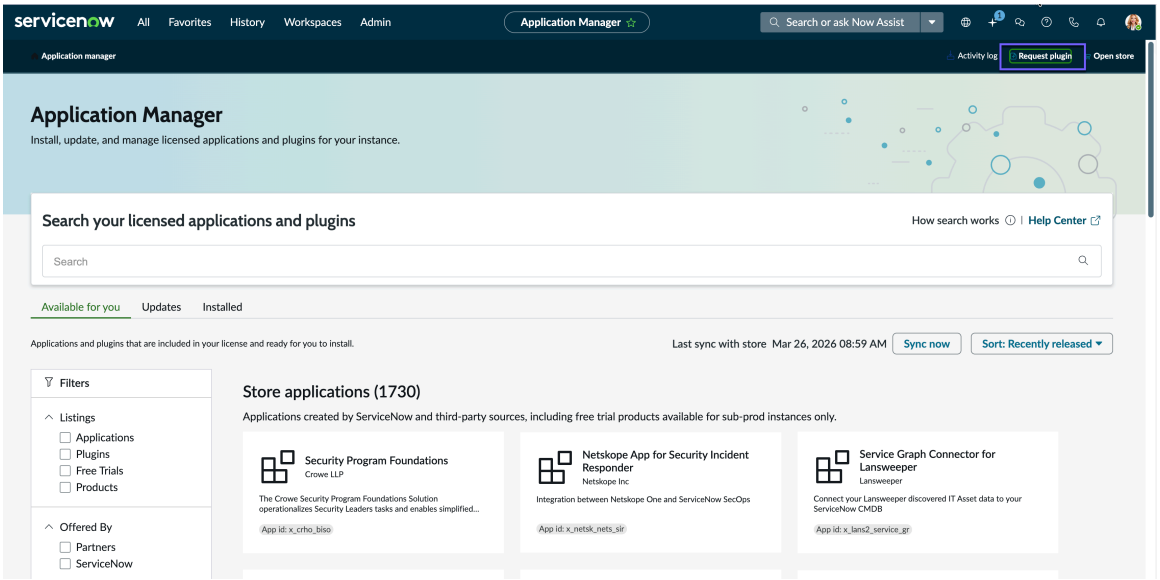
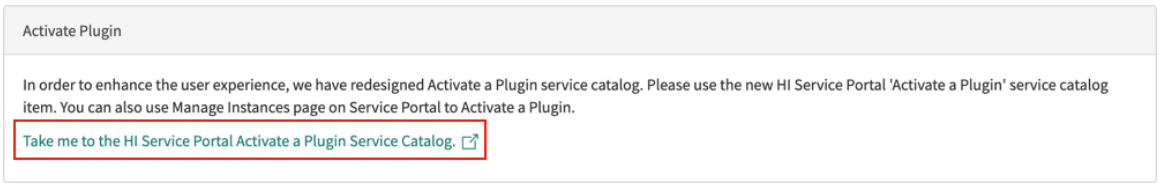


3. On Now Support, select the redirect link to access the Now Support Service Portal Service Catalog.



4. Select your instance.
5. Select **Actions > Activate Plugin**.
6. On the form, fill in the fields.

Activate Plugin request form

Field	Description
Target Instance	Instance on which to activate the plugin.
Plugin Name	Name of the plugin to activate.
Specify the date and time you would like this plugin to be enabled	The date and time must be at least two business days from the current time. **Note:** Plugins are activated in two batches, in the morning and in the evening, on every business day in the US Pacific time zone. If the plugin must be activated at a specific time, enter the request in the **Reason/Comments** field.
Reason/Comments	Information that would be helpful for the ServiceNow personnel who are activating the plugin. For example, if you need the plugin activated at a specific time instead of during

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Field	Description
	one of the default activation windows, specify that in the comments.

7. Select **Submit**.

Password Reset Windows Application

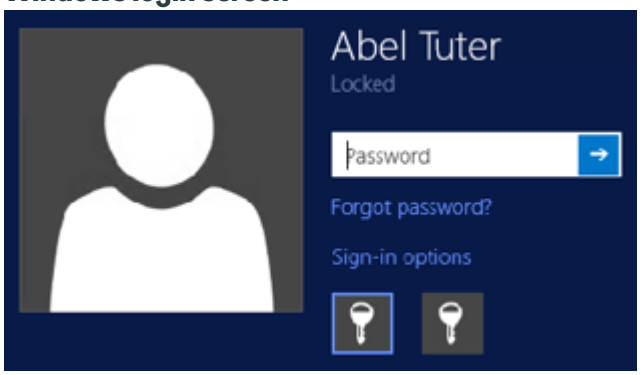
The Password Reset Windows Application enables a user, who forgets the password or is locked out of a Windows computer, to reset the password directly from the Windows login screen.

How the Password Reset Windows Application works

Download the Password Windows Reset application from the ServiceNow Store and run an EXE or MSI file to install or distribute the application to user computers. The application installs a link on the Windows login screen. The user clicks the link (**Forgot Password?** as depicted in the examples on various Windows versions) and is then guided through the process of resetting the password.

Windows login screen

Windows login screen



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Windows login screen

By default, when a user requests a reset, the instance sends the user a URL with a user-specific token. After the user opens the URL, the instance prompts the user to enter and confirm the new password. The instance does not send a temporary password.

Restrictions on the Password Reset Windows Application

- The Password Reset Windows Application does not support custom verifications.
- The Password Reset Windows Application uses the base-system CAPTCHA service even if the Password Reset application is configured to use Google reCAPTCHA with the web interface. See the section titled "Settings on the Details tab" in Configure your Password Reset process. .
- The Password strength indicator is not supported. See Configure the connection to a credential store for the Password Reset processes.
- For some verification types, you can use only one verification. Custom verifications are not supported. See Password Reset verifications for details.
- Custom UI macros configured on the **Process** > **Advanced** page are not supported (for example, entry, success, or failure macros). The system displays only the default success and failure messages.
- The Password Reset Windows Application supports newline characters in the **Password rule hint** text. Other formatting is not supported (bold, underline, hyperlink, and so on). See Configure the connection to a credential store for the Password Reset processes.

Password Reset Windows Application installation requirements

Activate the Password Reset Windows App (Password Reset Orchestration) (com.glideapp.password_reset_desktop) plugin and activate the Microsoft AD for Password Reset store app to use the Password Reset Windows Application. You must activate the Password Reset Windows App to use the Password Reset Windows Application.

Requirement	Description
Required ServiceNow release	Password Reset Windows Application latest version can be downloaded from store.
Required hardware	• 1 GHz or faster processor • 512 MB of RAM

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Requirement	Description
	• 10 MB of available hard disk space (x86) • 10 MB of available hard disk space (x64)
Required software	• Version of Password Reset Windows Application: 4.1 • Microsoft .NET Framework: 4.7.1 and newer • Microsoft Visual C++: Redistributable Visual Studio 2017
Supported operating systems	• Windows 7 • Windows 8.1 • Windows 10 Enterprise • Windows 10 Pro
Supported processor architecture	• X86 • X64
Supported network architecture	• Password Reset Windows Application clients must have direct access to both the Internet and the ServiceNow instance where the Password Reset Windows Application is configured • For Password Reset Windows Application versions that use an SHA certificate, the corporate network must not block the SHA certificate. • To reset an AD password, the client must be on the corporate network.

Set up Password Reset integration with Okta

Enables end users to reset or change their Okta passwords using Password Reset and Okta spoke.

Request apps on the Store

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

Integration Hub subscription

This application requires an Integration Hub or Workflow Data Fabric subscription. For more information, see Legal schedules - Integration Hub overview.

Application version

Password Reset integration with Okta 1.1.2 is the latest version.

Dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

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- Okta spoke v 4.1.3
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note:
Some of these plugins are licensable features and require appropriate licenses, if used outside the application implementation.

Subflows

The Password Reset integration with Okta application provides these subflows that automate the Password Reset tasks:

Subflow	Description
Password Change	Changes password of the required Okta user.
Password Connection Test	Tests connection to Okta.
Password Lock State	Checks the lock status of the specified user account in Okta.
Password Reset	Resets the password of the specified Okta user.
Password Unlock	Unlocks the required user account in Okta.
Send Email After Change Password	Sends a password change notification email to the user. This subflow is used in the Password Change subflow.

Actions

The Password Reset integration with Okta provides the Get Configuration Variables for Okta Reset Process action to retrieve the user name of the required Okta user and the details of all variables.

Set up the Password Reset integration with Okta

Customize the default credential store records and password reset processes to integrate Password Reset with Okta.

Before you begin

- Request Integration Hub subscription.
- Activate Password Reset
- Activate and set up the Okta spoke.
- Activate Password Reset integration with Okta.
- Role required: password_reset_admin

Procedure

1. Navigate to **Password Reset** > **Credential Stores**.
2. Open the record for Password Reset integration with Okta.
   For example, **Sample Okta Credential Store**

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3. Customize the default record as per your requirement.
   For more information, see Configure the connection to a credential store for the Password Reset processes.
4. Navigate to **Password Reset** > **Processes**.
5. Customize the default records, **Service-Desk Process for Okta** and **Employee Self-Service Process for Okta** , as per your requirement..

   Note:
   The **User must reset password** check box isn't supported in this integration. That is, you can't enforce users to reset their password upon first login after they reset password using the auto-generated password.

   For more information, see Configure your Password Reset process.

Set up Password Reset integration with Google Directory

Enables end users to reset their Google passwords using Password Reset and Google Directory spoke.

Request apps on the Store

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

Integration Hub subscription

This application requires an Integration Hub or Workflow Data Fabric subscription. For more information, see Legal schedules - Integration Hub overview.

Application version

Password Reset integration with Google Directory 1.0.3 is the latest version.

Dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Google Directory spoke v 1.3.1 or higher
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note:
Some of these plugins are licensable features and require appropriate licenses, if used outside the application implementation.

Subflows

The Password Reset integration with Google Directory application provides these subflows that automate the Password Reset tasks:

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Subflow	Description
Password Connection Test	Tests connection to Google Directory.
Password Lock State	Checks the lock status of the specified user account in Google Directory.
Password Reset	Resets the password of the specified Google Directory user.
Password Unlock	Unlocks the required user account in Google Directory.

Actions

The Password Reset integration with Google Directory provides the Get Configuration Variables for Google Directory Reset Process action to retrieve the user name of the required Google Directory user and the details of all variables.

Set up the Password Reset integration with Google Directory

Customize the default credential store records and password reset processes to integrate Password Reset with Google Directory.

Before you begin

- Request Integration Hub subscription.
- Activate Password Reset
- Activate and set up the Google Directory spoke.
- Activate Password Reset integration with Google Directory.
- Role required: admin

Procedure

1. Navigate to **Password Reset** > **Credential Stores**.
2. Open the record for Password Reset integration with Google Directory.
   For example, **Sample Google Directory Credential Store** .
3. Customize the default record as per your requirement.
   For more information, see Configure the connection to a credential store for the Password Reset processes.
4. Navigate to **Password Reset** > **Processes**.
5. Customize the default records, **Sample Service-Desk Process for Google Directory** and **Sample Employee Self-Service Process for Google Directory**, as per your requirement.
   For more information, see Configure your Password Reset process.

> **Note:**
> Google Directory doesn't support password change. Hence, the **Password change** check box on the process records isn't supported in this integration.

Configuring Password Reset

The Password Reset application enables an end user to reset or change a password using a self-service process. Alternatively, your organization can implement a process that requires a service desk agent to reset passwords for end users.

Watch the video: Introducing Password Reset (video)

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Elements of the Password Reset process

You configure the following elements of the process for your organization:

- A connection to the credential store for your organization where user credentials, like user name and password, are securely stored.
- One or more user groups on the ServiceNow instance that can use the password reset process.
- The type of identification that users must enter to identify themselves (generally user name or email address).
- One or more verifications — Methods to verify the identity of the user. Here are some examples of the verifications:
  - Question and answer: Answer a question that only the user knows (based on the **Security Question verification** type).
  - Email: Enter a code number that was emailed to the user.
  - SMS: Enter a code number that was texted to a mobile device.
  - Authenticator app: Enter a code that is displayed on your Authenticator app on a mobile device.

Note:
Password Reset supports the following authenticator apps:

- Google Authenticator
- Microsoft Authenticator
- Cisco Duo

Implementing a Password Reset process

1. Plan your implementation: Consider all applicable organizational guidelines, security policies, and areas of the organization.
2. Set up the elements of the password reset and password change processes according to the plan:
   - Connection to the credential store.
   - User groups that use the password reset process.
   - Identification type to use.
   - Verifications to use.
3. In the service desk-assisted model, assign service desk agents to monitor and reset passwords as needed.
4. Monitor password reset activity to identify security threats and to ensure compliance with the password policy requirements of your organization.

Password Reset Windows Application

If a user forgets the password or gets locked out of a Windows computer, the user can reset the password directly from the Windows login screen. The user clicks the **Forgot Password?** link and is then guided through the process of resetting the password. To learn more, see Password Reset Windows Application.

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Password Change application

The Password Change application extends the Password Reset application by letting admins define how users change their passwords. Users can change their passwords by using a self-service process.

1. The user logs in to the instance and then selects the **All** > **Password Reset** > **Change Password** module or link from the user profile record. The user can also use the Password Change application on mobile devices.

   Note:
   By default, the dark theme doesn't apply to the Change Password form. Users can change the theme to the dark theme. For more information about the dark theme, see Exploring themes in Next Experience.

2. On the Change Password form, the user selects a Password Reset process related to a credential store for which the user wants to change the password.
3. The user enters the old password and the new password.

   Note:

   As the user enters a password, the **New Password** field shows a message indicating whether the characters entered in the field are correct or not. For example, if a user enters a character that doesn't fit the password policy, the **New Password** field shows an error message. The strength bar also shows the strength of the new password that the user has entered.

   The password policy (granular password complexity) helps create a correct, strong password on the Change Password form in the Next Experience and the Core UI.

4. After all the password rules are met, the workflows validate the old password, and then implement the new one.
5. The user types the new password again in the **Retype password** field, and selects **Change Password**.
6. The system notifies the user that the password was changed.

Plan your Password Reset processes

To ensure security and efficiency, take the time to plan your Password Reset implementation.

Before you begin

Role required: password_reset_admin

Procedure

1. Decide on the password reset process:
   - **Self-service process:** Users reset their password over the Internet using a browser on any supported interface, including mobile devices. To make the Password Reset application with Orchestration available to all users publicly, create a new Password Reset process only for this purpose and make it accessible to all users by setting the **Public access** property. See Example: The default self-service Password Reset process.
   - **Service desk-assisted process:** Users reset passwords by requesting the assistance of a service desk agent, over the phone or in person. Only service desk agents with the password_reset_service_desk role can reset user passwords. See the video to reset the password using service desk-assisted process How to Set Up a Service Desk-Assisted Password Reset Process (Video).

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2. Decide how groups and roles differ in access and security needs.
   Analyze and assess how members of each group in your organization access the system. For example, if members of the sales group primarily access the system remotely, consider using a stronger method or multiple methods to verify the identity of each user.

   Identify user roles that have access to critical information and resources. For example, stronger verifications might be required for roles that have access to employee data, accounting information, or network configurations.

   Based on your analysis of groups and roles, determine the number and variety of verifications needed for the different Password Reset processes.
3. Decide how to manage credentials.
   Determine whether single sign-on is enabled with the type of directory service or other credential store used. If the directory service is configured for single sign-on, consider increasing the level of security by using multiple methods to verify identity of a user. A compromised user name and password can easily allow access to associated systems in a single sign-on environment.
4. Decide how to implement enrollment in the Password Reset program.
   For example, will enrollment be optional or required? Will users be auto-enrolled? How will users be notified to enroll in the program? The answers to these questions will help you determine the appropriate verification types to use.
5. Decide which Password Reset options to offer to users.
   - If your organization uses single sign-on, how will users reset their password if they are unable to log on?
   - What options are available to users working off-site?

Related topics

Configure your Password Reset process

Configure your Password Reset process

To implement the process, you configure credentials, verification methods and settings, and enrollment settings. You also specify to which users the process applies.

Before you begin
Role required: password_reset_admin

1. Be sure to Plan your Password Reset processes.
2. Create the credential store record for user names and passwords that are managed.

> **Note:**
> For LDAP integrations: If the Active Directory settings require users to reset the password when logging in, the results depend on the installed Password Reset plugin.
>
> - The Password Reset plugin cannot change an AD password. End users will not be able to log in to the instance.
> - The Self Service Password Reset plugin depends on the Password Reset Basic plugin. Self service is intended for password reset only on the local ServiceNow instance and cannot change an AD password. In order to change AD password, you must install the **Microsoft AD spoke for Password Reset**.
> - The Password Reset Windows App (com.glideapp.password_reset_desktop) plugin supports changing the AD password.

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3. Define the verifications that the process can use.
4. Configure Password Reset to auto-enroll users or to enable users to enroll for the program. See Configure your Password Reset process to auto-enroll users and Enable users to enroll for Password Reset.

Configuring password reset for external users: External users (users with the snc_external role) cannot manually enroll their devices in the password reset system. Security restrictions prevent external users from writing data to the password reset enrollment tables, and the enrollment form is not accessible to external users by default.

To enable password reset for external users, configure an automatic verification that does need manual enrollment such as Personal data verification or Email Code or SMS Code verification. Make sure that their email address or phone number is already stored in their user record.

To configure automatic verification for external users:

1. Navigate to **Password Reset** > **Processes**.
2. Select any of the automatic verifications from the related list of a process record ie Personal data/SMS/Email.
3. Ensure that the SMS/Email are of type Automatic and for that navigate to **Password Reset** > **Extensions** > **Verification types**.
4. Select the **Automatic enrollment** option.
5. Ensure that external users have a valid email address or phone number in their user profile.

Once configured, external users can receive a one-time verification code to their registered email address or phone number to complete the password reset process.

About this task

A Password Reset process consists of the following elements:

- The credential store that contains user login credentials.
- Optionally, the user groups that are authorized to use the Password Reset process.
- The verifications that verify the identity of the requesting user and that enable the service desk agents to authorize reset of the password. (Verifications are implemented by script includes.)
- Process strength configuration that helps view the security score of the process. You see the score in digits and colors based on the verification methods you select for the process. If enabled, notifications can be sent for potential configuration improvements to the process. If there are any deviations between the maximum attainable and current scores, an email with an actionable list of recommendations to improve the configuration is sent.

Procedure

1. Navigate to **All** > **Password Reset** > **Processes**.
2. Click **New** and then specify a meaningful **Name** and **Description** for the process.
3. Select the **Credential store** that contains the user credentials that the process applies to.
4. Specify the process that you are defining: Select the **Password reset** check box, the **Password change** check box, or both check boxes.
5. Specify the **Apply to all users** setting.
   For more information about the fields on the Password Reset Process form, see Password Reset Process form.
6. For Password Reset, configure settings on the **Password Reset Details** tab.

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For information about the settings and fields on the **Password Reset Details** tab, see Description of the fields on the **Password Reset Details** tab.

7. For Password Reset, configure settings of interest on the **Advanced** tab.
   For information about the fields on the **Advanced** tab, see Description of the fields on the **Advanced** tab.
8. For Password Reset, fill in any fields of interest on the **Enrollment Reminder** tab.
9. Save your changes on the Password Reset Process form.
   The form refreshes, and additional related lists appear.
10. From the **Password Reset Process Verifications** related list, select one or more verifications.
11. **Optional:** From the **Password Reset Process Groups** related list, select the user groups that use the process that you are defining.
    The **Password Reset Process Groups** related list appears only if the **Apply to all users** check box is not selected.
12. Save the record and then select the **Active** check box to enable the Password Reset process that you configured.
    The check box is available only after the record has been saved.
13. Click **Update**.
14. Navigate to **Password Reset** > **Properties** to set the properties that configure the Password Reset experience for end users.

Related topics

Plan your Password Reset processes

Configure the required strength for passwords

Calculating the security score for password reset process

The security score of the password reset process is a critical metric for the password reset administrators to assess the strength and configuration of the password reset process.

Password reset calculation

The password reset process score provides a quantitative measure of how well the process is configured to protect against unauthorized access and confirm that only legitimate users can reset their passwords. The score is based on the following categories:

- Identification score (Max: 20 points)
- Verification score (Max: 40 points)
- Configuration score (Max: 20 points)
- Password policy score (Max: 20 points)

Identification score

To increase your identification score, you must enable multiple identification methods. If you're currently using only one method, such as a username, adding another method like an email can increase your score by approximately five points. Additionally, enabling CAPTCHA adds 10 points to your score and help to prevent the bots from exploiting the password reset flow.

Verification score

To achieve a high score, you must use at least two verification methods with medium or high security levels. Each method adds up to 15 points (medium) or 25 points (high).

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For the custom verification types, you must assign the security level. By default the custom verification is set as **low**.

Configuration score

To optimize your score, enable either the Email/SMS Password Reset URL or auto-generate passwords. If neither is enabled, the score is set at 10 points. Enabling either of these options fetches 20 points.

Password Policy Score

To maximize your Password Policy Score, enable the Password Policy on the Credential Store if it isn't active. Implement the Enforce History Policy to prevent users from reusing their last five passwords as defined in the *password_history_limit* property. Use a **High** strength password policy and enable the following settings:

Send password reset process security score notification is a weekly job that send reminders to the password admin about the score and recommendations to improve the score. An email notification is sent to the Process Owners of all the active processes if **Enable security score notification** option is selected in Password Reset Process form.

Configure password expiration reminder

You can configure the password reset expiration reminder feature to send notifications to change or reset a user's password whenever it is going to expire.

Before you begin

You must enable the *pwd_reset.enable.password_expiration_reminder* property to configure password expiration reminder. By default, this property is turned off.

Role required: password_reset_admin

About this task

Configure password expiration reminder for any credential stores, such as Microsoft Entra ID.

Note:
Password expiration reminder doesn't support the local ServiceNow credential store.

After configuring password expiration reminder, notifications are sent to users by different channels, such as emails, text messages, or actionable virtual agent notifications. Users get an option to reset or change the password through notifications, such as a link that users can select to reset or change the password.

Procedure

1. Navigate to **All** > **Password Reset** > **Processes**.
2. On the Password Reset Process page, select the process for which you want to configure password expiration.
3. On the form for the selected process, select the **Password Expiration Configuration** tab.
4. Select the **Send expiration reminder** option.
5. On the form, fill in the fields.

   For information about the fields on the Password Expiration Configuration form, see Password Expiration Configuration form.

6. Save the form.

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After enabling password expiration reminder for a process, a sync expiration data scheduled job runs after an hour. The scheduled job creates records in the password expiration table for every user entitled for that process. The schedule job creates records for the process for which you configured password expiration and users who belong to this process.

If you find that the data in the password expiration table is not in sync, select **Sync Expiration data** to sync the data. Otherwise, the sync is an automated process.

Note:
After you select **Sync Expiration data**, the scheduled job runs after an hour. The **Sync Expiration data** button appears only for those processes that are active and the processes for which the **Send expiration reminder** option is selected.

Related topics

System properties for password expiration

View scheduled jobs

You can view scheduled jobs for the process that you configured password expiration for. When you configure password expiration for a process, two scheduled jobs are created automatically.

Before you begin
Role required: password_reset_admin

About this task
One scheduled job creates a record in the password expiration table, which has the prefix as *`Sync password expiration records for pwd_process_`* followed by a sys_id.

Note:
This job runs only once. This scheduled job only creates a record in the password expiration table. It doesn't fetch information about each user's password expiration by calling the external credential store. For example, the values for the **Last Password Reset Date** or **Password Expiration Date** field remain empty. The expiration reminder scheduled job retrieves the dates for all the expiration records with empty dates before sending the expiration notifications.

The second scheduled job runs periodically based on configuration. The scheduled job that has a prefix as *`pwd_expiration_reminder_`* followed by a sys_id does the following two actions:

- Fetches the latest information about the user's password expiration.
- Sends a notification when the user's password is going to expire.

Procedure

1. Navigate to **All** > **System Definition** > **Scheduled Jobs**.

   The Scheduled Jobs page shows the scheduled jobs, which are created after you configure the password expiration.

2. Select any of the scheduled jobs with the following prefixes:
   - *`Sync password expiration records for pwd_process_`*
   - *`pwd_expiration_reminder_`*

   These prefixes are followed by the sys_id of the password reset process.

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View a password expiration table

You can view a password expiration table and validate whether a record is created in it.

Before you begin

Role required: password_reset_admin

About this task

This table contains the password expiration information of an individual user in each process that the user is entitled to. The expiration framework uses this table information to send the expiration notification reminders across the credential stores. You can also view details of the record, such as if there are any errors, error logs, or password expiration dates.

Procedure

1. Select **All** and then enter *pwd_expiration.list* in the navigation filter.

   The Password Expirations page shows the table with the generated records.

2. View the various columns that you want to use in the table and validate the information.

Password expiration table

Column Name	Description
Users	Shows the reference to the sys_user table.
Password Reset Process	Shows the reference to the password reset process table. The process that a user belongs to and for which you have configured password expiration.
Last Password Reset Date	Shows the last date when the user reset the password.
Password Expiration Date	Shows the date that indicates when the password is going to expire.
Send Notification	Shows whether password expiration notifications are to be sent or not.
Active	Shows the status of the password expiration record. For example, suppose that a user is no longer associated with the process. In that case, the record shows the value as **false**. It means that the record is inactive and the scheduled process does not fetch the data for that user. The **true** value indicates that the record is active.
Error Count	Shows whether there is any error while getting information about the user password expiration. For example, when getting information about a user's password expiration while calling an external credential store, an error might occur.
Last Refresh Date	Shows the last date when the record was refreshed from an external system.

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Column Name	Description
Last Error Log	Shows the last error log if there is any error while getting information about the user's password expiration.

Note:
The password expiration table stores the password expiration information of different users for different password reset processes because both the tables are data domain separated. The password expiration table is also data domain separated. For more information about domain separation, see Domain separation and the Password Reset application.

Credential stores for Password Reset

Credential stores hold user information such as user names and passwords that can be used as login credentials. Examples include the User table [sys_user] or an Active Directory server.

Users with the password_reset_admin or password_reset_credential_manager role can create and modify connections to credential stores.

Credential store types installed with the base system

A credential store type is a set of workflows that specify how to connect to a credential store. Navigate to **Password Reset** > **Credential Store Types** to view the list of example credential stores that are based on the base-system types. The base system includes the following credential store types:

Name	Description
Local ServiceNow Instance	Represents the current (local) ServiceNow instance.

Credential store types included in Store apps

Name	Description
Microsoft AD Credential Store	Represents a Microsoft Active Directory credential store. See Set up Microsoft Active Directory for Password Reset.
Microsoft Entra ID Credential Store	Represents a Microsoft Entra ID credential store.
Okta credential store	Represents an Okta credential store.
Google credential store	Represents a Google Directory credential store.

Connection subflows for credential store types

A credential store type workflow requires a subflow that defines how to connect to the store, and can include an optional subflow that defines how to test the connection. Use the **Pwd reset – AD** and **Pwd Reset - Local** subflows as models for your custom connection workflows.

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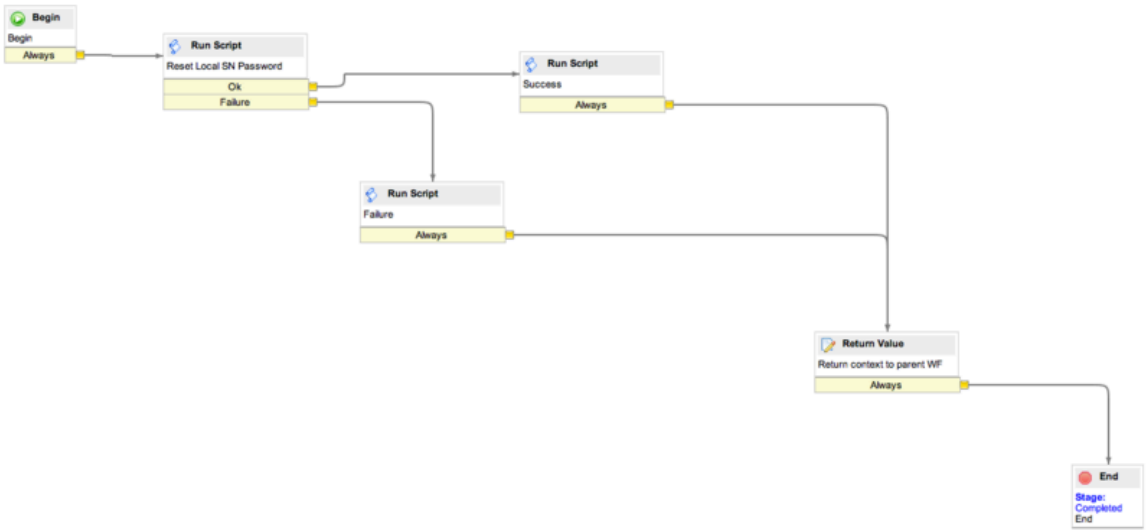
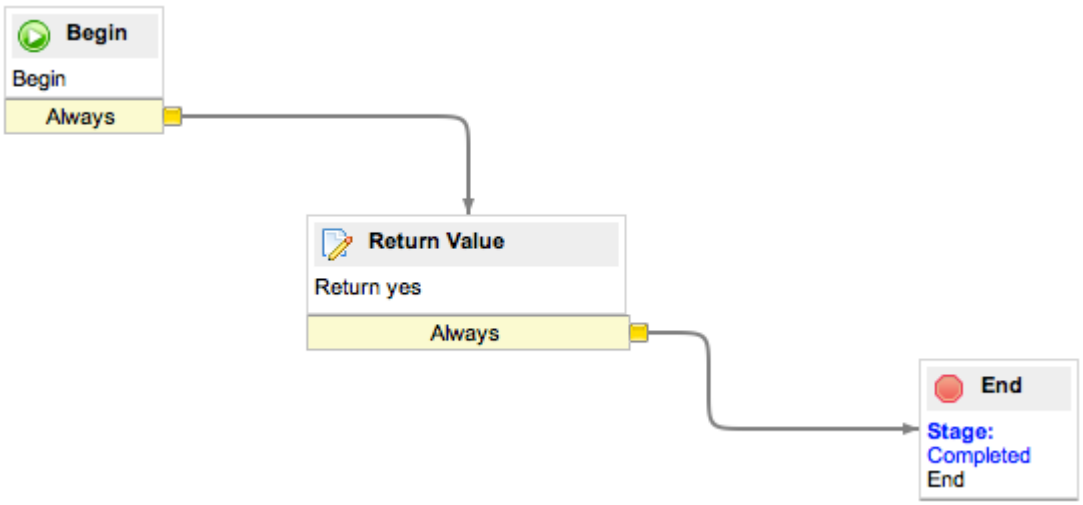
Pwd Reset Local sub workflow



Pwd connection test local SN sub workflow



Creating a custom credential store type

You can use a credential store type as a model to create a custom type. See Create a credential store type for Password Reset.

Configure the connection to a credential store for the Password Reset processes

You create a Password Reset credential store record to configure access to your credential store server while a user is changing or resetting a password. In addition to host connection information, you can specify the password hints that users should see, restrictions on password reuse, the allowed number of failed reset attempts, and other settings.

Before you begin

Role required: none

About this task

- For an AD credential store, skip this procedure and instead follow the instructions in Integrate Password Reset with your Active Directory service. The Password Reset Windows Application supports only AD credential stores.
- Configuration for multiple connections using a child alias. You can configure a connection credential alias with multiple child connections and map the child connection to a password

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reset credential store. The connections are used during the run time in the password reset flows. With this configuration password reset flows can support multiple Active Directory server credentials in Workflow Studio.

Procedure

1. Navigate to **All** > **Password Reset** > **Credential Stores**.
2. Select the following sample credential store.

   Local ServiceNow Instance credential store

3. Enter a unique and meaningful **Name** and **Description**, and then on the Password Reset Credential Store form, fill in the fields.
   For information about the fields on the Password Reset Credential Store form, see Password Reset Credential Store form.
4. Click **Submit**.
5. If you use the Local ServiceNow Instance credential store and you selected the **Enforce history policy** check box, then follow these steps:
   a. Open the Password Reset process that is associated with the credential store: **Password Reset** > **Processes**.
   b. On the **Password Reset Details** tab of the Password Reset Process form, clear the **Auto-generate password** check box and then save the process definition.
6. Select Enable password policies on your instance
7. Test the connection to the credential store.

Related topics

Configure the required strength for passwords

Credentials Store for Password Reset for Active Directory

A credential store type is a set of workflows that specify how to connect to a credential store. You can connect to **Password Reset Credential Stores** to view the list of example credential stores that are based on the base-system types.

Overview

Navigate to **Password Reset** > **Credential Stores** to view the list of example credential stores that are based on the base-system types. You can also use subflows and integration hub IntegrationHub.

Related topics

Integrate Password Reset with your Active Directory service

Configure the connection to an AD credential store

Integrate Password Reset with your Active Directory service

The Password Reset application can change passwords on an Active Directory credential store. The application changes passwords by referencing an Active Directory user role with the appropriate password change privileges.

Before you begin

Role required: password_reset_admin

Active Directory must have a user role with the following privileges:

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Descendent User objects:

- Reset password
- Read/Write pwdlastset
- Read/Write UserAccountcontrol
- Write Account Restrictions
- Read/Write lockouttime
- Read MemberOf

Descendent Group objects:

- Read Members
- Read MemberOf

Procedure

1. Install a MID Server on a Windows computer that can connect to Active Directory.
2. Configure the MID Server.
3. If using the Workflow and Orchestration add-ons, in the ServiceNow instance, navigate to **Orchestration** > **Credentials**.
4. Click **New**, complete the form with the following values for the AD credential, and then click **Submit**.

Field	Description
Type	Select Windows.
User name	Enter your Active Directory domain user. For example, **domain \admin**.
Password	Enter your Active Directory domain user password.
Applies to	Select the MID Server that you use to access the Active Directory server.

Note:
If you are using Integration Hub, from the Microsoft AD Credential store, click **Microsoft AD Connection Alias** to create a new connection. To learn more, see Set up the Microsoft AD v2 spoke.

What to do next

Create a connection to the credential store as described in Configure the connection to an AD credential store.

Configure the connection to an AD credential store

You can create a Password Reset credential store record to configure access to your Active Directory server while a user is changing or resetting a password. In addition to host connection information, you can specify the password hints that users should see, restrictions on password reuse, the allowed number of failed reset attempts, and other settings.

Before you begin

Role required: none

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About this task

The Microsoft AD Spoke for Password Reset add-on installs the AD Credential store type. The Password Reset Windows Application supports only **Microsoft AD Credential Store**.

Procedure

1. Navigate to **All** > **Password Reset** > **Credential Stores** and select **Sample Microsoft AD Credential Store** to use as a template.
2. Enter a unique and meaningful **Name** and **Description** and then fill in the form.

Type	Select **Microsoft AD Credential Store type**. A ServiceNow credential store type is a template that provides the required set of capabilities for a particular type of credential store. Credential stores inherit the functionality of the credential store type.
Auto-generate password	Specify a script include that generates a temporary password for use during the reset process. **Note:** If you select the **Enforce history policy** check box, then you must specify a value for **Auto-generate password** that is compliant with the password policy. There are several options to choose from: ○ An auto-generated password that is compliant with the policy you selected. ○ An auto-generated password that is Crypto-secure. ○ A default auto-generated password.
Enforce history policy	Appears only if you select a **Microsoft AD Credential Store type** or **Local ServiceNow Instance** credential store type. The Microsoft AD Credential Store type supports history check. The **Enforce history policy** option appears only when the **Supports history check** option is selected for the **Microsoft AD Credential Store type**. For information on configuring the setting for credential store types other than AD, see Configure the connection to a credential store for the Password Reset processes. Select the **Enforce history policy** check box to enforce the history policy (password reuse). History policy (password reuse): Active Directory domains can be configured to include a history policy that ensures that users don't reuse passwords. For example, the history policy might be configured to not allow the user to reuse any of the previous 10 passwords when resetting a password. This history policy limit is managed by the password_history_limit verification parameter.
Hostname	Specify the URL or IP address of the credential store.
User account lookup	Specify the script include that maps the user ServiceNow platform ID to the user credential store ID. The default script, *PwdDefaultUserAccountLookup*, returns the user ServiceNow platform user name.

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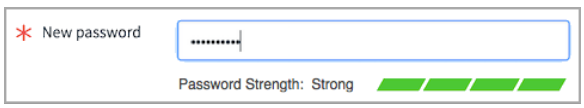
Password rule hint	Specify the text that appears on the password reset page to help the user to create a password that meets all requirements. The **Password rule** script enforces the requirements. **Note:** The Password Reset Windows Application supports newline characters in the hint. Other formatting is not supported (bold, underline, hyperlink, and so on).
Password rule	Specify the client script that validates the new password that the user enters. The script is invoked when the user enters a new password and clicks **Password Reset**. You can use the script to enforce password strength/complexity requirements.
Enable Password Strength	Select the check box to: ○ Display the text box for the **Strength rule** script so you can update the script. ○ Display the graphical **Password Strength** bar to the user while the user changes or resets the password. **Note:** The Password Reset Windows Application does not support Password Strength.
Strength rule	This text box appears only if you select **Enable Password Strength**. Specify the client script that calculates the strength/complexity of the password that the user enters. The script is invoked when the user begins to enter a new password during the reset process. Default settings: ○ Selected for local ServiceNow credential stores ○ Not selected for other credential stores **Note:** ○ To guide the user during the reset process, the system displays a graphical bar labeled **Password Strength** under the **New password** field.  ○ The Password Reset Windows Application does not support Password Strength.

3. Click **Submit**.
4. On the domain controller, set **Password Aging** (*MIN_PASSWORD_AGE*) to zero.
5. To enforce the history policy that is configured for the AD credential store, follow these steps:

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a. Open the Password Reset process that is associated with the credential store: **Password Reset** > **Processes**.

b. On the **Password Reset Details** tab of the Password Reset Process form, clear the **Auto-generate password** check box and then save the process definition.

6. To enforce the maximum number of attempts to reset the password, in the Password Reset Credential Store Parameters related list, set the value of the *max_reset_attempts* parameter to the number of allowed failed attempts.

   The default value of 0 (zero) enables an unlimited number of reset attempts.

   Note:
   The *max_reset_attempts* setting applies only to Password Reset processes that use AD credential stores.

7. Click **Submit**.
8. Set up the Microsoft AD v2 spoke
9. Test the connection to the credential store.

Related topics

Configure the required strength for passwords

Credential Store for Password Reset for Microsoft Entra ID

A credential store type is the set of flows to manage password and account of Microsoft Entra ID user. Navigate to **Password Reset** > **Credential Stores** to view the list of example credential stores that are based on the base-system types.

Related topics

Integrate Password Reset with your Microsoft Entra ID

Configure the connection to the Microsoft Entra ID Credential Store

Integrate Password Reset with your Microsoft Entra ID

When the Microsoft Entra ID Integration for Password Reset store app is activated, the Password Reset application can manage passwords of a Microsoft Entra ID application. The application manages passwords by referencing a Microsoft Entra ID user with appropriate roles and password change privileges.

Before you begin

Role required: password_reset_admin

Procedure

To integrate Password Reset with your Microsoft Entra ID, you must set up the Microsoft Entra ID spoke.
For more information about setting it up, see Set up Microsoft Entra ID spoke.
The Microsoft Entra ID Integration for Password Reset is integrated.

What to do next

Create a connection to the credential store as described in Configure the connection to an AD credential store.

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Configure the connection to the Microsoft Entra ID Credential Store

Create a Password Reset credential store record to configure access to your Microsoft Entra ID server while a user is changing or resetting a password. In addition to host connection information, you can specify the password hints that users should see and other settings.

Before you begin

Role required: none

About this task

The Microsoft Entra ID Integration for Password Reset installs the Microsoft Entra ID Credential Store type. The Microsoft Entra ID application supports only the **Microsoft Entra ID Credential Store**.

Procedure

1. Navigate to **All** > **Password Reset** > **Credential Stores** and select **Sample** *Microsoft* **Credential Store** that you can use out of the box or as a template.
2. Enter a unique **Name** and **Description** and then complete the form.

Type	Select **Sample Microsoft Entra ID Credential Store**. A ServiceNow credential store type is a template that provides the required set of capabilities for a particular type of credential store. Credential stores inherit the functionality of the credential store type.
Auto generate password	Specify a script include that generates a temporary password for use during the reset process.
Hostname	Specify the domain name of the Entra ID application in this column.
User account lookup	Specify the script include that maps the user ServiceNow platform ID to the user credential store ID. The default script, *PwdDefaultUserAccountLookup*, returns the user ServiceNow platform user name.
Password rule hint	Specify the text that appears on the password reset page to help the user to create a password that meets all requirements. The **Password rule** script enforces the requirements.
Password rule	Specify the client script that validates the new password entered by the user. The script is invoked when the user enters a new password and selects **Password Reset**.
Enable Password Strength	Select the check box to: ○ Display the text box for the **Strength rule** script so you can update the script. ○ Display the graphical **Password Strength** bar to the user while the user changes or resets the password.
Strength rule	This text box appears only if you select **Enable Password Strength**. Specify the client script that calculates the strength/complexity of the password that the user enters. The script is invoked when the user begins to enter a new password during the reset process. Default settings:

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- Selected for local ServiceNow credential stores
- Not selected for other credential stores

Note:

To guide the user during the reset process, the system displays a graphical bar labeled **Password Strength** under the **New password** field.

Enable password policy	Check this option to select either a default password policy or one you created yourself previously.

3. Click **Submit**.
   Password Reset Credential store record to access your Microsoft Entra ID server is configured.

Note:

- The **Enable Password Policy** option was added in the Quebec release. Checking the option displays your password policy choices right from your instance. To learn more, see Enable password policies on your instance.
- Since the Microsoft Entra ID doesn't support the history policy, the **Enforce history policy** option is hidden.

Test the connection to a credential store

You should test the connection to a credential store after you configure a new credential store or when users experience problems that might involve the connection.

Before you begin

Role required: password_reset_admin

Procedure

1. Navigate to **All** > **Password Reset** > **Credential Stores** and then open the credential store record.
2. In the header bar, click **Save and Test Connection**.
   A progress page displays the result of the test.

Delete a connection to a credential store for Password Reset

Important: Before you delete the connection to a credential store, check all Password Reset processes to ensure that the credential store is not in use. If the credential store is being used by a process, update the process before deleting the credential store.

Before you begin

Role required: password_reset_admin or password_reset_credential_manager

Procedure

1. Navigate to **All** > **Password Reset** > **Credential Stores** and then select the check box for the credential store.
2. In the *Actions* choice list, select **Delete**.

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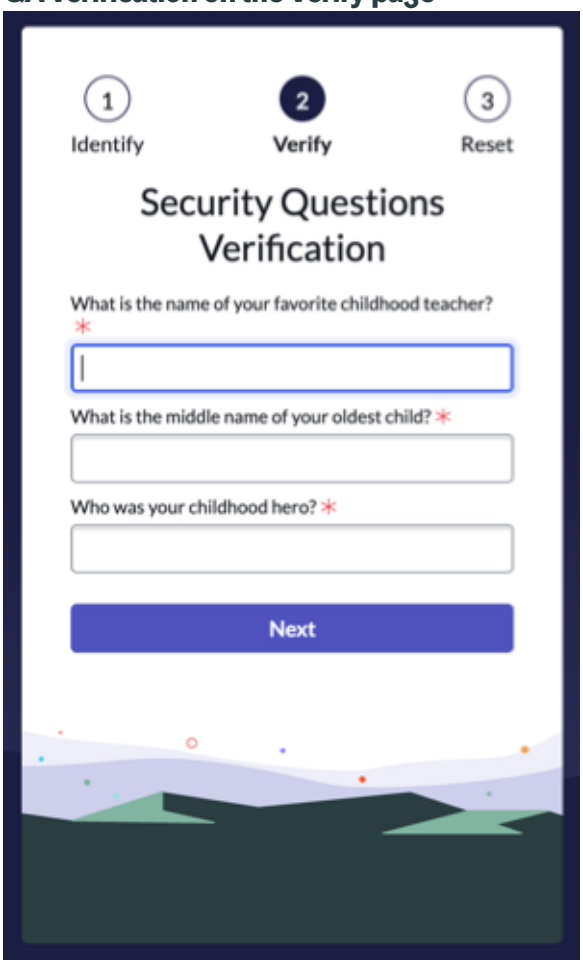
Password Reset verifications

Each verification specifies the method and process for verifying the identity of the user that is requesting a password reset.

Verifications included with Password Reset

The Password Reset application includes the following verifications in the base system. You can create a verification based on either a base-system verification or a verification type (a template).

Note:
The Password Reset Windows Application doesn't support custom verifications.

Password Reset verifications	
QA verification	Implements a self-service Password Reset model with questions that are included with the base system or custom questions that the admin defines. While enrolling for the process, the user decides which questions to provide answers for. Questions are presented in the language that the user requested during login. When a user requests a password reset, the system poses a specified number of the questions that the user selected during enrollment. The user must answer all questions correctly to verify their identity. **QA verification on the Verify page** 

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Password Reset verifications (continued)

	For information on the user enrollment experience, see Enroll for the Password Reset program using questions and answers. This verification is based on the **Security Questions** verification type.
Email verification	This verification relies on auto-generated code numbers. You typically implement email verification as a self-service Password Reset model. When a user requests a password reset, the system sends a verification code to an email address that the user authorized during enrollment. To verify identity, the user then submits the code on the Password Reset Verify page. For information on the user enrollment experience, see Enroll for the Password Reset program using emailed codes. The Password Reset Windows Application supports email verification. This verification is based on the **Email Code** verification type. By default, a six-digit email verification code is sent to the user through email. The code expires in 10 minutes. Users can attempt to send another code after two minutes. A maximum of 10 email verification codes can be sent to a user in one day.
SMS verification	Implements a self-service or service desk-assisted Password Reset model that relies on auto-generated code numbers. When a user requests a password reset, the system sends a code to an SMS-capable device that the user has authorized. To verify identity, the user then submits the code on the Password Reset Verify page. You can use the ServiceNow Notify feature to send the codes. For information on the user enrollment experience, see Enroll for the Password Reset program using SMS codes. This verification is based on the **SMS Code** verification type. When users enroll for email or SMS verification on the Password Reset Enrollment page, they get a code to verify their email address or device. After the users enter the code and select **Verify**, an associated record is automatically created in the Password Reset Enrollment for Verifications [pwd_enrollment] table even before they select **Submit**. By default, a six-digit verification code is sent to the user's mobile device. The code expires in five minutes. Users can attempt to send another SMS verification code to the device after two minutes. A maximum of 10 codes can be sent to a particular device in one day.

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Password Reset verifications (continued)

	Note: While the record is created automatically in the Password Reset Enrollment for Verifications [pwd_enrollment] table for the email or SMS verification, the associated enrollment check script doesn't get processed unless users select **Submit**.
Authenticator verification	Password Reset model that relies on auto-generated code numbers. Users typically implement authenticator verification as a self-service Password Reset model. When a user requests a password reset, the user reads a code from the authenticator app on a device that the user has paired. To verify identity, the user then submits the code on the Password Reset Verify page. For information on the user enrollment experience, see Enroll for the Password Reset program using an authenticator. The Password Reset Windows Application supports Google Authenticator verification. This verification is based on the authenticator verification type.
Personal Data — Confirm Email Address	Implements a self-service Password Reset model that relies on user information that is available in the user profile on the instance. This verification is based on the **Personal Data Confirmation** verification type. **Note:** Users can't configure this verification for the processes with the active public access.
Personal Data — Enter User Name	Implements a self-service Password Reset model that relies on user information that is available in the user profile on the instance. This verification is based on the **Personal Data** verification type.
Soft PIN Verification	Implements a self-service Password Reset model that relies on a Soft PIN that's a six-digit number. Users can enroll for the Soft PIN verification for a process and reset the Soft PIN. ServiceNow® Virtual Agent supports the Soft PIN verification method.

Related topics

- Create a custom Password Reset verification
- Create a Password Reset verification from an existing verification

Personal data identification types and confirmation type verifications

Personal data verifications allow users to verify their identity by providing answers to questions that are generated from personal information stored in the User table `[sys_user]`.

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User experience

For an example of how a user might enroll for Personal data verification, see Enroll for the Password Reset program using questions and answers.

Personal data identification types

The Password Reset application provides the email and username identification types. You can use either type as provided or as a model to create a custom identification type.

Name	Description
Email Identification	Identifies users by their email addresses.
Username Identification	Identifies users by their user names.

Personal data confirmation verifications

- **Personal data verification:** If users are associated with a Password Reset process that uses a personal data verification, the users are typically not required to enroll for Password Reset.
- **Personal data confirmation verifications** allow employees with the password_reset_service_desk role to access personal data from the sys_user table when assisting a user with a password reset request.

To configure personal data and personal data confirmation verifications, you specify parameters as name/value pairs that correspond to a particular piece of user information. For example, to verify users by their email address:

1. Set the **label** parameter (the text that the end user should see) to *Email* (that is, `label=Email`).
2. Set the **column** parameter (the column in the table that holds the verification data) to *email* (that is, `column=email`).

Note:
You can use only one set of name/value pair parameters per verification. Additional parameters are ignored.

To use multiple pieces of personal information for user verification, create more personal data or personal data confirmation verifications and add the verifications to the related Password Reset process.

Personal data and personal data confirmation type verifications

Parameter Name	Description
label	Text to display as a label for the field that the user fills in during the password reset request. Data Type: string Default Value: n/a
column	Column of the sys_user table that provides the data that is used to verify the identity of the user.

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Parameter Name	Description
	Data Type: string Default Value: n/a

Related topics

Create a custom identification type for Password Reset

SMS Code Verification type for Password Reset

Using the Simple Message Service (SMS) Code Verification type, a user can verify identity with the help of any SMS-enabled device, like a cell phone that accepts text messages. When a user requests password reset, the system sends a numerical code to the device and the user then enters the code on the Password Reset Verification page.

You can change the default behavior of an SMS code verification using either of the following methods:

- Set parameter values, as shown in the table.
- Update property settings for the Password Reset application.

Note:
The system allows only one instance of each SMS code parameter.

SMS Code Verification type parameters

Parameter name	Description
expiry	Number of minutes the verification code is valid. **Data Type**: integer (any positive integer) **Default Value**: 5
complexity	Number of digits in the numerical verification code. **Data Type**: integer (any positive integer) **Default Value**: 6
pause_window	Number of minutes before the user can request another SMS code for verification. **Data Type**: integer (any positive integer) **Default Value**: 2
max_per_day	Maximum number of codes sent for verification in one day. **Data Type**: integer (any positive integer) **Default Value**: 10

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User experience

For information on how users enroll for SMS verification, see Enroll for the Password Reset program using SMS codes.

Use Notify to send SMS codes for enrollment and verification

You can configure the Password Reset application to send SMS codes for enrollment and verification using the ServiceNow Notify application (via the Twilio SMS Messaging system). Notify is tightly integrated with the workflow engine and business rules and delivers a highly configurable and trusted way to deliver SMS messages.

Before you begin
Role required: password_reset_admin

About this task
Notify requires a separate contract with Twilio.

Procedure

1. Enroll for a Twilio account and telephone number at https://www.twilio.com/
2. Activate the **Notify** plugin.
3. Associate the Twilio account with Notify.

Result
No other configuration is required. Users who request password change or password reset receive SMS codes through Notify.

Related topics

Activate a plugin

Specify the number of required security questions

When designing a Security Questions verification for Password Reset, you can specify the number of questions to display when users enroll. You can also specify the number to display when a user is verifying identity while resetting the password.

Before you begin
Role required: password_reset_admin

Procedure

1. Navigate to **All** > **Password Reset** > **Verifications** and then open a verification that uses the **Security Questions Verification Type**.
2. Configure the parameters in the **Password Reset Verification Parameters** related list.

Parameters for Security Questions Verification

Parameter Name	Description
num_enroll	Number of questions that a user must provide answers to while enrolling for the Password Reset process. The value that you specify here overrides the setting of the **Number of security questions required during enrollment** property. See Configure Password Reset properties.

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Parameter Name	Description
	Data Type: Positive integer that does not exceed the number of questions in the security questions list (**Password Reset** > **Security Questions**). **Default Value**: 5
num_reset	Number of security questions that are displayed on the Verify page while a user is attempting to reset the password. The user must answer all questions correctly to verify identity. The questions are selected at random and are presented in random order. The value that you specify here overrides the setting of the **Number of security questions required during the password reset request** property. See Configure Password Reset properties. **Data Type**: Positive integer that does not exceed the value of the num_enroll parameter **Default Value**: 3

3. Click **Update**.

Related topics

Add a custom question to the Security Questions verification

Configure your Password Reset process to auto-enroll users

To simplify management, many organizations auto-enroll users in the Password Reset program. Every base-system verification type enables you to specify automatic enrollment for your process.

Before you begin
Role required: password_reset_admin

About this task
To enable automatic enrollment, you configure settings for the verification type that your Password Reset process is based on.

Procedure

1. Navigate to **All** > **Password Reset** > **Extensions** > **Verification Types**.
2. Click the verification type for the verification that your Password Reset process uses. The verification type for each base-system verification is identified in Password Reset verifications.
3. On the **Verification Types** page, specify the following settings:

Field	Description
Enrollment check	Script that determines whether a user is enrolled for verification.

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Field	Description
	Note: For automatic enrollment to work, the **Enrollment check** script must return true. This may require additional setup by the admin to ensure that the preconditions are met. For example, for the **SMS Code** verification type, records must be populated in particular tables. If no script is specified when **Automatic Enrollment** is selected, a default script is provided.
Automatic enrollment	Select the check box to auto-enroll users. **Note:** If **Automatic enrollment** is not selected, then you must provide an enrollment UI macro and enrollment processor script as described in Create a custom Password Reset verification type.

4. Repeat the procedure for all verifications that your Password Reset process uses.

Enable users to enroll for Password Reset

To enable users to enroll for the Password Reset program, you specify a UI macro that takes the user through the enrollment process and a script that processes the enrollment data that the user entered. The base system includes a functioning macro and script.

Before you begin
Role required: password_reset_admin

About this task
To enable users to enroll, you configure settings for the verification type that your Password Reset process is based on.

Procedure
1. Navigate to **All** > **Password Reset** > **Extensions** > **Verification Types**.
2. Click the verification type for the verification that your Password Reset process uses. The verification type for each base-system verification is identified in Password Reset verifications.
3. On the **Verification Types** page, specify the following settings:

Field	Description
Automatic enrollment	Clear the check box to disable automatic enrollment.
Enrollment UI	Enrollment UI macro that takes the user through the enrollment process.
Enrollment processor	Enrollment processor script that processes enrollment data.

4. Repeat the procedure for all verifications that your Password Reset process uses.

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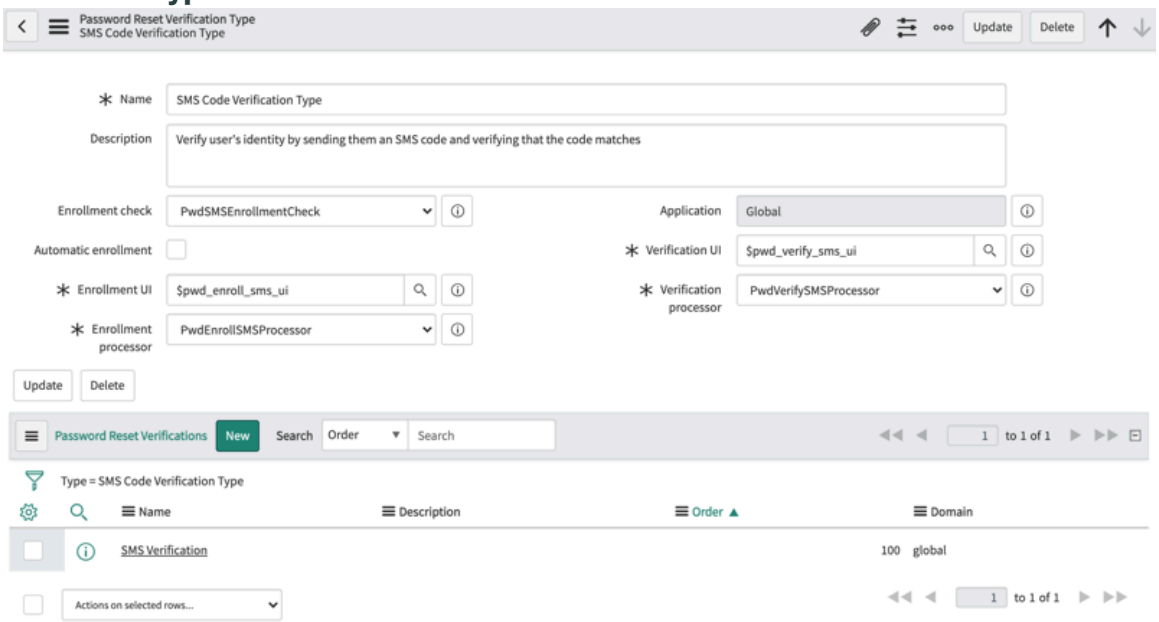
Example: Enabling user enrollment

This example verification type uses the *pwd_enroll_sms_ui* enrollment UI macro and the *PwdEnrollSMSProcessor* enrollment processor script.

Verification type



A verification type must also define a verification UI macro and a corresponding verification processor script. The example uses the *pwd_verify_sms_ui*verification UI macro and the *PwdVerifySMSProcessor* verification processor script.

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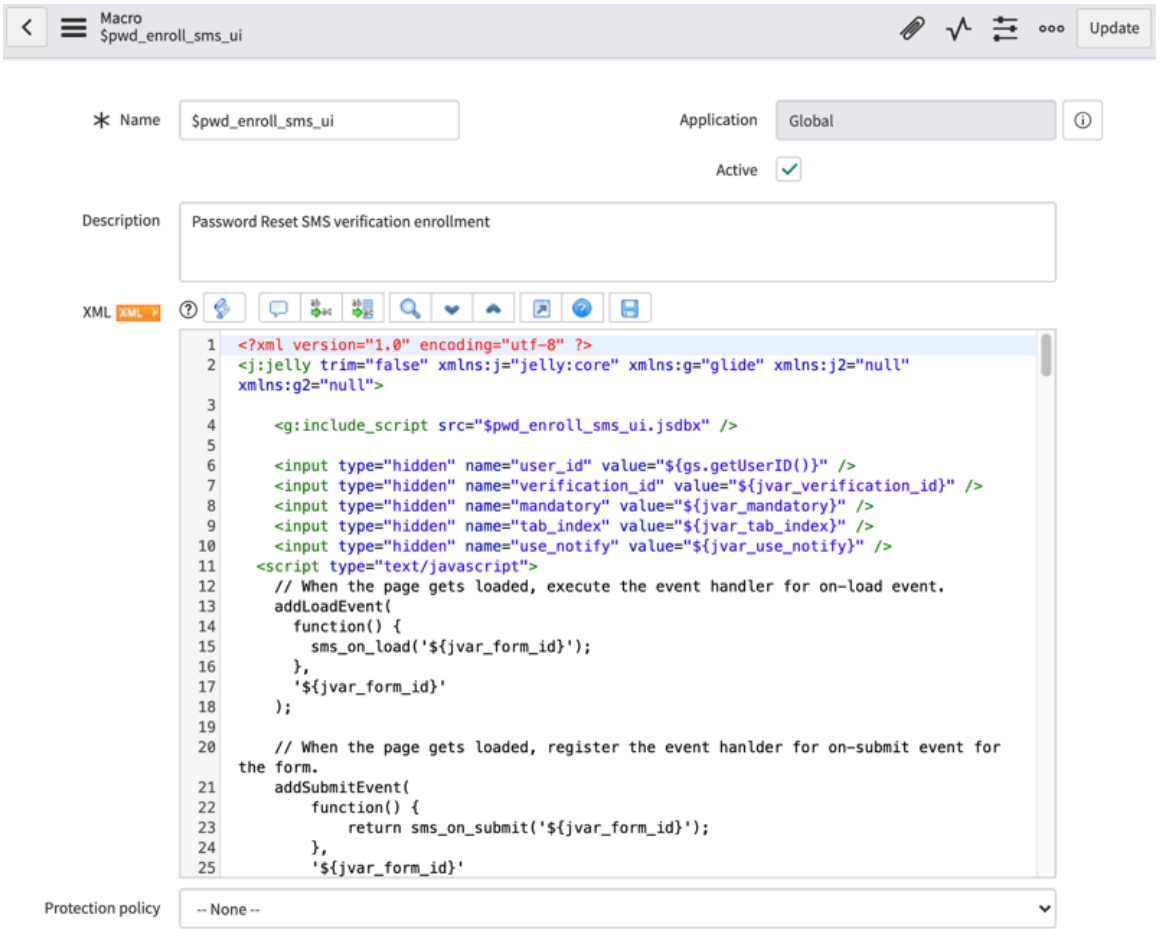
Verification UI macro



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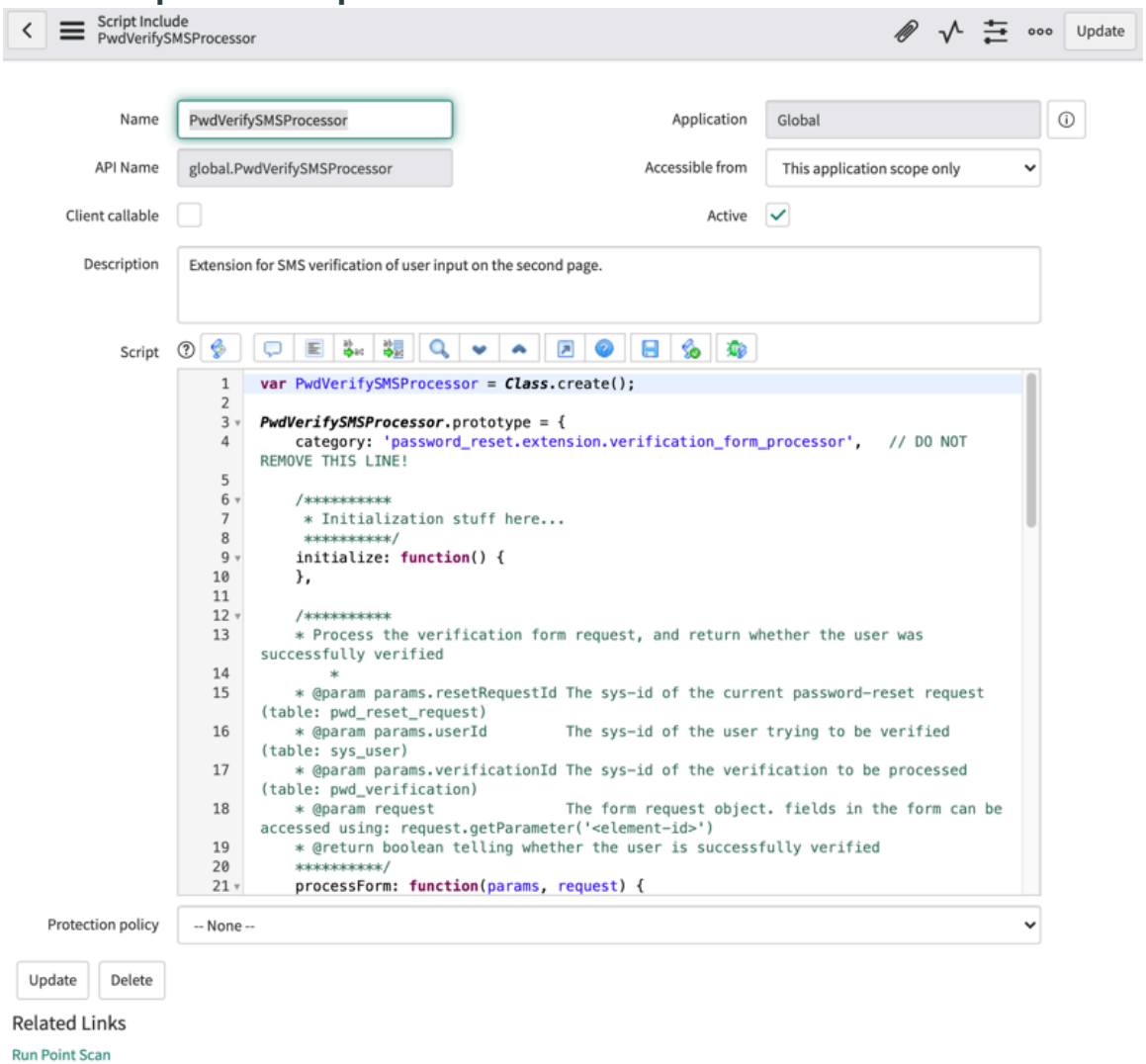
Verification processor script



Configure Password Reset properties

You can specify properties that configure the Password Reset experience for end users.

Before you begin

Role required: password_reset_admin

About this task

While there are no range limits for the values you can enter for properties, consider using only positive integer values starting at 1. When you determine the limit for the upper range of a property, consider the task that the user is performing.

For example, you would not want to allow 100 attempts for users to verify their identity. A more common value is 3 attempts. Similarly, you may not want to force users who are completing the enrollment process to spend time selecting and answering 30 security questions. The more commonly used number of security questions is between 5 and 7.

Procedure

1. Navigate to **All** > **Password Reset** > **Properties**.
   For information about the Password Reset properties, see Password Reset global properties.
2. Update settings as needed and then click **Save**.

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Send email to remind users to enroll for Password Reset

You can automatically send messages that remind users to enrolled in the Password Reset process. You specify the text of the message and can configure the messages to repeat at intervals.

Before you begin

Role required: password_reset_admin

About this task

The default email content is:

- Subject: Reminder: Enroll in the Password Reset program
- Body: Click here to enroll in the Password Reset program.

To customize the email, see Customize the Password Reset enrollment reminder email.

Procedure

1. Navigate to **All** > **Password Reset** > **Processes** and select your process.
2. Click the **Enrollment Reminder** tab, configure the following settings, and then click **Update**.

> **Note:**
> The tab appears only when the **Password reset** check box is selected.

Field	Value
Send reminder	Select the check box to send reminder emails to users (either all users or users in the specified groups, as you configured). Clear the check box to send no reminders.
Sender alias	Enter a non-functional email alias that should appear in both the **To** and **From** fields of the message. For example, `do-not-reply@myCompany.com`. Users will not be able to respond to the alias. The alias is required by the email system to use the **bcc** field for all of the users who receive the message. The intent is that the users should not see the other addressees. Default: do-not-reply@ServiceNow.com
Send, Day, and Time	Specify a schedule of one message each month or one message each week. ○ If you set **Send** to **Monthly**, then enter the day of the month and optionally the time of day when the message should be sent. ○ If you set **Send** to **Weekly**, then enter the day of the week and optionally the time of day when the message should be sent. Default: Weekly message at 00:00 on Monday
Starting	Date and time to send the first message. Click the calendar button to specify the setting. Default: [Now]

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Customize the Password Reset enrollment reminder email

The email message that reminds users to enroll for the Password Reset process is based on an email template. To customize the message, you can modify the default template or create a custom template.

Before you begin

Role required: password_reset_admin

About this task

The default email content is:

- Subject: Reminder: Enroll in the Password Reset program
- Body: Click here to enroll in the Password Reset program.

Procedure

1. To modify the email subject text:
   a. Navigate to **System Policy** > **Email** > **Templates**.
   b. Open the *Password reset enrollment reminder* template.
   c. Update the **Subject** field as needed.
   d. In the **Message HTML** text box, you can add code as needed, but do not modify the default text.
2. To modify the email body content:
   a. Navigate to **System Notifications** > **Email** > **Notification Email Scripts**.
   b. Open the *pwd.enrollment_reminder* script.
   c. Modify only the indicated portion of the script.

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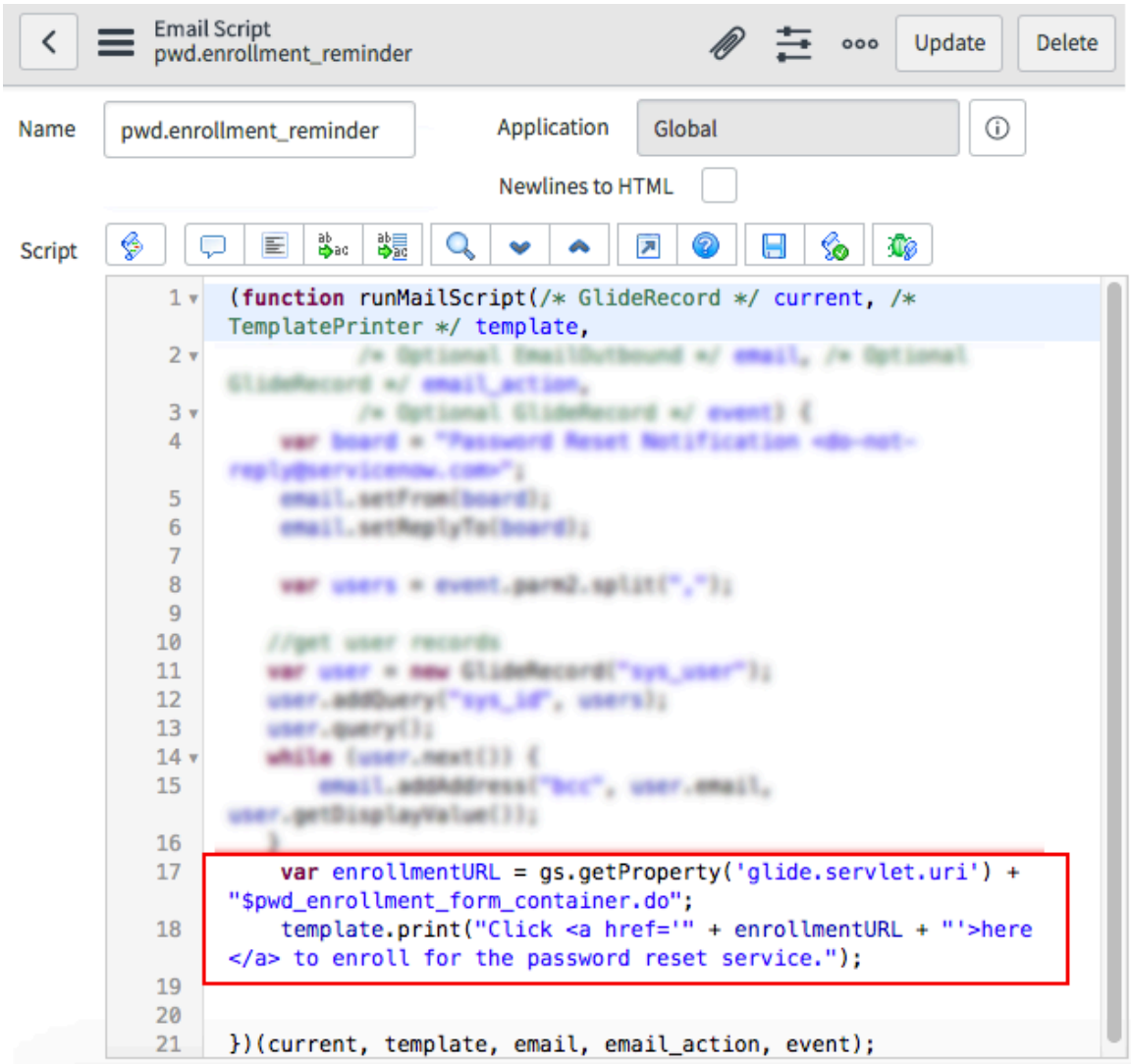

3. To create a custom email template:
   a. Make a copy of the *`Password reset enrollment reminder`* template and edit as described above.
   b. Navigate to **Password Reset** > **Properties** and enter the template name in the **Email template for enrollment reminder emails** field.

Configure the required strength for passwords

The password that a user defines must meet certain requirements — for example, it must contain at least 12 characters, it must include a numeral, and so on. You can configure the requirements as needed for your organization.

Before you begin

Role required: password_reset_admin

About this task

The base system includes example credential stores with various password requirements. You can modify password requirements and provide users with hints for creating a password. The default requirements are:

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- At least eight characters
- At least one uppercase and one lower case letter
- At least one numeral

Note:
In addition to configuring password strength requirements, you can configure several other settings for the credential store, as described in Configure the connection to a credential store for the Password Reset processes.

Procedure

1. Navigate to **All** > **Password Reset** > **Credential Stores**.
2. Select the credential store in the list and then configure the following settings:

Field	Description
Password rule hint	Specify the text that appears on the password reset page to help the user to create a password that meets all requirements. The **Password rule** script enforces the requirements. **Note:** The Password Reset Windows Application supports newline characters in the hint. Other formatting is not supported (bold, underline, hyperlink, and so on).
Password rule	Specify the client script that validates the new password that the user enters. The script is invoked when the user enters a new password and clicks **Password Reset**. You can use the script to enforce password strength/complexity requirements.
Enable Password Strength	Select the check box to: ○ Display the text box for the **Strength rule** script so you can update the script. ○ Display the graphical **Password Strength** bar to the user while the user changes or resets the password. **Note:** The Password Reset Windows Application does not support Password Strength.
Strength rule	This text box appears only if you select **Enable Password Strength**. Specify the client script that calculates the strength/complexity of the password that the user enters. The script is invoked when the user begins to enter a new password during the reset process. Default settings: ○ Selected for local ServiceNow credential stores ○ Not selected for other credential stores

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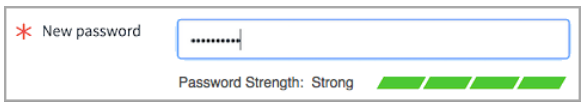
Field	Description
	Note: ○ To guide the user during the reset process, the system displays a graphical bar labeled **Password Strength** under the **New password** field.  ○ The Password Reset Windows Application does not support Password Strength.

3. Click **Submit**.
   You should test the connection to a credential store after you configure a new credential store or when users experience problems that might involve the connection.
4. Navigate to **Password Reset** > **Credential Stores** and then open the credential store.
5. In the header bar, click **Save and Test Connection**.
   A progress page displays the result of the test.

Specify lockout for failed login attempts

The system provides inactive script actions that enable you to specify the number of failed login attempts before a user account is locked and to reset the count after a successful login.

Before you begin

Role required: password_reset_admin

Procedure

Navigate to **All** > **System Policy** > **Script Actions** to view or activate the scripts.

Note:
Starting with the Kingston release, following a zBoot, the script actions **SNC User Lockout Check with Auto Unlock** and **SNC User Clear** are activated.

To learn more about properties that affect failed login attempts, see Managing failed login attempts (instance security hardening) in the Instance Security Hardening Settings.

Script action	Description
SNC User Lockout Check with Auto Unlock	• Uses the value of the `glide.user.max_unlock_attempts` property to set the limit for failed login attempts. • Unlocks the user account after the time period that is specified for the `glide.user.unlock_timeout_in_mins` property. If no value is specified, then the system unlocks the user account after the default period of 15 minutes.

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Script action	Description
SNC User Lockout Check	Tracks the number of failed login attempts and locks the user account after a specified number of failed login attempts (default: 5).
SNC User Clear	Updates the user record after a successful login: Resets the number of failed login attempts and updates the date of the last login.

What to do next

Each time a user attempts to log in, the action is recorded in an event log. You can view a log of failed login attempts.

1. Navigate to **System Policy** > **Event Logs**.
2. Filter for **login.failed** in the **Name** field. You can view the attempted login name, date, and IP address logged for the attempt.

Configure Google reCAPTCHA for the password reset process

To use the Google reCAPTCHA service, instances that are running on a domain other than `service-now.com` require an API key pair from Google.

Before you begin

Role required: password_reset_admin

About this task

- The procedure described in this topic is optional for instances that are running on the `service-now.com` domain.
- Because on-premises instances do not have access to the Internet, they cannot use the Google reCAPTCHA service. Do not follow the procedure described in this topic. Instead, set the *password_reset.captcha.google.enabled* system property to **false**. This setting enables the CAPTCHA service that is provided with the base system.
- The Password Reset Windows Application uses the base-system CAPTCHA service even if the Password Reset application is configured to use Google reCAPTCHA.

Procedure

1. Request an API key pair (a site key and a secret) from Google at https://www.google.com/recaptcha.
2. Set the following system properties:

Property	Value
password_reset.captcha.google.enable	Set to `true`. Type: string Default: true
google.captcha.site_key	Set to the site key that Google provided. Type: string

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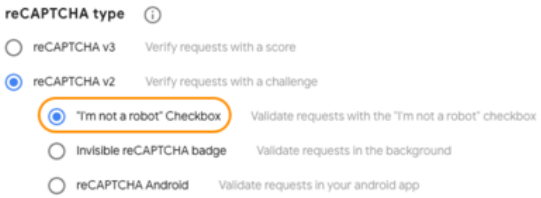
Property	Value
	Default: A site key that Google provided to ServiceNow
google.captcha.secret	Set to the secret that Google provided. Type: password2 Default: An encrypted secret that Google provided to ServiceNow **Note:** Select reCAPTCHA v2, **I'm not a robot** option. (reCAPTCHA v3 is not currently supported). 

Customizing Password Reset processes

Password Reset scripts enable you to customize Password Reset by creating your own credential store, verification, and identification types, and extend them by defining extension scripts. You can also create a custom credential store type, custom verification type, or verification.

Legacy

Password Reset scripting is available to users with the password_reset_admin role. The easiest way to customize Password Reset is:

1. Create custom types and scripts as described in Password Reset extension script categories.

   Extension scripts are example script includes that enable you to extend functionality in a password reset process. The extension script category refers to the specific types of behavior for an extension script (for example, credential store, verification, identification type, or as a post-processor).

2. Follow the configuration steps described in Configure your Password Reset process.
3. Select the new types that you created. You can customize the following components:
   - Credential store types: Define new types for how to connect to your credential stores by creating custom workflows for connection and testing. See Create a credential store type for Password Reset.
   - Verification types: Define new types for how users are verified. See Create a custom Password Reset verification type.
   - Identification types: Define new types for how users can identify themselves. See Create a custom identification type for Password Reset.

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Advanced password reset configuration

You can customize the Password Reset and Password Change applications to meet your organization's needs. See Password Reset and Password Change applications for more information. Also see Configure Password Reset properties for a list of properties that control several aspects of password reset.

Customize password reset processes and integrate third-party credential services

To customize password reset processes or to integrate them with third-party credential services such as Okta or Microsoft Entra ID, use Integration Hub capabilities. Use Workflow Studio to create or modify actions like user unlock, change password, and get user status. Use Workflow Studio to create or modify subflows that perform the actions.

Before you begin

Role required: password_reset_admin, or password_reset_credential_manager

About this task

- The base system provides actions, subflows, and credential store types for the "Local ServiceNow Instance" identity provider.
- For Microsoft Active Directory, the subflows are available when you activate the Microsoft AD Spoke for Password Reset app.
- To use any other identity provider such as Okta, you must use Integration Hub to create the required actions, subflows, and custom credential store types.
- For Microsoft Entra ID, the subflows are available when you activate the Microsoft Entra ID Integration for Password Reset app.

Procedure

1. Use Workflow Studio to create password reset actions like user unlock, change password, and get user status.
   For more information about Workflow Studio, see Action Designer.
2. Use Workflow Studio to create the following subflows.

   Use the specified names, inputs, and outputs for the subflows. For more information about the subflows, see Subflows.

Subflow name	Input	Input type	Output	Output type
<Provider Name> Password Unlock	Password Reset Request	Record.Password Reset Request	Error Message	String
			Status	Choice
<Provider Name> Password Reset	Password	Password (2 Way Encrypted)	Status	Choice
	Password Reset Request	Record.Password Reset Request	Error Message	String
<Provider Name> Password Change	Password Reset Request	Record.Password Reset Request	Status	Choice
	Current Password	Password (2 Way Encrypted)	Error Message	String

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Subflow name	Input	Input type	Output	Output type
		Note: **Name** under **Advanced options** is `old_password`.		
	New Password	Password (2 Way Encrypted) **Note:** **Name** under **Advanced options** is `new_password`.		
<Provider Name> Password Lock State	Password Reset Request	Record.Password Reset Request	Error Message	String
			Locked	Choice
			Status	Choice
<Provider Name> Password Connection Test	Not Applicable	Not Applicable	Error Message	String
			Status	Choice

3. For third party providers, create a credential store type.
   a. Select the **Use Flow** check box.
   b. Select the password reset subflows that you created for the provider. See Password Reset application for more information.
4. Create password reset credential store.
5. Create a password reset process.
6. Select the credential store type created for the provider.

Result
The password reset mechanism for the required third-party application is set up.

Add a custom question to the Security Questions verification

To enroll for the 'Security Questions' verification, the user selects several questions and supplies confidential answers that only the user knows. You can add a custom question to the set of questions that are included with the base system.

Before you begin
Role required: password_reset_admin

About this task
The base system provides a large set of default questions in all supported languages. Questions are presented to each user in the language that the user requested during login. Creating a custom English language question is a one-step process. To create a custom question in a non-English language, you can use either of the following options:

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- Create a custom question in the non-English language.
- Create a custom English language question plus one or more translations of the question into other languages.

Procedure

1. Navigate to **All** > **Password Reset** > **Security Questions**.

   Note:
   Each question in the list is presented to users when they enroll for the Password Reset process. The user selects each question to use by providing a confidential answer to the question.

2. Follow this procedure to create a custom question in a single language.

   Note:
   To enter non-English question text, you must request the language when logging in.

   a. On the Password Reset Questions page, click **New**.

   b. Enter the text in the **Question (Translated field)** field and then click **Submit**.
   The question is added to the list of questions that is presented to users when they enroll. No additional steps are needed and you can skip the remaining steps.

3. Follow this procedure to create a custom question in English and the same question in one or more other languages:

   a. Click **New**, enter English language text in the **Question (Translated field)** field, and then click **Submit**.

   b. Create a record in the *sys_translated* table for the non-English language question.

   Details appear at Translated Name / Field table and Languages table.

Field	Description
Label (translate)	Non-English equivalent of the English text in the **Value** field.
Element	Name of the field in the Password Reset Question [pwd_question] table: `question_translated`
ID	ISO 639.2 code for the language.
Table	Table that you are adding the translated question to: the **Password Reset Question [pwd_question]** table.
Language	Language code for this translated text.
Value	English-language question that you added in the Security Questions table.

   c. Repeat the process for each language that users might request.

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Add a custom header or footer to the user pages for Password Reset

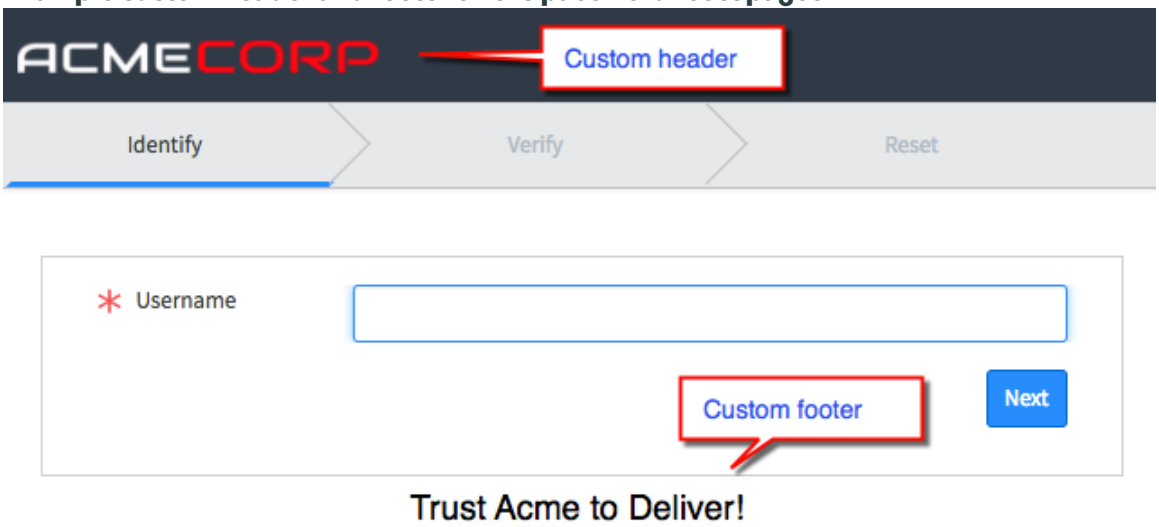
You can specify UI macros that add a header or footer to the pages that end users work in while resetting a password (the Identify, Verify, and Reset pages).

Before you begin

Role required: password_reset_admin

About this task

Example custom header and footer on the password reset pages



Procedure

1. Configure a UI macro for the header or footer: Navigate to **All** > **System UI** > **UI Macros**, click **New**, and then enter a meaningful **Name** and **Description**.
2. In the **XML** text box, enter the macro text.

   The example macro adds the text "Trust Acme to Deliver!" to the footer of the page that users work in while resetting a password.

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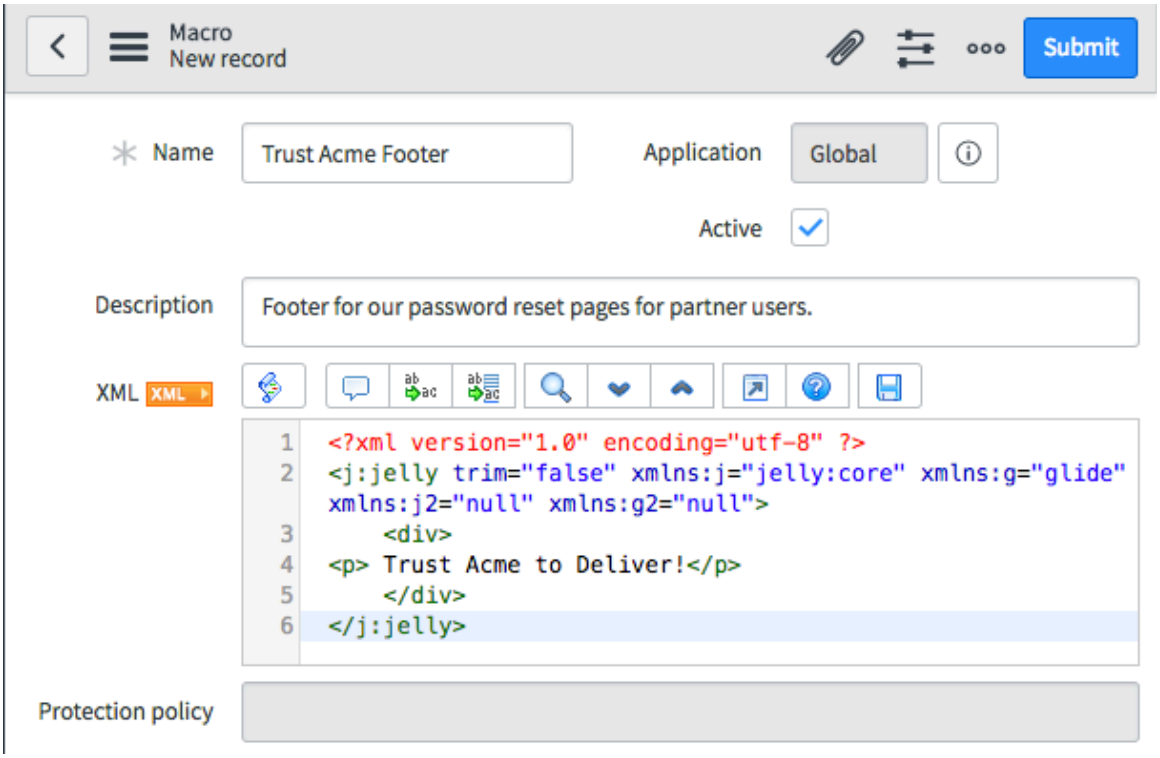

3. Select the **Active** check box and then click **Submit**.
4. Navigate to **Password Reset** > **Processes** and select the process to update.
5. On the **Advanced** tab, click ( ) for the **Header UI macro** or **Footer UI macro** and select the macro that you created.
6. Click **Save**.
7. Verify the appearance of the end-user pages.

Option	Description
If the reset pages are Public Access	On the **Password Reset Details** tab, click the **Public URL**.
If the reset pages are not Public Access	Log in as an end user and request password reset.

Create a Password Reset verification from an existing verification

The Password Reset application includes several example verifications that you can use as they are or as the basis for a custom verification. If the verification types in the base system do not meet your needs, you can create a custom verification type.

Before you begin

Role required: password_reset_admin

About this task

Note:
The Password Reset Windows Application does not support custom verifications.

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Procedure

1. Navigate to **All** > **Password Reset** > **Verifications** and select a verification.
2. If needed, modify the parameters on the **Password Reset Verification Parameters** tab. The parameters are described in the instructions for the type of verification that you are working on.
3. Click **Submit**.

> **Note:**
> Each verification type has properties that control the user experience. Review the property settings and update as needed.

Create a custom Password Reset verification type

Each verification in Password Reset is based on the settings for a verification type. If the verification types in the base system do not meet your needs, you can create a custom verification type.

Before you begin

Role required: password_reset_admin

Review the verification types that are provided in the base system to determine whether to create a custom verification type. Then review the verification type components to develop. For more information about verification types in the base system, see Verification types in the base system.

Procedure

1. Navigate to **All** > **Password Reset** > **Extensions** > **Verification Types**.
2. Click **New**, enter a unique and meaningful **Name** and **Description**, and then fill in the form. For information about the fields on the Password Reset Verification Type form, see Password Reset Verification Type form.
3. Click **Submit**.

Related topics

- Password Reset script includes
- Password Reset extension script categories
- Installed with Password Reset

Create a custom Password Reset verification

Use a verification type in the base system as a template to design a custom verification. The Password Reset Windows Application does not support custom verifications.

Before you begin

Role required: password_reset_admin

Review the verification types that are provided in the base system to determine whether to create a custom verification type. Then review the verification type components to develop. For more information about verification types in the base system, see Verification types in the base system.

Procedure

1. Navigate to **All** > **Password Reset** > **Verifications**.
2. Click **New**, enter a unique and meaningful **Name** and **Description**, and then fill in the form.

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For information about the fields on the Password Reset Verification form, see Password Reset Verification form.

3. Click **Submit**.

> **Note:**
> Each verification type has properties that control the user experience. Review the property settings and update as needed.

Create a custom identification type for Password Reset

A custom identification type enables the user to enter alternative verification information such as an employee ID while resetting the password.

Before you begin
Role required: password_reset_admin

About this task

Procedure

1. Navigate to **All** > **Password Reset** > **Extensions** > **Identification Types**.
2. Click **New**, enter a unique and meaningful **Name** and **Description**, and then fill in the form.

Identification field label	Text to display as a label for the **Identification** field.
Identification processor	Identification processor script. Choose an existing script or create your own using the Identification form processor category (extension script).

3. Click **Submit**.

Related topics

Create a Password Reset extension script

Configure a credential store type to support third-party password auto-generation

Enable the subflows in credential store type to support third-party password auto-generation.

Before you begin
Role required: password_reset_credential_manager, password_reset_admin

About this task
Users can easily reset their passwords for the credential stores that don't have REST APIs to reset the password. For example, the password reset subflows support Robotic Process Automation. The Password Reset process can be automated with a Robotic Process Automation robot to reset the password of an application that does not have an API to reset the password.

For more information about Robotic Process Automation, see Robotic Process Automation (RPA) Hub.

Procedure

1. Navigate to **All** > **Password Reset** > **Extensions** > **Credential Store Types**.
2. Open the credential store type.

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3. To use password reset subflows in the Integration Hub, leave the **Use Flow** check box selected.
4. In the **Password reset flow** field, enter a required value for the password reset subflow.
5. From the **Password Delivery Mechanism** list, select **Reset flow doesn't accept password as input**.
6. If you want your users to change the password immediately after signing in post password reset, select the **Supports Force Password Change On First Log In** check box.

   Note:
   Ensure that the **User must reset password** check box is selected on the Password Reset Process form of the associated process. But these settings of changing passwords after first sign-in post reset work only if the credential store you are configuring supports the settings.

7. Click **Update** or save the changes.

Asynchronous password reset subflow

When a user requests a password reset, based on the application for which the password reset is requested, the process works either synchronously or asynchronously.

When a user requests a password reset for a credential store for which the REST APIs are available to reset the password, the password is reset immediately. This process is synchronous.

In the asynchronous process, when a user requests a password reset for credential stores that don't provide REST APIs, you can configure such credential stores to reset passwords using an external system, such as Robotic Process Automation.

For more information about Robotic Process Automation, see Robotic Process Automation (RPA) Hub.

When a user requests a password reset, the password doesn't get reset immediately. The user receives a message that shows the request has been submitted, and the request status is displayed as **Pending With External System** on the Password Reset Requests page for that request.

When the process completes, the password is reset. The user receives an appropriate message based on the success or failure of the password reset action from the external system, which resets a password for the user. If the password reset is successful, the user receives an email containing the new password from the external system if the credential store doesn't accept the password.

If a credential store processes a password reset request asynchronously, then to update the corresponding password reset request status from pending to either **Completed With Success** or **Completed With Failure**, the process must use the **Update Password Reset Request** subflow as a callback.

Note:
To open the **Update Password Reset Request Status** subflow, navigate to **All** > **Process Automation** > *Workflow Studio*, and click the **Subflows** tab. Then search for and select the **Update Password Reset Request Status** subflow.

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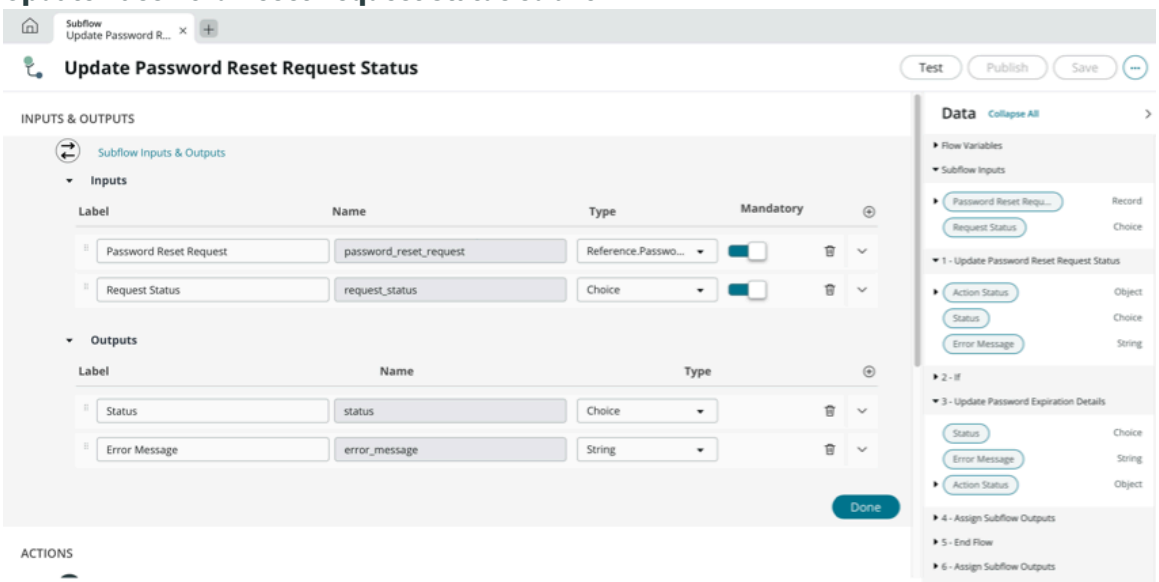
Update Password Reset Request Status subflow input parameters

Input Parameters	Description
Password Reset Request	Glide record of the password reset request.
Request Status	Determines which choices are available as input. For example, **Completed With Success** or **Completed With Failure**.

When this subflow is used, the input parameters are considered in this subflow to set the corresponding password reset status.

Update Password Reset Request Status subflow



Create a credential store type for Password Reset

Create a custom credential store type when the base-system types do not meet your needs.

Before you begin

Role required: password_reset_credential_manager

About this task

You can also configure a credential store type to work independently with the password reset, password change, and unlock password actions.

Procedure

1. Navigate to **All** > **Password Reset** > **Extensions** > **Credential Store Types**.
2. Click **New**.
3. In the **Name** field, enter the name for the credential store type.
4. In the **Description** field, enter the description for the credential store type.
5. To use password reset subflows in Integration Hub, leave the **Use Flow** check box selected.

Note:
See Customize password reset processes and integrate third-party credential services for information on creating provider-specific subflows.

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6. Select the **Supports history check** check box to determine whether the credential store supports the history policy capability.

   If selected, only then the password_reser_admin can disable or enable this feature through a credential store record.

7. Select the subflows created for the third-party application.

   Note:
   See Customize password reset processes and integrate third-party credential services for information on creating provider-specific subflows.

Subflow	Description
Base Alias	A connection and credential alias that is used in the subflows of this credential store type. This is the default alias used by the subflows while making an external call. **Note:** If you want to override the default alias, use the child alias property of the credential store.
Password change flow	Changes the password of an authenticated and unlocked user account to the provided new password. Verifies that the new password conforms to the password format and history policies. Displays an error if the user is not authenticated or is locked out. Use the Password Reset flow to unlock a locked user account and require a password change.
Unlock user flow	Defines the process to unlock a user. If a credential store supports the unlock user flow, the **Get user lock state flow** field becomes a required field. But when a credential store doesn't support the unlock user flow, you can still set up the user lock state flow.
Get user lock state flow	Retrieves the lock status of an account specific to the credential store.
Connection test flow	Defines how to test the connection.
Password reset flow	Unlocks the specified user account. Expires the current password and changes the password to the provided new password if it conforms to the password format and history policies. If it doesn't conform, a warning is displayed. **Note:** In the case of an Robotic Process Automation setup, the subflow doesn't reset the password immediately but only pushes the request into the Robotic Process Automation queue and the status is displayed as **Pending**.

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Subflow	Description
Password Delivery Mechanism	Sets the mechanism such as whether to accept the password as input or not. For example, in the case of the credential store for which Robotic Process Automation functionality is required, Robotic Process Automation can't accept the password from the Password Reset application for security purposes. So, for Robotic Process Automation subflows, the **Reset flow doesn't accept password as input** value must be selected. That means, while users create a reset password request, they are not asked to enter passwords of their choice. **Note:** This feature is applicable only to the password reset action. If for a credential store, the reset flow doesn't accept a password, which is configured through the password delivery mechanism, then all the fields for password policy and password generation are hidden on the related credential store form. For example, **Enable password policy**, **Password policy**, **Enable Password Strength**, **Strength rule**, and **Auto-generate password**.
Supports Force Password Change On First Log In	When selected, notifies the user to change the password when the user signs in for the first time with the new password that the user receives after the password reset action is completed. **Note:** Based on this setting, the fields on the Password Reset Process form change. For example, when a password reset administrator selects the **Auto-generate password** check box on the Password Reset Process form, the form displays the **User must reset password** field. So, it depends on the password reset administrator whether to prompt users to change their auto-generated password or not even if the **Supports Force Password Change On First Log In** check box is selected.

8. If you want to use workflows, clear the **Use Flow** check box to use the password reset workflows in Orchestration.

Note:

- The workflows have been deprecated. Use the subflows by leaving the **Use Flow** check box selected.
- The workflows are available only if you have upgraded from the previous releases.

Field	Description
Password Reset workflow	Defines the credential store processing. Password Reset workflows are available to use as a model. Provide scripts for each of the activities defined for the subflow. For more information about how to create a workflow, see Create a workflow. For installed workflows, see Installed with Password Reset.
Connection test workflow	Defines how to test the connection. Connection test workflows are available to use as a model. If you create a connection test subflow, provide scripts for each of the activities defined for the subflow. For installed workflows, see Installed with Password Reset.
Get user lock state workflow	Defines how to get the user lock state. Get user lock state workflows are available to use as a model. Provide scripts for each of the activities defined for

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Field	Description
	the subflow. For more on how to create a workflow, see Create a workflow. For installed workflows, see Installed with Password Reset.
Unlock user workflow	Defines how to unlock a user. Unlock user workflows are available to use as a model. If you create a connection test subflow, provide scripts for each of the activities defined for the subflow. For installed workflows, see Installed with Password Reset.

9. Click **Submit**.

Reset a password or unlock a user account with service desk assistance

Reset a password or unlock a user account by requesting the assistance of a service desk agent.

Before you begin

Watch this video example of service desk agents resetting passwords: Resetting User Passwords (Video).

Note:

- You must clear the **Public access** property to enable the service desk-assisted process. See Configure your Password Reset process.
- You can perform this activity on a mobile device.
- You can change the theme of the service desk page to the dark theme. For more information about the dark theme, see Exploring themes in Next Experience.

Role required: password_reset_admin or password_reset_service_desk

About this task

In a service desk-assisted Password Reset process, only the service desk agents with the password_reset_service_desk role can reset user passwords. Users can't reset passwords.

Procedure

1. Navigate to **All** > **Password Reset** > **Service Desk**.
2. Select a user and the Password Reset process to use.
3. Click **Verify Identity**.
4. On the Verify Identity form, enter the answers provided by the user, and then click **Continue**. If the user's identity is verified, the Reset Password form displays the identity verification and status of the account lock.
5. Perform one of the following actions.
   - If the user isn't locked, the form displays the **Reset password** button. Enter the new password and click **Reset password**.
   - If the user's account is locked, the form displays the **Reset password** and **Unlock account** buttons. You can enter a new password and click **Reset password** to reset the password and unlock the account. If the **Enable account unlock** option is selected for the password process, you can unlock the account without resetting the password by clicking **Unlock account**.
6. To reset the password for a different user, you must first navigate away from the **Service Desk** and then navigate to **Password Reset** > **Service Desk**.

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View user requests for password reset

The **Reset Requests** module displays the status of each password reset request from the Password Reset Request table [pwd_reset_request].

Before you begin

Role required: password_reset_admin or password_reset_service_desk

Procedure

Navigate to **All** > **Password Reset** > **Reset Requests**.

Password Reset request fields

Field	Description
User	User whose password is being reset or changed.
Process	Process that implements this password reset request.
Type	Type of Password Reset request: • **Change Password**: Request to change a password. • **Help Desk**: Request opened on behalf of the requesting user by a service desk agent. • **Self Service**: Requesting user opened the reset request.
Action Type	Corrective action performed during the Password Reset request. • **Change Password**: Update the credential store with the new password. • **Reset and Unlock Account**: Generate a new password for the user and unlock the user account. • **Reset Password**: Generate a new password for the user. • **Unlock Account**: Unlock the user account.
Status	Result of the Password Reset request: • **Completed With Failure**: User completed all steps in the Password Reset process, but the password was not reset in the credential store. • **Completed With Success**: User completed all steps in the Password Reset process and the password was reset in the credential store. • **Expired**: User did not complete all steps in the Password Reset process in the time allowed. • **In Progress**: User is working through the steps to reset the password. • **Max Number of Attempts**: User failed to answer the security questions correctly during the identity verification step and has exceeded the maximum number of attempts allowed. • **Verified**: User has completed the identity verification step and is verified. The user can move to the Password Reset step.
Active	Whether the request is open or closed.
Retry	Total number of times the user has attempted to complete a password reset request.

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Unblock a Password Reset user

If a user is manually banned or is flagged as exceeding max attempts, the user can be blocked (not allowed to use the Password Reset application). You can unblock a blocked user.

Before you begin

Role required: password_reset_admin or password_reset_service_desk

About this task

Blocking events include:

- The user exceeded the limit for the number of failed password attempts.
- The most recent password reset occurred before the wait time required until the next reset.
- The user failed to provide the correct information while attempting to reset the password.

If the number of blocked or locked users exceeds the limit within a defined time interval, it triggers a system log event. You can configure the number of blocked or locked users and the time interval required to generate the log event by setting the *password_reset.activity_monitor.incident_threshold* and *password_reset.activity_monitor.incident_window* properties.

Procedure

1. To view the list of blocked users, navigate to **Password Reset** > **Blocked Users**.
2. To unblock a self-service user:
   a. Navigate to **Password Reset** > **Blocked Users**.
   b. Select a user from the list.
   c. Select **Delete** on the **Actions on selected rows** list.
3. To unblock a user whose password was reset by a service desk agent:
   If a user is manually banned or flagged as exceeding max attempts, the user can be blocked (not allowed to use the Password Reset application). When the password reset request is made through self-service, the user is unblocked when the password is successfully reset.

   In contrast, service desk agents are allowed any number of retries. The *max_attempt_reached* limit does not apply and the **Blocked** status for the user is not reset after the password is reset. As a result, after you successfully reset a user password, you must unblock the user manually.

   If the user is not unblocked manually, then the system resets the blocked state only when the *max_attempt_window* time period elapses and the user tries to reset the password using self-service.

   a. After you successfully reset a user password, navigate to **Password Reset** > **Blocked Users**.
   b. Change the **Blocked** setting for the user from true to false.

Related topics

Configure Password Reset properties

Password Reset and Password Change reports and logs

Integrate Password Reset with a Service Portal widget

You can enable a Password Reset process in a Service Portal page by adding a widget that opens the password reset pages inside the portal.

Before you begin

Role required: password_reset_admin or sp_admin

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Procedure

1. On the Service Portal Designer for the portal, create a new page — the page where the user will perform the password reset process.
2. On the **Widget** tab, under Layouts, select the 12-column layout and drop it onto the page.
3. Drop the **Pwd reset** widget into the 12-column layout and then save the page.
   The three tabs of the password reset process appear in the layout.
4. In the **Reset my password** link on the login page for the portal, specify the URL of the new password reset page.
   The URL must include one required parameter and may contain one optional parameter:
   - Required: `sysparm_show_custom_header_footer=false`. This parameter disables the native header and footer feature of the password reset page.
   - `sysparm_redirect_url=<portalName>?id=<pageName>`. This parameter specifies the page to go to after a successful reset — typically the login page for the portal.

   For example, `https://server.acme.com/acme_community?id=password_reset_page&sysparm_show_custom_header_footer=false&sysparm_redirect_url=acme_communityid=communities_login`

Integrate Password Reset with a CMS integration

You can configure a site in the ServiceNow content management (CMS) application to define a single-site access point that includes the Password Reset service. For example, you can create an employee self-service site that provides Password Reset service.

Before you begin

Role required: content_admin

About this task

Each Password Reset process requires a separate CMS page.

Procedure

1. Navigate to **All** > **Content Management** > **Specialty Content** > **iFrames** and create an iFrame record.
2. Go to **Content Management** > **Sites** and create a site that has no login page.

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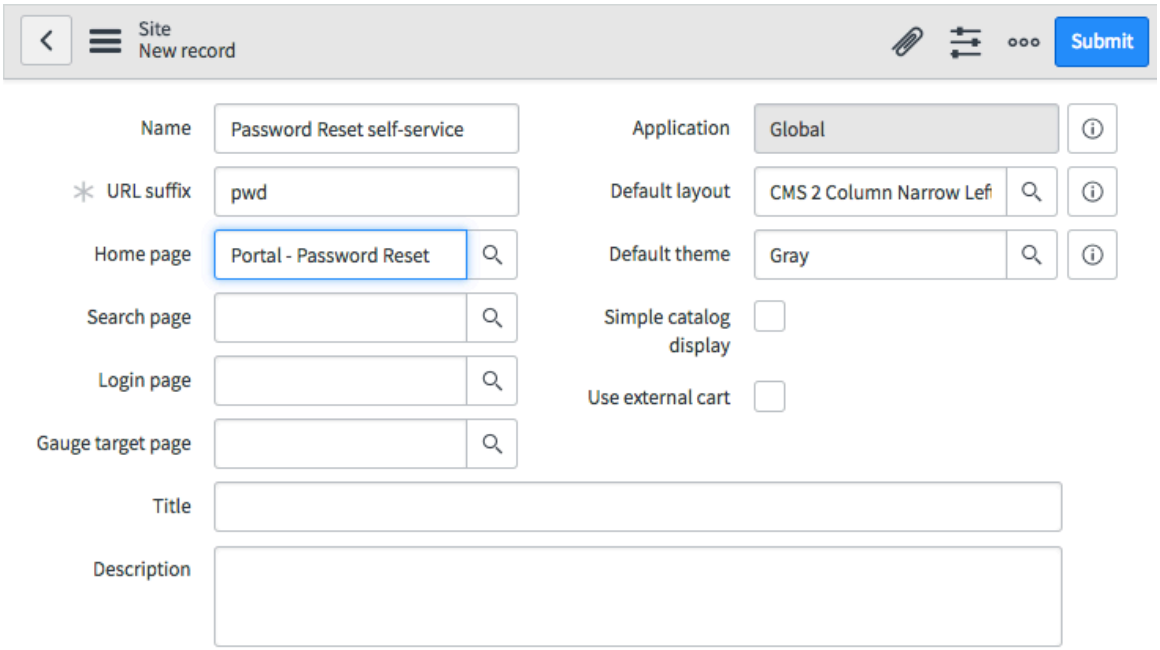

3. Go to **Content Management** > **Pages** and create a password reset page.
4. Enter the name of the site that you created in the **Content site** field (**Password Reset self-service** in the example).
5. Right-click the form header and click **Save**.
6. Click the **Edit Page** related link and then click **Add content**.
7. In the **Content Blocks** section, select the iFrame that you created and add more content as needed.
8. Click **Update**.

Installing and configuring Password Reset Windows Application

Request the Password Reset Windows App (Password Reset Orchestration) (com.glideapp.password_reset_desktop) plugin that enables connections to the Active Directory (AD) credential store types.

Administrators download and run an EXE or MSI file to install or distribute the application to user computers. The application installs a link on the Windows login screen.

Password Reset Windows Application installation requirements

Activate the Password Reset Windows App (Password Reset Orchestration) (com.glideapp.password_reset_desktop) plugin and activate the Microsoft AD for Password Reset store app to use the Password Reset Windows Application.

Requirement	Description
Required ServiceNow release	Password Reset Windows Application version 5.1.4 is supported on the Yokohama, Xanadu, and Washington DC releases.
Required hardware	• 1 GHz or faster processor • 512 MB of RAM

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Requirement	Description
	• 10 MB of available hard disk space (x86) • 10 MB of available hard disk space (x64)
Required software	• Version of Password Reset Windows Application: 5.1.4 • Microsoft .NET Framework: 4.7.1 and newer • Microsoft Visual C++: Redistributable Visual Studio 2017
Supported operating systems	• Windows 8.1 • Windows 10 Enterprise • Windows 10 Pro • Windows 11
Supported processor architecture	• X86 • X64
Supported network architecture	• Password Reset Windows Application clients must have direct access to both the internet and the ServiceNow instance where the Password Reset Windows Application is configured • For Password Reset Windows Application versions that use an SHA certificate, the corporate network must not block the SHA certificate. • To reset an AD password, the client must be on the corporate network.

Download the Password Reset Windows Application installer

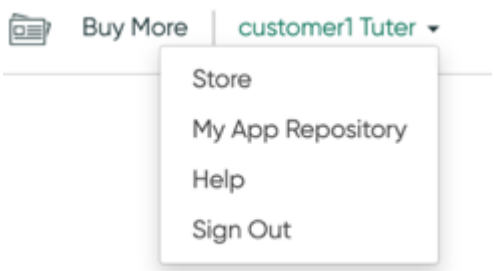
Download the Password Reset Windows Application installer.

Before you begin

Role required: any user

Procedure

1. Log in to the ServiceNow Store Publisher Portal.
2. Click your user menu and select **Store**.



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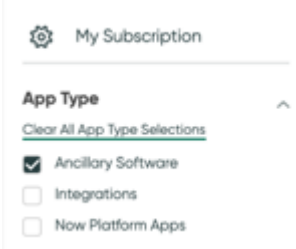
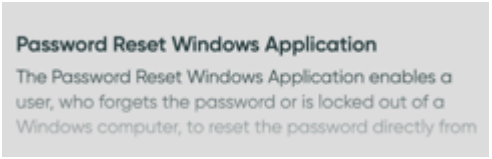
3. Set the filter for the **Ancillary Software** app type.



4. Click **Password Reset Windows Application**.
   The application download location appears.



5. Click **Download**.

Install Password Reset Windows Application

Install Password Reset Windows Application using different available methods.

Use an EXE file from the command line

As an alternative to command-line installation, you can use a wizard.

Before you begin

Role required: security_admin elevated privilege
Privilege required: Windows local administrator

Procedure

1. Ensure that the user with the ServiceNow security_admin role configures the security properties.
   For more information about the security properties, see Configure security settings for the Password Reset Windows Application
2. Copy the following command into a text editor as one line with no breaks.

```
PasswordResetWinAppInstall.exe /VERYSILENT /
PasswordResetLinkURL
 https://<YourServerName>/$pwd_reset.do?sysparm_url=default /
PasswordResetLinkName "Forgot password?"
```

3. Add arguments and replace the default parameter values with the correct values for your organization.

Argument	Example	Description
`/Log`	`/Log=c:\temp\PwdResetInstallLog.log`	Optional. To generate a log file, you must first create the directory that the file is written to. In this example, you would create the `c:`

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Argument	Example	Description
		`\temp` directory before running the installation.
`/NORESTART`	`/NORESTART`	Optional. Include `/NORESTART` to prompt the user to restart the computer after installation.

Parameter	Default	Description
PasswordResetLinkURL	`https://<YourServerName>/$pwd_reset.do?sysparm_url=default`	URL of the page that users access when resetting a password. Be sure to substitute your ServiceNow server name and the URL suffix for the desired Password Reset process.
PasswordResetLinkName	`"Forgot password?"`	Text to display for the Password Reset link on the Windows login page. Update the text as needed. You must enclose the text in double-quote characters as shown. To ensure that the correct characters are used, do not copy/paste the example text. Instead, type the characters at the command line.
CredentialProviderGUID		Most installations do not need to specify this parameter value. Provide this value only if you use a customized credential provider and can provide a valid credential provider GUID.

4. Navigate to the directory that holds the `PasswordResetWinAppInstall.exe` file.
5. Run the updated command at the command line.
6. After installation and depending on the setting for the `/NORESTART` argument, you might need to restart the computer.
   See Install Password Reset Windows Application using a wizard.

Use an MSI file from the command line

Use the MSI file to install the Password Reset Windows Application on multiple computers over a network. As an alternative to MSI installation, you can also install from the command line.

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Before you begin

Role required: Windows local administrator

Procedure

1. Ensure that the user with the ServiceNow security_admin role configures the security properties.
   For more information about security properties, see Configure security settings for the Password Reset Windows Application.
2. Copy the following command into a text editor as one line with no breaks.

```
msiexec.exe /i PasswordResetWinAppInstall.msi /quiet
 WRAPPED_ARGUMENTS="/SUPPRESSMSGBOXES /VERYSILENT /NORESTART /
PasswordResetLinkURL
 https://<YourServerName>/$pwd_reset.do?sysparm_url=default /
PasswordResetLinkName ""Forgot password?"""
```

3. Add arguments and replace the default parameter values with the correct values for your organization.

Argument	Example	Description
`/Log`	`/Log=c:\temp\PwdResetInstallLog.log`	Optional. To generate a log file, you must first create the directory that the file is written to. In this example, you would create the `c:\temp` directory before running the installation.
`/NORESTART`	`/NORESTART`	Optional. By default, MSI installations restart the computers. Include `/NORESTART` not to restart the computers after installation. You might want to communicate with end users that they must restart their computer to enable the Password Reset Windows Application.

Parameter	Default value to replace	Description
PasswordResetLinkURL	`https://<YourServerName>/$pwd_reset.do?sysparm_url=default`	URL of the page that users access when resetting a password. Be sure to substitute your ServiceNow server name and the URL suffix for the desired Password Reset process.

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Parameter	Default value to replace	Description
PasswordResetLinkName	`""Forgot password?""`	Text to display for the Password Reset link on the Windows login page. You must enclose the text in two double-quote characters as shown. To ensure that the correct characters are used, do not copy/paste the example text. Instead, type the characters at the command line.
Optional: CredentialProviderGUID		Most installations do not need to specify this parameter value. Provide this value only if you use a customized credential provider and can provide a valid credential provider GUID.

4. Navigate to the directory that holds the `PasswordResetWinAppInstall.msi` file.
5. Run the updated command at the command line.
6. After installation and depending on the setting for the `/NORESTART` argument, you might need to restart computers.
   See Install Password Reset Windows Application using a wizard and Install the Password Reset Windows Application using an EXE file from the command line.

Use a wizard

As an alternative to wizard installation, you can run commands directly at the command line.

Before you begin

Role required: Windows local administrator

Procedure

1. Ensure that the user with the ServiceNow security_admin role configures the security properties.
   For more information about the security properties, see Configure security settings for the Password Reset Windows Application.
2. Right-click the `PasswordResetWinAppInstall.exe` installation file that you downloaded and select **Run as administrator**.
3. On the **Configure Password Reset Web page and credential provider** page, configure the following settings and then click **Next**:

Field	Description	Default
URL of the Password Reset page	URL of the page on your ServiceNow instance that users access when resetting a password.	`https://<YourServerName>/$pwd_reset.do?sysparm_url=default`

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Field	Description	Default
	Be sure to substitute your ServiceNow server name and the URL suffix for the desired Password Reset process.	
Text to display for the Password Reset link	Text to display for the Password Reset link on the Windows login page. Update the text as needed.	`Forgot password?`
GUID of the credential provider	Most installations do not need to specify this parameter value. Provide this value only if you use a customized credential provider and can provide a valid credential provider GUID.	[Accept the default.]

4. For the remaining pages, perform the following actions:

Page title	Action
License Agreement	Select **I accept the agreement**.
Select Destination Location	Accept the default installation location.
Select Start Menu Folder	Accept the default "ServiceNow".
Ready to Install	Click **Install**.

5. Restart the computer.
   See Use an EXE file from the command line.

Configure security settings for the Password Reset Windows Application

Configuring security settings for the Password Reset Windows Application.

Security settings

- The *glide.security.use_csrf_token* property setting allows the Password Reset Windows Application to retrieve a token for a secure communication with the datacenter instance.
- The *CheckCertificateRevocationList* registry key default setting of **true** causes the Password Reset Windows Application to validate the server certificate before every communication. See Customize the Password Reset Windows Application for details.

Configure the glide.security.use_csrf_token property

To configure the *glide.security.use_csrf_token* property, a security_admin elevated privilege is required.

Set the *glide.security.use_csrf_token* property to true (Yes). See the topic titled "High Security Settings" in https://servicenow.com/docs.

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The Windows local administrator performs the remainder of the installation procedure.

Configure the Password Reset Windows Application to use a proxy server

The Password Reset Windows Application supports the use of a proxy server. There are three options for configuring the proxy server.

Before you begin
Role required: Windows system administrator

Procedure

Use any one of the following configuration options to enable the Password Reset Windows Application to use a proxy server.

Configure an exception policy on your proxy server

You can configure an exception policy on your proxy server to allow unauthenticated access to the *service-now.com* domain.

Before you begin
Role required: Windows system administrator

Procedure

1. On a machine in the network, back up the following registry key: `HKEY_USERS\.DEFAULT\Software\Microsoft\Windows\CurrentVersion\Internet Settings`
2. Download and install the Sysinternals Suite from `https://technet.microsoft.com/en-us/sysinternals/bb842062.aspx`
3. At the command prompt, navigate to the extracted `sysinternals` folder.
4. Run the following command to launch Internet Explorer:
   `psexec -s -i "C:\Program Files\Internet Explorer\iexplore.exe"`
5. On the Internet Explorer **Tools** menu, select **Internet options**.
6. On the **Connections** tab, click **LAN settings**.
7. In the **Proxy server** section, select **Use a proxy server for your LAN** and then fill in the **Address** field using the following format: `<proxy_server>:<port>`
8. Click **OK** to close the **LAN Settings** page and then click **OK** to close **Internet options**.
9. Export the following registry key to all clients that use the Password Reset Windows Application:`HKEY_USERS\.DEFAULT\Software\Microsoft\Windows\CurrentVersion\Internet Settings`

Configure a proxy server using client credentials method

If you cannot configure an exception policy, you must configure all Windows clients that use the Password Reset Windows Application to pass valid credentials to the proxy server.

Before you begin
Role required: Windows system administrator

About this task
If you choose not to use the method described in this topic, there are other methods to configure a proxy server:

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- Configure registry keys. See Configure registry keys on your proxy server.
- Configure an exception policy on your proxy server to allow unauthenticated access to the *service-now.com* domain. See Configure an exception policy on your proxy server.

Procedure

1. On a machine in the network, back up the following registry key: `HKEY_USERS\.DEFAULT\Software\Microsoft\Windows\CurrentVersion\Internet Settings`
2. Download and install the Sysinternals Suite from `https://technet.microsoft.com/en-us/sysinternals/bb842062.aspx`
3. At the command prompt, navigate to the extracted `sysinternals` folder.
4. Run the following command to launch Internet Explorer:
   `psexec -s -i "C:\Program Files\Internet Explorer\iexplore.exe"`
5. On the Internet Explorer **Tools** menu, select **Internet options**.
6. On the **Connections** tab, click **LAN settings**.
7. In the **Proxy server** section, select **Use a proxy server for your LAN** and then fill in the **Address** field using the following format: `http://<userID>:<password>@<proxy_server>:<port>`
8. Click **OK** to close the **LAN Settings** page and then click **OK** to close **Internet options**.
9. Export the following registry key to all clients that use the Password Reset Windows Application:`HKEY_USERS\.DEFAULT\Software\Microsoft\Windows\CurrentVersion\Internet Settings`

Configure registry keys on your proxy server

You can configure registry keys to enable the Password Reset Windows Application to use a proxy server.

Before you begin

Role required: Windows system administrator

About this task

If you choose not to use the method described in this topic, there are other methods to configure a proxy server:

- Configure an exception policy on your proxy server to allow unauthenticated access to the *service-now.com* domain. See Configure an exception policy on your proxy server.
- Configure all Windows clients that use the Password Reset Windows Application to pass valid credentials to the proxy server. See Configure a proxy server using client credentials method.

Procedure

1. Open the Registry Editor on your Windows computer.
2. Go to **Computer** > **HKEY_LOCAL_MACHINE** > **SOFTWARE** > **Microsoft** > **Windows** > **CurrentVersion** > **Authentication** > **Credential Providers** > **0780AF60-65C2-4718-942D-E0C56E89EF9B**.
3. Set the following registry keys:

Note:
You can modify any of the listed string values.

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```
"ProxyServer"="<YourProxyName>:<PortNumber>"
"ProxyEnable"="true"
"ProxyUser"="<YourProxyUserName>"
"ProxyPassword"="<YourProxyPassword>"
"ProxyDomainName"="<YourProxyDomainName>"
"ByPassProxyOnLocal"="false"
```

- ProxyServer: Set the proxy server name or IP address with port
- ProxyUser: User name associated with the credentials, in case proxy is enabled with basic authentication
- ProxyPassword: Password for the user name associated with the credentials
- ProxyDomainName: Domain name that verifies the credentials
- ByPassProxyOnLocal: Set to true if you want to bypass a proxy server for local calls.

Configure a proxy server using PAC file (automatic configuration script method)

Configure the Proxy Auto-Configuration (PAC) file or Windows proxy auto detection (WPAD) using the Internet Explorer (IE) settings.

Before you begin

Role required: Windows system administrator

About this task

The Password Reset Windows Application internal classes automatically pick the configuration that is done using **Use automatic configuration script** at the Internet Explorer level. If you configure the proxy at Internet Explorer, level all the changes done at a remote proxy level are applicable in the Password Reset Windows Application as well.

Procedure

1. On the Internet Explorer Tools menu, select **Internet options**.
2. On the **Connections** tab, click **LAN settings**.

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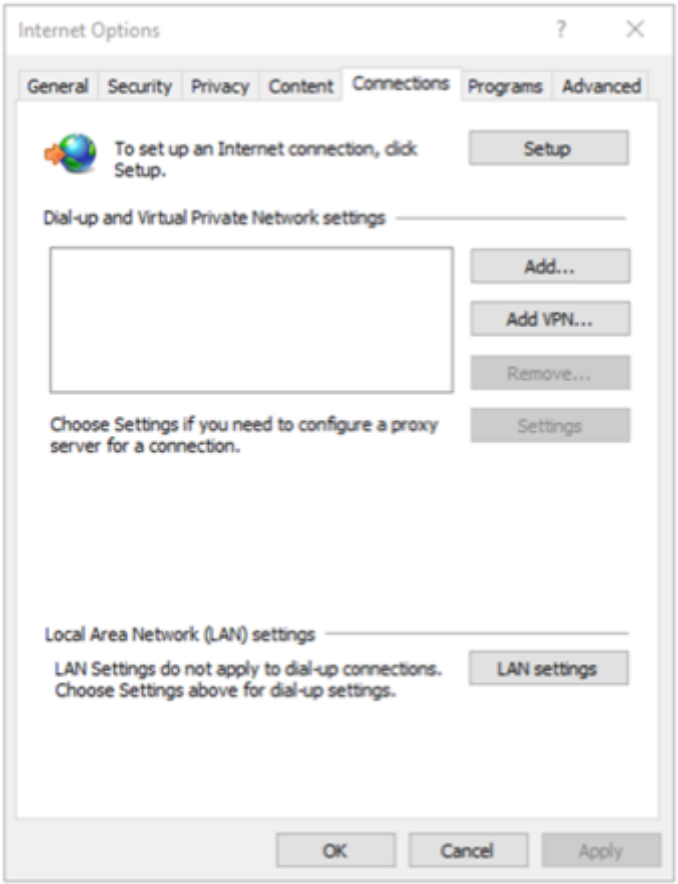
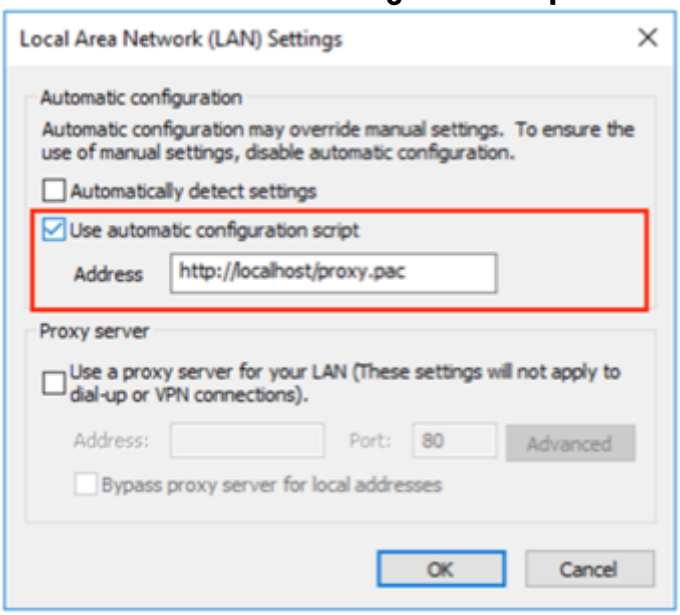


3. Select the **Use automatic configuration script** check box.



4. In the **Address** field, enter the PAC file location on the network.
5. Click **OK**.

PAC file with registry setting

In this proxy configuration, the Proxy Auto-Configuration (PAC) file can be configured in Password Reset Windows Application registry settings.

The name of the registry setting enables the proxy via PAC file is *`UseProxyAutoConfigScript`*. The PAC script location (URL) can be provided in the

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ProxyServer setting. The reference configuration is provided as shown in the following image:

Name	Type	Data
(Default)	REG_SZ	PasswordResetCredentialProvider
AppDir	REG_SZ	C:\Program Files\ServiceNow
AppFormIconFile	REG_SZ	C:\Program Files\ServiceNow\bin\ServicenowLogo.png
AppFormTitle	REG_SZ	Password Reset Windows Application
ByPassProxyOnLocal	REG_SZ	false
CheckCertificateRevocationList	REG_SZ	true
CompanyName	REG_SZ	ServiceNow Inc.
CredentialProviderGUID	REG_SZ	{60b78e88-ead8-445c-9cfd-0b87f74ea6cd}
DebugFlag	REG_SZ	0
PasswordResetLinkName	REG_SZ	Forgot password?
PasswordResetLinkURL	REG_SZ	http://yourdomain.service-now.com/$pwd_reset.do?sysparm_url=ms_ad_ss_defa...
ProxyDomainName	REG_SZ	YourProxyDomainName
ProxyEnable	REG_SZ	true
ProxyPassword	REG_SZ	YourProxyPassword
ProxyServer	REG_SZ	http://localhost/proxy.pac
ProxyUser	REG_SZ	YourProxyUser
ServiceNowServerVersion	REG_SZ	4
ServiceNowWinAppVersion	REG_SZ	5.1.4
UseProxyAutoConfigScript	REG_SZ	true
UserAccountPictureLoc	REG_SZ	C:\Program Files\ServiceNow\bin\tileimage.bmp
VerifyEmbeddedFileSignature	REG_SZ	true
WorkingDir	REG_SZ	C:\Program Files\ServiceNow\bin

Registry setting to configure proxy via PAC

- ProxyEnable – <true>

  Enables the proxy on application level.

- ProxyServer – <PAC file URL>

  Initialize the PAC file location here.

- UseProxyAutoConfigScript – <true>

  If set to true, it indicates that the address provided in the *ProxyServer* registry setting is PAC script.

How it works

The PAC file provided in the *ProxyServer* registry setting is used to get the actual target proxy server address for a URL (In this case, the ServiceNow instance) based on the PAC file script configuration. The PAC file script must return a valid Proxy server address for a provided ServiceNow URL to make the application work.

The target proxy address is cached for a URL in the machine. The caching behavior is applicable for the browsers as well. The ServiceNow® Password Reset Windows Application behaves the same as the Internet Explorer browser. That is, if the URL is accessible via a browser, then it's accessible via the app as well.

Note:
It is not necessary to configure the proxy setting in Internet Explorer as the APP is reading the PAC file script via a registry.

Enable the Password Reset Windows Application to set the display language for the session

When the Password Reset Windows Application starts, the application passes the Windows language code to the instance. The instance then dynamically sets the language for the guest user session.

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Before you begin

Role required: password_reset_admin

Procedure

1. On the Windows computer: Set the **Welcome screen display language** property to the preferred language.
2. On the instance:

   a. Activate the plugin for the preferred language.

   b. Ensure that no record in the [sys_user_preference] table specifies a particular **user.language** for *guest* user.
   You clear the setting for a *guest* user to enable the instance to dynamically set the language during the session.

Integrate McAfee disk encryption with the Password Reset Windows Application

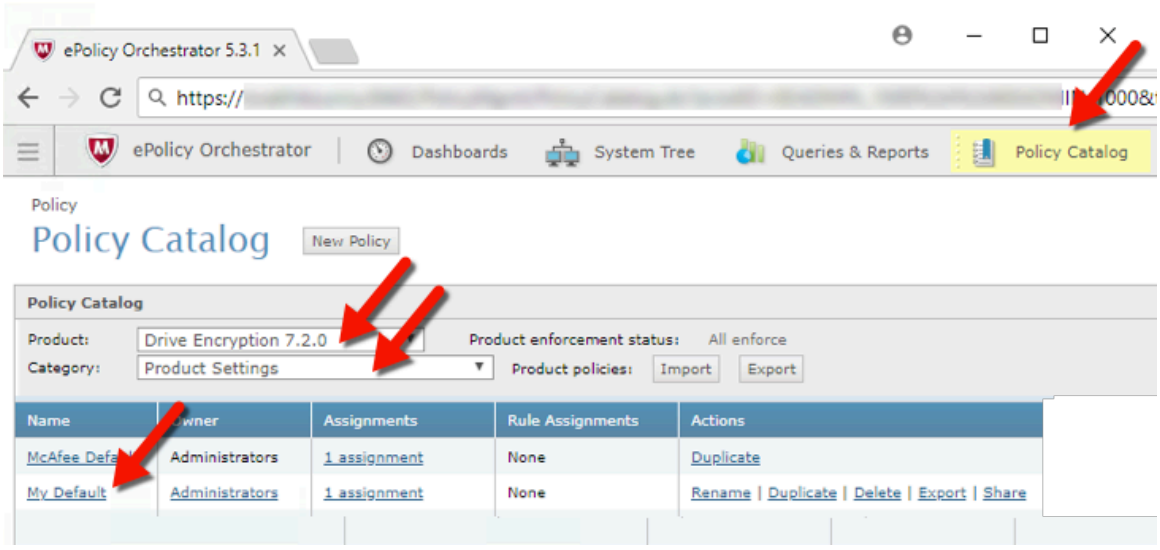
You use ePolicy Orchestrator (ePO) to enable McAfee MDE 7.2 on a Windows desktop computer to support the Password Reset Windows Application.

Before you begin

- Role required: password_reset_admin
- Required: MDE version 7.2x

Procedure

1. Log in to ePO.
2. On the Policy Catalog, select **Product** > **Drive Encryption 7.2.0** and select **Category** > **Product Settings**



3. Click the **Name** of your policy catalog (**My Default** in the example).
4. On the **Log On** tab, select the **V7.2 Onwards** tab and then select the **Allow integrated third-party credential providers ...** check box.

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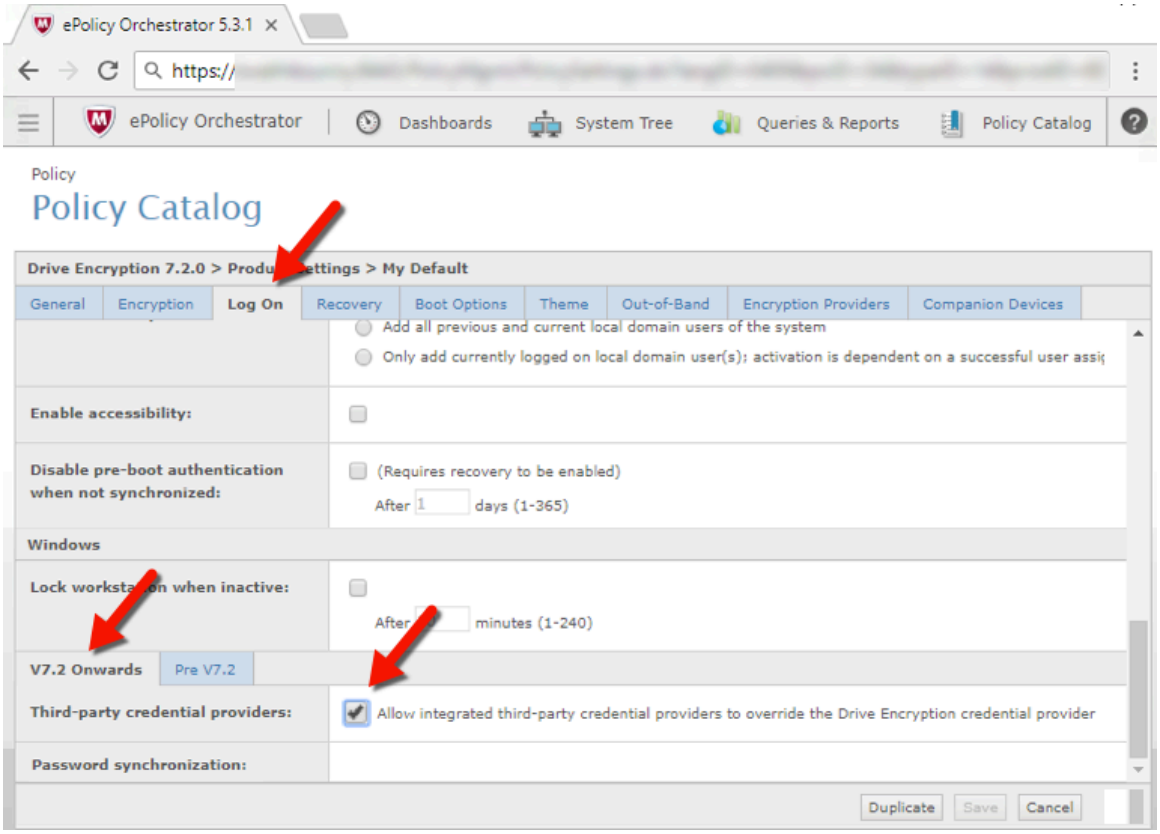

5. Click **Save** and then log out of ePO.
6. On the end-user computer, create the following registry keys (client-side ePO setting):

```
Windows Registry Editor Version 5.00
[HKEY_LOCAL_MACHINE\SOFTWARE\McAfee EndPoint
 Encryption\IntegratedCredentialProviders\{0780AF60-65C2-4718-9
42D-E0C56E89EF9B}]
"Vendor"="ServiceNow, Inc"
"Product"="ServiceNow PasswordReset WinApp"
"Version"="<PasswordReset WinApp version>" (for example,
 "Version"="4.5")
"BuiltAgainst"="<MDE version>" (for example,
 "BuiltAgainst"="7.2.3.28")
```

7. Restart the computer.

Customize the Password Reset Windows Application

You can customize the appearance and other aspects of the application.

Before you begin

Role required: Windows system administrator

Procedure

1. Open the Registry Editor on your Windows computer.
2. Go to **Computer** > **HKEY_LOCAL_MACHINE** > **SOFTWARE** > **Microsoft** > **Windows** > **CurrentVersion** > **Authentication** > **Credential Providers** > **0780AF60-65C2-4718-942D-E0C56E89EF9B**.

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3. Modify any of the listed string values:

Note:
Registry keys that begin with the text `"proxy"` enable use of a proxy server. See Configure registry keys on your proxy server.

Registry configuration options

File name	Description	Default string
AppDir	Directory that holds the Password Reset Windows Application application files.	`C:\Program Files\ServiceNow`
AppFormIconFile	Icon that is associated with the Password Reset application. You can change the icon that's associated with your company. Replace the `ServicenowLogo.png` with your company logo and change the `AppFormIconFile` path in the registry.	`C:\Program Files\ServiceNow\bin\ServicenowLogo.png`
AppFormTitle	Displayed name of the application.	Password Reset Windows Application
CheckCertificateRevocationList	By default, before every communication, the Password Reset Windows Application validates that the server certificate has not been revoked by checking the Certificate Revocation List (CRL). If the Password Reset Windows Application is slow to load after a user requests reset, you can choose to skip checking the CRL.	Default: "true" ○ **true**: When a user requests reset, the application first checks the CRL to validate the certificate. The application does not proceed without a valid certificate. ○ **false**: The application starts immediately and does not validate the certificate.
CredentialProviderGUID	GUID of the credential provider that is in use.	""="{6f45dc1e-5384-457a-bc13-2cd81b0d28ed}"
DebugFlag	Write entries in the ServiceNowPwdReset event log.	"0"
PasswordResetLinkName	Text to display for the Password Reset link on the Windows login page.	"Forgot password?"
PasswordResetLinkURL	URL of the Password Reset application on your ServiceNow instance.	https://<YourServerName>/$pwd_reset.do?sysparm_url=default

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File name	Description	Default string
Proxy	Keys that configure proxy settings	Registry keys that begin with the text `"proxy"` enable use of a proxy server. See Configure registry keys on your proxy server.
ServiceNowServerVersion	Version of your production instance.	"<YourInstanceVersion>" (For example, "Kingston")
ServiceNowWinAppVersion	Version of the Password Reset Windows Application.	"<YourWindowsAppVersion>" (For example, "4.5")
UserAccountPictureLoc	Image that appears on the Login screen.	`%programdata%\Microsoft\User Account Pictures\user.bmp`
WorkingDir	Directory that holds the library files.	`C:\Program Files\ServiceNow\bin`

Limitations of the Password Reset Windows Application

The Password Reset Windows Application has a few limitations.

- The Password Reset Windows Application doesn't support custom verifications.
- The Password Reset Windows Application uses the base-system CAPTCHA service even if the Password Reset application is configured to use Google reCAPTCHA with the web interface.
- The Password strength indicator is not supported.
- For some verification types, you can use only one verification. Custom verifications are not supported. For more information, see Password Reset verifications.
- Custom UI macros configured on the **Process** > **Advanced** page are not supported (for example, entry, success, or failure macros). The system displays only the default success and failure messages.
- The Password Reset Windows Application supports newline characters in the **Password rule hint** text. Other formatting is not supported (bold, underline, and hyperlink). For more information, see Configure the connection to a credential store for the Password Reset processes.

Uninstall the Password Reset Windows Application

You can run either an EXE or an MSI file to uninstall the application.

Before you begin

Role required: Windows Local Administrator

Procedure

Follow either procedure.

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Option	Description
Use an EXE file from the command line	**a.** Navigate to the uninstall directory that you created during installation, for example: `C:\Program Files\ServiceNow\uninstall\` **b.** Double-click the `unins000.exe` file.
Use an MSI file from the command line	**a.** Navigate to the directory that holds the `PasswordResetWinAppInstall.msi` file. **b.** Run the following command at the command line: `msiexec.exe /x PasswordResetWinAppInstall.msi /quiet`

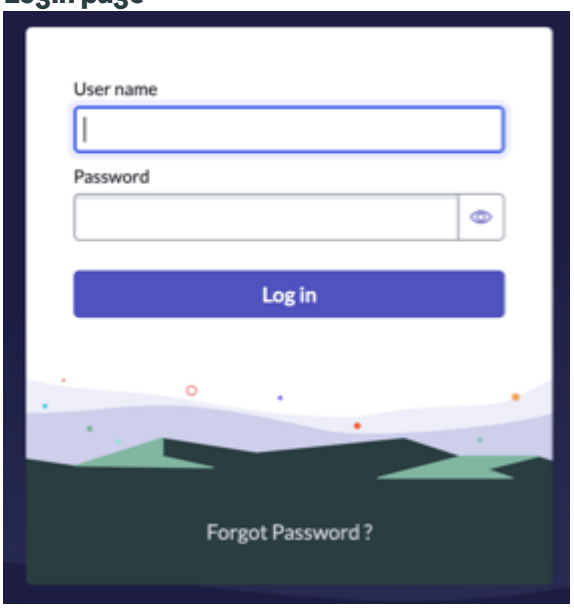
Enrolling in the Password Reset application to reset your password

The self-service process is a typical process that you might follow to reset your password. Your experience might differ.

Example experience of the self-service process

1. On the Login page, click the **Forgot Password** link to start the process.

Login page



2. On the Identify page, enter your identifying information (generally your user name or email address). The example includes the CAPTCHA security feature.

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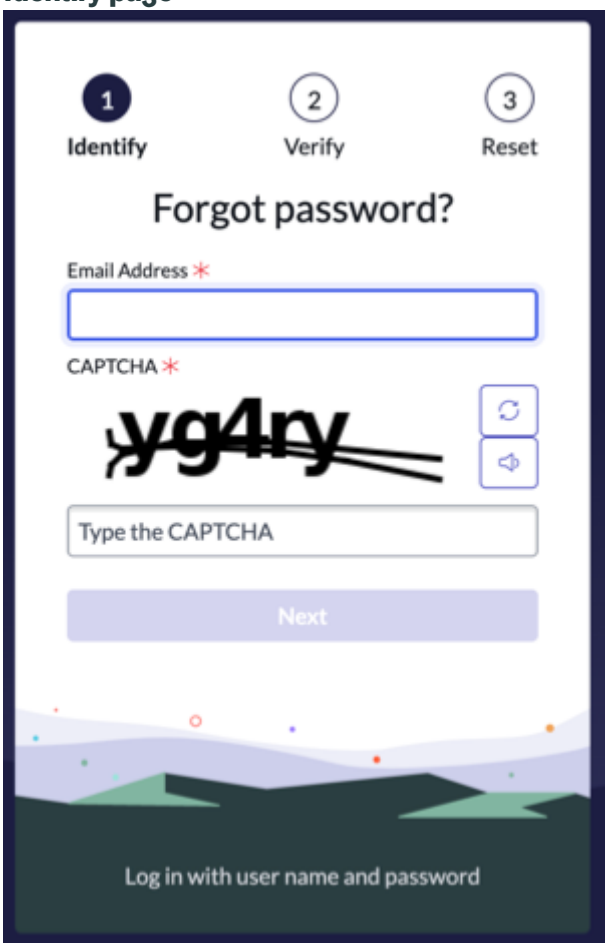
Identify page



3. On the Verify page, verify your identity by providing your verification information. The admin configured the method of verification and can require multiple verifications. In the following example, the admin has configured the Security Questions verification. You must answer questions to prove your identity. (Earlier, while enrolling for the password reset process, you selected these questions and provided secure, private answers.) Other possible verifications require you to enter a code that was sent to a mobile device by SMS text, through the authenticator app, or by email.

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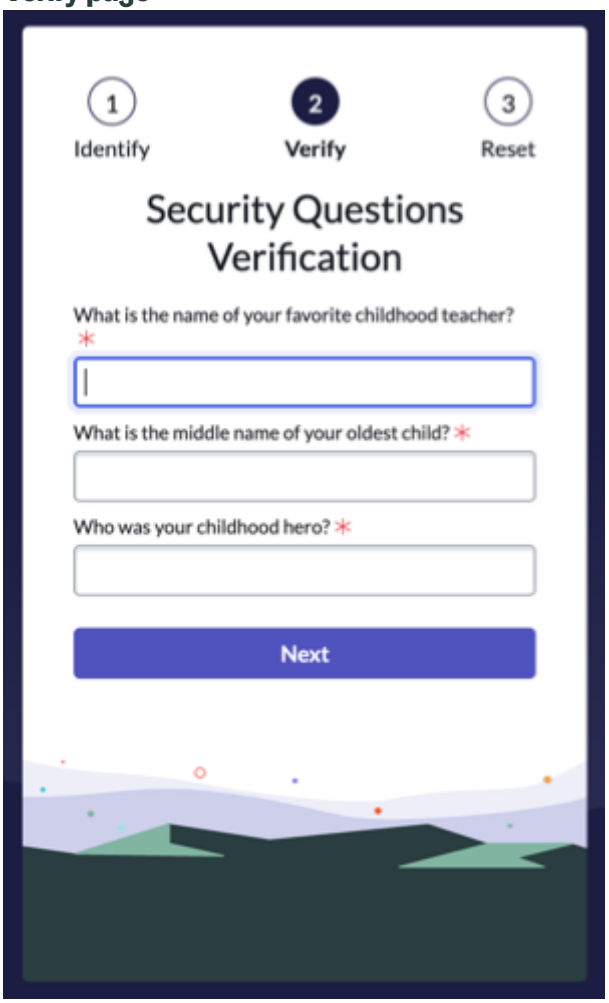
Verify page



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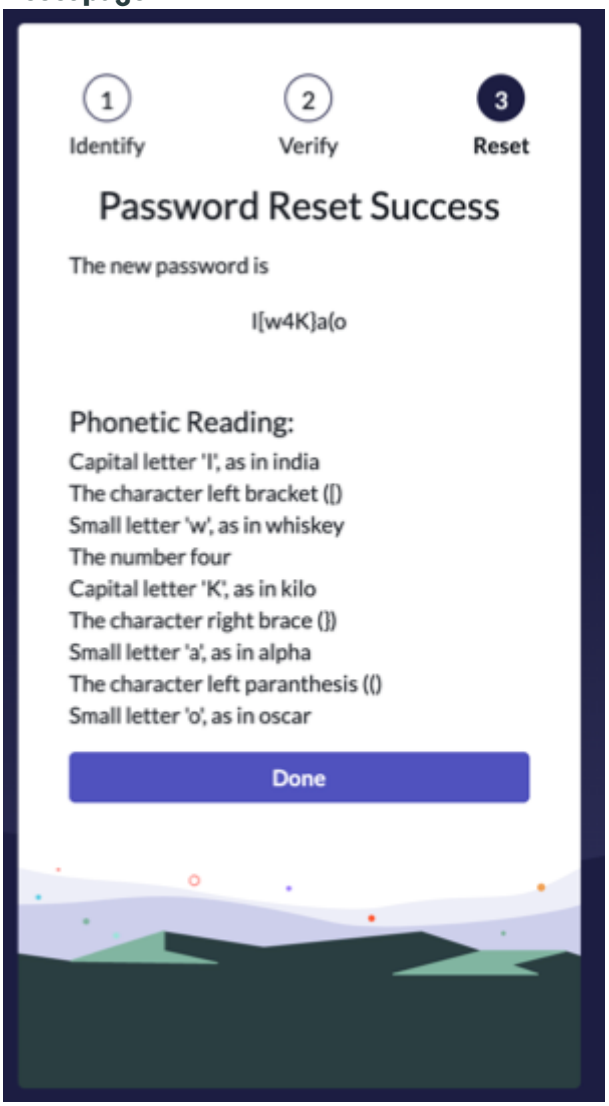
4. The system checks the credential store to verify your identity and then displays the new password on the Reset page.

Reset page



Enroll in the Password Reset program

Some organizations auto-enroll users in a Password Reset program. Your organization could offer end users the option to enroll for one or more methods of verifying your identity when resetting the password. End users can enroll for most Password Reset programs on a mobile device.

Note:
By default, the dark theme doesn't apply to the Password Reset Enrollment form. Users can change the theme to the dark theme. For more information about the dark theme, see Exploring themes in Next Experience.

End users might enroll for any combination of the following methods:

Verify your identity using an authenticator app

- You enroll on a computer that you normally use to access the instance (you use an authenticator app to reset your password, but can't use an authenticator to enroll for Password Reset Windows Application.). After you've enrolled, you install

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an authenticator app on one or more devices and then authorize the devices for authenticator verification.

- Later, when you want to reset your password, read the authenticator code on your device and then enter the code on the web page to verify your identity.

Verify your identity using an SMS code (SMS verification)

- To enroll, you authorize a mobile device for SMS verification.
- Later, when you want to reset your password, you get a code on the device and enter the code on the web page to verify your identity.

Verify your identity using an emailed code

- To enroll, you authorize one or more email addresses.
- Later, when you want to reset your password, the system sends a code to the email address. You then enter the code on the web page to verify your identity.

Verify your identity using security questions verification

- To enroll, you choose multiple questions that only you can answer (like the name of your first pet) and then supply answers. The system stores your answers securely.
- Later, when you want to reset your password, the system presents one or more of the questions. You answer the questions to verify your identity.

Enroll for the Password Reset program using an authenticator

Verify your identity while resetting your password by enrolling for the Password Reset program using a third-party authenticator app.

Before you begin

Role required: none

About this task

To verify your identity while resetting your password, you get a code from an authenticator app on your mobile device and then enter the code on the Password Reset web page.

Password Reset supports the following authenticator apps:

- Google Authenticator
- Microsoft Authenticator
- Cisco Duo
- Okta Verify

Procedure

1. Navigate to **All** > **Password Reset** > **Enroll**.
2. Click the **Authenticator App Verification** tab.

   Note:
   If your organization requires you to enroll for the Password Reset Authenticator verification method, the tab is marked with an asterisk (*).

3. Download the authenticator app to your device.

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4. Open the app and then use the device to scan the QR code on the tab.
5. When the device generates a code, enter the code in the text box, and then click **Pair Device**.
6. Select **Submit**.
7. **Optional:** If the system displays a success message, select **Submit**.
8. **Optional:** If the system displays a failure message, enter the code again, click **Pair Device**, and then select **Submit**.

   When you submit the enrollment, the tab displays the following options:

Option	Description
Generate New QR Code	Enables you to pair a device with a new code. This option is useful if you have a new device. New data replaces the existing secure verification data.
Disable Multi-factor Authentication	Deletes existing secure verification data. The Google Authenticator verification is no longer available.

9. **Optional:** Enroll for an additional identity verification using any of the other methods that your organization offers.
   For more information about enrolling using different methods, see the following topics:
   - Enroll for the Password Reset program using questions and answers
   - Enroll for the Password Reset program using SMS codes
   - Enroll for the Password Reset program using emailed codes

Enroll for the Password Reset program using SMS codes

To verify your identity while resetting your password, you can use a code (the SMS code) that was delivered to your mobile phone or device. You can enroll on a mobile device.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Password Reset** > **Enroll** and then click the **SMS Verification** tab.
   If your organization requires you to enroll for the SMS verification method, then the tab is marked with an asterisk (*).
2. To add and verify a device, click **Add Device** and then follow the instructions.

   Note:
   If you had previously added an SMS-enabled device to your Password Reset profile, the device is listed.

3. Provide a meaningful name for each device, and if you want to add multiple devices, then repeat the process.
4. After you verify each device, select the **Authorized** check box for each device that you expect to use to change or reset your password.

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Note:
You can deauthorize a device at any time by clearing the **Authorized** check box.

5. Select **Submit**.
6. **Optional:** Enroll for an additional identity verification using any of the other methods that your organization offers.

   (Optional) For more information about enrolling in the Password Reset program, see the following topics:

   - Enroll for the Password Reset program using questions and answers
   - Enroll for the Password Reset program using an authenticator
   - Enroll for the Password Reset program using emailed codes

Enroll for the Password Reset program using emailed codes

To verify your identity while resetting your password, you enter a code that was sent to your email address. You can enroll for this program on a mobile device.

Before you begin
Role required: none

About this task
During this enrollment process, you add the email address, the system sends you a code so you can verify the address, and then you authorize the address to be used for the Password Reset process. By default, the system sends the code to the email address that is associated with your ServiceNow profile. You can send the code to additional email addresses.

Procedure

1. Navigate to **All** > **Password Reset** > **Enroll** and then click the **Email Verification** tab.
   If your organization requires you to enroll for the Email verification method, then the tab is marked with an asterisk (*). Email addresses that were added previously are listed on the tab.
2. Click **Add Email**, enter the email address and a meaningful email name to associate with the address and then click **Add Email**.
   Repeat the process for as many email addresses as you need.
3. On the **Email Verification** tab, for each email that should receive Password Reset codes, click **Verify**.
   The system sends an email message with a code and then displays the **Verify the Email Address** pop-up.
4. On the **Verify the Email Address** pop-up, enter the code and click **Verify**.

   Note:
   If this process fails, click **Send a New Code** to send a different code and try again.

5. After you verify each email address, select the **Authorized** check box for each address that you expect to use to change or reset your password.

   Note:
   To deauthorize an email address so that it does not receive Password Reset codes, clear the **Authorized** check box.

6. Click **Submit**.

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7. **Optional:** Enroll for an additional identity verification using any of the other methods that your organization offers.
   For more information about enrolling using different methods, see the following topics:
   - Enroll for the Password Reset program using questions and answers
   - Enroll for the Password Reset program using SMS codes
   - Enroll for the Password Reset program using an authenticator

Enroll for the Password Reset program using questions and answers

Your organization might ask you to select the questions to use when resetting your password. You select the questions and provide answers that only you know. At another time, when you reset your password, your answers verify your identity. You can enroll on a mobile device.

Before you begin
Role required: none

About this task
The list of questions is presented in the language that you requested while logging in.

Procedure

1. Navigate to **All** > **Password Reset** > **Enroll** and then click the **QA Verification** tab.
   If you are required to enroll for the QA verification method, then the tab is marked with an asterisk (*).
2. For each **Question** field, select a question from the list and then enter the answer in the **Answer** field.
   Repeat the process until the required number of **Question** and **Answer** fields are filled in.
3. Click **Submit**.
4. **Optional:** Enroll for an extra identity verification using any of the other methods that your organization offers.
   For more information about enrolling using different methods, see the following topics:
   - Enroll for the Password Reset program using SMS codes
   - Enroll for the Password Reset program using an authenticator
   - Enroll for the Password Reset program using emailed codes

Enroll for the Password Reset program using Soft PIN

Verify your identity while resetting your password by using a Soft PIN. To use it, you must enroll for the verification using a Soft PIN.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Password Reset** > **Enroll**.
2. Select the **Soft PIN Verification** tab.

Note:

If your organization requires you to enroll for the Soft PIN verification, then the tab is marked with an asterisk (*).

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3. In the **Enter the Soft PIN** field, enter a six-digit number of your choice.

   Make sure that you follow these rules while enrolling for the Soft PIN verification.

   - The length of the Soft PIN must be six digits.
   - The soft PIN repetition threshold is two.
   - The soft PIN sequence threshold is two.
   - You can't use your previous five Soft PINs.

   Note:
   Based on the configuration set by your admin, these rules might change.

4. Select **Submit**.
   You're enrolled for the Soft PIN verification.

Reset your password on Windows systems

If your organization uses the Password Reset Windows Application, you can reset your password directly from your Windows login screen.

Before you begin
Role required: none

Procedure

1. Start your computer or press **Ctrl**+**Alt**+**Delete** to go to the Windows login screen.
2. Click the **Forgot Password?** link.

   Note:
   Your administrator may configure different text for the link.

3. On the **Identify** page, enter the requested information and then click **Next**.
4. On the **Verify** page, enter the requested information, and then click **Next**.

   Note:
   You might be given the option to choose the method used to verify your identity.

   If your identity is verified, the **Reset** page displays whether you were successfully verified and the state of your account (either locked or unlocked).
5. Based on your locked/unlocked state, perform one of the following actions:
   - If your account is not locked, the page displays the **Reset Password** button. Enter and reenter the new password and then click **Reset Password**.
   - If your account is locked, the page displays the **Reset Password** and **Unlock Account** buttons.
     - You can enter a new password and click **Reset password** to reset the password and unlock the account.
     - If your administrator has selected **Enable account unlock** for the password process, you can unlock the account without resetting the password by clicking **Unlock account**.

Password Reset reference

Reference topics provide additional information about the lists and forms that you use to configure and administer Password Reset.

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To view reference information, check the next topics, such as Installed with Password Reset.

Installed with Password Reset

Tables, roles, business rules, scripts, and workflows are installed with the Password Reset application.

Password Reset tables

Table name	Description
Password Reset Active Answer [pwd_active_answer]	Security questions and associated answers, in an encrypted state, that users selected while going through the enrollment process.
Password Reset Active Question [pwd_active_question]	Security questions that users selected while going through the enrollment process.
Password Reset Activity Log [pwd_reset_activity]	All Password Reset requests.
Password Reset Activity Monitor [pwd_activity_monitor]	Password Reset lockout activity.
Password Reset Credential Store [pwd_cred_store]	Password Reset credential stores that are available.
Password Reset Credential Store Parameters [pwd_cred_store_param]	User-created credential store parameters.
Password Reset Credential Store Types [pwd_cred_store_type]	Password Reset credential store types that are available.
Password Reset Desktop Access Control [pwd_access_control]	Password Reset Windows Application access control.
Password Reset Desktop Access Log [pwd_access_log]	Password Reset Windows Application access logs.
Password Reset Device Enrollment Code [pwd_dvc_enrollment_code]	Device enrollment codes that were sent to users during SMS code enrollment.
Password Reset Devices [pwd_device]	User SMS devices that are in a state of verified.

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Table name	Description
Password Reset Email Verification Code [pwd_email_code]	Verification codes that were sent to users via email for password reset or email address enrollment.
Password Reset Enrollment for Verification [pwd_enrollment]	Information about user enrollment by verification.
Password Reset Enrollment Snapshot [pwd_enrollment_snapshot]	Snapshot of user enrollment by verification. This table is used for the reporting purpose. The Sync Password Reset Enrollment Snapshot Data Monthly scheduled job runs once a month to generate or sync snapshot data in this table. The data, such as sys_user creation or deletion, verification to process creation or deletion, and so on, is synchronized. Password Reset DB listener is used to create or update the data in this table which is managed by the *`pwd_reset.enable.dbListener`* property with default value as true. If you're an admin and want to manually sync the data in this table related to an active process, select **Sync Enrollment Snapshot Data** on that Password Reset process. You can turn off the data synchronization in this table through the DB listener or the monthly scheduled job by setting the *`pwd_reset.enable.enrollment_snapshot`* property to false. **Note:** Initially, an inactive record is created by the DB listener for a user-verification pair. When the users enrol themselves on the Password Reset Enrolment page, the record becomes active in this table.
Password Reset Extension Type [pwd_extension_type]	Extension types that are available.
Password Reset History [pwd_history]	History of passwords that users reset.
Password Reset Identification Type [pwd_identification_type]	Password Reset identification types that are available.
Password Reset Process	Password Reset processes that are available.

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Table name	Description
[pwd_process]	
Password Reset Process Credential Store [pwd_map_proc_to_cred_store]	Credential stores and the associated Password Reset processes that the application is using.
Password Reset Process User Group [pwd_map_proc_to_group]	Groups and the associated Password Reset processes that the application is using.
Password Reset Process Verification [pwd_map_proc_to_verification]	Verifications and the associated Password Reset processes that the application is using.
Password Reset Question [pwd_question]	Questions that the application uses for security question verifications.
Password Reset Request [pwd_reset_request]	Information about Password Reset requests.
Password Reset Request Verification [pwd_map_request_to_verification]	Password reset requests and the associated verification that the application is using.
Password Reset SMS Verification Code [pwd_sms_code]	SMS verification codes that were sent to users for a password reset.
Password Reset User Lockout [pwd_user_lockout]	Users that are locked out of Password Reset.
Password Reset Verification [pwd_verification]	Verifications that are available.
Password Reset Verification Param [pwd_verification_param]	User-created verification parameters.
Password Reset Verification Type [pwd_verification_type]	Password Reset verification types that are available.

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Password Reset roles

Note:
Only the user with the following roles can have access to Password Reset tables. The deny unless authenticated ACLs restrict access to the Password Reset tables for any unauthenticated role such as public role user.

For more information, see Deny-Unless ACL.

Role	Description
password reset administrator [password_reset_admin]	Configures and maintains Password Reset and Password Change.
service desk agent [password_reset_service_desk]	Resets passwords on behalf of users, tracks password reset requests, and views logs.
credentials manager [password_reset_credential_manager]	Determines which credential stores are valid for use with Password Reset.

Password Reset business rules

Business rule	Table	Description
Abort if password history limit exceeds	Password Reset Credential Store Parameters [pwd_cred_store_param]	Prevents setting password history limit that exceeds the value of the *password_reset.history.limit* property. You can set a password reset history value in the *password_reset.history.limit* property. This system property checks the history of previous passwords based on the specified value. By default, the value is 10. But you can set it based on your organizational needs. **Note:** Currently, this property is applicable only to the ServiceNow credential store.
Add default parameters QA verification	Password Reset Verification [pwd_verification]	If no parameters for Security Question verifications are specified, generates parameters.
Add default parameters SMS verification	Password Reset Verification [pwd_verification]	If there are no parameters specified, generates SMS code verifications parameters.
Add params personal confirm verification	Password Reset Verification	If there are no parameters specified, generates personal data confirmation verifications parameters.

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Business rule	Table	Description
	[pwd_verification]	
Add params personal verification	Password Reset Verification [pwd_verification]	If there are no parameters specified, generates parameters for personal data verification.
Check unique verifications	Password Reset Process Verification [pwd_map_proc_to_verification]	Prevents a verification from being assigned multiple times to a specific Password Reset process.
Clear parameters for Mock verification	Password Reset Verification [pwd_verification]	Clears parameters for the Mock verification.
Deactivate process with no group	Password Reset Process User Group [pwd_map_proc_to_group]	Deactivates the process if it does not apply to all users or if the groups associated with it are removed.
Deactivate process with no min ver	Password Reset Process Verification [pwd_map_proc_to_verification]	Deactivates the process if the verifications associated with the process are less than the minimum value for the process.
Deactivate process with no verification	Password Reset Process Verification [pwd_map_proc_to_verification]	Deactivates the process if the verifications associated with it are removed.
Delete history passwords if needed	Password Reset Credential Store [pwd_cred_store]	Deletes history passwords if needed.
Enforce password history message	Password Reset Credential Store [pwd_cred_store]	Passes enforce password history related messages to the client side.
Google Auth Enabled Check	Password Reset Process [pwd_process]	Deactivates the process with Google Authenticator verification if the Google authenticator is disabled.
GoogleAuthSysPropertyCheck	Password Reset Process Verification [pwd_map_proc_to_verification]	Deactivates the process with the Google Authenticator verification if the Google authenticator is disabled.
Handle req_enroll validation/ default val	Password Reset Process Verification [pwd_map_proc_to_verification]	Handles requires_enrollment and auto_enroll values for the process.
Insert/update scheduled job for reminder	Password Reset Process [pwd_process]	Inserts/updates the scheduled job for enrollment reminder.

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Business rule	Table	Description
Order must be unique	Password Reset Desktop Access Control [pwd_access_control]	Enforces order to be unique.
Parameter Names Cannot Be Updated	Password Reset Verification Param [pwd_verification_param]	Prevents parameter name changes.
Password Reset Activity Monitor	Password Reset User Lockout [pwd_user_lockout]	Creates an event when the number of users locked out of Password Reset during a specific interval exceeds the threshold value.
Password Reset Validate Auto-generate	Password Reset Process [pwd_process]	Checks that either **Email/SMS password** or **Display password** is selected when the **Auto-generate password** check box is selected.
Personal Data Confirm Param Validation	Password Reset Verification Param [pwd_verification_param]	Checks that a column exists in the sys_user table for the parameter used in a personal data confirmation verification.
Personal Data Param Validation	Password Reset Verification Param [pwd_verification_param]	Checks that a column exists in the sys_user table for the parameter used in a personal data verification.
Prevent against deletion	Password Reset Credential Store [pwd_cred_store]	Checks whether the credential store is part of an active process before allowing deletion.
Prevent against deletion	Password Reset Identification Type [pwd_identification_type]	If an identification type is part of an active process, prevents the identification type from being deleted.
Prevent against deletion	Password Reset Verification [pwd_verification]	If the verification is part of an active process, prevents it from being deleted.
Prevent against deletion when in use	Password Reset Credential Store Types [pwd_cred_store_type]	Prevents deletion when the type is in use.
Prevent against deletion when in use	Password Reset Verification Type [pwd_verification_type]	Prevents deletion when the type is in use.
Queue event if history limit decreases	Password Reset Credential Store Parameters	Queues the pwd.credStore.history.limit.decrease event if history limit decreases.

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Business rule	Table	Description
	[pwd_cred_store_param]	
Security Questions Param Validation	Password Reset Verification Param [pwd_verification_param]	Checks for valid parameters in security question verifications.
Send SMS code	Password Reset Device Enrollment Code [pwd_dvc_enrollment_code]	Sends an enrollment code to a device.
Set new record flag	Password Reset Process [pwd_process]	Sets a new record flag for the client to take appropriate action.
Send SMS Verification Code Via Notify	Password Reset SMS Verification Code [pwd_sms_code]	Sends out SMS authentication code via Notify if the Notify plugin is active.
Single credential store per process	Password Reset Process Credential Store [pwd_map_proc_to_cred_store]	Prevents having more than one credential store per process.
SMS Code Param Validation	Password Reset Verification Param [pwd_verification_param]	Checks for valid parameters in SMS code verifications.
Update action based on access conditions	Password Reset Desktop Access Log [pwd_access_log]	Updates the "action" field of this log record based on the access control conditions.
Update proc_to_cred_store	Password Reset Process [pwd_process]	Enforces a one-to-one relation between a Password Reset process and a credential store.
Validate Process	Password Reset Process [pwd_process]	Verifies that a Password Reset process is configured correctly.
Validate Pwd Cred Store Name	Password Reset Credential Store [pwd_cred_store]	Enforces the name to be unique.
Validate Pwd Cred Store Type Name	Password Reset Credential Store Types [pwd_cred_store_type]	Enforces the name to be unique.
Validate Pwd Extension Type Name	Password Reset Extension Type	Enforces the name to be unique.

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Business rule	Table	Description
	[pwd_extension_type]	
Validate Pwd Identification Type Name	Password Reset Identification Type [pwd_identification_type]	Enforces the name to be unique and not empty.
Validate Pwd Process Name	Password Reset Process [pwd_process]	Enforces the name to be unique.
Validate Pwd Verification Name	Password Reset Verification [pwd_verification]	Enforces the name to be unique.
Validate Pwd Verification Type Name	Password Reset Verification Type [pwd_verification_type]	Enforces the name to be unique.
Validate Security Question	Password Reset Question [pwd_question]	Validates rules for security questions such as no duplicates or empty questions.
Verify Account Lookup Script	Password Reset Credential Store [pwd_cred_store]	Checks whether the account lookup script has the correctly named function.
VerifyAutoEnroll	Password Reset Verification Type [pwd_verification_type]	Checks whether auto-enroll is selected and ensures that an enrollment check script is provided.

Password Reset UI pages

Name	Description
$pwd_reset	First page of self-service reset process (asks for user ID).
$pwd_reset_serviceDesk	First page of service desk assisted reset process (asks for user ID).
$pwd_verify	Second page of reset process (asks user to verify identity).
$pwd_new	Last page of password change process (asks for new password).
$pwd_success	Page that appears when password is reset successfully.
$pwd_error	Page that appears on error during reset process.
$pwd_confirm	For processes configured to email or SMS password reset URL: After successful verification, this page displays message about sending link to user.
$pwd_change	Page for changing password.

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Name	Description
$pwd_change_success	Page that appears when password is changed successfully.
$pwd_change_error	Page that appears on error during password change process.
$pwd_enrollment_form_container	Enrollment page for all verifications.
$pwd_enrollment_success	Page that appears when enrollment is successful.
$pwd_enroll_error	Page that appears when any error happens during enrollment.
$pwd_unlock_success	Page that appears when locked user is successfully unlocked.
$pwd_reset_downloads_ui	Page for downloading Password Reset Windows Application.

Password Reset UI macros

Name	Description
$pwd_csrf_validation	CSRF validation for Password Reset Application. If violation is detected, the page will be redirected to the error page.
$pwd_display_password	Displays a temporary password on the success page if the process is configured to auto-generate.
$pwd_enroll_email_ui and $pwd_verify_email_ui	UI for email enrollment and verification.
$pwd_enroll_google_auth_ui and $pwd_verify_google_auth_ui	UI for Google Authentication enrollment and verification.
$pwd_enroll_questions_ui	UI for question and answer security validation enrollment.
$pwd_enroll_questions_ui_js	JavaScript code that requires server-side data for security question and answer enrollment.
$pwd_enroll_sample_ui	Sample UI macro for enrollment for Mock Verification Type.
$pwd_enroll_sms_ui and $pwd_verify_sms_ui	UI for SMS enrollment and verification.
$pwd_enrollment_form_title	Jelly macro function that prints the title for the enrollment form. A verification ID is mandatory.
$pwd_error_message	UI for displaying error messages.
$pwd_process_flow	UI for indicating current stage.
$pwd_process_footer	JavaScript code to get the footer macro name.
$pwd_reset_stylesheet	JavaScript code to get the default CSS file ID.
$pwd_verify_personal_data_ui and $pwd_verify_personal_data_confirmation_ui	UI for verifying personal data and for confirming personal data.

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Name	Description
$pwd_verify_questions_ui	UI for verifying questions.
$pwd_verify_simple_ui	Input section for a simple verification method. This field is a single input field.

UI scripts installed with Password Reset

You can create a UI script and reference the script from a UI macro or UI page by using a `<g:include_script>` Jelly tag. The following example shows how the *$pwd_enroll_questions_ui* UI macro can reference the *$pwd_enroll_questions_ui* script. In the example, *[UI Script Name]+".jsdbx"* is the name of the script:

```
<g:include_script src="$pwd_enroll_questions_ui.jsdbx" />
```

By referencing an external script, you can maintain separation between client JavaScript code and Jelly code, which simplifies maintenance. You can use the following installed scripts with Password Reset UI macros:

Name	Description
$pwd_csrf_common_ui_script	Common UI script for handling a Cross-site Request Forgery (CSRF).
$pwd_enroll_email_ui	JavaScript code for the $pwd_enroll_questions_ui UI macro.
$pwd_enroll_google_auth_ui	JavaScript code for the $pwd_enroll_google_auth_ui UI macro.
$pwd_enroll_questions_ui	JavaScript code for the *$pwd_enroll_questions_ui* UI macro.
$pwd_enroll_sample_ui	Included sample client JavaScript for the *$pwd_enroll_sample_ui* UI macro.
$pwd_enroll_sms_ui	SMS enrollment UI script.
$pwd_enrollment_submit_event	UI script for an enrollment submission event.
$pwd_util	Utilities for password reset UI pages and UI macros.
$pwdWfManager	Helper class to handle workflow activities and post-processing.

Password Reset workflows

The Password Reset plugin adds workflows that you can use as examples to create custom workflows for Password Reset processes.

Workflows that connect to a credential stores

Workflow	Description
Pwd Reset - AD	Connects to an AD server.
Pwd Reset - Local ServiceNow	Current (local) instance.
Pwd Reset - Master	Password Reset primary workflow.

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Workflows that connect to a credential stores (continued)

Workflow	Description
Pwd Reset - Mock Fatal	Example workflow to use in Password Reset testing to simulate a fatal error. No retries.
Pwd Reset - Mock Non Fatal	Example workflow to use in Password Reset testing to simulate a non-fatal error.
Pwd Reset - Mock Success	Example workflow to use in Password Reset testing to simulate a successful completion.
Pwd Reset - Remote ServiceNow	Connects to a remote(SOAP) ServiceNow instance.

Workflows that test the connection to a credential store

Workflow	Description
Pwd Connection Test - AD	Tests connection to an AD server.
Pwd Connection Test - Local SN	Tests connection to local instance.
Pwd Connection Test - Master	Master workflow to test credential store connectivity.
Pwd Connection Test - Mock Failure	Example credential store connection test that simulates a failed connection.
Pwd Connection Test - Mock Success	Example credential store connection test that simulates a successful connection.
Pwd Connection Test - Remote SN	Tests connection to a remote(SOAP) ServiceNow instance.

Workflows that determine the lock state of a user account

Workflow	Description
Pwd Get Lock State - AD	Gets a user account lock state for the AD server.
Pwd Get Lock State - Local SN	Workflow to get a user account lock state for the local instance.
Pwd Get Lock State - Master	Primary workflow to get a user account lock state.
Pwd Get Lock State - Remote SN	Gets a user account lock state for the remote(SOAP) ServiceNow instance.

Workflows that unlock a user account

Workflow	Description
Pwd Unlock Account – AD	Unlocks a user account for a local instance.
Pwd Unlock Account - Local SN	Workflow to unlock a user account for a local instance.
Pwd Unlock Account - Master	Master workflow to unlock a user account.

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Workflows that unlock a user account (continued)

Workflow	Description
Pwd Unlock Account – Remote SN	Unlocks a user account for a remote(SOAP) ServiceNow instance.

Workflows that change a password

Workflow	Description
Pwd Change - Master	Password change primary workflow.
Pwd Change – Local ServiceNow	Connects to a local instance to change a password.
Pwd Change – AD	Connects to an AD server to change a password.
Pwd Change – Remote ServiceNow	Connects to a remote(SOAP) ServiceNow instance to change a password.

Password Reset notifications

Name	Fired by event name	Description
Password Reset – Send SMS Code	pwd.send_sms_code.trigger	Sends out SMS authentication code for verification.
[K] Password Reset – Send Email Code	pwd.send_email_code.trigger	Sends out authentication code via Email for verification.
Password Reset - Enrollment Reminder	pwd.enrollment_reminder.trigger	Sends emails to remind users to enroll in the required verifications.
Password Reset - New Password Confirmation	pwd.email.trigger	For the Email/SMS Password process, sends an email or SMS (if configured) that includes the new password.
Password Reset - Send Verify Code	pwd.send_verify_code.trigger	Sends authentication code to users using email or SMS for password reset or enrollment. **Note:** If the Notify plugin is active, SMS code is sent via Twilio instead of ServiceNow Notification.
Password Reset URL	password.reset.url	For the Email/SMS Password Reset URL process: Sends email or SMS (if configured) that includes a link to the password reset URL.

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Name	Fired by event name	Description
		Note: Check the following items if the instance does not send the email notification to the user: • Check the System Event [sys_event] table to see if the email was sent. • Verify that the user is subscribed to the notification. • Verify that the Default Self Service password reset process and password reset properties are configured correctly.

SOAP messages for Password Reset

SOAP Message	Description
Change Password	When the Orchestration Add-on plugin is active, the system can use the SOAP protocol to change passwords on remote credential stores such as a remote ServiceNow instance.
Password Reset Request	When the Orchestration Add-on plugin is active, the system can use the SOAP protocol to reset passwords on remote credential stores such as a remote ServiceNow instance.

REST API

- Name: Pwd Reset
- API ID: pwd_reset
- Base API path: /api/now/pwd_reset

Resources (Version v1)

Name	Resource path	API Version	Description
pwd_init	/api/now/v1/pwd_reset/init	v1	Initial request to establish session, write logs, and fetch UI messages.
pwd_identify	/api/now/v1/pwd_reset/identify	v1	Get identification page components.
pwd_verify	/api/now/v1/pwd_reset/verify	v1	Get verification page components.
pwd_new	/api/now/v1/pwd_reset/reset	v1	Get resetting password page components.

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Resources (Version v1) (continued)

Name	Resource path	API Version	Description
pwd_success	/api/now/v1/pwd_reset/success	v1	Get success page components.
pwd_failure	/api/now/v1/pwd_reset/failure	v1	Get failure page components.

Resources (Version v2)

Name	Resource path	API Version	Description
pwd_init	/api/now/v2/pwd_reset/init	v2	Initial request to establish session, write logs, and fetch UI messages.
pwd_identify	/api/now/v2/pwd_reset/identify	v2	Get identification page components.
pwd_verify	/api/now/v2/pwd_reset/verify	v2	Get verification page components.
pwd_new	/api/now/v2/pwd_reset/reset	v2	Get reset password page components.
pwd_success	/api/now/v2/pwd_reset/success	v2	Get success page components.
pwd_failure	/api/now/v2/pwd_reset/failure	v2	Get failure page components.

Domain separation and the Password Reset application

Domain separation is supported in the Password Reset application. A password reset process that you define in any domain is isolated from a process that you create in any other domain. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard

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

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

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

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How domain separation works in Password Reset

Domain separation for Password Reset is applied at the process level. The admin configures the following elements to define a password reset process: A connection to a credential store, user groups that can use the process, method of identification, and verifications to use during the process.

- A connection to the credential store where user credentials (like username/password) are securely stored. Each connection inherits the domain setting from a template called a connection type. Each connection type is tied to a domain (the connection type record has a domain field). There are uniqueness constraints on connection names within a domain.
- One or more user groups on the ServiceNow instance that can use the password reset process. User accounts are members of one or more domains — they use the standard ServiceNow domain separation. When a user enrolls to use one of the password reset processes that is configured for the organization, the user is allowed to choose only from the processes in the user's domain.
- The identification — the method that the end user employs to claim identity for the public password reset or password change process. Each identification inherits the domain setting from a template called an identification type. Each identification type is tied to a domain (the identification type record has a domain field). There are uniqueness constraints on identification names within a domain.
- One or more verifications — methods to verify the identity of the person who is attempting to reset the password. Each verification inherits the domain setting from a template called a verification type. Each verification type is tied to a domain (the verification type record has a domain field). There are uniqueness constraints on verification names within a domain.
- All Password Reset tables have a domain column.
- Password Reset process tables include a *sys_overrides* column on business rules, UI actions, and so on.
- The Password Reset application is built using Orchestration. Orchestration supports "Data only" domain separation — the data security model of separating visibility of data from one domain to another.

Password Change process

The Password Change application extends the Password Reset application by letting admins define how users change their passwords. A service desk-assisted process is not supported. An admin must publish the URL for the self-service password change form.

The Password Change application enables an end user to change a password over the Internet using a browser on any supported interface, including mobile devices. The end user can select from any configured process in the end user's domain (or child domain of an end user's domain).

A password change process uses the same elements as a password reset process (connections, user groups, identifications, and verifications), with the same domain-separation features.

Related topics

Domain separation for service providers

Password Reset Process form

Description of the fields on the Password Reset Process form.

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Fields in the Process Strength Configuration section on the Password Reset Process form

Field	Description
Security score	View the security score in digits. As the security score changes, the color of the field changes. The following are three ranges of the security score: • 0 to 40: The color is red and the security is low. • 40 to 75: The color is orange and the security is medium. • 76 to 100: The color is green and the security is high.
Enable security score notification	Send security score notifications to process owners. If this field is selected, a weekly scheduled job sends emails containing the security score for all the active public processes. **Note:** The email notifications aren't sent for the service-desk processes and the processes for which only Change Password is configured.
Process owner	Designate one or more users as owners for the process you're creating. You can add only the users with the password reset admin role to this field. If you select **Enable security score notification**, the Process owner field becomes a required field.

Note:
The Process Strength Configuration section is displayed only when you select the **Public access** check box in the **Password Reset Details** tab.

Description of the fields on the Password Reset Details tab

Field	Value
Public access	The check box is available only when **Password reset** is selected. • Select the check box to enable a self-service process with public user access to the Password Reset or Password Change form through a URL. • Clear the check box to define a Service desk-assisted process in which only service desk agents can reset a password at the request of a user.
Public URL	The field is available only when **Public access** is selected. URL of the page where users go to reset or change the password. The value from the URL suffix field is appended to the URL when you tab out of the URL suffix field. For the Default self-service Password Reset process, this value must be `/$pwd_reset.do?sysparm_url=ss_default`.
URL suffix	The field is available only when **Public access** is selected.

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Description of the fields on the Password Reset Details tab (continued)

Field	Value
	Suffix used to create a unique URL for the Password Reset or Password Change form.
Display CAPTCHA	The check box is available only when **Public access** is selected. Select the check box to display a CAPTCHA on the user identification page. The Password Reset application uses Google reCAPTCHA as the default CAPTCHA service. See Configure Google reCAPTCHA for the password reset process. **Note:** The Password Reset Windows Application uses the base-system CAPTCHA service even if the Password Reset application is configured to use Google reCAPTCHA. Because on-premises instances do not have access to the internet, the instances cannot use the Google reCAPTCHA service. Set the *password_reset.captcha.google.enabled* system property to **false** for on-premises instances. To use the base system CAPTCHA, change the *password_reset.captcha.google.enabled* system property to false.
Identification type	Method that the user employs to claim identity for the public Password Reset or Password Change process. Any selection overrides the default identification that is associated with the process. The base system includes the Email and Username Identification identification types. You can create a custom identification type (some knowledge of JavaScript is recommended). See Personal data identification types and confirmation type verifications.
Redirect URL	URL to go to after a successfully resetting a password — typically, the URL of the original login page. Enter a complete path, including the protocol (for example, https://myDomain.myURL.com). If the path is under the same domain as the **Public URL**, then start the path with the / character.
Minimum verifications	Number of verifications that a user must successfully submit to reset the password. If the number exceeds the number of required verifications, then the user must submit enough additional optional verifications to meet the number specified for **Minimum verifications**. **Note:** Each user must submit all mandatory verifications regardless of the number specified. By default, during the password reset process, the system presents optional verifications to the user based on the **Order** values for the verifications. If you

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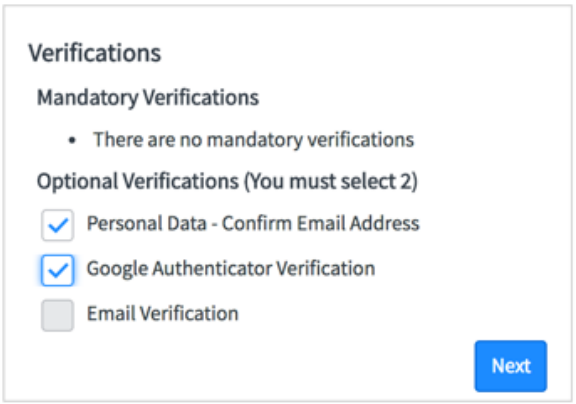
Description of the fields on the Password Reset Details tab (continued)

Field	Value
	selected **Allow user to choose from optional verifications**, then the Verification page presents all optional verifications to the user. The user then selects the appropriate number of verifications. In this example, the **Minimum verifications** value is 1. Because no mandatory verifications are configured, the user can choose an optional verification. Also, see **Allow user to choose from optional verifications**.
Allow user to choose from optional verifications	Select the check box to enable a user, on the Verifications page during the process of resetting the password, to select which optional verifications to use. The choice of optional verifications appears only if the **Minimum verifications** setting is greater than the number of mandatory verifications. The number that you specify for **Minimum verifications** determines how many optional verifications that the user is allowed to select. In the example, the **Minimum verifications** setting is **2** and there are no mandatory verifications. The user has selected two optional verifications, so cannot select a third verification. 
Email/SMS Password Reset URL	Select the check box to enable users to reset the password by clicking a link in an email that the instance sends to them. This is the secured method of resetting a password. If configured, the instance also sends the URL to the users through SMS on mobile devices. By default, the self-service Password Reset processes enable this option. When you select this option, the **Auto-generate password** check box is not available. See Example: The default self-service Password Reset process for an outline of the process that is enabled by default. If you don't select the **Email/SMS Password Reset URL** option and try to save the record, you get a message that suggests you select the verification options to configure with secure verification. You can't set the QA verification as the only verification for this process as the process becomes less secure. You must either enable the **Email/SMS Password Reset URL** option or configure this process with multi-factor authentication. Also, you can't configure the process only with personal data and QA verifications. You must configure any other verification along with these two.

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Description of the fields on the Password Reset Details tab (continued)

Field	Value
	If you still don't select the **Email/SMS Password Reset URL** option with a weak security verification configuration, it might allow unauthenticated users to reset any user's password using any user ID or email address.
Enable account unlock	This check box is available only when **Password reset** is selected. Select the check box to allow user accounts on credential stores to be unlocked without resetting the password. **Note:** Not supported by the default self-service Password Reset process.
Unlock user account	Select the check box to unlock user accounts on credential stores after a password reset.
Auto-generate password	Select the check box to auto-generate a new password for the user. When this check box is selected, you must select the **Email/SMS password** or **Display password** check box, or both. This setting is useful for Service Desk assisted processes. This check box is available only when: • The **Password reset** check box is selected. • The **Email/SMS Password Reset URL** check box is cleared. **Note:** If you use the credential store on your local ServiceNow instance or an Active Directory credential store: Clear the check box to enable the **Enforce history policy** option for a credential store. See Configure the connection to a credential store for the Password Reset processes.
User must reset password	This check box is available only when **Auto-generate password** is selected. Select the check box to require users to reset their password immediately after logging in with the auto-generated password. **Note:** Users whose credentials are held in the local ServiceNow instance credential store are prompted to change their password the first time that they log in. Users whose credentials are held in an Active Directory credential store are not prompted to change their passwords in the instance. Such users must change their passwords from a computer on the domain.
Display password	This check box is available only when **Auto-generate password** is selected. Select the check box to display the new password on the screen. In a self-service process, the password appears on the user screen. In a service desk-assisted process, the password appears on the service desk agent screen.
Email/SMS password	This check box is available only when **Auto-generate password** is selected.

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Description of the fields on the Password Reset Details tab (continued)

Field	Value
	Select the check box to email or SMS the new password to the user. The setting is useful in both self-service and Service Desk assisted processes. The setting can add a layer of security by requiring that users access their email or SMS to view the password. In a Service Desk assisted process, sending password through email or SMS to users ensures that only the user requesting the password reset can view the password.

Related lists on the Password Reset Details tab

List	Description
Verifications	One or more verifications that the Password Reset process uses. See Password Reset verifications. The Verifications related list is available only after the record has been saved.
Groups	ServiceNow user groups to associate with the Password Reset process. The Groups related list is available only after the record has been saved and if the **Apply to all users** check box is cleared.

Description of the fields on the Advanced tab

Field	Description
Entry UI macro	UI macro that displays a customized message to users when they access the initial Password Reset screen.
Success UI macro	UI macro that displays a customized message to users on the final Password Reset screen when their password is successfully reset.
Failure UI macro	UI macro that displays a customized message to users on the final Password Reset screen when their password reset fails.
Post reset script	Script include that performs actions after the Password Reset process completes whether the outcome is success or failure. For more information on customizing post processor scripts, see the **Post reset** script category as described in Password Reset extension script categories.
Header UI macro or Footer UI macro	Macros that add a header or footer to customize the appearance of the pages that end users work in while resetting a password (the Identify, Verify, and Reset pages. See Add a custom header or footer to the user pages for Password Reset.

Related topics

Configure your Password Reset process

Password Expiration Configuration form

The Password Expiration Configuration form allows you to define how frequently users must update their passwords and receive reminder notifications before expiration.

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Access the Password Expiration Configuration form

To access the **Password Expiration Configuration** form, navigate to **All** > **System Properties** > **Password Expiration**.

Password Expiration Configuration form

Field	Description
Days password is valid	The number of days that you want a password to be set as valid. The default value is **90**.
Days prior to start reminders	The number of days required to send notifications before password expiration. For example, if you set it to 5 days, a notification is sent 5 days prior to password expiration. The default value is **10**.
Schedule Frequency	Frequency to send reminders, such as daily or periodically. The default value is **Daily**. If you select **Periodically**, then notifications are sent based on the period, for example, alternate days or once in three days.
Time zone	The time zone to send reminders.
Time	The time when you want reminder notifications to be sent.
Repeat Interval	The days and the time that you want to use to send reminders with a specific interval. For example, when you enter 2 days and time, the notification is sent alternate days on the time you specified. This field appears only when **Periodically** is selected from the **Schedule Frequency** field.
Start time	The time when you want a notification reminder to be started.

System properties for password expiration

You can configure the system properties that support operations in password expiration.

To navigate to the system properties, you can select **All** and then enter *`sys_properties.list`* in the navigation filter.

Properties for password expiration

Property	Description
pwd_reset.enable.password_expiration_reminder	Use this property to enable or turn off a password expiration feature. By default, the value of this property is **false**, which means that password expiration is turned off by default.

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Properties for password expiration (continued)

Property	Description
pwd_reset.enable.dbListener	Use this property to enable or turn off the password reset DB listener (to raise events). The default value is **true**, which means that the property is enabled by default. **Note:** If this property is enabled, the password expiration records are managed automatically while inserting or deleting user data. While importing bulk data, for each sys_user or sys_user_grmember insertion or deletion, password expiration records are inserted or updated for each password reset process that users are entitled to. Even if updating the expiration data is an asynchronous activity, this activity might impact the performance, if the number of users is high. In that case, disable the *pwd_reset.enable.dbListener* property by setting it to **false** so that there is not an event on insertion or deletion of sys_user or sys_user_grmember.
pwd_reset.password_expiration.error_count	Number of maximum attempts (if there is failure) while retrieving the expiration details from the external credential store for a user. The default value is **5**. The expiration record is deactivated if the error count exceeds the value of this property. This property is not available by default. To use the property, you must create it.
pwd_reset.refresh_expiration_data.duration	Duration, in days, to refresh the expiration details for a user whose password never expires. The default value is **30 days**. This property is not available by default. To use the property, you must create it.

Related topics

Configure password expiration reminder

Password Reset Credential Store form

Description of the fields on the Password Reset Credential Store form.

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Type	Type of credential store that you are connecting to. A ServiceNow credential store type is a template that provides the required set of capabilities for a particular kind of credential store. Credential stores inherit the functionality of the credential store type. **Note:** For an AD credential store, skip this procedure and see Integrate Password Reset with your Active Directory service. The Password Reset Windows Application supports only AD credential stores.
Auto generate password	Script include that generates a temporary password for use during the reset process. If you select the **Enforce history policy** check box, then you must specify a value for **Auto-generate password** that is compliant with the password policy.
Enforce history policy	Appears only if you select a credential store **Type** of **AD Credential Store** or **Local ServiceNow Instance**. For information on configuring the setting for an AD credential store, see Configure the connection to an AD credential store. Select the **Enforce history policy** check box to ensure that users do not reuse passwords. For example, you might configure the history policy to not allow the user to reuse any of the previous 10 passwords. Follow this procedure: 1. Select the **Enforce history policy** check box. 2. In the Password Reset Credential Store Parameters related list, create a *password_history_limit* parameter. 3. Set the value of the parameter to the number of previous passwords that cannot be used (maximum **10**). The default value of 0 (zero) enables use of any previous password.
Child Alias	Child aliases are associated with the base alias. After creating a connection and credential alias, you can create a child alias to configure multiple connections for a password reset credential store. When a password reset request is made, the flow checks whether there are child alias connections at the process level. If the child alias is configured at the credential store level, the flow picks the aliases connections and proceeds with the request.
Enable password policy	See Enable password policies on your instance
Password policy	You can use the default policy or define your own.
Hostname	URL or IP address of the credential store.
User account lookup	Script include that maps the user ServiceNow platform ID to the user credential store ID. A default script, *PwdDefaultUserAccountLookup*, returns the user ServiceNow platform user name.
Password rule hint	Specify the text that appears on the password reset page to help the user to create a password that meets all requirements. The **Password rule** script enforces the requirements.

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Note:
The Password Reset Windows Application supports newline characters in the hint. Other formatting is not supported (bold, underline, hyperlink, and so on).

Password rule	Specify the client script that validates the new password that the user enters. The script is invoked when the user enters a new password and clicks **Password Reset**. You can use the script to enforce password strength/ complexity requirements.
Enable Password Strength	Select the check box to: • Display the text box for the **Strength rule** script so you can update the script. • Display the graphical **Password Strength** bar to the user while the user changes or resets the password. **Note:** The Password Reset Windows Application does not support Password Strength.
Strength rule	This text box appears only if you select **Enable Password Strength**. Specify the client script that calculates the strength/complexity of the password that the user enters. The script is invoked when the user begins to enter a new password during the reset process. Default settings: • Selected for local ServiceNow credential stores • Not selected for other credential stores **Note:** • To guide the user during the reset process, the system displays a graphical bar labeled **Password Strength** under the **New password** field. • The Password Reset Windows Application does not support Password Strength.

Related topics

Configure the connection to a credential store for the Password Reset processes

Password Reset global properties

You can configure the Password Reset global properties.

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Password Reset properties

Property Label	Property Name	Description
Password Reset Global Properties		
Email template for enrollment reminder emails	password_reset.enroll_reminder.email_template	The instance can send email reminders to users who are not yet enrolled in the Password Reset process. Template to use for the email messages that remind users to enroll for the password reset process. See Send email to remind users to enroll for Password Reset.
Workflow polling frequency	password_reset.wf.refresh_rate	Time period in milliseconds between checks on status of the Password Reset workflow. • Type: integer • Default value: 500
Workflow expiration	password_reset.wf.timeout	Maximum wait time in milliseconds for the workflow to complete. The workflow is triggered during the password reset request when the user clicks **Submit**. • Type: integer • Default value: 90000
Disable CAPTCHA validation functionality	password_reset.captcha.ignore	Enables or disables CAPTCHA functionality. • Type: true|false • Default value: false The Password Reset application uses Google re-CAPTCHA as the default CAPTCHA service. To use the base system CAPTCHA, change the *password_reset.captcha.google.* system property to *false*. See Configure Google reCAPTCHA

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Password Reset properties (continued)

Property Label	Property Name	Description
Password Reset Request Properties		
Number of unsuccessful attempts allowed to resetting/ changing password	password_reset.request.max_attempt	Number of password reset attempts a user is allowed before they are locked out for a period determined by the value in *max_attempt_window*. • Type: integer • Default value: 3 (attempts)
Number of minutes a user needs to wait for resetting/ changing password after exceeding the maximum allowed unsuccessful attempts	password_reset.request.max_attempt_window	Time period that users are blocked or prevented from changing their passwords after trying the maximum number of times. • Type: integer • Default value: 1440 (minutes)
Number of minutes a user needs to wait to reset/change password after the last successful reset/ change	password_reset.request.success_window	Time period that a user must wait after successfully resetting the password to reset the password again. • Type: integer • Default value: 1440 (minutes)
Number of minutes a user needs to wait to start a reset request after the last successful unlock account.	password_reset.request.unlock_window	Time period that a user must wait after a successful unlock operation before starting a new request. • Type: integer • Default value: 1440 (minutes)
Number of minutes before a password reset request expires	password_reset.request.expiry	Time period during which a user must perform the Password Reset process. • Type: integer • Default value: 10 (minutes)

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Password Reset properties (continued)

Property Label	Property Name	Description
Number of hours before the password reset one time token validity expires	glide.pwd_reset.onetime.token.validity	Time period during which a user must perform the Password Reset process using the email link. • Type: integer • Default value: 12 (hours) **Note:** The setting for the `glide.pwd_reset.onetime.tok` property takes precedence over the setting for `password_reset.request.expi` when the **Email Password Reset URL** check box on the process record is selected.
Maximum number of times that a user can receive "Reset Password" link via email, in a span of 24 hours. The upper limit is 5.	password_reset.request.max_email	Maximum number of times a user can receive emails containing a link for resetting a password in a duration of 24 hours. For example, when you set the maximum number to 3, users would receive 3 emails in the duration of 24 hours. The maximum number you can set is 5.
Password Reset Security Question Properties		
Number of security questions required during the password reset request	password_reset.qa.num_reset	Number of security questions that are displayed on the Verify page while a user is attempting to reset the password. The user must answer all questions correctly to verify identity. The questions are selected at random and are presented in random order. • Type: integer • Default value: 3 (questions) • Possible values: Integers that are less than the

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Password Reset properties (continued)

Property Label	Property Name	Description
		number specified for the **Number of security questions required during enrollment** property (the *num_enroll* parameter). **Note:** You can override this property setting for a Password Reset process by configuring the *num_reset* parameter. See Specify the number of required security questions.
Number of security questions required during enrollment	password_reset.qa.num_enroll	Number of questions that a user must provide answers to while enrolling for the Password Reset process. • Type: integer • Default value: 5 • Possible values: Integers that are greater than or equal to the number specified for the **Number of security questions required during enrollment** property (the *num_reset* parameter).

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Password Reset properties (continued)

Property Label	Property Name	Description
		Note: • While attempting to verify identity, if a user answers a question incorrectly, the application refreshes with a random set of the specified questions in random order. You should, therefore, require more questions than specified for the **Number of security questions required during enrollment** property (the *num_reset* parameter). • You can override this property setting for a Password Reset process by configuring the *num_enroll* parameter. See Specify the number of required security questions.
Minimum length requirement for security answers	password_reset.qa.ans_min_len	Minimum number of alphanumeric characters that the user must enter in the answer text box for any security question. Default value: 3 characters
Password Reset SMS Code Properties		
Maximum number of SMS codes sent for verification per day	password_reset.sms.max_per_day	Maximum number of SMS codes that are sent to a user within one 24-hour period. The 24-hour period begins when a user clicks **Send Code**.

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Password Reset properties (continued)

Property Label	Property Name	Description
		• Type: integer • Default value: 10 (per day) **Note:** You can override this SMS code property by adding the *max_per_day* parameter in the SMS code verification.
Number of minutes before the user can attempt to send another SMS code for verification	password_reset.sms.pause_window	Time that must pass before another SMS code can be sent to a user. • Type: integer • Default value: 2 (minutes) **Note:** You can override this SMS code property by adding the *pause_window* parameter in the SMS code verification.
Number of digits in the SMS code sent to the user	password_reset.sms.default_complexity	Number of characters required for a user to reset their password. • Type: integer • Default value: 4 (digits) You can override this SMS code property by adding the *complexity* parameter in the SMS code verification.
Number of minutes before the SMS code expires	password_reset.sms.expiry	Time, in minutes, until the SMS code sent to the user expires. • Type: integer • Default value: 5 (minutes)

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Password Reset properties (continued)

Property Label	Property Name	Description
		Note: You can override this SMS code property by the *expiry* parameter in the SMS code verification.
Use Notify for SMS code notification for enrollment and verification	password_reset.sms.use_notify	Support for SMS channel used for notifying users for password reset enrollment and verification. If selected, the users would receive notifications through Notify. • Type: Yes|No • Default value: Yes **Note:** To use Notify, you must activate the Notify plugin (com.snc.notify).
Password Reset Soft PIN Properties		
Enable Soft PIN expiration	password_reset.softpin.expiration_enabled	Enables or turns off Soft PIN expiration for users. • Type: Yes|No • Default value: Yes Use this property when you want to let users know that their Soft PIN is expiring. You can enable sending reminders for Soft PIN expiration. If the users are resetting Soft PIN using the Virtual Agent,they view the corresponding messages with the number of days when the Soft PIN is going to expire.
The number of days after which the Soft PIN expires	password_reset.softpin.expiration_day	Number of days after which the Soft PIN expires. For example, if you set the number to 90, the Soft PIN

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Password Reset properties (continued)

Property Label	Property Name	Description
		will expire after 90 days are completed. The minimum limit is 30 days. Default value: 90
Enable Soft PIN expiration reminder	password_reset.softpin.expiration_reminder_enabled	Enables or turns off the Soft PIN expiration reminders. If selected, the users will not get any email notifications stating that their Soft PIN is expiring. • Type: Yes|No • Default value: Yes
The time at which the Soft PIN expiration reminder is sent. Format: HH:MM	password_reset.softpin.expiration_reminder_time	The time at which you want the users to receive the reminders. You must enter the value in the HH:MM format. Default value is 00:00 at system time zone.
The number of days that specify when to send a reminder before the Soft PIN expires	password_reset.softpin.expiration_reminder_warn_days	Number of days that specify when to send a reminder before the Soft PIN expires. For example, if you set the value to 5, users would get the reminder 5 days before their Soft PIN expires. Default value: 10
The number that sets a history limit on reusing previously used Soft PINs for the enrollment. Use any value from 1 to 30	password_reset.softpin.history_limit	Number of previous Soft PINs which can’t be reused for the enrollment. For example,if you set the number to 3, the users won't be able to use the same Soft PIN that's used in the previous 3 Soft PINs. You must use the number between 1 and 30. Default value: 5

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Password Reset properties (continued)

Property Label	Property Name	Description
Password Reset Monitoring and Reporting Properties		
Time interval, in minutes, for counting blocked users	password_reset.activity_monitor.incident_window	Time window to count the number of blocked users. • Type: integer • Default value: 60 (minutes)
Number of blocked users, in the defined time interval, that triggers a system log event	password_reset.activity_monitor.incident_threshold	Number of blocked (or locked) users, within the specified time window, that triggers a system log event. • Type: integer • Default value: 10 (blocked users)
Password Reset Style Sheet		
Style sheet to apply to end-user pages during the password reset process.	password_reset.stylesheet	Name of a custom CSS style sheet in the Style Sheet [content_css] table. You can use the default style sheet as a template for the custom style sheet. You cannot add element definitions to the style sheet. • Type: string • Default value: **css_pwd_reset_default**

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Note:
Several components in the Self Service Password Reset (`com.snc.password_reset`) plugin and the Password Reset (`com.glideapp.password_reset`) plugin control the password reset flow. The following properties affect Password Reset, but do not appear on the **Password Reset** > **Properties** page:

You can add the `glide.pwd_reset.onetime.token.validity` property to the System Properties [sys_properties] table to specify the number of hours that the Password Reset token should be valid. Default: 12.

Note:
The setting for the `glide.pwd_reset.onetime.token.validity` property takes precedence over the setting for `password_reset.request.expiry` when the **Email Password Reset URL** checkbox on the process record is selected.

Properties accessible from the System Properties [sys_properties] table:

- For Password Reset on mobile devices, you can specify the URL that the user is taken to when user taps the **Forgot password?** button. See the `glide.security.password_reset.uri` property in High Security Settings . Default: */$pwd_reset.do?sysparm_url=ss_default*
- If `glide.security.forgot_password.display.link` is set to **true**, displays the **Forgot Password?** link on the login page.

Related topics

Configure Password Reset properties

Verification types in the base system

Use a verification type in the base system as a template to design a custom verification.

Verification types in the base system

Verification type	Description
Personal Data Confirmation	Verifies user identity using data from the User [sys_user] table. The user data is displayed to a service desk agent. The agent verifies the data. Enrollment is not required for this type. Recommended for service desk-assisted processes. **Note:** The Password Reset Windows Application does not support the Personal Data Confirmation Verification type. See Personal data identification types and confirmation type verifications.
Personal Data	Verifies user identity using data from the User [sys_user] table. The user is required to answer questions. Enrollment is not required for this type. **Note:** The Password Reset Windows Application allows you to define and use multiple verifications of the Personal Data type.

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Verification types in the base system (continued)

Verification type	Description
	See Personal data identification types and confirmation type verifications.
Email Code	When a user requests password reset, the system sends a verification code to the email address in the user profile or to an email address that the user authorized during enrollment. To verify identity, the user then submits the code on the Password Reset **Verify** page. **Note:** The Password Reset Windows Application allows you to define and use multiple verifications of the Email Code type. See Personal data identification types and confirmation type verifications.
Google Authenticator	While requesting password reset, the user reads a code from the Google Authenticator app on a device that the user has paired. To verify identity, the user then submits the code on the Password Reset **Verify** page. **Note:** The Password Reset and Password Reset Windows Application support only a single verification of the SMS Code type.
Security Questions	Verifies user identity by presenting personal security questions that the user must answer correctly. **Note:** The Password Reset and Password Reset Windows Application support only a single verification of the Security Questions type. See Add a custom question to the Security Questions verification.
SMS Code	When a user requests password reset, the system sends a code to an SMS-capable device that the user has authorized. To verify identity, the user then enters the code on the Password Reset web page. **Note:** The Password Reset and Password Reset Windows Application support only a single verification of the SMS Code type. See SMS Code Verification type for Password Reset.
Mock	Not a functional identity verification. Demonstrates how to add a verification type in a Password Reset process. **Note:** The Password Reset Windows Application does not support the Mock verification type.

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Verification types in the base system (continued)

Verification type	Description
	• The enrollment UI macro for this verification gets the user input and returns the entered value in the enrollment processor. • The Password Reset UI macro for this verification gets input from the user and returns the entered value through the verification processor.

Related topics

Create a custom Password Reset verification

Create a custom Password Reset verification type

Password Reset Verification Type form

Description of the fields on the Password Reset Verification Type form.

Field	Description
Enrollment check	Script that determines whether a user is enrolled for verification. Automatic enrollment requires an enrollment check. If no script is specified when **Automatic Enrollment** is selected, a default script is provided.
Automatic enrollment	Select the check box to auto-enroll users. If **Automatic enrollment** is not selected, then you must provide an enrollment UI macro and enrollment processor script. For SMS and email verification, if the **Automatic enrollment** check box is selected and the user's mobile number and email address already appear in the sys_user table record, the user is enrolled for the corresponding verification. If the user's mobile number and email address aren't mentioned in the sys_user table, the user is not enrolled. **Note:** If the **Automatic enrollment** check box isn't selected, then even if the user's mobile number and email address appear in the sys_user table record, the user is not enrolled. The user must enroll manually by using the password reset enrollment process.
Enrollment UI	Enrollment UI macro that provides the UI for the enrollment.
Enrollment processor	Enrollment processor script that processes the enrollment.
Verification UI	Verification UI macro that provides the UI for the verification.
Verification processor	Verification processor script (extension scripts) that processes the verification.

Related topics

Create a custom Password Reset verification type

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Password Reset Verification form

Description of the fields on the Password Reset Verification form.

Field	Description
Type	Create verifications based on one of the verification types in the base system. Password Reset supports the following types. You can create multiple instances of any type. • Personal Data Confirmation Verification • Personal Data Verification • Security Question Verification • SMS Code Verification The Password Reset Windows Application supports the following types: • Personal Data Verification. You can create only a single instance. • Security Question Verification. You can create multiple instances. • SMS Code Verification. You can create only a single instance.
Order	Position of the verification as it appears on the Enrollment form and Password Reset form.
Password Reset Verification Parameters	Parameters used by a verification to configure specific behaviors, like number of questions required to enroll, request expiration time, and columns used. Set parameters for any behavior that should be different from the value that is specified in the Password Reset properties. The available parameters are described separately for each verification type.

Related topics

Create a custom Password Reset verification

Password Reset script includes

The Password Reset plugin installs script includes that implement password reset processes. To enable you to extend functionality, each base-system script include provides extension points that you can use to invoke "extension scripts" that you customized.

The extension script category refers to the specific types of behavior for an extension script (for example, credential store, verification, identification type, or as a post-processor).

'Enrollment check' script includes

All enrollment check script includes take the following parameters and return a boolean indicating whether the user is enrolled for Password Reset.

- `params.userId`: The sys_id of the user being checked (table: [sys_user]).
- `params.verificationId`: The sys_id of the verification being checked (table: [pwd_verification]).

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Name	Description
PwdAlwaysEnrolled	Default check of whether a user is enrolled that always returns true.
PwdMockIsEnrolled	Default check of whether a user is enrolled that always returns true.
PwdQuestionsEnrollmentCheck	Determines whether a user has enrolled for Password Reset using security question verification.
PwdSMSEnrollmentCheck	Determines whether a user has enrolled for Password Reset using SMS verification.

'Identification form processor' script includes

Identification form processor script includes provide functionality for extending identification processing.

All identification form processor script includes take the following parameters, and return the sys_id of the user that corresponds to the requested input. If the user was not identified, it returns null.

- `params.processId`: The sys_id of the calling Password Reset process (table: [pwd_process]).
- `param request`: The form request object. Fields in the form can be accessed with `request.getParameter('<element-id>')`. The supported request parameter is `sysparm_user_id`, the user identifier value entered in the form.

Name	Description
PwdIdentifyViaEmail	Verifies a user's identity by checking the email address.
PwdIdentifyViaUsername	Verifies a user's identity by checking the user name.

'Enrollment form processor' script includes

Enrollment form processor script includes provide functionality for extending enrollment form processing.

All enrollment form processor script includes take the following parameters, and return a boolean indicating whether the user was successfully enrolled.

- `params.userId`: The sys_id of the user trying to enroll (table: [sys_user]).
- `params.verificationId`: The sys_id of the verification used to enroll (table: [pwd_verification]).
- `params.enrollmentId`: The sys_id of this enrollment process.
- `request`: The form request object. Fields in the form can be accessed with `request.getParameter('<element-id>')`.

You should add the following information to the state of the enrollment process:

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- `gs.getSession().putProperty("result.status",status)`: Whether the user was successfully enrolled.
- `gs.getSession().putProperty("result.message",message)`: An associated message to be returned to the UI, such as a detailed error message.
- `gs.getSession().putProperty("result.value",value)`: A custom value associated with the enrollment.

Name	Description
PwdEnrollQuestionsProcessor	Handles questions and answers for verification.
PwdEnrollSampleProcessor	Provides an enrollment processor for sample verification.
PwdEnrollSMSProcessor	Provides an enrollment processor for SMS verification.

'User account lookup' script includes

User account lookup script includes return the credential store account_id for a given user.

The following parameter returns the credential store account_id for a given user.
`params.userId`: The sys_id of the user being checked (table: [sys_user]).

Name	Description
PwdDefaultUserAccountLookup	Provides a default script for user account lookup from a user_id to the account in a credential store. The default mapping is to use the user name as the account name.

'Password generator' script includes

Password generator script includes take the following parameter, and return an auto-generated string password.

`params.credentialStoreId`: The sys_id of the calling Password Reset process (table: [pwd_process]).

Name	Description
PwdDefaultAutoGenPassword	Generates a password from a random word and 4 digits.

'Verification processor' script includes

If the user identity is verified, the verification processor script includes return `true`.

Verification processor script includes take the following parameters:

- `params.resetRequestId`: The sys_id of the current Password Reset request (table: [pwd_reset_request]).
- `params.userId`: The sys_id of the user to be verified (table: [sys_user]).
- `params.verificationId`: The sys_id of the verification (table: [pwd_verification]).
- `request`: The form request object. Access the fields in the form with `request.getParameter('<element-id>')`.

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Name	Description
PwdVerifyPersonalDataConfirmationProcess	Verifies that the user accepts the answer.
PwdVerifyPersonalDataProcessor	Verifies that the user's answers match the expected data in the system.
PwdVerifyQuestionsProcessor	Provides question and answer verification of user input on the second page of the verification form.
PwdVerifySimpleProcessor	Provides simple verification of user input on the second page of the verification form.
PwdVerifySMSProcessor	Provides SMS verification of user input on the second page of the verification form.

'Post processor' script includes

Post processor script includes execute custom actions after the Password Reset process has completed.

All post processor script includes take the following parameters.

- `params.resetRequestId`: The sys_id of the current Password Reset request (table: [pwd_reset_request]).
- `params.wfSuccess`: A flag indicating whether the workflow completed successfully: True if, and only if, successful.

Name	Description
PwdPostProcessor	Executes actions after the process completes for success, failure, or both conditions.

Related topics

- Using extension points to extend application functionality
- Using scripted extension points in server-side scripts
- Using UI extension points in server-side UI macros
- Using client extension points in client-side UI scripting

Example custom scripts for Password Reset

The example scripts perform a user account lookup and processes an identification form, define a credential store, and create an identification type.

Perform a user account lookup and process an identification form

The main script calls two extension scripts, one to perform the user account lookup, and the other to process the identification form.

```
// User account lookup
var lookupExtensionSysId =
 getExtensionScriptSysId('SampleUserAccountLookupExtension',
 'user_account_lookup');
var lookupExtension = new
 SNC.PwdExtensionPoint(lookupExtensionSysId);
```

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```
// Setup parameters required for this extension type - userId
var params = new SNC.PwdExtensionPointParameter() ;
params.userId= 'joe.employee';

// Invoke the extension
var answer = lookupExtension.process(params);
gs.print('user: ' + answer);

//Form processor sample - Identification form processor
var identExtensionSysId =
 getExtensionScriptSysId('SampleIdentificationProcessorExtensio
n', 'identification_form_processor');
var identificationExtension = new
 SNC.PwdExtensionPoint(identExtensionSysId);

// Setup parameters required for this extension type - processId
var params = new SNC.PwdExtensionPointParameter() ;
params.processId = 'pwdreq1234';

// Simulate the posted form parameter for the indentification
 processor
var request = new SNC.PwdExtensionPointParameter() ; // A real
 life case will inject it's own request object
request.setParameter('sysparm_user_id', 'joe.employee');

var userIdentity = identificationExtension.processForm(params,
 request);
gs.print('identity: ' + userIdentity);

// Simple helper to return the sys-id for a given extension
 script
function getExtensionScriptSysId(scriptName, category) {
   var result;
   var now_GR = new GlideRecord('sys_script_include');
   gr.addQuery('name', scriptName);
   gr.addQuery('script', 'CONTAINS', 'category:
 \'password_reset.extension.' + category + '\'');
   gr.query();

   if (gr.next() ) {
     result = gr.getValue('sys_id');
   }
   return result;
}
```

Define a credential store

The following is an example of an extended process function in the User Account Lookup category used to define a credential store. To create this extension script, go to **Password Reset** > **Extensions** > **New extension script** and create a new script as described in Create an Extension Script. To configure the User Lookup in a Password Reset process, see Credential Stores.

```
<?xml version="1.0" encoding="UTF-8"?>
<record_update table="sys_script_include">
  <sys_script_include action="INSERT_OR_UPDATE">
```

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```
    <active>true</active>
    <client_callable>false</client_callable>
    <description>Simple account lookup that returns the supplied
 user id</description>
    <name>SampleUserAccountLookupExtension</name>
    <script><![CDATA[var SampleUserAccountLookupExtension =
 Class.create();
SampleUserAccountLookupExtension.prototype = {
  category: 'password_reset.extension.user_account_lookup', //
 DO NOT REMOVE THIS LINE!

  /**********
   * Returns the credential-store account id for a given user
   *
   * @param params.userId  The sys-id of the user being checked
 (table: sys_user)
   * @return              The credential-store account-id
 (string) for a given user
   **********/
  process: function(params) {
    return params.userId;
  },

  type: 'SampleUserAccountLookupExtension'

};]]></script>
    <sys_created_by>admin</sys_created_by>
    <sys_created_on>2013-07-30 16:44:55</sys_created_on>
    <sys_id>2df5a103d73201002bb9af728e610333</sys_id>
    <sys_mod_count>1</sys_mod_count>
    <sys_updated_by>admin</sys_updated_by>
    <sys_updated_on>2013-07-30 16:46:00</sys_updated_on>
  </sys_script_include>
  <sys_app_file action="INSERT_OR_UPDATE">
    <customer_update>false</customer_update>
    <publish_override/>
    <replace_on_upgrade>false</replace_on_upgrade>
    <restore/>
    <sys_app/>
    <sys_code>!!1W4/</sys_code>
    <sys_created_by>admin</sys_created_by>
    <sys_created_on>2013-07-30 16:44:55</sys_created_on>
    <sys_id>8306e143d73201002bb9af728e6103d3</sys_id>
    <sys_mod_count>0</sys_mod_count>
    <sys_name>SampleUserAccountLookupExtension</sys_name>
    <sys_parent/>
    <sys_path>!!1W4/</sys_path>
    <sys_policy/>
    <sys_source_deleted>false</sys_source_deleted>

 <sys_source_id>2df5a103d73201002bb9af728e610333</sys_source_id>
    <sys_source_table>sys_script_include</sys_source_table>
    <sys_type>code</sys_type>

 <sys_update_name>sys_script_include_2df5a103d73201002bb9af728e6
10333</sys_update_name>
    <sys_updated_by>admin</sys_updated_by>
```

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```
    <sys_updated_on>2013-07-30 16:46:00</sys_updated_on>
  </sys_app_file>
</record_update>
```

Create an identification type

The following is an example of an extended processForm function in the Identification Form Processor category that can be used to create an identification type. To create this extension script, go to **Password Reset** > **Extensions** > **New extension script** and create a new script as described in Create an Extension Script.

```
<?xml version="1.0" encoding="UTF-8"?>
<record_update table="sys_script_include">
  <sys_script_include action="INSERT_OR_UPDATE">
    <active>true</active>
    <client_callable>false</client_callable>
    <description>Script that processes an identification
 form.&#13;
Returns the sys-id of the user that corresponds to the requested
 input; if no user was found, null should be returned.&#13;
</description>
    <name>SampleIdentificationProcessorExtension</name>
    <script><![CDATA[var SampleIdentificationProcessorExtension
 = Class.create();
SampleIdentificationProcessorExtension.prototype = {
  category:
 'password_reset.extension.identification_form_processor', // DO
 NOT REMOVE THIS LINE!

  /**********
   * Process the identification form request, and returns the
 user's sys_id.  if user was not identified return null.
   *
   * @param params.processId   The sys-id of the calling
 password-reset process (table: pwd_process)
   * @param request           The form request
 object. fields in the form can be accessed using:
 request.getParameter('<element-id>')
   *                          Supported request paramters:
   *                              sysparm_user_id - the user
 identifier value entered in the form.
   * @return The sys-id of the user that corresponds to the
 requested input; if no user was found, null should be returned.
   **********/
  processForm: function(params, request) {
    return request.getParameter('sysparm_user_id') + '_' +
 params.processId;
  },

  type: 'SampleIdentificationProcessorExtension'

};]]></script>
    <sys_created_by>admin</sys_created_by>
    <sys_created_on>2013-07-30 17:00:28</sys_created_on>
    <sys_id>3a79a503d73201002bb9af728e610349</sys_id>
    <sys_mod_count>1</sys_mod_count>
```

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```
    <sys_updated_by>admin</sys_updated_by>
    <sys_updated_on>2013-07-30 17:08:41</sys_updated_on>
  </sys_script_include>
  <sys_app_file action="INSERT_OR_UPDATE">
    <customer_update>false</customer_update>
    <publish_override/>
    <replace_on_upgrade>false</replace_on_upgrade>
    <restore/>
    <sys_app/>
    <sys_code>!!1W5/</sys_code>
    <sys_created_by>admin</sys_created_by>
    <sys_created_on>2013-07-30 17:00:28</sys_created_on>
    <sys_id>4799ed03d73201002bb9af728e610333</sys_id>
    <sys_mod_count>0</sys_mod_count>
    <sys_name>SampleIdentificationProcessorExtension</sys_name>
    <sys_parent/>
    <sys_path>!!1W5/</sys_path>
    <sys_policy/>
    <sys_source_deleted>false</sys_source_deleted>

 <sys_source_id>3a79a503d73201002bb9af728e610349</sys_source_id>
    <sys_source_table>sys_script_include</sys_source_table>
    <sys_type>code</sys_type>

 <sys_update_name>sys_script_include_3a79a503d73201002bb9af728e6
10349</sys_update_name>
    <sys_updated_by>admin</sys_updated_by>
    <sys_updated_on>2013-07-30 17:08:41</sys_updated_on>
  </sys_app_file>
</record_update>
```

Use the process and processForm extensions

This example shows a script that uses two sample extensions, one *process* extension and one *processForm* extension.

```
// User account lookup
var lookupExtensionSysId =
 getExtensionScriptSysId('SampleUserAccountLookupExtension','use
r_account_lookup');
var lookupExtension =new
 SNC.PwdExtensionPoint(lookupExtensionSysId);

// Setup parameters required for this extension type - userId
var params =new SNC.PwdExtensionPointParameter();
params.userId='joe.employee';

// Invoke the extension
var answer = lookupExtension.process(params);
gs.print('user: '+ answer);


//Form processor sample - Identification form processor
var identExtensionSysId =
 getExtensionScriptSysId('SampleIdentificationProcessorExtension
','identification_form_processor');
```

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```
var identificationExtension =new
 SNC.PwdExtensionPoint(identExtensionSysId);

// Setup parameters required for this extension type - processId
var params =new SNC.PwdExtensionPointParameter();
params.processId='pwdreq1234';

// Simulate the posted form parameter for the indentification
 processor
var request =new SNC.PwdExtensionPointParameter();// A real life
 case will inject it's own request object
request.setParameter('sysparm_user_id','joe.employee');

var userIdentity = identificationExtension.processForm(params,
 request);
gs.print('identity: '+ userIdentity);

// Simple helper to return the sys-id for a given extension
 scriptfunction
getExtensionScriptSysId(scriptName, category){
var result;
var now_GR =new GlideRecord('sys_script_include');
   gr.addQuery('name', scriptName);
   gr.addQuery('script','CONTAINS','category:
 \'password_reset.extension.'+ category +'\'');
   gr.query();

   if(gr.next()){
     result = gr.getValue('sys_id');}return result;}
```

process function:

```
<?xml version="1.0" encoding="UTF-8"?><record_update
 table="sys_script_include"><sys_script_include
 action="INSERT_OR_UPDATE"><active>true</active><client_callable
>false</client_callable><description>Simple
 account lookup that returns the supplied user
 id</description><name>SampleUserAccountLookupExtension</name><s
cript><![CDATA[var SampleUserAccountLookupExtension
 =Class.create();
SampleUserAccountLookupExtension.prototype={
  category:'password_reset.extension.user_account_lookup',// DO
 NOT REMOVE THIS LINE!

  /**********
   * Returns the credential-store account id for a given user
   *
   * @param params.userId  The sys-id of the user being checked
 (table: sys_user)
   * @return              The credential-store account-id
 (string) for a given user
   **********/
  process:function(params){return params.userId;},

  type:'SampleUserAccountLookupExtension'
```

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```
};]]></script><sys_created_by>admin</sys_created_by><sys_created
_on>2013-07-3016:44:55</sys_created_on><sys_id>2df5a103d73201002
bb9af728e610333</sys_id><sys_mod_count>1</sys_mod_count><sys_upd
ated_by>admin</sys_updated_by><sys_updated_on>2013-07-3016:46:0
0</sys_updated_on></sys_script_include><sys_app_file
 action="INSERT_OR_UPDATE"><customer_update>false</customer_upda
te><publish_override/><replace_on_upgrade>false</replace_on_upgr
ade><restore/><sys_app/><sys_code>!!1W4/</sys_code><sys_created_
by>admin</sys_created_by><sys_created_on>2013-07-3016:44:55</sys
_created_on><sys_id>8306e143d73201002bb9af728e6103d3</sys_id><sy
s_mod_count>0</sys_mod_count><sys_name>SampleUserAccountLookupEx
tension</sys_name><sys_parent/><sys_path>!!1W4/</sys_path><sys_p
olicy/><sys_source_deleted>false</sys_source_deleted><sys_source
_id>2df5a103d73201002bb9af728e610333</sys_source_id><sys_source_
table>sys_script_include</sys_source_table><sys_type>code</sys_t
ype><sys_update_name>sys_script_include_2df5a103d73201002bb9af72
8e610333</sys_update_name><sys_updated_by>admin</sys_updated_by>
<sys_updated_on>2013-07-3016:46:00</sys_updated_on></sys_app_fil
e></record_update>
```

processForm function:

```
<?xml version="1.0" encoding="UTF-8"?><record_update
 table="sys_script_include"><sys_script_include
 action="INSERT_OR_UPDATE"><active>true</active><client_callable
>false</client_callable><description>Script that processes an
 identification form.&#13;
Returns the sys-id of the user that corresponds to the
 requested input;if no user was found,null should be
 returned.&#13;</description><name>SampleIdentificationProcessor
Extension</name><script><![CDATA[var
 SampleIdentificationProcessorExtension =Class.create();
SampleIdentificationProcessorExtension.prototype={

 category:'password_reset.extension.identification_form_processo
r',// DO NOT REMOVE THIS LINE!

  /**********
   * Process the identification form request, and returns the
 user's sys_id.  if user was not identified return null.
   *
   * @param params.processId   The sys-id of the calling
 password-reset process (table: pwd_process)
   * @param request           The form request
 object. fields in the form can be accessed using:
 request.getParameter('<element-id>')
   *                          Supported request paramters:
   *                              sysparm_user_id - the user
 identifier value entered in the form.
   * @return The sys-id of the user that corresponds to the
 requested input; if no user was found, null should be returned.
   **********/
  processForm:function(params, request){return
 request.getParameter('sysparm_user_id')+'_'+
 params.processId;},

  type:'SampleIdentificationProcessorExtension'
```

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```
};]]></script><sys_created_by>admin</sys_created_by><sys_created
_on>2013-07-3017:00:28</sys_created_on><sys_id>3a79a503d73201002
bb9af728e610349</sys_id><sys_mod_count>1</sys_mod_count><sys_upd
ated_by>admin</sys_updated_by><sys_updated_on>2013-07-3017:08:4
1</sys_updated_on></sys_script_include><sys_app_file
 action="INSERT_OR_UPDATE"><customer_update>false</customer_upda
te><publish_override/><replace_on_upgrade>false</replace_on_upgr
ade><restore/><sys_app/><sys_code>!!1W5/</sys_code><sys_created_
by>admin</sys_created_by><sys_created_on>2013-07-3017:00:28</sys
_created_on><sys_id>4799ed03d73201002bb9af728e610333</sys_id><sy
s_mod_count>0</sys_mod_count><sys_name>SampleIdentificationProce
ssorExtension</sys_name><sys_parent/><sys_path>!!1W5/</sys_path>
<sys_policy/><sys_source_deleted>false</sys_source_deleted><sys_
source_id>3a79a503d73201002bb9af728e610349</sys_source_id><sys_s
ource_table>sys_script_include</sys_source_table><sys_type>cod
e</sys_type><sys_update_name>sys_script_include_3a79a503d7320100
2bb9af728e610349</sys_update_name><sys_updated_by>admin</sys_upd
ated_by><sys_updated_on>2013-07-3017:08:41</sys_updated_on></sys
_app_file></record_update>
```


Password Reset extension script categories

You can use a custom extension script to extend Password Reset functionality for credential store, verification, or identification types.

Note:
To use a script include as an extension script, you must set it to **Active** status.

Password Reset extension script categories

Extension scripts must specify a category that indicates which script include is being extended, for example, `category: 'password_reset.extension.enrollment_check'`. The ServiceNow platform installs several scripts in each category. A script in the **Enrollment check** category can perform the enrollment check for a verification. Detailed information on each extension script appears in Password Reset extension scripts.

Extension script category	Description
Enrollment check	Defines how to check that a user is enrolled in the Password Reset process. Scripts of this category are available in the **Enrollment check** field when you define a verification type (Password Reset Verification Type form).
Enrollment form processor	Defines how an enrollment form is processed (if automatic enrollment is not configured). Scripts of this category are available in the **Enrollment form processor** field when you define a verification type (Password Reset Verification Type form).
Identification form processor	Defines how a user identification is processed. Scripts of this category are available in the **Identification processor** field when you define a verification type (Password Reset Identification Type form).
Password generator	Defines how to generate a password. Scripts of this category are available in the **Auto generate password** field when you configure a credential store (Password Reset Credential Store Type form).

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Extension script category	Description
Post reset script	Executes at the end of a Password Reset process. Scripts of this category are available in the **Post reset script** field when you configure a process (Password Reset Process form).
User account lookup	Defines how to look up a user account. Scripts of this category are available in the **User account lookup** field when you configure a credential store (Password Reset Credential Store form).
Verification form processor	Defines how a verification form is processed. Scripts of this category are available in the **Verification processor** field when you define a verification type (Password Reset Verification Type form).

Related topics

Password Reset extension scripts

Password Reset extension scripts

Extension scripts allow you to extend Password Reset functionality in credential store, verification, or identification types.

Password Reset extension script includes

Each script include is associated with a specific category, which is available in the appropriate field of a Password Reset form.

Note:
Create extension scripts only from the Password Reset Extension Script form (**Password Reset** > **Extensions** > **New extension script**). Extension scripts are special purpose script includes that are not created in the **System Definition** > **Script Includes** interface. To use a script include as an extension script, you must set it to **Active** status.

'Enrollment Check' script include category

Script include category	Description	Method signature	Input fields	Output fields
Enrollment Check	Checks whether a user is enrolled for a given verification.	process(params)	Parameters: • `params.userId` - The sys_id of the user to check (table: sys_user). • `params.verificationId` - The sys_id of the verification to check (table: pwd_verification).	Returns: (boolean) true, if the user is enrolled in the specified verification; otherwise, false.

This Enrollment Check example signals that the user is enrolled if both expected parameters are supplied. The code would be contained in the **Script** field of an extension script named `SampleEnrollmentCheck`:

```
var SampleEnrollmentCheck = Class.create ();
SampleEnrollmentCheck. prototype = {
```

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```
 category:'password_reset.extension.enrollment_check', // DO
NOT REMOVE THIS LINE!

  /**********
  * Returns boolean telling whether the user is enrolled.
  * This sample returns true if both parameters are supplied,
false otherwise
  *
  * @param params.userId         The sys-id of the user being
checked (table: sys_user)
  * @param params.verificationId The sys-id of the verification
being checked (table: pwd_verification)
  * @return Boolean indicating whether the user is enrolled
into the specified verification
  **********/
 process:function (params) {return (params.userId &&
params.verificationId)? true:false; },

 type:'SampleEnrollmentCheck'};
```

'Enrollment Form Processor' script include category

Script include category	Description	Method signature	Input fields	Output fields
Enrollment Form Processor	Checks whether all necessary information has been collected from the user. Stores the information so it can be used for verification when the user resets their password.	process(params)	Parameters: • *params.resetRequestId* - The sys_id of the current Password Reset request (table: pwd_reset_request). • *params.userId* - The sys_id of the user to be verified (table: sys_user). • *params.verificationId* - The sys_id of the verification to be processed (table: pwd_verification). • *request* - The form request object. Fields in the form can be accessed with request.getParameter('<element-id>'). The following information should be added to the state of the enrollment process: • gs.getSession().putProperty("result.status",status) - Whether the user was successfully enrolled. • gs.getSession().putProperty("result.message",message) - An associated message to be returned to the UI, such as a detailed error message. • gs.getSession().putProperty("result.value",value) - A custom value associated with the enrollment.	Returns: (boolean true, if th user is enrolled in the specifie verificati otherwis false.

This example processes an enrollment form submission successfully if the user-submitted response was success. The code would be contained in the **Script** field of an extension script named *SampleEnrollmentProcessor*.

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```
var SampleEnrollmentProcessor = Class.create ();
SampleEnrollmentProcessor.prototype = {
    category:
 'password_reset.extension.enrollment_form_processor', // DO NOT
 REMOVE THIS LINE!

     /**********
    * Process the enrollment form request, and return whether
 the user was successfully enrolled.
    *
    * @param params.userId         The sys_id of the user trying
 to enroll (table: sys_user)
    * @param params.verificationId The sys_id of the
 verification to be enrolled into (table: pwd_verification)
    * @param params.enrollmentId   The sys_id of this enrollment
 process
    * @param request               The form request object.
 Felds in the form can be accessed with
    *
 request.getParameter('<element-id>')
    * @return boolean telling whether the user was successfully
 enrolled
    * The following information should be added to the state of
 the enrollment process
    *     gs.getSession().putProperty("result.status",status) -
 whether the user was successfully enrolled
    *     gs.getSession().putProperty("result.message",message)
 - an associated message to be returned
    *             to the UI. Eg. a detailed error message
    *     gs.getSession().putProperty("result.value",value) -
 custom value associated with the enrollment
    **********/
    processForm:function (params, request) {var verificationId =
 params.verificationId; var sampleInput = request.getParameter
 ('sample_input');

  if (gs.nil (verificationId) || (sampleInput!= 'success'))
 { return false; }

  var now_GR = new GlideRecord ('sys_user');
 now_GR.get (params. userId);
 now_GR.print ('User:' + now_GR.getValue ('user_name') + '
 successfully enrolled'); return true; },
    type: 'SampleEnrollmentProcessor' };
```

'Identification Form Processor' script include category

Script include category	Description	Method signature	Input fields
Identification Form Processor	Processes an identification form request.	processForm(params, request)	Parameters: • *params.processId* - The sys_id of the calling Password Reset process (table: pwd_process). • *request* - The form request object. Fields in the form can be accessed with

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Script include category	Description	Method signature	Input fields
			`request.getParameter('<element-id>')`. Use `request.getParameter('sysparm_user_id')` to get the user ID that was entered into the form.

This example attempts to identify the user within the sys_user table given a user name submitted from the identification form. The code would be contained in the **Script** field of an extension script named *`PwdIdentifyViaUsername`*:

```
var PwdIdentifyViaUsername = Class.create ();
PwdIdentifyViaUsername. prototype = {
    category:
 'password_reset.extension.identification_form_processor', // DO
 NOT REMOVE THIS LINE!

    initialize: function () { },

   /**********
   * Process the identification form request, and returns the
 user's sys_id. If user was not identified return null.
   *
   * @param params.processId   The sys_id of the calling Password
Reset process (table: pwd_process)
   * @param request            The form request object. fields
 in the form can be accessed with
   *  request.getParameter('<element-id>')
   *  Supported request parameters: sysparm_user_id - the user
 identifier value entered in the form
   * @return The sys_id of the user that corresponds to the
 requested input;
   *  if no user was found, null should be returned
   **********/
  processForm: function (params, request) {var processId =
 params. processId; var sysparm_user_id = request.getParameter
 ('sysparm_user_id');
     now_GR = new GlideRecord ('sys_user') ;
     now_GR.addQuery ('user_name', sysparm_user_id) ;
     now_GR.query (); if (!now_GR.next ()) {return null; }
 return now_GR.sys_id;},

    type:'PwdIdentifyViaUsername' }
```

'Password Generator' script include category

Script include category	Description	Method signature	Input fields	Output fields
Password Generator	Returns an auto-generated password.	process(params)	Parameters:*`params.processId`* - The sys_id of the calling Password Reset process (table: pwd_process).	Returns: (String) an auto-

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Script include category	Description	Method signature	Input fields	Output fields
				generated password.

This example randomly generates a password from a base word and numbers. The base word is selected depending on the credential store. The code would be contained in the **Script** field of an extension script named *SamplePasswordGenerator*:

```
var SamplePasswordGenerator = Class.create ();
SamplePasswordGenerator. prototype = {
  category: 'password_reset.extension.password_generator', // DO
 NOT REMOVE THIS LINE!

   /**********
   * Returns an auto-generated string password.
   * This sample randomly generates 4 digits to add to the
 password.
   *
   * @param params.credentialStoreId The sys_id of the
 target Password Reset credential store to generate
   *  a password for (table: pwd_cred_store)
   * @return An auto-generated string password
   **********/
  process:function (params) { var basePassword ;

  var now_GR = new GlideRecord ('pwd_cred_store');
 now_GR.addQuery ('name', 'Local ServiceNow Instance');
 now_GR.query (); if (now_GR.next ()) { if
 (params.credentialStoreId = now_GR.getValue ('sys_id'))
   basePassword = "Password"; else
   basePassword = "Dorwssap"; } return this. generateSimple
 (basePassword); },

  generateSimple:function (base) {var pwd = base; var numbers =
 '0123456789'; var length = 4;

     for (var i  = 0 , n  = numbers. length ; i  < length ; i
 ++) {
        pwd += numbers.charAt (Math.floor (Math.random () * n) +
 1); } return pwd;},

  type:'SamplePasswordGenerator'} ;
```

'Post Reset' script include category

Script include category	Description	Method signature	Input fields	Output fields
Post Reset	Performs additional operations after the completion of the	process(params)	Parameters:	Returns: void

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Script include category	Description	Method signature	Input fields	Output fields
	Password Reset process.		• *params.resetRequestId* - The sys_id of the calling Password Reset process (table: pwd_process). • *params.wfSuccess* - A flag indicating whether the workflow completed successfully. True if, and only if, successful.	

This example adds failed reset requests to the system log. The code would be contained in the **Script** field for an extension script named *PwdPostProcessor*':

```
var PwdPostProcessor = Class.create ();

PwdPostProcessor. prototype = {
    category: 'password_reset.extension.post_reset_script', //
 DO NOT REMOVE THIS LINE!

    initialize:function () { },

     /**********
     * Execute custom actions after the Password Reset process has
 completed.
    *
    * @param params.resetRequestId The sys_id of the
 current Password Reset request (table: pwd_reset_request)
    * @param params.wfSuccess      A flag indicating if the
 workflow completed sucessfully.
    *  True if (and only if) successful.
    * @return no return value
    **********/
    process: function (params) {if (!params. wfSuccess) {
           now_GS.log ('[PwdPostProcessor.process] failure post
 processing for request [' + params. resetRequestId + ']'); }

         // We could place actions here that we always want
 executed return; },

    type:'PwdPostProcessor' }
```

'User Account Lookup' script include category

Script include category	Description	Method signature	Input fields	Output fields
User Account Lookup	Gets the credential store account ID for a given user.	process(params)	Parameters:*params.userId* - The sys_id of the user being checked (table: sys_user).	Returns: (String) the credential store account ID for the given user.

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This example gets the credential store account for a user. This code would be contained in the **Script** field of an extension script named *SampleUserAccountLookupExtension*:

```
var SampleUserAccountLookupExtension = Class.create ();
SampleUserAccountLookupExtension. prototype = {
  category:'password_reset.extension.user_account_lookup', // DO
 NOT REMOVE THIS LINE!

   /**********
  * Returns the credential store account id for a given user.
  * This sample echoes the user_id supplied as the credential
 store account id for that user.
  *
  * @param params.userId  The sys_id of the user being checked
 (table: sys_user)
  * @return              The credential store account id
 (string) for a given user
  **********/
  process:function (params) {return params.userId;},

  type:'SampleUserAccountLookupExtension' }
```

'Verification Form Processor' script include category

Script include category	Description	Method signature	Input fields	Output fields
Verification Form Processor	Processes a verification form request and indicates whether the user was verified or not.	processForm(params, request)	Parameters: • *params.resetRequestId* - The sys_id of the current Password Reset request (table: pwd_reset_request). • *params.userId* - The sys_id of the user to be verified (table: sys_user). • *params.verificationId* - The sys_id of the verification to be processed (table: pwd_verification). • *request* - The form request object. Fields in the form can be accessed with request.getParameter('<element-id>').	Returns: (boolean) true, if the user is verified; otherwise, false.

This example shows a verification processor that returns true only if the user sent **ok** in the input field; otherwise, it returns false. The code would be contained in the *Script* field of an extension script named *SampleVerificationFormProcessor*.

```
var SampleVerificationFormProcessor = Class.create ();
SampleVerificationFormProcessor.prototype = {
```

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```
 category:'password_reset.extension.verification_form_processor'
, // DO NOT REMOVE THIS LINE!

   /**********
   * Process the verification form request, and return whether
 the user was successfully verified.
   * This is a sample verification processor returns true only
 if the user sent "ok" in the input field;
   * otherwise, it returns false.
   *
   * @param params.resetRequestId The sys_id of the
 current Password Reset request (table: pwd_reset_request)
   * @param params.userId         The sys_id of the user trying
 to be verified (table: sys_user)
   * @param params.verificationId The sys_id of the verification
 to be processed (table: pwd_verification)
   * @param request               The form request object.
 Fields in the form can be accessed with
   * request.getParameter('<element-id>')
   * @return Boolean indicating whether the user is successfully
 verified
   **********/
  processForm:function (params, request) {if
 (request.getParameter ("sysparm_simple_input") == "ok") return
 true; else return false; },

  type:'SampleVerificationFormProcessor'};
```

Related topics

Extension points

Create a Password Reset extension script

Create extension scripts only from the Password Reset Extension Script form. Do not create extension scripts in the **System Definition** > **Script Includes** interface.

Before you begin

Role required: password_reset_admin or admin

Note:
To use a script include as an extension script, you must set it to **Active** status.

Procedure

1. Navigate to **Password Reset** > **Extensions** > **New extension script**.
2. Enter a name in the **Extension script name** field.
   Use CamelCase to construct a name without spaces, for example, `PwdEnrollmentCustom`.
3. Select an **Extension script category**.
   - Enrollment check
   - Enrollment form processor
   - Identification form processor
   - Password generator

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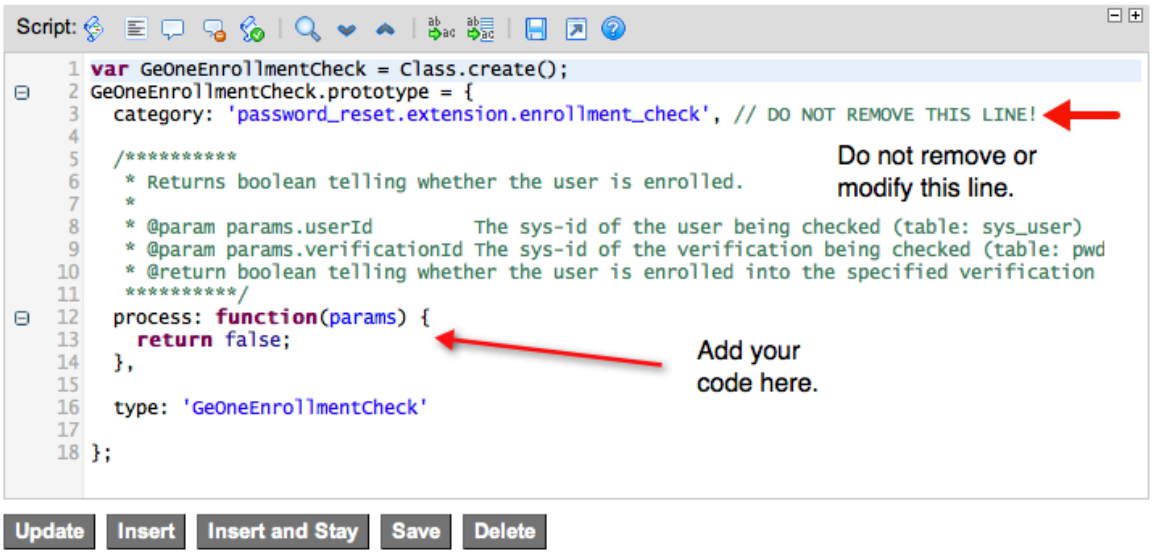
- User account lookup
- Verification form processor

4. Click **Submit**.
   A new instance of the script include for the selected category opens.
5. Edit the script by providing an implementation in the body of the process or `processForm` function, depending on the script category.
   You can add additional functions as long as the process or `processForm` function accepts the defined parameters and returns the expected results.

Note:
Do not edit or delete the `Category` declaration.



6. Click **Update**.

Password Reset and Password Change reports and logs

The Password Reset application provides several tools for monitoring and troubleshooting password reset activities.

Users with the password_reset_credential_manager or password_reset_admin role can view the status of password reset activities, identify potential security threats, and monitor for compliance with password security policies.

The **Reset Requests**, **Activity Log**, and **Blocked Users** modules are useful for monitoring password reset activities and for troubleshooting password reset issues. They also provide access to more detailed information than is provided on the Overview module.

To make room for new data, the system periodically purges the data that is used for password reset monitoring and reporting.

Password Reset Overview module

The **Password Reset** > **Overview** module displays reports on password reset and password change activities. Users with the password_reset_admin role can customize the layout of the reports that appear in the Overview module.

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Password Reset reports

Title	Description
Password Requests (last 7 days)	Number of password reset requests by type during the last 7 days.
Blocked Users (last 7 days)	Number of users blocked over the last 7 days.
Password Reset Request Status (last 7 days)	Status of all password reset requests by process.
Password Reset Request by Action (last 30 days)	Number of password reset requests by action type: **Reset Password**, **Unlock Account**, or **Reset and Unlock**.
Password Reset Top Users (last 30 days)	Number of password reset requests per user. Many password reset requests from a single user could indicate a security issue.
Password Reset Failed Verifications (last 7 days)	Number of failed verification attempts, by verification instance. A failed verification occurs when a user attempts to reset the password, but fails for one reason or another, during the identity verification step. Many failed verification attempts for a specific type of verification could indicate that the process is too complicated or unclear.
Password Reset Enrollment By Verification	Number of users by verification type who enrolled and did not enroll in the password reset program. A large number for users who did not enrolled could indicate a compliance or communication issue within the organization.
Password Change Top Users (last 30 days)	Number of password change requests per user. Many password change requests from a single user could indicate a security issue.

Password Reset activity log

The activity log (**Password Reset** > **Activity Log**) provides detailed information that you can use to troubleshoot and to generate reports on password reset metrics. Information contained in the activity log is stored in the Password Reset activity log [pwd_reset_activity] table.

You must have the password_reset_credential_manager or password_reset_admin role to view the log.

Password Reset event log

The event log is a valuable resource for troubleshooting. On the **Start** menu, click **Programs (or All Programs)** > **Administrative Tools** > **Event Viewer**.

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If the log does not appear, then, on the **Windows Logs** menu, click **Applications** > **Service Logs**.

You must have the admin role to view the log.

To write to the Password Reset event log

Edit the `DebugFlag` registry key entry at: `Computer > HKEY_LOCAL_MACHINE > SOFTWARE > Microsoft > Windows > CurrentVersion > Authentication > Credential Providers > {B6EFF27D-C1C4-481F-B81B-F3547C47D58A}`

By default, the key is set to 0. Set the key to 1 to write log entries to the `ServiceNowPwdReset` event log.

You must have the password_reset_credential_manager or password_reset_admin role to write to the log.

Password Reset blocked user notification

You can receive email notifications when the number of users that are blocked or locked exceeds the password blocked threshold. Notifications can alert you to suspicious activities. The default threshold is 10.

To subscribe: Add an email notification device or modify an existing device and then subscribe to the **Password Reset-Activity Monitor Lockout** notification.

You must have the password_reset_credential_manager or password_reset_admin role to subscribe.

Schedule for purging Password Reset data

To make room for new data, the system periodically purges the data that is used for password reset monitoring and reporting. Information contained in reports and monitoring tools could change dramatically immediately after a data purge.

Users with the password_reset_credential_manager or password_reset_admin role can follow this procedure to modify the purge interval:

1. On a non-production instance: Navigate to **Automated Test Framework** > **Administration** > **Table Cleanup**.
2. Modify the designated tables.
3. Test all changes on the non-production instance.
4. Modify the tables on your production instance and test.

Alternatively, contact ServiceNow Technical Support to modify the purge interval.

Purge intervals for Password Reset tables

Table name	Purge interval
[pwd_reset_request]	90 days (7,776,000 seconds). Depending on your organizational data monitoring requirements, you could configure the rule to: • Purge successful requests after 90 days • Keep failed requests for 120 days
[pwd_user_lockout]	90 days (7,776,000 seconds).

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Purge intervals for Password Reset tables (continued)

Table name	Purge interval
	Depending on your organizational data monitoring requirements, you could configure the rule to: • Purge successful requests after 90 days • Keep failed requests for 120 days
[pwd_reset_activity]	90 days (7,776,000 seconds).
[pwd_activity_monitor]	90 days (7,776,000 seconds).
[pwd_dvc_enrollment_code]	1 day (86,400 seconds).
[pwd_sms_code]	1 day (86,400 seconds).

Related topics

View user requests for password reset

Unblock a Password Reset user

Actions in Password Reset for Virtual Agent

The actions in the Virtual Agent use plugins.

- Password Reset (com.glideapp.password_reset): This plugin is active by default.
- Password Reset for Virtual Agent (com.snc.password_reset.virtual_agent): You must install this plugin to use Password Reset for Virtual Agent.

For more information about creating your password reset process, see Password Reset.

End users can initiate a password reset conversation with Virtual Agent by entering specific keywords. For example, when a user enters the keyword `Reset`, the Virtual Agent shows the **Reset Password** action. The users can select the action to initiate the password reset.

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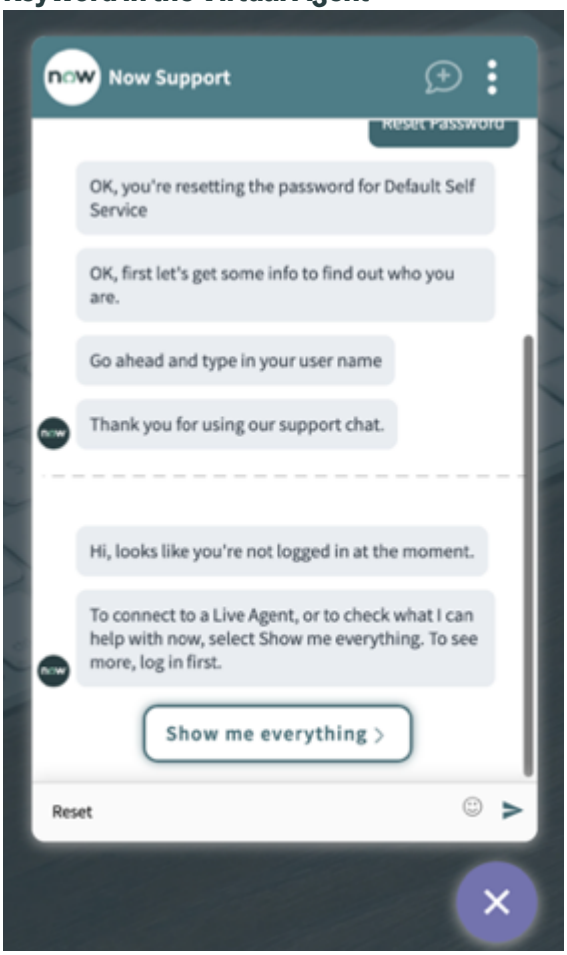
Keyword in the Virtual Agent



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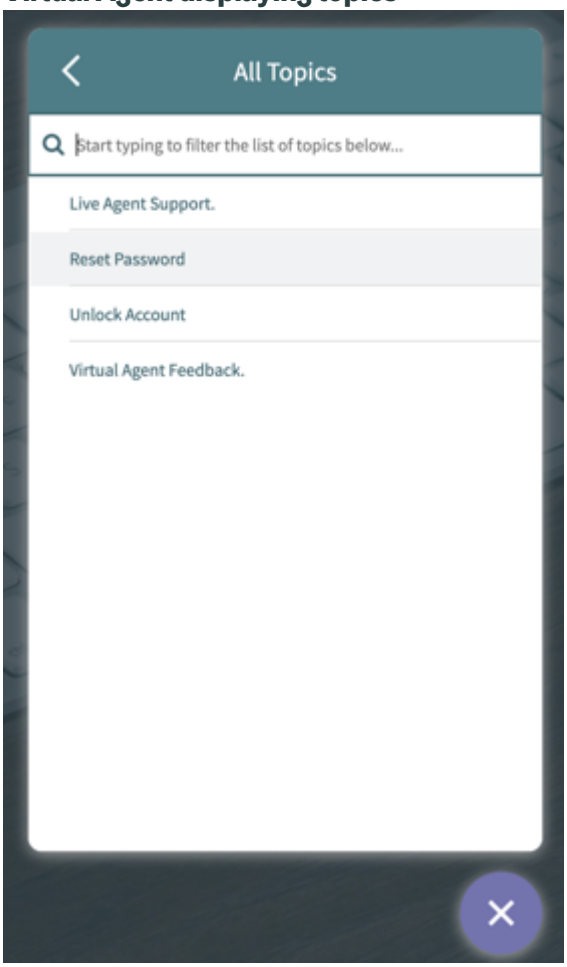
Virtual Agent displaying topics



Enrollment in Password Reset for Virtual Agent

You can let end users enroll for Password Reset verifications using the Virtual Agent. The Virtual Agent includes an enrollment topic and its topic blocks for each verification, such as SMS, email, security question, Soft PIN, or a third-party authenticator app. Users can select any of the topic blocks to enroll for verification.

You can modify the enrollment topic, but you must duplicate the default enrollment topic and then modify the duplicated topic.

Here's the enrollment flow in Virtual Agent:

1. Users select the enrollment topic in Virtual Agent.
2. Users select any one of these verification types:

   Security questions

   - If users aren't enrolled, Virtual Agent displays the questions, and users need to select questions and give answers to them.
   - If users are already enrolled, Virtual Agent shows options to the users to:
     - Change answers to the existing questions
     - Re-enroll

   Soft PIN

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- If the user isn't enrolled, Virtual Agent displays rules that are followed by a Soft PIN question. Users enter a valid Soft PIN and complete the enrollment.
- If users are already enrolled, they get a message asking whether to update existing Soft PIN enrollment.

  If users select **Yes**, Virtual Agent displays rules that are followed by a Soft PIN question.

  Users must enter a valid Soft PIN to complete the enrollment.

  Note:
  When users change the existing Soft PIN, they must use a new Soft PIN that must differ from the previously existing Soft PIN.

Third-party authenticator app

- If users aren't enrolled, they get a QR code and an alphanumeric code. Users can scan the QR code or enter the alphanumeric code in the authenticator app.
- If users are already enrolled, they get two options:
  - Generate a new QR code and an alphanumeric code
  - Disable multi-factor authentication

  If users select an option to generate a new QR, the new enrollment flow starts. If users select the other option, the multi-factor authentication gets disabled. If the multi-factor authentication is disabled, to re-enroll, users must enable it again.

Password Reset supports the following third-party authenticator apps:

- Google Authenticator
- Microsoft Authenticator
- Cisco Duo

Email and SMS

- If users aren’t enrolled, they can add new mobile devices for SMS verification or can add an email address for email verification.
- If users are already enrolled, they can view the list of enrolled mobile devices for SMS verification, or they can view an email address. For SMS, the users can verify, remove, or authorize mobile devices. For email, the users can verify or authorize the email address.

3. Users complete the enrollment.

Verification options for Password Reset for Virtual Agent conversations

The following verification options are supported in Virtual Agent conversations. Custom verifications are not supported in Virtual Agent.

- Personal data: The user provides specific pieces of personal data.
- Authenticator app: The user enters the generated code from the an authenticator app on a mobile device.
- SMS:The user enters the code received on a mobile phone.

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- Email:The user enters the code received in an email.
- Security question verification: The user enters the answers for the security question.

Soft PIN expiration framework for Password Reset

Virtual Agent supports expiration framework to account for Soft PIN verification during Password reset. As an end-user, you can use the existing Virtual Agent topic to enroll for Soft PIN enrollment to:

- Re-enroll when your Soft PIN has expires.
- Inform you of the number of days from the time you setup a new Soft PIN after which your token expires.
- Reset Soft PIN to account for history policies.
- Configure the topic to ask for password before proceeding to reset your Soft PIN.

Reset password conversation flow for Virtual Agent

1. Virtual Agent sends identity verification information to the end users based on the password reset process configuration.
2. Virtual Agent provides the reset steps if users successfully verify themselves with the given inputs.
3. Virtual Agent displays the password rules.
4. The user enters a new password, adhering to the password rules.
5. Virtual Agent prompts the user to reenter the password if the password does not meet the criteria.
6. Once the password meets the criteria, the Virtual Agent resets the password.
7. Users then log in using the new password.

Password reset flow using interactive voice response (IVR)

A user can reset a password using interactive voice response (IVR). For example, by using a phone call. A user gets the instructions for verification on a phone call. Once the verification is complete, the user receives an auto-generated password or an email containing a URL, which the user can use to reset the password based on the configuration of the process.

After resetting your password, the newly auto-generated password is spoken over IVR. If the Password Reset process is configured with an email or SMS, the password is also sent to the registered email and SMS.

The following verification types are supported over IVR:

- Authenticator app
- SMS
- Email

You can use the *sn_pwdreset_va.supported_channels* system property to enable the IVR or Microsoft Teams or both.

Note:
By default, the minimum character length is 8 characters. The maximum length in the password policy must be modified for a better experience over IVR.

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Change password conversation flow for Virtual Agent

1. The user initiates the Change Password action. The user selects the password reset process, or if only one process is available, the process is selected automatically.
2. Virtual Agent prompts the password guidelines or rules.
3. The user enters the old password, enters the new password, confirms the new password, and submits the request.
4. Virtual Agent shows the request status whether the password is changed or not.
5. If the password is changed, the users can use the new password to log in.

Unlock account conversation flow for Virtual Agent

When a user account is locked, the user can't log in to the account. But using the Virtual Agent, the user can unlock the account and log in.

1. Virtual Agent sends identity verification information to the end user based on the password reset process configuration.
2. Virtual Agent provides the verification information if the user successfully verifies their identity with the given inputs.
3. Once the user has been identified and verified, the Virtual Agent unlocks the user's account.

Note:
Users can also use the Microsoft Teams channel to unlock accounts and reset passwords.

Notify

Notify provides support for SMS and voice channels on the ServiceNow platform for communicating internally with team members and externally with customers and contractors. The plug-in also provides APIs and workflow activities to achieve the above. Some customers directly make use of the APIs in their products, and others via products like Major Incident Management, On-Call and CTI Softphone.

Explore	Configure
• Notify Twilio Direct driver • Notify Zoom connector • Notify voice and SMS capabilities • Notify Cisco Webex Connector • Notify connector for Microsoft Teams	• Activate Notify • Configure Notify with Twilio • Configure Notify Zoom connector in Notify • Configure a provider in Notify • Configure SMS opt-out preferences • Configure Notify Cisco Webex Connector • Install Notify connector for Microsoft Teams

Use	Reference

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(continued)

- Using Notify with SMS
- Using Notify for making conference calls
- Using Notify with tasks
- Using Notify with Incident Communications Management
- Using Notify with On-Call Scheduling
- Using the Notify Cisco Webex Connector with a major incident
- Use Notify connector for Microsoft Teams
- Differences between Notify-Twilio and Notify-Twilio Direct
- Notify workflow activities
- Components installed with Notify
- Developer training
- Developer documentation

Exploring Notify

Use and integrate Notify with the third-party service providers as a communication channel to meet with the stakeholders to resolve the incidents.

Notify Twilio Direct driver

The Notify-Twilio integration with the Notify-Twilio Direct driver provides APIs and workflow activities for applications to handle various notification features.

The Notify-Twilio Direct driver provides the following notification features:

- Start and manage a conference
- Send and receive SMS messages
- Send and receive calls

Notify automatically creates a TwiML application in the Twilio account and configures the application to use the instance as an endpoint.

Phone numbers associated with the Twilio account are imported to Notify. To manage phone numbers per instance, set up one Twilio account for each instance and configure all relevant phone numbers for the instance under that account.

Note:
Only one Twilio account (or subaccount) can be configured on a given Notify driver at a time. Both the old and new driver can be used simultaneously because they can be configured with different accounts.

The Notify-Twilio direct driver supports the use of API Keys and API Secret to make outbound REST API calls to Twilio. For more details, see API Key Resource.

To enhance the security, another set of user credentials are added in the system for the credentials in the form of Twilio API keys. The record contains the generated API key and the API secret as the username and password respectively.

Note:
Twilio Direct creates the Standard type API keys.

If the instance is connected to Twilio and you upgrade to Zurich, the Twilio will not be disconnected from your instance and continues to use the Account SID and Auth key. However, if the administrator disconnects Twilio from the instance and re-connect the Twilio service, the additional record will be created to enhance the security.

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Activation Information

For new customers, only the Notify-Twilio Direct driver is available by default. For customers upgrading to the latest version, both the Notify-Twilio Direct and Notify-Twilio drivers are available.

The Notify plugin must be active to access Notify.

Related topics

Configure Notify with Twilio

Notify Zoom connector

The Notify Zoom Connector expands the Notify communication channel by managing and initiating a Zoom meeting directly from any task record such as an incident or a change.

Compatibility

New York and later.

Key Features

- Start and end Zoom meeting directly from any task record such as incident, or a change or even from the Major incident Workbench.
- Manage a Zoom meeting by adding or removing participants.
- Track and report meeting details such as meeting duration and attendees for further analysis.

System Requirements

- Install and activate the Notify plugin (com.snc.notify) before you install the application.
- Ensure that the system has Zoom spoke, version 1.0.2, for ServiceNow Integration Hub plugin (sn_zoom_spoke) installed and the necessary Integration Hub license to use Zoom for meeting management.

Plugins

- ServiceNow IntegrationHub Installer (com.glide.hub.integrations): Suite of plugins necessary to design integration flows in the Workflow Studio application.
- The Zoom spoke, version 1.0.2 (com.sn.zoom.spoke) for ServiceNow Integration Hub provides actions that allow user to create and manage the conference meetings.

Notify voice and SMS capabilities

Notify provides support for SMS and voice channels for communicating internally with team members and externally with customers and contractors.

Notify provides a way for applications to start and manage a conference, send/receive SMS, send/receive calls and present them with IVR like system.

How Notify processes incoming calls

Notify processes incoming calls using workflow activities.

Any Notify activity that manages incoming phone calls creates a record on the Notify Workflow Activity [notify_wf_activity] table. Each notify_wf_activity record is associated with a single call. These records store JSON data detailing the actions to send to the telephony provider.

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Notify processes incoming calls in the following way:

1. A person calls a Notify phone number.
2. Notify launches the incoming call workflow associated with that Notify phone number.
3. The workflow reaches a Notify activity and invokes the activity `onExecute()` function.
4. The activity creates a new notify_wf_activity record detailing any actions to take, with a **State** value of execute.
5. Notify sends the specified actions to the telephony provider.
6. The notify_wf_activity record **State** changes to processed.
7. The telephony provider sends a response.
8. Response arguments, such as user input or recording info, are stored as JSON data in the notify_wf_activity **response_args** field.
9. The notify_wf_activity **State** changes to complete.
10. The JSON data from the notify_wf_activity record is copied to the **Last action** field in the Notify call record that triggered the workflow.
11. The workflow invokes the `onUpdate()` function in executing activities.
12. The activity confirms that the associated notify_wf_activity record has completed, and changes the activity state to finished.
13. The workflow transitions to the next activity.

Notify Cisco Webex Connector

Notify Cisco Webex Connector enables you to manage and initiate a Webex meeting directly from an incident.

Key Features

- Start and end Cisco Webex meetings directly from the major incident workbench.
- Manage a Cisco Webex meeting by adding or removing participants.

System Requirements

Install and activate the Notify plugin (com.snc.notify) before you install the application.

Install the ServiceNow IntegrationHub Installer (com.glide.hub.integrations) plugin to design the integration flows in the Workflow Studio application. For more information, see Request IntegrationHub.

Configuring Notify

Configure and use Notify application with the third-party applications in your environment to resolve the incidents.

Activate Notify

You can activate the Notify (com.snc.notify) plugin if you are an administrator. This plugin includes demo data and activates related plugins if they are not already active.

Before you begin
Role required: admin

About this task
Notify activates these related plugins if they are not already active.

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Plugins for Notify

Plugin	Description
E164 Compliant Phone Number [com.glide.phone_number]	Provides E-164 compliant phone number support.
SMS Preferences [com.snc.sms_pref]	Provides ability to set SMS preferences for receiving messages from different providers.

Note:
If you are upgrading from an earlier version of Notify, the Notify-Twilio driver remains active.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Related topics

List of plugins

E.164 phone number field configuration

Differences between Notify and Legacy Notify

Describes the differences between the Notify and Legacy Notify applications, including architecture, workflows, Twilio support, and task-initiated conference calls.

Legacy Notify (com.snc.notifynow)	Notify (com.snc.notify)
Is deprecated. Supported only telephony services.	Supports pure conferencing solutions such as Zoom in addition to the Telephony providers like Twilio.
Manage a single number from a Twilio account per instance.	Provides support for multiple numbers per Twilio account, especially cross-geographical scenarios.

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(continued)

Legacy Notify (com.snc.notifynow)	Notify (com.snc.notify)
Does not include support for customizable workflows for Voice and SMS incoming or outgoing scenarios.	Workflow-driven approach for handling incoming and outgoing Voice and SMS events, making the integration easy to customize.
Hard-coded join conference SMS and IVR prompts for joining a conference call.	Includes a configurable workflow for handling SMS and Voice IVR prompts.
Support for SMS-based answers.	Notify On Task support for sending SMS and initiating conference calls from any task.

Migrating from Legacy Notify

When migrating to Notify from the Legacy Notify functionality, several changes are made to the instance.

If the Legacy Notify functionality is already enabled, several automatic changes occur when you activate Notify:

- The Legacy Notify menu is removed from the application navigator.
- Two separators are added to the new Notify menu: **Legacy Notify** and **Legacy Notify Admin**. New modules that replace the Legacy Notify modules are added to these sections.

  Note:
  The added modules are not the same modules that were in the Legacy Notify menu. Any customizations made to the Legacy Notify modules are not preserved.

- The notify_admin role allows access to Notify modules.
- The notifynow_admin role allows access to Legacy Notify modules.
- All workflow activities from the Legacy Notify application are moved to the **Legacy Notify** group.

Configure Notify with Twilio

Configure Notify to use the Twilio telephony service.

Before you begin
You must have an SID and authentication token for an active Twilio account (https://www.twilio.com/). You must have a separate contract with Twilio.

You must exclusively use a Twilio account to connect your ServiceNow instance.

Important:
Ensure that each instance on which you configure Notify uses a different Twilio account. Each account specifies a unique account SID, authentication token, telephone numbers, and endpoint. Using the same account across multiple instances may cause your Twilio service configuration to be overwritten.

Account and sub-account are Twilio categorizations, and both act the same for a ServiceNow instance.

Role required: notify_admin

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Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Twilio Direct Configuration**.
2. On the Twilio Account Properties page, enter your **Account SID**.
3. Enter your **Auth Token**.
4. Click **Connect**.
   If the account is not associated with an instance and the connection is successful, a read-only list of E.164 and short code phone numbers associated with this Twilio account appears. This list displays the phone number, supported capabilities such as voice or SMS, the country for each Twilio number, and the Notify number group to which the number belongs.

   If the account is already associated with an instance, the system displays an error message. To connect to this account,

   - Disconnect the account from the instance.
   - Delete the TwiML apps in the Twilio account.

Note:
If you buy or release numbers on the Twilio account, open the configuration page again to refresh the list of numbers. Numbers removed from the Twilio service remain as Notify Number records, but with the **Active** field set to false. Use only active phone numbers for inbound or outbound communication.

What to do next

Phone numbers and short codes are provided by Twilio once the account is successfully connected and are stored on the Notify Phone Numbers [notify_number] table. Assign each number to a number group. Number groups allow you to control which workflows run when using the phone numbers in each number group.

Twilio-Direct callback testing

Make an outgoing call or send an SMS using Twilio and trigger callbacks to ServiceNow to test whether Twilio can reach the instance. You can also view when the last callback test was run, its status, and the test logs.

Before you begin

Role required: notify_setup_admin, notify_admin

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Twilio Direct Configuration**.
2. Click **Test Callbacks**.
3. Select the SMS option and click **Initiate SMS**.
4. Select the call option and click **Initiate Test Call**.

Note:
The callbacks can be tested only after a connection is established with Twilio.

Advanced configuration for SMS

Use the Twilio co-pilot features to improve SMS delivery with phone number like using multiple numbers to send high-volume messages and content intelligence to automatically format every message without writing custom code. Reach large lists of users with one API request.

Before you begin

Role required: notify_admin

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About this task

The Twilio co-pilot features are enabled in your instance once configured. An example of a copilot feature is that you can configure which identity (phone number, shortcode, or alpha sender ID) to use to send a message. You can also spread the messaging traffic over several phone numbers or prioritize an alpha sender ID when sending messages to countries where alpha senders are commonly used. To know more about these features, visit https://www.twilio.com/copilot.

Important:
All the Twilio numbers must be part of the same messaging service for which you have enabled the **Advance SMS Features** feature.

The Twilio Notify bulk SMS feature is used to send SMS in bulk to customers. Use the passthrough `sendBulkSMS` API to reach large number of users across using a single API request. For more information on these features visit https://www.twilio.com/notify

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Twilio Direct Configuration**.
2. On the Twilio Account Properties page, enter your **Account SID**.
3. Enter your **Auth Token**.
4. Click **Connect**.
5. On the **Advance SMS Features** tab, check the **Intelligent SMS Handling** box.

   Note:
   To setup Alpha Sender ID, users need to go to Twilio console.

   When you enable **Intelligent SMS Handling**, the "Messaging Service SID" is used to send the SMS even if a Twilio number is used in Notify.sendSMS API.

6. On the **Advance SMS Features** tab, check the **Twilio Notify Bulk SMS** box.

   Note:
   This feature uses Twilio Notify feature and might have an associated cost. Contact Twilio Support for more details.

Related topics

Using Notify with SMS

Advanced configuration for voice

Configure Answering Machine Detection (AMD) to determine if a human has picked up the call or not.

Before you begin

Role required: notify_admin

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Twilio Direct Configuration**.
2. On the Twilio Account Properties page, enter your **Account SID**.
3. Enter your **Auth Token**.
4. Click **Connect**.

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5. On the **Advance Voice Features** tab, check the **Detect answering machine**box.
6. On the **Advance Voice Features** tab, enter the number of seconds in the **Machine detection timeout** field to set a timeout value.

Disconnect from a Twilio account

If a Twilio account is already associated with a different system, disconnect the account from the other system before connecting to the current instance.

Before you begin
Role required: notify_admin

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Twilio Direct Configuration**.
2. On the Twilio Account Properties page, click **Disconnect**.
3. In the Disconnecting Twilio account pop-up window, click **OK**.

   The account is disconnected from the instance. The system clears the **Account SID** and **Auth Token** fields and deactivates the list of associated phone numbers.

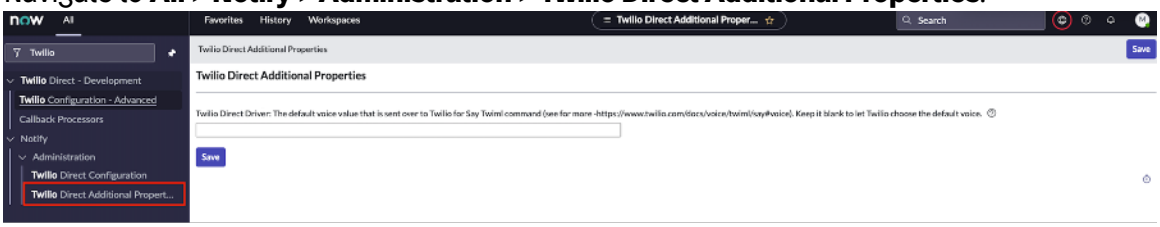
Configure Amazon Polly as default voice tone for text to speech

You can configure Amazon Polly as the default voice by overriding the default voice tone for text to speech.

Before you begin
Role required: notify_admin

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Twilio Direct Additional Properties**.



2. In the Twilio Direct driver property field, enter the preferred voice tone.

   For example: "`Polly.Joanne`". The ServiceNow® instance passes Polly.Joanne value to the Twilio service and renders the voice in Joanne's tone.

   If you have a new *`San Diego`* or a higher version instance, the voice property will not be defined by default and the voice settings at Twilio will be considered. For more information on Amazon Polly voice, see Twilio Text-to-speech. However, if you are upgrading to *`San Diego`* or a higher release version, the default voice property will be "alice".

   Note:
   If you are defining the property in your ServiceNow® instance, the Twilio voice settings are overridden.

Configure Notify Zoom connector in Notify

Configure Notify to receive the event information from Zoom. An event is usually any action that is related to a meeting.

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Before you begin

Role required: notify_setup_admin

Procedure

1. Navigate to **All** > **Notify** > **Zoom** > **Configuration**.
2. On the zoom configuration table, select **Main**.
3. On the form, fill in the details:

Zoom config

Field	Description
Webhook secret token	Copy the verification token that you recorded on Zoom Event Subscription screen. The Webhook secret token is used to verify event notifications sent by Zoom provider. **Note:** This is a mandatory field.
Run subflow on conference change	Subflow that is run when zoom conference call is started, or participants are added to the call.
Do not set password	Select the check box to not set password for Zoom conferences.
Zoom transcript handling	Select on how you want the Zoom transcript to be handled when you record the meeting in Zoom and after the meeting ends. Available options: ○ Do not process or store the transcript - The transcript is not processed and stored in the system. ○ Store only the link to the transcript - The URL link to the transcript that is sent by the Zoom provider is stored in the system. This is the default value. ○ Download and store the transcript as attachment - The transcript is downloaded from the Zoom server and stored in the system. as an attachment in **.vtt** format. **Note:** By default, this field is set to **Store only the link to the transcript**.
Store zoom summary	Select the check box to store the Zoom summary that is sent by Zoom provider.

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Field	Description
	Note: By default, this check box is cleared.

4. Select **Update**.

What to do next

Configure and use Zoom as a conference provider from any of the task records.

Note:
The person creating the conference is the host of the conference and must have their email set in their ServiceNow profile and use the same email for the Zoom account.

You must sign in to the browser in order to direct to the Zoom client. However, if you are not signed in, you must provide your registration details.

Related topics

Configure a provider in Notify

Start a conference call

Set up Notify Zoom connector in Zoom

Use the Notify Zoom connector to expand the Notify communication channel by managing and initiating a Zoom meeting directly from any task record such as an incident or a change.

Before you begin

Role required: notify_setup_admin, Zoom admin

1. Ensure that you have Zoom spoke installed on your instance.
2. Make sure you have the required credentials and connections to Zoom on your instance.
3. Configure the Notify Zoom connector with the same Zoom account with which you created the OAuth app for Zoom spoke.

Procedure

1. On your Zoom OAuth app, navigate to **Feature** > **Add Feature** > **Event Subscription**.
2. Use the toggle button to enable the event subscription feature.
3. In the form that appears, fill in the URL using the following URL format: https://yourinstancename.com/api/sn_notify_zoom/notify_zoom/ZoomEvent
   The URL is used to post information about events in Zoom to your instance.
4. Use the **Add Events** button to list all the events which Zoom is informing Notify about.
5. In the categories that appear, select **Meeting** and select all the meeting-related events from the list and click **Done.**
6. Under **Recording**, select **All Recordings have completed** and **Recording Transcript files have completed** from the list and click **Done**.
7. Click **Save**on the Add feature screen.
   A *`Verification Token`* appears on the Add Feature screen.
8. Record the token by clicking **Copy**.

What to do next

Configure Notify with the verification token from Zoom.

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Related topics

Configure Notify Zoom connector in Notify

Disable Zoom meeting password

Disable Zoom meeting password so that you can join a Zoom meeting without any meeting password.

Before you begin

Role required: notify_admin or notify_setup_admin

Procedure

1. Navigate to **Notify** > **Zoom** > **Configuration**.
2. Select **Do not set password**.
3. Click **Update**.

Configure a provider in Notify

Configure a conference provider or a phone number to be used as choices for initiating a conference call. For sending SMS, configure preferences for phone numbers.

Before you begin

Role required: notify_admin

About this task

Procedure

1. Navigate to **All** > **Notify** > **Provider Selector**.
2. Click **New**.
3. On the form, fill in the fields.

Provider selector fields

Field	Description
Name	Name of the provider you are adding.
Order	Order in which the provider appears when multiple providers are configured.
Source table	The table to which this provider needs to be added.
Condition	Conditions on the source table based on which provider selectors is applied.
Active	Indicates whether the provider is active.
Catch-all	Selects this provider if no other Provider Selector matches.
Manual selection	Disables the automatic selection of this provider, for example, if in a communication plan you want to use this provider only as a forced communication channel.

4. Click **Submit.**

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5. In the Provider Selector Choices section, click **New.**
6. Search for the conference provider or the Notify group that contains the phone numbers for initiating a conference.
   For sending SMS, search for the Notify group that contains the phone numbers.
7. Click **Submit.**

Configure SMS opt-out preferences

Allow recipients to opt out of receiving text messages.

Before you begin

Role required: notify_setup_admin, notify_admin

About this task

According to regulations in the CTIA Short Code Monitoring Handbook, recipients must be allowed to opt out of receiving text messages. The opt-out functionality is applicable only to Notify. When the user sends an SMS message with an opt-out keyword to any Notify number, the user is opted out of receiving messages from only the Notify number to which the message has been sent, not from all Notify numbers on that instance.

Important:
The Advanced opt-out feature is automatically enabled for short code and long code numbers associated with a Messaging Service. For more information, refer Getting Started with Advanced Opt-Out for Messaging Services. As this feature is a duplicate of the Twilio's new Advanced Opt-out feature, you should not activate the feature for numbers that are part of Messaging Service. For long code numbers that are not part of a Messaging service, Twilio handles the opt-out for default stop keywords listed at Twilio support for opt-out keywords.

This feature is disabled by default and holds significance for short-code and long codes that are not part of Messaging Service. To enable this feature, the Notify admin.

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **SMS Preference Configuration**.
2. Click **New** in the SMS Preference Configuration window.
3. Fill in the form fields.

SMS configuration preference fields

Field	Description
Provider	Select the provider for which you are configuring the SMS preferences.
Name	A user-friendly name for the configuration.
Order	Order in which the preference configurations apply. If you have multiple configurations, this field indicates which configuration to consider first.
Default preference	The default preference for the configuration. The two options are:

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Field	Description
	○ **Opt-in**: Users by default will receive SMS messages. ○ **Opt-out**: Users by default will not receive SMS messages. They can start receiving SMS messages from a specific Notify number after sending a message with an opt-in keyword like START or BEGIN.
Enable for long code	Option that enables the opt-out feature for long code or toll-free numbers.
Enable for short code	Enables the opt-out feature for short codes only.
Opt-out keywords	Keyword replies that prevent a customer from receiving new messages from the phone number they're responding to. You can configure standard keywords such as STOP, STOPALL, END, CANCEL, QUIT, and UNSUBSCRIBE.
Opt-out confirmation message	Customized confirmation message to send to customers when they opt out of receiving SMS messages.
Opt-in keywords	Customized confirmation responses that enable customers to receive the messages coming from a phone number. You can configure standard keywords such as START, UNSTOP, and YES.
Opt-in confirmation message	A customized confirmation message to send to customers when they opt in to receiving SMS messages.

4. Click **Submit**.

Configure Notify Cisco Webex Connector

Configure the Notify Cisco Webex Connector in your environment to be able to use Cisco Webex application for making conference calls.

Install Notify Cisco Webex Connector

You can install the Notify Cisco Webex Connector application (sn_notify_webex) if you have the admin role.The application includes demo data and installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Confirm that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application .

Role required: notify_setup_admin

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Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Notify Cisco Webex Connector application (sn_notify_webex) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   In the list next to the **Install** button, the versions that are available to you are displayed.
3. Select a version from the list and select **Install**.

   In the Review Installation Details dialog box, any dependencies installed with your application are listed.
4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data are the sample records that describe application features for common use cases. Load the demo data when you first install the application on a development or test instance.
6. Select **Install**.

Create a Cisco Webex app

Create an app in Cisco portal to make outbound calls from an incident using Webex.

Before you begin

Role required: Cisco admin

Procedure

1. Log in to Cisco admin portal.
2. Navigate to **Start Building Apps** > **Start Building Apps** > **Create a New App** > **Create an Integration**.
3. On the form, fill the details for the integration app.

   a. **Will this integration use a mobile SDK**: Select **No**.

   b. **Integration name**: Option to provide the name for the Notify with Cisco Webex app.

   c. **Icon**: Option to choose an icon for the app.
   Select upload to select an icon for the Cisco Webex app.

   d. **Description**: A brief description of the app.

   e. **Redirect URI(s)**: URL of your ServiceNow instance.
   The URL should be of the format: "http://<instance_url>/oauth_redirect.do" where <instance_url> is your instance URL.

   f. **Scopes**: Option to select the scopes that are required for conference calls.
   Select **meeting:admin_participants_read**, **meeting:admin_schedule_read**, **meeting:admin_schedule_write**, and **spark:all**.

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g. Select **Add Integration**.

The app is successfully created. Save the **Client ID** and **Client Secret** by clicking on the **Copy** button in a notepad.

You must update the **Client ID** and **Client Secret** values in your ServiceNow instance.

Configure OAuth entity for Notify Cisco Webex

Configure the Cisco Webex as an OAuth provider and allow the ServiceNow instance to request OAuth 2.0 tokens.

Before you begin

Role required: notify_setup_admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Select **Cisco Webex Teams spoke**.
3. Update the following values in the application registry.
   - **Client ID**: Paste the client ID generated while creating the Cisco integration app.
   - **Client Secret**: Paste the client secret generated while creating the Cisco integration app.
   - **Redirect URL**: Provide your instance details of your ServiceNow instance. The URL should be of the format "http://<instance_url>/oauth_redirect.do" where <instance_url> is your instance URL.
4. Select **Update**.
5. Select **OAuth Entity Scopes** tab.

   The following scopes are available by default:
   - meeting:admin_participants_read
   - meeting:admin_schedule_read
   - meeting:admin_schedule_write
   - spark:all

Create an OAuth credential record for Notify with Cisco Webex

Create a credential record for the Notify with Cisco Webex account.

Before you begin

Role required: notify_setup_admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select **OAuth 2.0 Credentials**.
4. On the form, fill these values.

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OAuth 2.0 Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, Cisco Webex Teams Cred.
Active	Option to actively use the credential record.
OAuth Entity Profile	OAuth profile created during the registration of Cisco Webex Teams as an OAuth provider. For example, Cisco Webex Teams OAuth Profile.
Applies to	Option to specify if the credential applies to all MID Servers in your network, or to one or more **Specific MID servers**. Specify the MID Servers that should use this credential in the **MID servers** field.
Order	Order to apply this credential. For example, 100.
Credential alias	Credential alias associated with the spoke.

5. Right-click the form header and click **Submit**.
6. Select the **Get OAuth Token** related link.

   You must log in to Cisco Webex account to retrieve the token details.

   Enter the email address of the Cisco account that connects your ServiceNow instance with Cisco Webex portal. This email address should be unique and can't be assigned to any user. Ex: cisco_servicenow@webex.com.

   On successful authentication, a confirmation message is displayed on the header.

Create a connection and credential alias for Notify connector for Cisco Webex Spoke

Create a credential record for the Notify connector for Cisco Webex account. The Notify connector for Cisco Webex Spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: notify_setup_admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select the **CiscoWebexTeams** record.
3. Select **New** under **Connections** tab.
4. On the form, fill these values.

Connection & Credential for Cisco Webex Teams

Field	Description
Name	Name for the HTTPS connection record for Cisco Webex Teams spoke

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Field	Description
Credentials	Name of the credential created for Cisco Webex Teams spoke Provide the value created in “Create a OAuth credential record for the Cisco Webex Teams spoke”.
Connection URL	Option to provide the connection URL. Provide the value as https://webexapis.com

5. Right-click the form header and click **Submit**.

Make Notify Cisco Webex Connector as default communication channel

Make Notify Cisco Webex Connector as a default communication channel to initiate a meeting to resolve the major incidents.

Before you begin

Role required: notify_setup_admin

Procedure

1. Navigate to **All** > **Notify** > **Provider Selector**.
2. Select **New**.
3. On the form, fill in the fields.

Provider Selector

Field	Description
Name	Name of the provider you are adding. For Example, Notify Cisco Webex.
Order	Order in which this provider appears when multiple providers are configured.
Source table	The table to which Notify Cisco Webex must be added. For Example: incident.
Active	Option for indicating whether Notify Cisco Webex as a provider is active.
Default	Option for making Notify Cisco Webex the default provider if other notify providers like Zoom or Twilio are configured. Enable the default option.

4. Select **Submit**.
5. Select the newly created service provider.
6. In the **Provider Selector Choices** section, select **New**.

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a. Select **Webex** as the conference provider.

7. Select **Submit**.

Manage Notify properties

Manage the Notify Webex Connector application properties to configure the meeting capabilities.

Before you begin

Role required: notify_setup_admin

Procedure

1. Navigate to **All** > **Notify** > **Administration** > **Notify Properties**.
2. On the form, fill the fields.

Notify properties

Field	Description
Enable Notify integration for Task table and extensions	Option to enable Notify integration for Task table and extensions. Select the check box.
Enable Notify integration for Incident Communications Management. Entering phone number in 'com.snc.iam.notify_number' property is equivalent to setting this to true.	Option to use Notify Webex Connector for incident and major incident-related records. Select the check box.

3. Select **Save**.

Using Notify

Use the service providers to schedule the conference calls with the stake holders to resolve the incidents.

Using Notify with SMS

Send and receive SMS messages using Notify.

Notify stores inbound and outbound SMS messages in the Notify Messages [notify_message] table.

Notify supports sending concatenated SMS messages. Messages that exceed 160 characters, or 70 unicode characters, are split into multiple messages. This may affect your total telephony cost because each message can incur a cost. Some mobile carriers, such as Sprint, do not support concatenated SMS messages.

To send SMS messages to an individual recipient, use the Notify API `sendSMS` method. This method takes one recipient as an input parameter. You can also use the **send SMS** workflow activity.

To send SMS messages to one or more recipients, use the Notify API `sendBulkSMS` method. This method takes a list as an input parameter and uses one API call to send multiple messages.

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Include the list of phone numbers in an array in the API call. This method improves performance by streamlining platform checks and Notify number validation.

Note:
When using *SNC.Notify.sendBulkSMS* API, instead of simply iterating over the numbers, all the given numbers are sent for SMS to Twilio in one API call. This happens only when Twilio Direct driver is active and Twilio Notify bulk SMS is enabled for the number in Advanced SMS features.

The Notify-Twilio integration provides programmable SMS outbound message status tracking with Status Callbacks. These callbacks can be helpful to see if a message has been delivered, failed, or ran into some other delivery issues.

SMS Statuses

Every Twilio SMS message request has a status value which describes the current state of the message. Use this information for troubleshooting SMS related incidents/ issues. Here are few descriptions of possible statuses of SMS sent from Notify through Twilio REST API.

Outbound message status progression

Status	Description
queued	The message has been queued by the provider to be sent to the carrier network.
accepted	The message is being processed by the provider before sending it to the carrier network.
sending	The message is being forwarded to the carrier network.
sent	The message has been successfully forwarded to the carrier network.
receiving	The provider has received an incoming message from the carrier network and is processing it.
received	ServiceNow has received the incoming message from the provider.
delivered	The message has been delivered to the target device. **Note:** A provider may not be able to report this status if the upstream carrier does not report this.
undelivered	The message could not be delivered to the target device. **Note:** A provider may not be able to report this status if the upstream carrier does not report this.
failed	The message failed to be forwarded to the carrier network.
unknown	The driver does not support the status

Send an SMS with Zoom meeting invite

Send an SMS with Zoom meeting invite to ensure that the meeting participants or any newly added participant is updated with the meeting details when the meeting host starts the conference or adds a participant to the conference.

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Before you begin

Role required: notify_view, notify_admin or notify_setup_admin

> **Note:**
> You need a telephony provider like Twilio or Nexmo.

Procedure

1. Navigate to **All** > **Notify** > **Zoom** > **Configuration**.
2. In the **Run Workflow on conference change** field, enter `Notify Zoom: Send SMS on Conference Change`.
   The Notify Zoom: Send SMS on Conference Change workflow is available with the demo data of the Notify Zoom Connector plugin (sn_notify_zoom).
3. Click **Update**.

Outbound communication requirements

Outbound communications initiated through Notify, such as phone calls and SMS messages, must satisfy recipient number requirements.

Recipient number requirements

These requirements apply to any number that receives a Notify phone call or message.

- The number must be E.164 compliant.
- The number must be different than the phone number used to initiate the call or message.

These requirements apply to all outbound communication initiated through Notify, such as by using Notify workflow activities or the Notify JavaScript API.

Invalid numbers prevent Notify workflows from running and cause an error to be logged. Set the **glide.notify.debug** property to true to create detailed error logs.

Using Notify for making conference calls

Notify administrators, major incident managers, or communications managers can manage conference calls.

Conference call records are stored on the Notify Conference Calls [notify_conference_call] table. Conference call participant records are stored on the Notify Conference Call Participants [notify_participant] table.

Conference call and participant records are created automatically when starting and connecting to a conference call. Most fields, such as the **Duration** of a call, are set automatically using business rules.

> **Note:**
> If a participant attempts to join a conference call using an invalid phone number, the caller is added to the participant list and the phone number is marked with a status of **Invalid**.

Notify administrators, major incident managers, or communications managers can manage conference call participants.

Several conference call workflows are available by default. These workflows can be used for incoming and outgoing calls and incoming SMS messages. Conference call workflows are:

- Notify: (Re)join Conference Call
- Notify: Join Conference Call Via SMS

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- Notify: (Re)join Conference Call with muting

> **Note:**
> Notify: (Re)join Conference Call with muting is available only with demo data.

The number groups Conference Call Group and Notify On Task Group use these conference call workflows by default.

Start a conference call

Start a conference call from a task or an incident communication plan by inviting one or more users to join a call. The conference will not start until at least two participants join.

Before you begin
Role required: notify_view, incident_communication_manager

About this task
Call participants can include:

- Users who have been assigned specific responsibilities
- Ad-hoc user contacts
- Other involved parties who are not recorded as users, such as third-party contacts

Procedure

1. Navigate to **All** > **Incident Communications Management** > **Open**.
2. Open the relevant incident communication plan.
3. Click the **Initiate Conference Call** related link.
4. From the dialog box that appears, choose the **Conference Bridge** that you want to dial from.
5. Select the participants for the conference.

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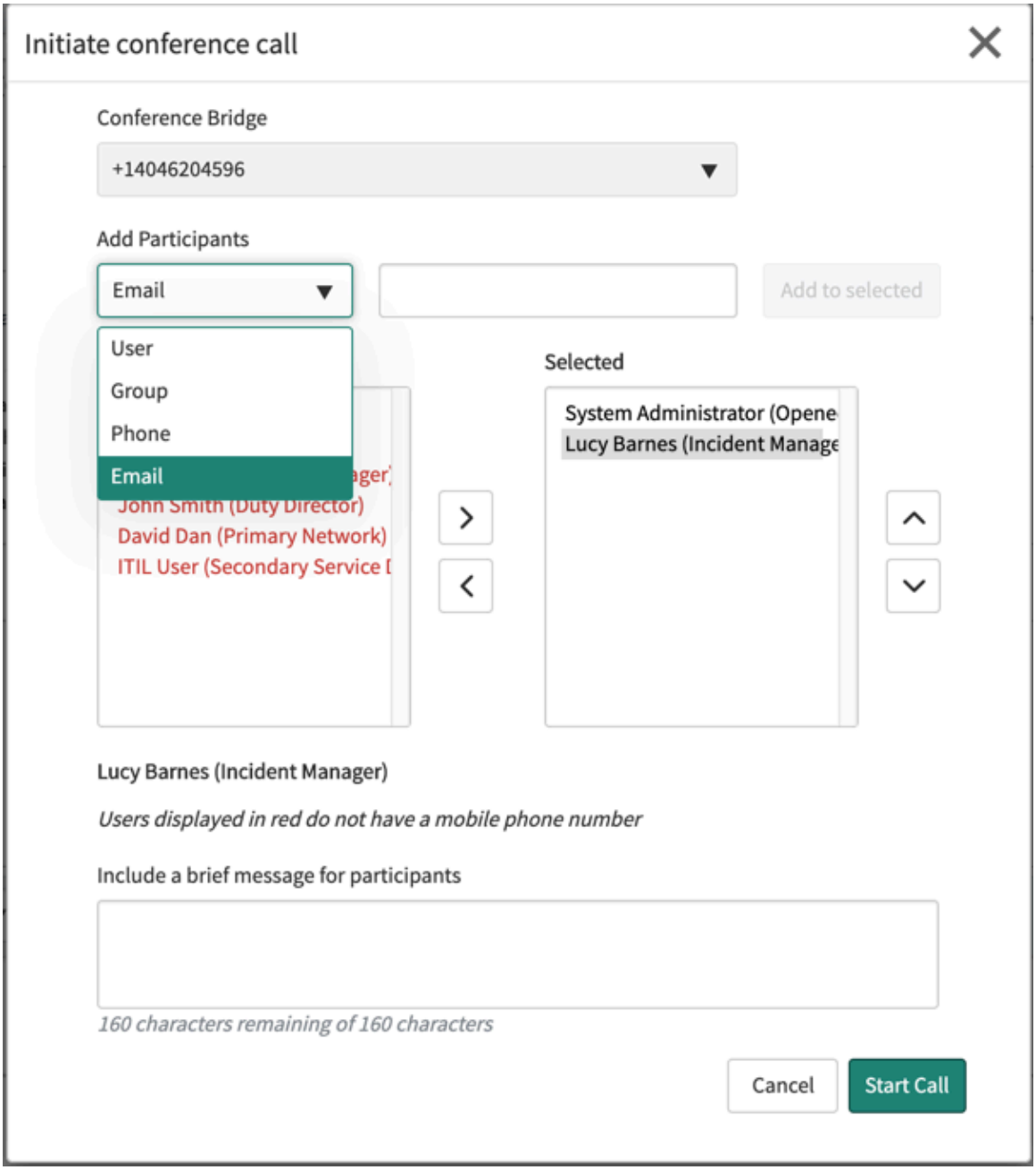
Initiate a conference call



The dialog box displays the Recommended and Selected participants for the conference. All users from the **User Contacts**list in the incident communication plan are in the Recommended section by default. The user who initiates the conference call is added to the selected list of participants.

If a shift exists for the group contacts, the primary and secondary on-call resources are shown in the **Recommended** list.

Calls are placed to the number in the **Mobile** phone field on the user record. If that information is blank, the user cannot be contacted through Notify. The mobile phone number has to be an E.164 compliant phone number. If the phone number is a local number, without the + prefix, the number will be retrieved based on the user's location and, if possible, converted into a valid E.164 number.

6. To select ad-hoc participants,

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Option	Description
Click the reference lookup icon, and select the relevant user.	Click **Add to selected**.
Enter the participant's phone number	Click **Add to selected**.

7. After the participant list is finalized, click **Start Call**.
   The conference call starts and a **Conference call initiated** message is displayed at the top of the incident communication plan form. Each user is called and can accept the call to join the conference.
8. Click the **Conference call initiated** message to see details of that conference call.
   When the final participant leaves the conference, the conference call closes.

> **Note:**
> VoIP phone systems, which do not use touch tone phones, may encounter issues with recognizing key presses. To avoid problems, ensure that conference call users use touch tone phones, or configure your VoIP system settings to recognize key presses, as described in your VoIP system documentation.

Add participants to a conference call

Add a participant to a conference call using Notify.

Before you begin

Role required: notify_view, notify_admin, major_incident_manager, or communication_manager

About this task

You can add the following participants:

- Users who have been assigned specific responsibilities
- Required ad-hoc user contacts
- Other involved parties who are not recorded as users, such as third-party contacts

Procedure

1. Navigate to **All** > **Notify** > **Conference Calls**.
2. Open the conference call that you want to add a participant to.
3. Click the **Add Participant** related link.
4. In the dialog box that appears, select the participants you want to add to the conference.
   You can add a single participant, a group of participants, or a phone number.

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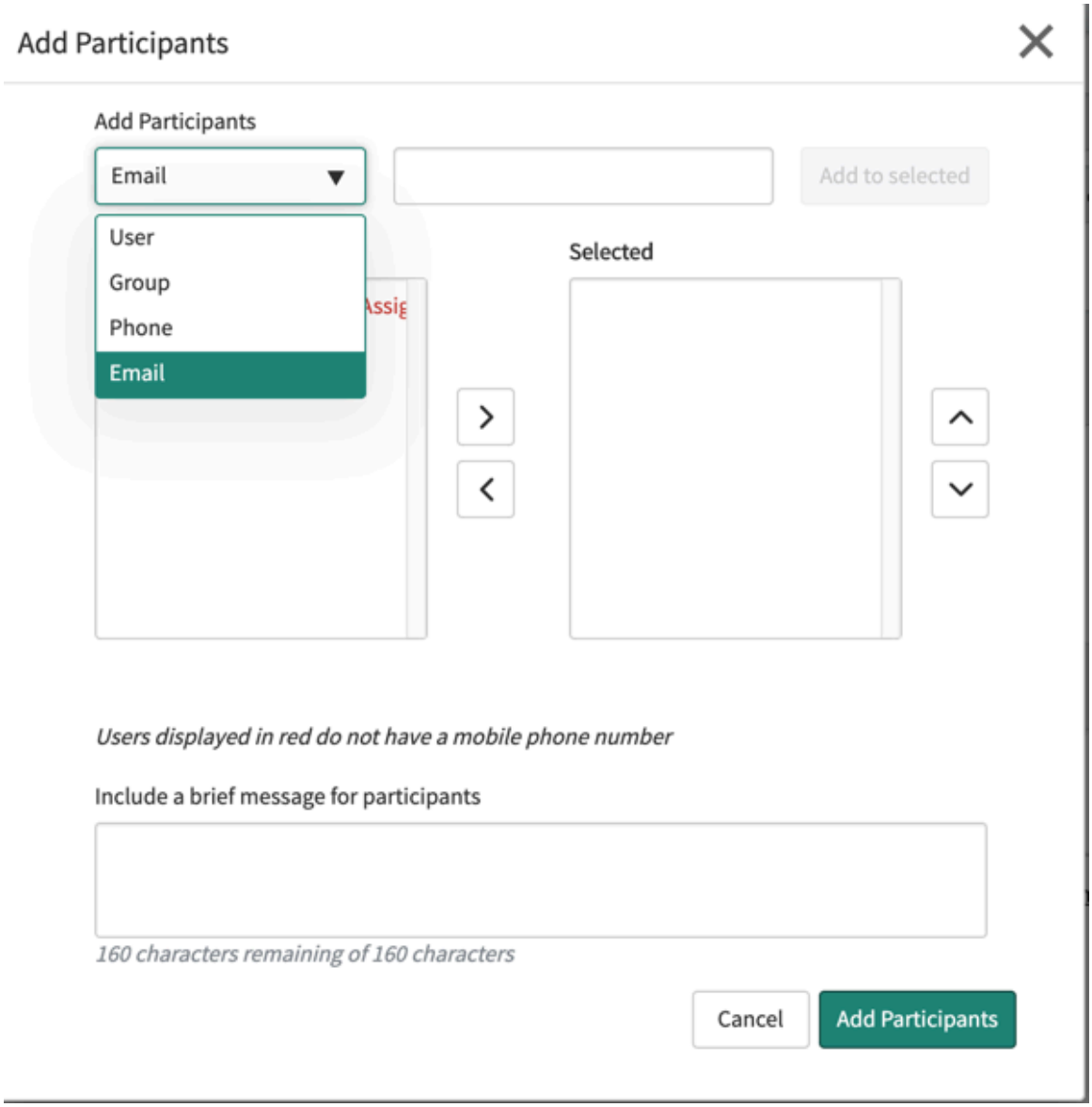

5. You can send a message for the participant who you want to add in the **Include a brief message for participants** field.
6. Click **Add Participant**.
   The selected user, group, or phone number is added to the selected conference call.

Related topics

Mute or remove a conference call participant

Mute or unmute all participants

As a communications manager or a conference call host, mute/unmute all the conference participants from the workbench.

Before you begin

Role required: notify_view, notify_admin, major_incident_manager, or communications_manager
Before starting this procedure, ensure there is an active conference call with one or more participants.

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Procedure

1. Navigate to **All** > **Major Incident Management** in the application filters.
2. Select the incident that you are trying to resolve.
3. On the incident, click **View Workbench**
4. In the **Conferences** tab, select a conference

Option	Description
Mute All	Click this button to mute all the participants in the conference
Unmute All	Click this button to unmute all the participants in the conference

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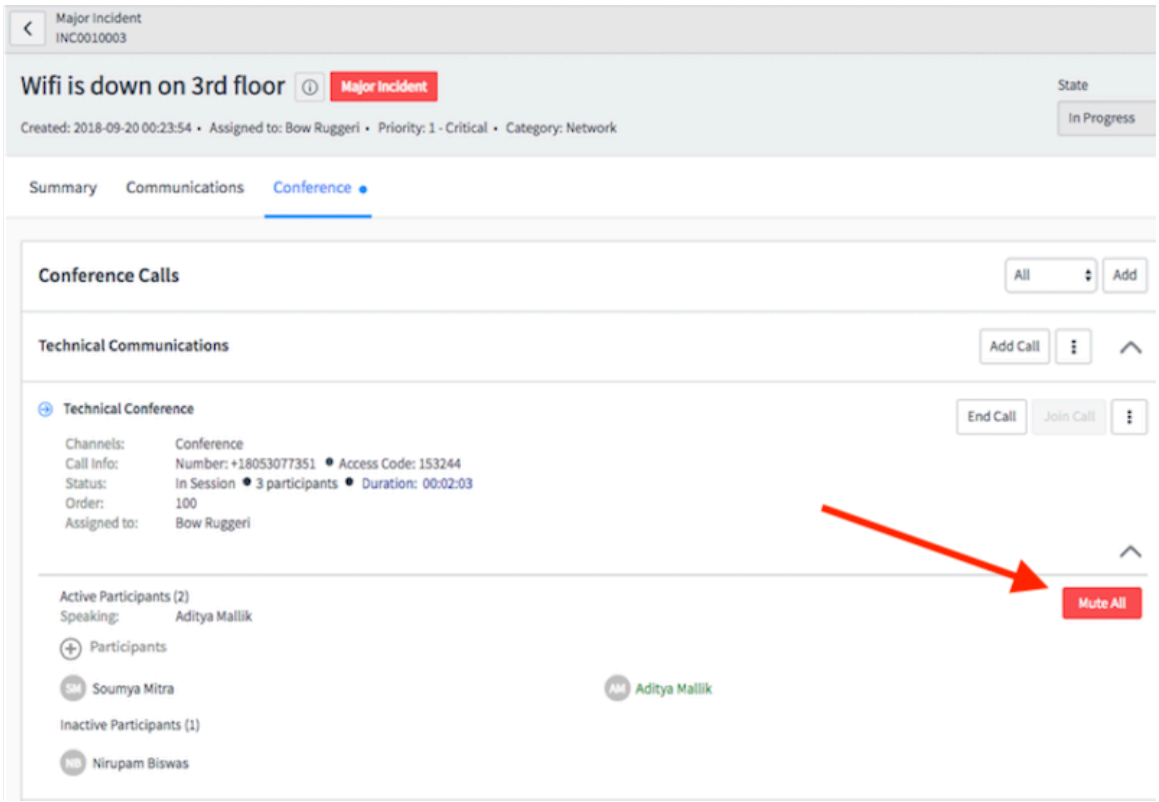
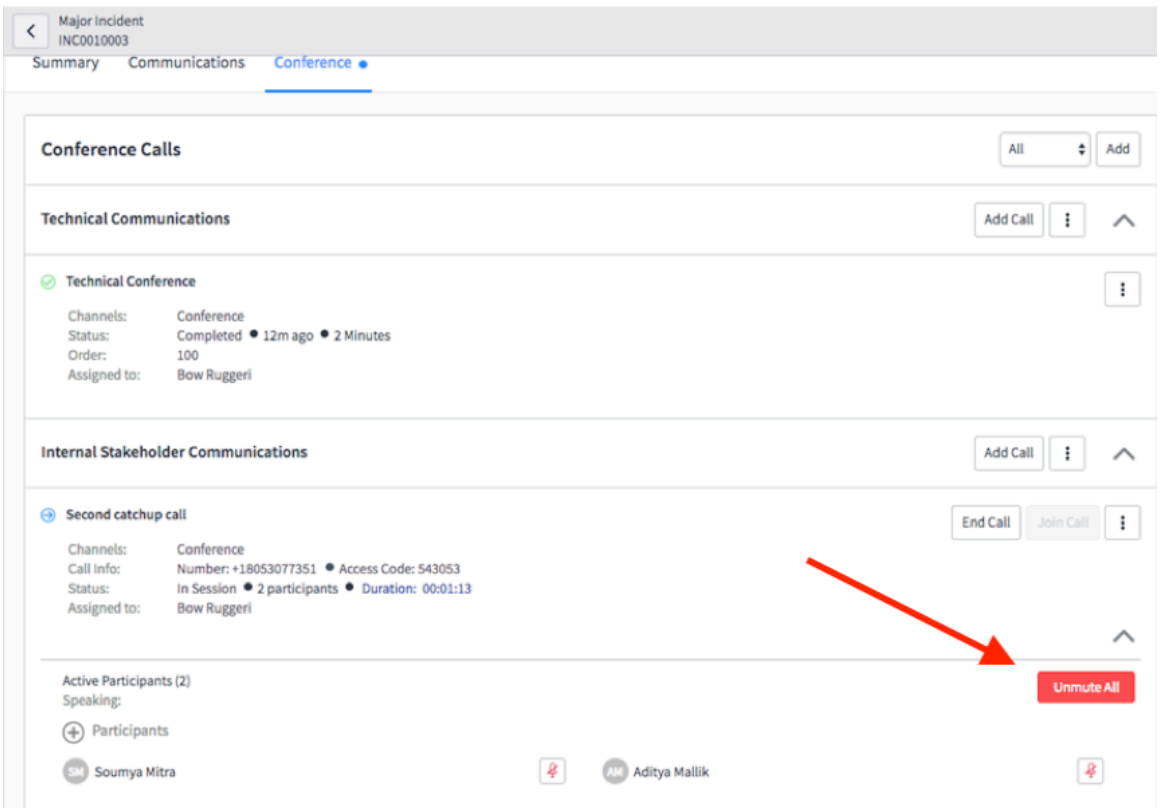
Mute All



Unmute All



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Mute or remove a conference call participant

As a communications manager, you can mute or kick conference call participants.

Before you begin

Role required: notify_view, notify_admin, major_incident_manager, or communication_manager
Before starting this procedure, ensure there is an active conference call with one or more participants.

Note:
Any participant with the host flag set to active, can mute or kick a participant from a conference call.

Procedure

1. Navigate to **All** > **Notify** > **Conference Calls**.
2. Select a conference call.
3. In the **Notify Conference Call Participants** related list, select a participant.
4. Click **Mute** or **Kick**.

Note:
You can unmute a muted participant. A kicked participant may rejoin the conference call by calling in again.

Send a message to conference call participants

Send a brief message as a text or voice message to the participants of a conference call to set a context to the call.

Before you begin

Role required: notify_view, or major_incident_manager

About this task

You must configure a telephony provider like Twilio so that you can use one of the Notify numbers to send SMS to the conference call participants.

Procedure

1. Navigate to **All** > **Major Incident Management** > **View Workbench**.
2. In the **Conference** tab, select the type of the call and click **Start Call**.
3. In the **Include a brief message for participants** field, type the message that you want to send to the conference call participants and click **Start Call**.

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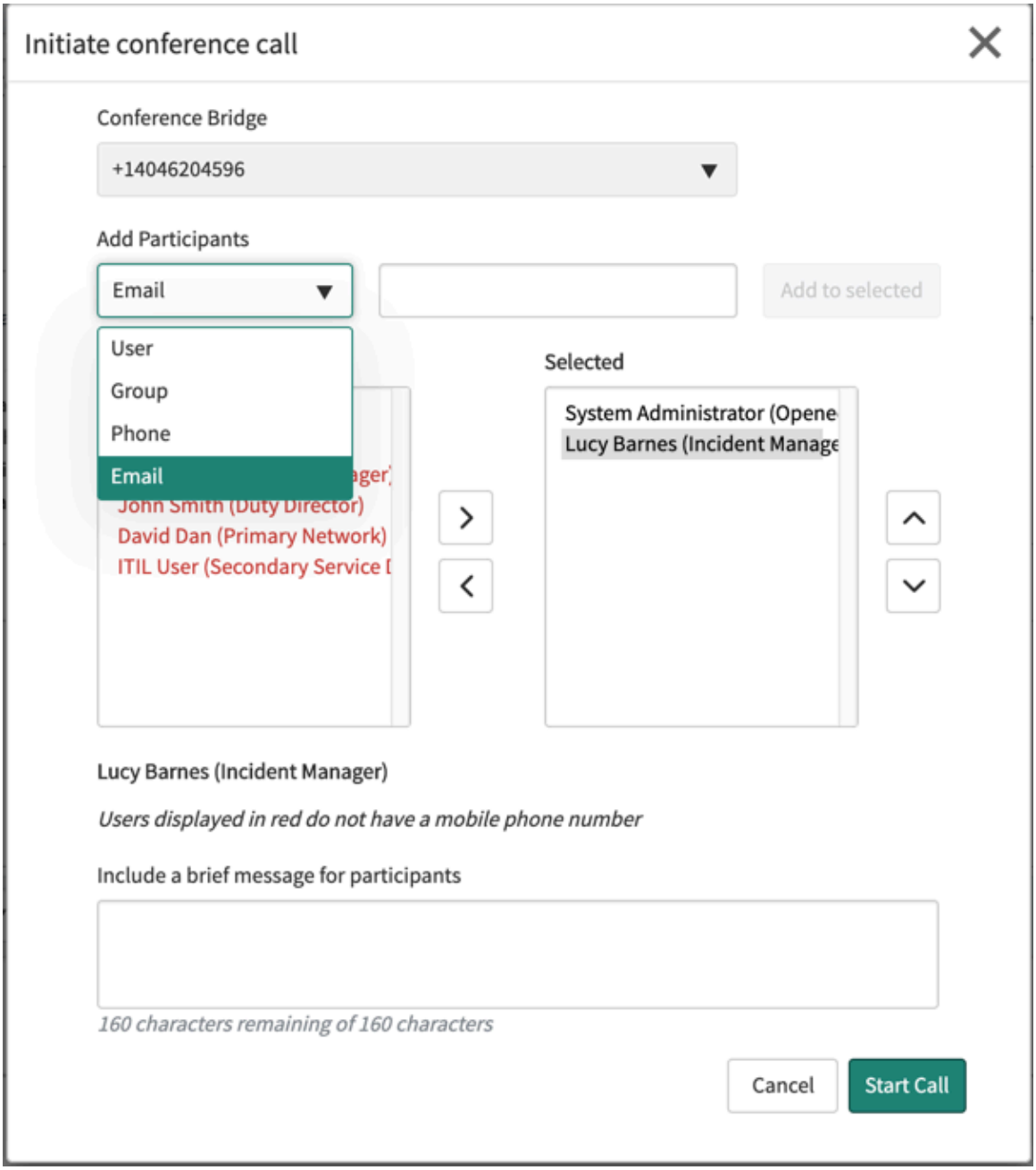
Initiate a conference call



Note:
Upon clicking **Start Call** the message text entered will be stored as description on the conference call record. If the OOB workflow is not modified, then the workflow takes care of sending this message text as SMS to the user. This is applicable if you have configured a telephony provider.

Viewing conference call information

Conference calls are listed as system activities in the **Activity** section of the Incident Communication Plan form and also are listed in the **Conference Calls** related list.

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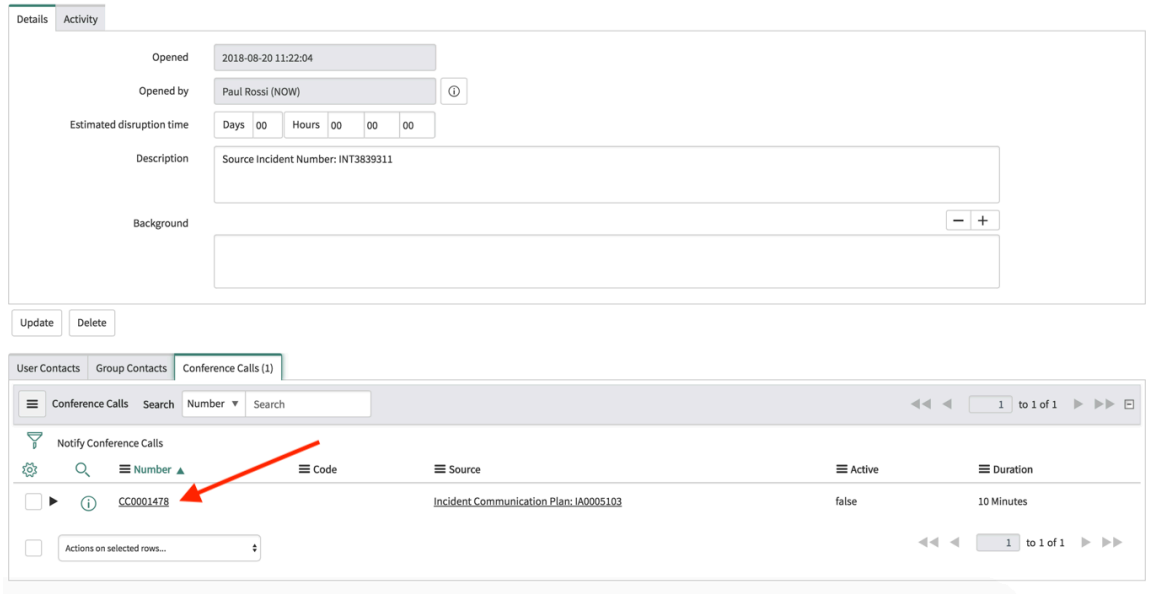
View conference call information



List of Notify calls

If you are a Notify administrator, you can view a list of calls and the status of a call made to or from Notify. The call records help in reporting and analytics.

To view a list of calls, navigate to **Notify** > **Calls**.

Call records are generated automatically when a user calls a Notify number or when a user makes an outbound call through Notify. You cannot create call records manually.

Note:
Although you can delete a call record, doing so may result in cascade deletion of related records.

For Notify calls where the source is specified, such as a task number, the source is added to the Notify Calls [notify_call] table in the **Source** column. For Notify conference calls where the source is specified, the source is added to the records for each of the calls in the conference.

Call status	Description
initiated	The number has just been dialed
ringing	The call is currently ringing.
in_progress	The call was answered and is currently in progress.
no_answer	The call was not answered.
completed	The call was answered and has ended normally.
busy	The caller received a busy signal.
failed	The call could not be completed as dialed, most likely because the phone number was non-existent.
invalid	The call could not be connected since input is invalid.

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Call status	Description
unknown	The driver does not support the status

Using Notify with tasks

Notify allows you to initiate conference calls and send SMS alerts from task records.

This functionality is available for all tables that extend the Task table, such as incident, problem, or change request. All calls and messages made from tasks are initiated using a single Notify phone number (E.164 or short code). You can configure which phone number is used by setting the property **glide.notify.task.phone_number**.

Start a conference call from a task

Use Notify to start conference calls from a task record.

Before you begin

Role required: notify_view, or itil
Notify must be set up before you can use Notify on task. Ensure there are Notify phone numbers (E.164 or short code) in number groups with phone call workflow.

Use **glide.enable.notify_on_task** property to enable Notify integration for Task table and its extensions. Entering phone number in **glide.notify.task.phone_number** property is equivalent to setting **glide.enable.notify_on_task** to true.

Procedure

1. Navigate to any task record, such as an incident or change request.
2. Click the **Start conference call** related link.
3. Select one or more **Recipients** to participate in the conference call.
4. Click **Start**.
   Any conference call records created from a task are associated with that task. You can view associated conference calls from the task record in the **Conference calls** related list. You may need to configure the form to add the related list.

Manage conference calls on task

Add and manage multiple participants on the conference including self-joining in to the conference call and end the conference call when the discussion is over.

Before you begin

- Role required: notify_view, itil, itil_admin, or notify_setup_admin
- A conference call is already initiated.

About this task

The **Manage Conference Calls** UI action is available for any table that extends the Task [task] table. If at least one conference call is active on a task record, the link appears on the related links section of the form. Out of the tables that extend the task table, the **Manage Conference Calls** UI action is intentionally hidden for Incident Communication Plan [incident_alert] table and Communication Task [comm_task] table. For these two tables, the functionality is already available as **Join conference call** and **End conference call** UI actions.

Procedure

1. Navigate to any task record such as Incident, Problem, or Change Request.
2. Open the record on which the conference all is active.

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3. In the related links, click **Manage Conference Calls**.
4. In the Manage Conferences window, you can perform the following activities:

Options	Description
Join Conference Call	If the logged in user is not already a part of the conference call, the user can join the conference.
Add Participants	Add participants to the conference who can contribute to the discussion.
End Conference Call	End the conference when the discussion is over.

5. **Optional:** In the Manage Conferences window, click the conference call number to know the details of the conference.

Send an SMS alert from a task

Use Notify to send information related to a call through SMS alerts from a task record.

Before you begin

Role required: notify_view, or itil

About this task

Ensure that there are Notify phone numbers (E.164 or short code) in number groups with SMS workflows.

Use **glide.enable.notify_on_task** property to enable Notify integration for Task table and its extensions. Entering phone number in **glide.notify.task.phone_number** property is equivalent to setting **glide.enable.notify_on_task** to true.

Procedure

1. Navigate to any task record such as an incident or a change request.
2. Click the **Send SMS** related link.
3. In the **From** choice list, select the phone number from which you want to send the SMS message.
4. Select and add the participants to whom you want to send the SMS message.
   All users from the **User Contacts** list in the incident communication plan are in the Recommended section by default.

   The dialog box displays the Recommended and Selected participants you selected to send an SMS message.
5. To select ad-hoc participants, choose one of the following actions.

Option	Description
Click the reference lookup icon and select the relevant user	Click **Add to selected**.

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Option	Description
Enter the participant's phone number	Click **Add to selected**.

6. After the participant list is finalized, type the message you want to send to the participants in the **Message** field and click **Send SMS**.

Result

Any SMS records created from a task are associated with that task. You can view associated SMS messages from the task record in the **SMS Messages** related list. You might need to configure the form to add this related list.

Using Notify with Incident Communications Management

Use Notify with incident communication plan to send SMS messages or start conference calls.

Certain configuration steps are required to use Notify with an incident communication plan.

- Both Notify and Incident Communications Management must be active.
- Notify must be configured and able to initiate and receive phone calls and SMS messages.
- The property **com.snc.iam.notify_number** must be set to an active Notify number with outgoing voice and SMS capability.
- This Notify number must belong to a number group configured with inbound and outbound conference call workflows.

Note:
The Conference Call Group number group is configured with conference call workflows by default.

Related topics

Incident Communications Management

Numbers and number groups

Using Notify for making conference calls

Initiate a conference call from incident communication plan

Use Notify to initiate a conference call from an incident communication plan by inviting one or more users.

Before you begin

Role required: notify_view, or notify_setup_admin

Procedure

1. Navigate to **Incident Communications Management** > **All**.
2. Open the relevant incident communication plan.
3. Click the **Conference** tab.
4. For the relevant incident communications task, under **Actions**, click **Start Conference Call**.
5. Select the conference bridge and the participants for the conference call.
   Available options in the conference bridge depend on the conference providers configured. For more information, refer Configure a provider in Notify.

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Join and end a conference call from incident communications management

After a conference call is initiated, join the call to participate in the discussion or end the call when the conference is no longer required.

Before you begin

Role required: notify_view, ia_admin or notify_setup_admin

Procedure

1. Navigate to **Incident Communications Management** > **All**.
2. Open the relevant incident communication plan.
3. Click the **Conference** tab.
4. For the relevant incident communications task, under **Actions**, perform one of the following actions.

Send communication updates for an incident communications plan

Update users on the latest communication on an incident through selected communication channels.

Before you begin

- Role required: notify_view, or notify_setup_admin
- Activate the Notify plugin (com.snc.notify) if you want to send communication through SMS.
- Set at least one communication channel for a communication task as SMS or email.

Procedure

1. Navigate to **Incident Communications Management** > **All**.
2. Open an incident communication plan record.
3. From the Incident Communication Tasks related list, open the incident communication task for which you want to send updates.
4. In the related links, click **Start Updates**.
5. Fill the required information and click **Send**.
   For sending an SMS communication, in the **From** choice list, select a number from which you want to send the communication.
6. Click **Send**.

Related topics

Incident Communications Management

Using Notify with On-Call Scheduling

When using both Notify and On-Call Scheduling, you can send On-call escalation notifications as SMS messages, in addition to emails.

Configure the following items to use Notify with On-Call Scheduling:

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- You must add at least one Notify phone number to the On-Call Group number group. This group is configured by default to handle inbound SMS responses (via On-Call: Check Assignment Response) that accepts or rejects an on-call assignment and to handle outbound voice calls (via On-Call: Assign by Acknowledgement Voice) to accept or reject assignments.
- You must configure workflows, such as the On-Call: Assign by Acknowledgement to drive escalations via SMS and Voice.

Set up Notify with On-Call Scheduling

You can configure on-call scheduling to use Notify functionality to send SMS alerts and assign users to tasks based on the SMS responses.

Before you begin

Ensure that the Notify and On-Call Scheduling plugins on your instance are activated.

Role required: notify_view, or notify_setup_admin

About this task

Set up Notify with On-Call Scheduling for the first time or migrate from On-Call Scheduling with NotifyNow.

Procedure

1. Navigate to **All** > **Notify** > **Numbers**.
2. Select the phone number you want to use to send and receive on-call scheduling messages.
3. In the **Notify group** field, select the **On-Call Group**.
   The On-Call Group is configured with the on-call workflows: **On-Call: Check Assignment Response**and **On-Call: Assign by Acknowledgement Voice** by default.
4. Navigate to **Workflow** > **Workflow Editor**.
5. Select the **On-Call: Assign by Acknowledgement** workflow.
6. Click the workflow menu icon in the title bar and select **Copy** to copy the **On-Call: Assign by Acknowledgement per rota** workflow.

   Save the copied workflow under a different name than what it is named by default.

   Note:
   You must avoid modifying default workflows and instead choose to copy and then modify the required workflow.

7. Select a **Send SMS** activity.
8. In the **To (script)** field, modify the `getRecipientsAndNumberToSendFrom()` to use the correct value from `getNotifyNumber()` notify number's sys ID.
9. Close the **Workflow Editor**
10. Navigate to **On-Call Scheduling** > **Trigger Rules**.
11. Select a trigger rule that launches an assignment workflow
12. In the **Trigger action** field, select **Workflow**.
13. In the **Trigger workflow** field, select the On-call: Assign by Acknowledgement workflow.
14. Click **Update.**
15. Repeat the previous 3 steps for each assignment trigger rule.
    Each time the conditions for one of these trigger rules is met, the On-call: Assign by Acknowledgement workflow runs.

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Related topics

Workflow editor title bar

Controlling the on-call communication channel with Notify

Configure On-Call Scheduling with Notify to always use a user's preferred communication channel.

If **Force communication channel** is specified in the **Escalation settings** for rosters, the preferred user device is used: SMS, voice, or email.

For example, if the preferred device is SMS and the on-call member does not have an SMS device defined, the user is not contacted even if the user has an email address. When forcing a communication channel on an escalation level does not succeed, no further communication attempts are made. The fact that the user could not be reached is logged.

Related topics

Subscription-based notifications

On-Call Assign by Acknowledgement workflow

The **On-Call: Assign by Acknowledgement** workflow is provided with Notify.

The workflow uses data from the escalation settings, including overlapping shifts and custom escalation settings, of shifts and rosters. Depending on these escalation settings, the workflow iterates through the defined escalation chain and sends notifications by SMS, email, or voice to users asking them for incident assignment. The workflow respects time-off as specified in the rosters. People who have time-off are not included in the escalation chain and no notifications are sent to them.

When you install both On-Call Scheduling and Notify, the message_number column is added to the Notify Messages [notify_messages] table to track responses to on-call assignment requests. This column indicates if the contacted user accepted or rejected the assignment. Before you can send notifications, you must define trigger rules. Trigger rules determine the conditions that must be met before a notification is sent and what action must be taken.

Call a user from the WebRTC UI

Make outbound calls and receive a voice call in the browser through the WebRTC interface from On-Call Schedules landing page, Roster and Escalation Details dialog box and on-call calendar.

Before you begin

Role required: notify_view, or itil

Procedure

1. Navigate to **All** > **On Call scheduling** > **On Call calendars**.
2. In the calendar that opens, click the name of the user you want to call.

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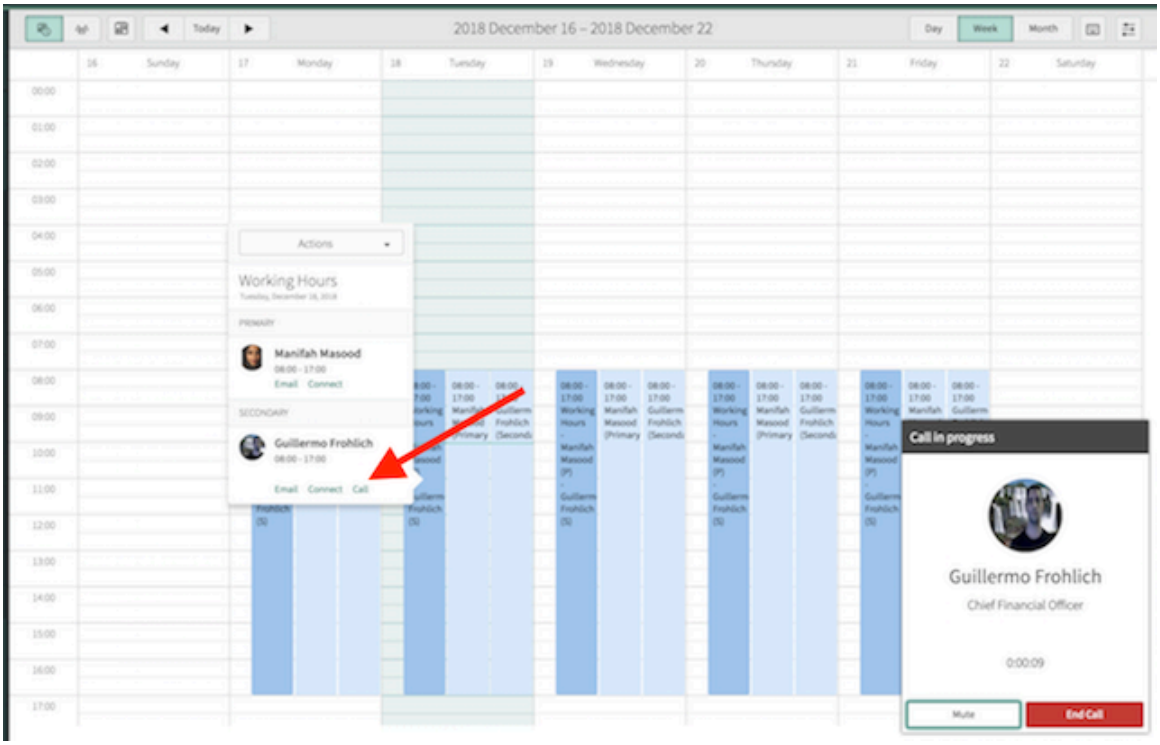
3. Choose **Call** to call the user.



Key differences between on-call scheduling with NotifyNow and with Notify

There are key differences between on-call scheduling with NotifyNow and on-call scheduling with Notify.

Tracking responses to questions

The On call:Assign by Acknowledgement workflow no longer uses the Notify Question tables to track assignment responses. When you install On-Call Scheduling with Notify, the message_number column is added to the Notify Messages [notify_messages] table to track responses to on-call assignment requests. This column indicates if the contacted user accepted or rejected the assignment.

Using the Notify Cisco Webex Connector with a major incident

Initiate a conference call from the major incident workbench by inviting one or more users to join a call.

Notify administrators, major incident managers, or communications managers can manage conference calls.

Create a collaborative communication task from MIM workbench

Create a communication plan or add a new communication task to an existing communication plan to resolve a major incident from the major incident management workbench.

Before you begin

Role required: notify_view, or notify_setup_admin

Procedure

1. Navigate to **All** > **Incident** > **Major Incidents** > **Open**.
2. Open the relevant major incident.

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3. Select **View Workbench**.
4. Select **Collaborate** tab.
5. Select **Add** that appears in the **Communication Tasks** section.
6. On the form, fill the fields.

Collaborative Task

Field	Description
Task Short description	Option to provide a short description for the communication task.
Channels	Option to choose the channel for communication. Select **Conference**.
Frequency	Option to select the frequency at which the task must be executed. A task can be executed only once or on specific durations.
Due in (Minutes)	Time span by when the task must be executed after the task initiates.

7. Select **Next**.
8. In the **Manage Recipients** tab, add the users required to be involved in the major incident communication plan.
9. Select **Add**.

Initiate Notify Cisco Webex conference from MIM workbench

Initiate a Webex conference from the MIM workbench to work towards the resolution of the major incident.

Before you begin

Role required: notify_view, or major_incident_manager

Procedure

1. Navigate to **All** > **Incident** > **Major Incidents** > **Open**.
2. Open the relevant major incident.
3. Select **View Workbench**.
4. Select **Collaborate** tab.
5. Select **Initiate** button.
6. On the form, fill the fields.

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Initiate task dialog box table

Field	Description
Conference Bridge	Option to select the conference bridge for the meeting. The Conference Bridge will be selected as Webex only Webex is the default provider selector.
Add Participants	Option to add the users and the stakeholders to work towards the resolution of the ticket. ○ **Users**: Enter the name of the user to include in the call. ○ **Group**: Enter the group of users to be included in the call. ○ **Email**: Enter a valid email of the participant to be included in the call. After adding the required stakeholders, click **Add to selected**.
Title	The default title is the ticket number appended with the short description.
Include a brief message for participants	Option to provide an opening message to the user before beginning the interaction.

7. Select **Start**.
8. Select **Open Link** in the dialog box that appears.

   You can also click the link from the workbench to begin the Webex conference call.

Add participants to a conference call

Add a participant to a conference call to participate in the discussion to resolve the major incident.

Before you begin

Role required: notify_admin, major_incident_manager, or communication_manager

Procedure

1. Navigate to **All** > **Incident** > **Major Incidents** > **Open**.
2. Open the relevant major incident.
3. Select **View Workbench**.
4. Select **Collaborate** tab.
5. Select (+) Participants under **Active Participants**.
6. On the form, fill the fields.

Add participants

Field	Description
Add Participants	Option to add the users and the stakeholders to work towards the resolution of the ticket.

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Field	Description
	○ **Users**: Enter the name of the user to include in the call. ○ **Group**: Enter the group of users to be included in the call. ○ **Email**: Enter a valid email of the participant to be included in the call. After adding the required stakeholders, click **Add to selected**.
Title	The default title is the ticket number appended with the short description.
Include a brief message for participants	Option to provide an opening message to the user before beginning the interaction.

7. Select **Add Participants**.

   You can view the participants status in an active conference call.

Join a conference call

You can join an active conference call from an incident to discuss about the resolution of an incident.

Before you begin

Role required: notify_view, notify_admin, major_incident_manager, or communication_manager

Procedure

1. Navigate to **All** > **Incident** > **Major Incidents** > **Open**.
2. Open the relevant major incident.
3. Select **View Workbench**.
4. Select **Collaborate** tab.
5. Select **Join Call**.

Notify reference

View the additional information about Notify application in this section.

Differences between Notify-Twilio and Notify-Twilio Direct

Describes the differences between the Notify-Twilio and Notify-Twilio Direct drivers, including architecture, workflows, Twilio support, and task-initiated conference calls.

Differences between Notify-Twilio and Notify-Twilio Direct

Notify-Twilio (com.snc.notify.twilio)	Notify-Twilio Direct (com.snc.notify.twilio_direct)
This plugin is deprecated. Notify - Twilio Direct Driver now replaces this plugin.	Provides next generation integration with Twilio and Notify.
Uses Java SDK based integration with Twilio.	It is a JavaScript based driver which uses platform provided outbound REST APIs to connect to Twilio.

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Differences between Notify-Twilio and Notify-Twilio Direct (continued)

Notify-Twilio (com.snc.notify.twilio)	Notify-Twilio Direct (com.snc.notify.twilio_direct)
NA	Adds support for various advanced SMS features such as Co-pilot messaging, Twilio Notify bulk SMS.
NA	Adds support for various functionalities in conference calls such as view the participant who is speaking on the conference call, disable beep when someone enters/exits a conference, advanced call features like machine detection and so on.

Migrate to Notify-Twilio Direct driver

Migrating to Notify-Twilio Direct driver provides next-generation integration with Twilio and Notify.

Before you begin

You must be connected to Twilio using the Notify Twilio driver.

Role required: notify_admin

Procedure

1. Navigate to **Notify** > **Administration** > **Twilio Configuration (Legacy)**.
2. Click **Migrate Now**.
3. Click **Ok** on the confirmation dialog.
   A disconnection of the Twilio driver is initiated and the Account SID and Auth Token are copied to Twilio Direct's configuration page. Twilio Direct is then autoconnected to that account, and you are redirected to the driver's configuration page.

Public URLs

On-premise customers should ensure that the URLs are accessible from the Internet for the Notify-Twilio driver to work correctly.

The Notify-Twilio drivers (both new and old) require that specific URLs on the instance be accessible from the Internet by the Twilio server without authentication. If the instance is within a private network, you need to either port forward or set up a reverse proxy.

For the Notify-Twilio driver, the URLs are:

- /NotifyTwilioCallProcessor.do
- /NotifyTwilioCallStatusProcessor.do
- /NotifyTwilioSMSProcessor.do
- /NotifyTwilioDialStatusProcessor.do
- /NotifyTwilioEventProcessor.do
- /NotifyTwilioDialProcessor.do
- /NotifyTwilioRecordingProcessor.do

For the Notify-Twilio Direct driver, the URLs are:

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- /api/sn_twilio_direct/twilio_callbacks/process/twiml/{callback_name}
- /api/sn_twilio_direct/twilio_callbacks/process/xml/{callback_name}

Note:
The *glide.notify.endpoint* property needs to be set to an Internet visible name because the instance name inside a private network can be different from the Internet domain.

Components installed with Twilio Direct driver

Several types of components are installed with the Twilio Direct driver for integration with Notify.

Business rules installed with Twilio Direct driver

Twilio installs the following business rules.

Business rule	Table	Description
Account Connected Disconnected Message	[sn_twilio_direct_twilio_config]	Verifies if Twilio is completely configured and displays an info message.
Calculate test duration	[sn_twilio_direct_callback_test]	Sets the duration for Twilio Callback tests.
Machine detection timeout range check	[sn_twilio_direct_twilio_config]	Verifies the timeout values for detecting the answering machine if the **Detect answering machine**is enabled. The valid range of the timeout is 3-120 seconds.
Move credentials	[sn_twilio_direct_twilio_config]	Moves the account credentials to [sn_twilio_direct_basic_auth]
Populate Credentials	[sn_twilio_direct_twilio_config]	Populates the current SID and Auth token from the [sn_twilio_direct_basic_auth] table to display them.
Set outbound calculated fields & auth	[sn_twilio_direct_twilio_config]	Sets the account credentials in the basic auth profile
Set Reset JWT Key	[sn_twilio_direct_basic_auth]	Copies the auth token from [sn_twilio_direct_basic_auth] to signing key password in [jwt_keystore_aliases].
Validate & set inbound calculated fields	[sn_twilio_direct_twilio_config]	Populates the callback_endpoint field based on the inbound rest field value. Displays an error message if the endpoint URLs are not in the correct format.
Validate Fast Bulk SMS option	[sn_twilio_direct_twilio_config]	When **Twilio Notify bulk SMS** is enabled, validates the Twilio messaging and Notify service id.
Validate Intelligent SMS option	[sn_twilio_direct_twilio_config]	When **Intelligent SMS handling** is enabled, validates the Twilio messaging service id.

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Tables installed with Twilio Direct driver

The tables installed with Twilio Direct driver are described below.

Tables installed with Twilio Direct driver

Table	Description
[sn_twilio_direct_callback_processor]	Extends the application file. Contains scripts which process callback payloads from Twilio and generate appropriate response XML or TwiML document. **Note:** Use caution when editing, deleting or adding new Callback Processor scripts as they are one of the key core components of the driver.
[sn_twilio_direct_twilio_config]	Extends the application file. Contains configuration option values for the driver.
[sn_twilio_direct_basic_auth]	Extends the basic auth credentials. The Account SID and Auth token are stored in this table.
[sn_twilio_direct_callback_test]	Stores the history of callback test runs.

Numbers and number groups

Number groups allow you to group Notify phone numbers and share workflows across grouped numbers.

Each phone number within Notify has an associated number group. Numbers within a group use the same workflows for handling incoming and outgoing calls and SMS messages.

Numbers associated with a group appear on the **Notify Phone Numbers** related list on the Notify Phone Number Group form.

If the number group workflows have incorrect conditions, a warning appears.

Create a number group

Group Notify phone numbers and share workflows across grouped numbers.

Before you begin

Role required: notify_admin

About this task

Each phone number within Notify has an associated number group. Numbers within a group use the same workflows for handling incoming and outgoing calls and SMS messages.

Numbers associated with a group appear on the **Notify Phone Numbers** related list on the Notify Phone Number Group form.

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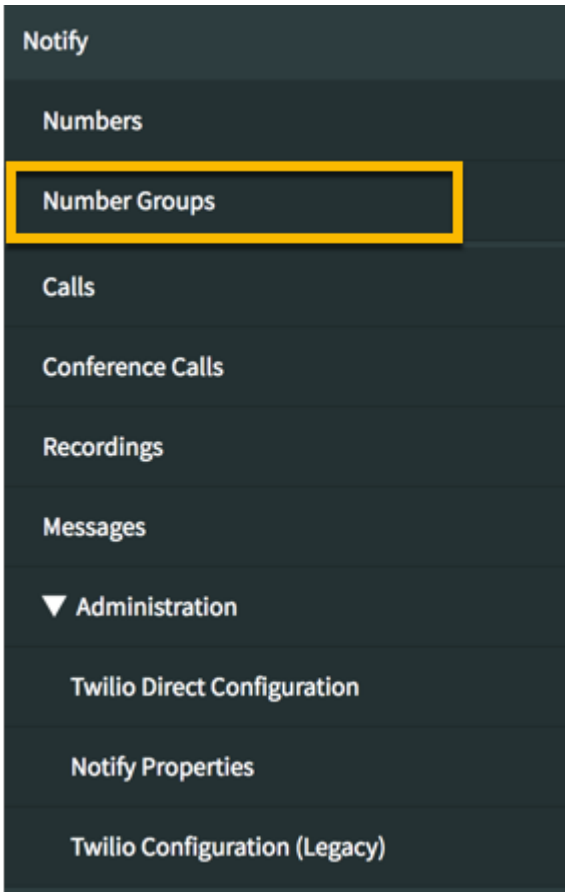
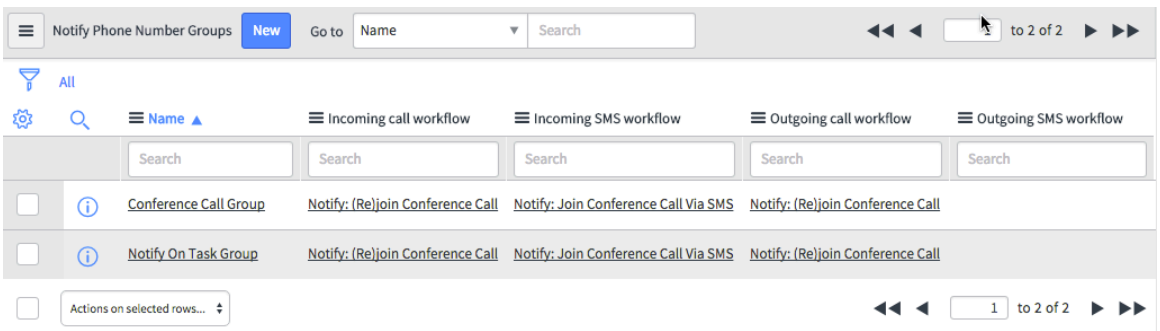
Procedure

1. Navigate to **All** > **Notify** > **Number Groups**.



2. Click **New**.
3. Enter a **Name**, and select **Notify: (Re)join Conference Call** for the **Incoming call workflow** field.



Note:
Ensure not to configure a workflow, which sends an outbound SMS itself, resulting in recursive calling of the workflow.

Field	Description
Name	Unique name for the number group.

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Field	Description
Incoming call workflow	Workflow to run when there is an incoming phone call for this group.
Incoming SMS workflow	Workflow to run when there is an incoming SMS message for this group.
Outgoing call workflow	Workflow to run when there is an outgoing phone call for this group.
Outgoing SMS workflow	Workflow to run when there is an outgoing SMS message for this group. **Note:** The Out of the Box workflow "Notify: Join Conference Call Via SMS" should not be populated for "Outgoing SMS workflow". Populating a workflow that sends an SMS under Outgoing SMS Workflow will trigger the same workflow thus causing recursive loop.

Incoming call workflows must run on the Notify Call [notify_call] table. Incoming and outgoing SMS workflows must run on the Notify Message [notify_message] or Global [global] tables.

Short codes can only be associated with SMS workflow groups. You cannot add an incoming or outgoing call to a short code group.

4. Click **Submit**.

What to do next

Associate a number to a number group

After creating a number group, associate numbers with that group to use the selected workflows.

Note:
Each phone number can only be associated with one number group.

You can create multiple number groups and configure with different Twilio numbers. You can then the associate the number groups with the various workflows based on your requirement.

Associate a number to a number group

Associate a Notify number to a number group to use inbound and outbound workflows.

Before you begin

Role required: notify_admin

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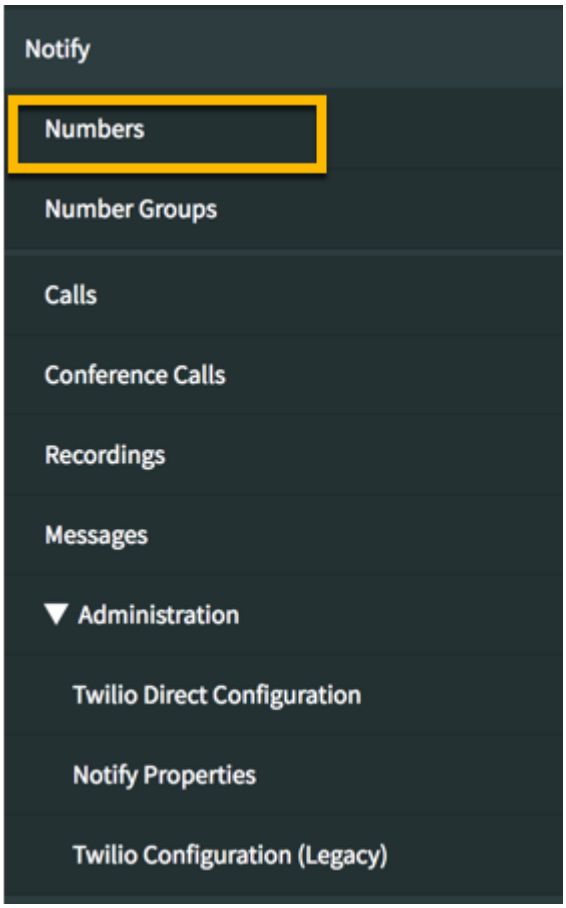
Procedure

1. Navigate to **All** > **Notify** > **Numbers**.



2. Click the listed phone number and assign it to a **Number Group**, as appropriate.

Note:
Each phone number can only be associated with one number group.

Field	Description
Number	Number for the entry.
Phone number	E.164 phone number, if applicable.
Notify group	(Optional) Group to which this number is assigned.
Number owner	Service provider of the number.
Short Code	Short code number, if applicable.
Active	Check box that indicates whether the number is active or not.

3. Click **Update**.

Notify flows

Use Notify flows to manage the calls and SMS messages.

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Starting Zurich, the following actions are available as flow actions and can be used when creating subflows:

Notify flows

Flow	Description
Join conference call	The **Join Conference Call** action connects an incoming or outgoing call to a Notify conference call. The action inputs are: • Notify Call • Notify Conference Call • Record • Muted • Start on enter • End on exit • Hangup on Star • Beep on enter • Beep on exit • Enable immediate input • Additional config
Call	The **Call** action makes outbound phone calls using a Notify flow. This action can be added to any table. The action inputs are: • Notify Number • Source Table • Source Sys Id • Phone number to call • Conference Call Record • User Sys Id • Group Sys Id • Extra Params
Send SMS	The **send SMS** workflow action sends short text messages using Notify to users' phones. This action can be added to any table. The action inputs are: • Recipients • Message
Forward call	The **Forward Call** action forwards a Notify call to an E.164-compliant phone number. The action inputs are:

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Notify flows (continued)

Flow	Description
	• Notify Call • Phone numbers to call • Timeout (in seconds) • Record
Input	The **Input** action creates a phone menu by presenting a list of options on a Notify call. The action inputs are: • Number of digits • Finish key • Timeout (in seconds) • IVR menulist • Say • Play • Notify Call
Hangup	The **Hangup** action disconnects an active Notify phone call. The action input is *`Notify Call`*.
Play	The **Play** action plays a sound file on a Notify call. The action inputs are: • URL • Loop • Notify Call
Record call	The **Record call** action records audio from a user on a Notify call. The action inputs are: • Notify Call • Max Duration (in seconds) • Timeout (in seconds) • Finish Key
Reject	The **Reject** action rejects an incoming Notify call. The action inputs are: • Reason • Notify Call
Say	The **say** action allows you to play a message, using text to speech, on a Notify call. The action inputs are:

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Notify flows (continued)

Flow	Description
	• Text to say • Language • Notify Call
Forward to notify client	The **forward to notify client** action connects a phone call to a Notify WebRTC client. The action inputs are: • User • Timeout (in seconds) • Record • Notify Call
Queue	The **Queue** action places an active Notify call in a queue. The action input is *`Notify Call`*.

You can build, and modify your own custom on-call scheduling flows in Workflow Studio with subflows for new instances. The following base system workflows have been migrated to subflows:

- (Re)join Conference Call
- Join Conference Call with muting
- Join Conference Call with SMS

Create a custom Notify subflow

Create your own custom flows to use in Notify using Workflow Studio.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select **Subflows**.
3. Select **New** > **Subflow**.
4. Provide the details in the new subflow section, and then select **Build subflow**.
5. Select **Action** under **ACTIONS**.
6. Select **Global**, and then select a Notify action.
7. Enter the details in Action Inputs based on the Notify action chosen.
   For example, if you select **Say**, you must enter the details as shown below:
   - **Text to say**: Provide the text in this field that must be read.
   - **Language**: Select the language.
   - **Notify Call**: Select the Notify call.
8. Select **Done**.

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9. Select **Publish**.

   A pop-up window appears to confirm the publication of the subflow.

10. Select **Publish**.

What to do next

In order to use your workflow, you can test and map the subflow to a Notify number group. To map the subflow, you must navigate to **All** > **Notify** > **Number Groups**. Select a Notify group, and then map the created subflow.

Notify workflow activities

Notify workflow activities manage calls and SMS messages in Notify.

All Notify workflows that manage a phone call must run on the notify_call table. Call-related Notify activities can be added only to workflows where the **Table** field value is **Notify Call [notify_call]**.

You can identify if an outbound call was answered by a human or by an answering machine from within a Notify workflow by evaluating the `current.is_human` variable, such as with an **If** workflow activity. This variable is set by the telephony provider when an outbound call is answered. This variable is always true for inbound calls.

Note:
Do not add a **Timer** activity between multiple Notify activities that interact with active phone calls.

Important:
When creating a Notify workflow, set the workflow **If condition matches** field to **-- None --**. Notify controls which workflow to run based on the configured number groups.

Related topics

Using variables in Notify workflow activities

Join conference call workflow activity

The **Join Conference Call** activity connects an incoming or outgoing call to a Notify conference call.

Notify includes the workflows Notify: (Re)join Conference Call and Notify: Join Conference Call Via SMS to demonstrate how to use the **join conference call** activity to connect inbound and outbound calls, and inbound SMS messages to a conference call.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
Record	Select this check box to record the conference call.
Advanced	Select this check box to display advanced configuration options.
Script	Specify advanced configuration options using JavaScript, such as if the new participant should be muted upon joining the conference call. You can access values from the workflow scratchpad.

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Conditions

The conditions determine which transition comes after this activity. The **join conference call** activity does not specify any conditions by default.

You can add an error condition to this activity. The activity transitions through the error condition if the confernece_call scratchpad variable is not set.

Scratchpad entries

The activity uses the workflow scratchpad to read persistent values.

Values read from scratchpad

Scratchpad variable	Description
workflow.scratchpad.conference_call	A GlideRecord for a single conference call record. A call processed by this activity is added to this conference call. If this value is not specified, the **join conference call** activity will log an error. When initiating an outgoing call workflow using the Notify API `call(String notifyPhoneNumber, String toPhoneNumber, GlideRecord conferenceCall)` method, this scratchpad value is set automatically to the conference call GlideRecord. For incoming call workflows, or workflows initiated using a different mechanism, you must explicitly set this scratchpad value.

Enable different attributes available with Join Conference Call activity

System administrators can enable any or all of the below attributes and use them in the Join Conference Call workflow activity.

Attribute	Description
hangupOnStar	When hangupOnStar is enabled (set to true), participants in a conference call can press the * button to disconnect from the call. Control is returned to the workflow, which can be used to trigger customer-defined actions.
muted	When muted is enabled (set to true), the participant will join the conference in a muted state.
beepOnEnter	When beepOnEnter is enabled (set to true), a notification beep is played when a user joins the conference.
beepOnExit	When beepOnExit is enabled (set to true), a notification beep is played when a user leaves the conference.
enableImmediateInput	When enableImmediateInput is enabled (set to true), it allows input of a single digit immediately after the conference

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Attribute	Description
	ends for this user and sets that in workflow.scratchpad.confDigits. This option will be ignored if hangupOnStar is false.

To enable any of the above attributes, perform the following steps:

1. Navigate to **Workflow** > **Administration** > **Workflow Versions**.
2. Open the Notify: (Re)join Conference Call workflow.
3. Click the **Show Workflow** related link.
4. To modify the workflow, click the WorkFlow Actions icon and click **Checkout**.
5. Open the Join Conference Call workflow activity.
6. Enable the **Advanced** check box to display the **Script** field.
7. Set the **hangupOnStar** attribute to true in the *config* variable in the script. The default setting is false.
8. Click **Update**.
9. Click the WorkFlow Actions icon and click **Publish** to save the changes.

Similarly, you can enable the other attributes.

Call workflow activity

The **Call** activity makes outbound phone calls using a Notify workflow. This workflow activity can be added to any table.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
Notify Number	The Notify phone number to make the call from. When you initiate a call, the outgoing call workflow for the number group associated with this number runs.
Phone number to call	The E.164-compliant phone number to call.
Advanced	Select this check box to use a script to determine number to call, and the Notify number to call from instead of using the **Phone number to call** and **Notify Number** variables.
Script	Define a script that controls which number to call. This script should return a string listing the Notify number sys_id, as well as the phone number to call, such as {notify_number: 'sys_id', phone_number: '+316...'}

Conditions

The conditions determine which transition comes after this activity. The **call** activity does not specify any conditions by default.

You can add an error condition to this activity. The activity transitions through the error condition if the call could not be set up due to invalid data returned by the advanced script.

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Send SMS workflow activity

The **send SMS** workflow activity to send short text messages using Notify to users' phones. This workflow activity can be added to any table.

Notify requirements

To send SMS messages, you must add and configure a provider in Notify. For more information about configuring a provider, see Configure a provider in Notify.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
From	Select the Notify phone number to use to send the SMS message.
Advanced	Select this check box to use JavaScript to determine which numbers to send the message to, and the Notify number to use to send the message.
To	Select any number of users to send the message to. The user record must have a E.164-compliant phone number or notification device configured for SMS messages.
To (groups)	Select any number of groups to send the message to. All members of that group with an E.164-compliant phone number or SMS notification device receive the message.
Message	Enter the message to send. You can add field values from the current record by using the **Select variables** box. You can also add values from the workflow scratchpad. If a field and a scratchpad variable have the same name, the field value is used. Because you can use variables in this message, it is not possible to determine the length of the message at design time. If the activity sends a message that is longer than supported by the telephony provider, the message is truncated and the instance logs a warning.
To (script)	Enter a script to determine which numbers to send the message to, and the Notify number to use to send the message. The script should return a JavaScript object with the format `{notify_number: \'...sys_id...\', users: [...], groups: [...], numbers: [...]}`. Specify the users or groups to send the message to as an array of sys_id values. Specify other numbers as an array of E.164-compliant phone numbers. This field appears only if **Advanced** is selected.

Conditions

The conditions determine which transition comes after this activity. This activity does not specify any conditions by default.

You can add an error condition to this activity. The activity transitions through the error condition if the Notify number used to make the call is not configured correctly or unable to send SMS messages, or if an error occurs while sending the SMS.

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Forward call workflow activity

The **Forward Call** activity forwards a Notify call to an E.164-compliant phone number.

If the person receiving a forwarded call hangs up, the **forward call** activity completes and transitions to the next activity. Any further Notify activities in the workflow run for the caller only.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
Phone number to call	Enter the phone number to forward the call to.
Timeout (in seconds)	Enter the amount of time to wait for the call to be answered before hanging up.
Record	Select this check box to record the conversation.

Conditions

The conditions determine which transition comes after this activity.The **forward call** activity does not specify any conditions by default.

You can add an error condition to this activity. The activity transitions through the error condition if the phone number to call is invalid.

Input workflow activity

The **Input** activity creates a phone menu by presenting a list of options on a Notify call.

Input Variables

Input variables determine the initial behavior of the activity.

Input Variables

Variable	Description
Number of digits	Specify the maximum number of digits the caller can enter. A caller can enter fewer digits than the maximum and press the **Finish key** to complete the entry.
Finish key	Specify the key a caller can press on their phone when finished selecting a menu option.
Timeout (in seconds)	Specify the amount of time to wait before closing the menu automatically when the caller does not select a menu option.
Advanced	Select this check box to use a script to build the phone menu, instead of using the activity conditions.

Script	Define the script to build the phone menu. The script must specify an *answer* variable as a JavaScript object with the following format:
	`answer = {`
	`"1": {`

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Input Variables (continued)

Variable	Description

	<pre>"play": "https://some_url.com/options/one.mp3",
	"myCustomData": "some data here"
	},
	"2": {
	"play": "https://some_url.com/options/two.mp3",
	"myCustomData": "some other data here"
	},
	"3": {
	"speak": "type 3 to speak to a representative",
	"language": "en-US",
	"myCustomData": "some more data here"
	}
	};</pre>
	The script may specify either a text-to-speech string and language code using the *speak* attribute or URL of the music to be played using the *play* attribute. You can also add optional attributes to store related information, such as *myCustomData* in the example above.
	
	Note:
	The script object continues to support *say* attribute for backward compatibility.

Conditions

The conditions determine the transition that comes after this activity.

The **input** activity does not specify any conditions by default. You must define conditions to build the phone menu. Each condition is one option on the phone menu. Notify reads the text from each condition **Name** to the caller, up to 100 characters per condition.

You can specify a language for each condition by prefixing the message with the language code, in the format **xx-XX:<Message>**. For example, add **fr-CA:** for Canadian French. Available languages are stored on the Notify Language [notify_language] table.

The condition that the activity transitions through depends on the digits entered by the caller. Set the condition **Condition** value to **parseInt(workflow.scratchpad.digits) == <expected digits>**. For example, to transition through a condition when the caller presses the number 3, set the **Condition** to **parseInt(workflow.scratchpad.digits) == 3**.

You can add an error condition to this activity. The activity transitions through the error condition if the advanced script returns an invalid value, or if the text to say for a condition is empty.

Scratchpad Entries

The activity uses the workflow scratchpad to write persistent values.

Values written to scratchpad

Entry	Description
workflow.scratchpad.digits	The digits entered by the caller, as a string.

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Values written to scratchpad (continued)

Entry	Description

workflow.scratchpad.menu<activity name>	The entire *answer* variable, if using the advanced script option. You can access this menu from other activities after this activity successfully executes.
	
	For example, if the activity name is `choices`, you can access values from the menu using
	`var previousActivity = "choices";`
	`var choicesMenu = workflow.scratchpad.menu[previousActivity];`
	`var menuItem = choicesMenu[workflow.scratchpad.digits];  // Selects the menu item based on the caller's input.`
	`var selectedValue = menuItem.myCustomData; //get the custom data for the selected menu item.`

Hangup workflow activity

The **Hangup** activity disconnects an active Notify phone call.

You can use the **hangup** activity to disconnect only calls that have been answered. Use the **reject** activity to disconnect calls that have not been answered.

Play workflow activity

The **Play** activity plays a sound file on a Notify call.

Input Variables

Input variables determine the initial behavior of the activity.

Input Variables

Variable	Description
URL	Enter the URL of a sound file to play. If the URL is inaccessible, or if the audio file mime type is not supported by the telephony provider, the **play** activity is skipped.
Loop	Enter the number of times the sound file should play.

Conditions

The conditions determine which transition comes after this activity. The **play** activity does not specify any conditions by default.

You can create an error condition to handle errors with the sound file. The activity transitions through the error condition if the specified sound file is not available, or has an unsupported mime type. Supported mime types are listed on the Notify Audio MIME Types [notify_mime_type] table.

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Record workflow activity

The **Record** workflow activity records audio from a user on a Notify call.

> **Note:**
> The Record workflow activity records Notify call but not the Notify conference call. To record the Notify conference call, you can set the **Record** activity variable on the Join Conference Call workflow activity.

Input Variables

Input variables determine the initial behavior of the activity.

Input Variables

Variable	Description
Max duration (in seconds)	Enter the maximum duration, in seconds, allowed for a recording.
Timeout (in seconds)	Enter the amount of time to wait before ending a recording automatically when the caller is silent.
Finish Key	Specify the key a caller can press on their phone to end the recording.

Scratchpad Entries

The activity uses the workflow scratchpad to store persistent values.

The **record** activity adds the *recording* variable to the workflow scratchpad. This variable stores metadata about the recording, such as URI, ID, and duration. You can access the following values from this variable.

Values written to scratchpad

Value	Description
recording.recordingDuration	The duration of the recording, in seconds.
recording.from_number	The caller's phone number, including country code.
recording.notify_number	The Notify phone number used to respond to the call, including country code.
recording.recordingID	The ID used by the telephony provider to identify the recording.
recording.recordingURL	The URL from the telephony provider to access the recording.

Reject workflow

The **Reject** workflow activity rejects an incoming Notify call.

You can use the **reject** activity to disconnect only calls that have not yet been answered. Use the **hang up** activity to disconnect calls that have been answered.

Input variables

Input variables determine the initial behavior of the activity.

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Input variables

Variable	Description
reason	Select a reason for rejecting the call, such as **busy**.

Say workflow activity

The **say** workflow activity allows you to play a message, using text to speech, on a Notify call.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
Text to say	Specify the text to read.
Language	Select the language and locale to use when reading text.
Advanced	Select this check box to use a script to define the language and message, instead of using the **Text to say** and **Language** values.
Script	Define a script to set what text is read on the call. The script must return a string that defines the language and the text to read. For example, to play an English-language message, return {language: 'en-US', text: 'Text to read'}.

Forward to notify client workflow activity

The **forward to notify client** workflow activity connects a phone call to a Notify WebRTC client.

Input variables

Input variables determine the initial behavior of the activity.

Input variables

Variable	Description
User	Select the user to connect the call to.
Advanced	Select this check box to use a script to determine which client to connect to, instead of using the **User** variable.
Script	Define a script that controls which client to connect to. This script should return a GlideRecord for a single User [sys_user] record.
Timeout (in seconds)	Enter the amount of time to wait for the call to be connected before hanging up.
Record	Select this check box to record the call.

Conditions

The conditions determine which transition comes after this activity. The **Forward to Notify Client** activity does not specify any conditions by default.

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You can add an error condition to this activity. The activity transitions through the error condition if there is an issue with the Notify client.

Queue workflow activity

The **Queue** activity places an active Notify call in a queue.

Add the **Queue** activity to a workflow on the Notify Call [notify_call] table to put the current call on hold. This activity does not specify any input variables.

The queue that the call is added to is given a random ID.

Notify activity event handlers

Notify workflow activities provide JavaScript functions that are invoked automatically when your telephony provider broadcasts certain events.

When the telephony provider broadcasts an event related to a Notify call, such as the caller hanging up, the event is processed by the workflow associated with that Notify call. All currently-executing Notify activities in that workflow invoke a JavaScript function associated with that event.

Not all activities that support an event provide a default event handler implementation. You can provide an implementation for those event handlers when creating custom Notify activities.

Related topics

- Creating Notify activities
- Available Notify activity event handlers

Creating Notify activities

Default Notify workflow generally performs a single action, such as initiating a phone call. You can create custom Notify workflow activities to implement more complex functionality.

Use event handler functions in each Notify activity definition to design your own activity behavior. For example, you can set the activity result if the caller hangs up by using the *onCompleted* function.

```
onCompleted: function() {
activity.result = 'call_ended';
},
```

When creating a new Notify workflow activity, follow these design principles.

- Within *onExecute* event handler function, create a new NotifyAction object. Use this object to create a simple or complex action, then serialize the object to the notify_wf_activity table.
- Within the *onUpdate* event handler function, deserialize the NotifyAction object from the notify_wf_activity table and use this object to perform any other operations.
- Use the other event handler functions and the Notify as needed to implement the desired activity behavior.

Related topics

- NotifyAction - Global

Notify languages

Notify supports multiple languages when using text-to-speech.

For example, when using the **input** or **say** workflow activities, you can specify which language to use when reading the text.

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The list of available languages is stored on the Notify Languages [notify_language] table. By default, languages supported by all Notify telephony providers are available. You can add additional languages if they are supported by your specific telephony provider.

Available Notify activity event handlers

When creating Notify workflow activities, you can use event-handler functions to respond to events from a telephony provider.

Not all activities or telephony providers support all events. For example, the **Reject** activity ends the call before the caller connects so the `onNoAnswer` function is never invoked from this activity.

Note:
When configuring an activity to respond to an event, ensure that your telephony provider supports that event.

The following table describes available event handlers and lists the Notify workflow activities that can invoke each handler.

Event handlers

Handler	Description	Activities
onExecute	Runs when the activity first runs.	All call-related activities
onUpdate	Runs when the call record associated with the workflow is updated.	All call-related activities
onCompleted	Runs when a call ends.	All call-related activities
onRinging	Runs when a call starts ringing.	Forward call, call, join conference call, forward to notify client
onInProgress	Runs when both parties are connected on a call.	Forward call, call, join conference call, forward to notify client
onNoAnswer	Runs when a call is not answered.	Forward call, call, join conference call, forward to notify client
onBusy	Runs when a called number is busy.	Forward call, call, join conference call, forward to notify client
onFailed	Runs when an error occurs.	All call-related activities

Components installed with Notify

Several types of components are installed with the Notify application.

Roles installed with Notify

Notify adds the following roles.

If you have created a new role, then you must add the new role to the corresponding deny ACL list to not allow user to access the Notify tables.

Note:
Only the user with the Notify administrator [notify_admin], and Notify viewer [notify_view] roles can have access to Notify tables. The deny unless authenticated ACLs restrict access to the Notify tables for any unauthenticated role such as public role user.

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To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Notify administrator [notify_admin]

Administrator with privileges for Notify 2 functionality.

Contains Roles

List of roles contained within the role.

- workflow_admin
- workflow_creator
- workflow_publisher

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Important:
Avoid granting an admin role when more specialized roles are available.

Notify viewer [notify_view]

Assign to users who need to view notify content.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

This role has read-only access to the Notify Conference Calls table [notify_conference_call] and the Notify Conference Call Participants table [notify_participant].

The itil role inherits the notify_view role when the Incident Communications Management and the Notify plugins are activated.

Tables installed with Notify

Notify adds the following tables.

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Tables

Table	Description
Notify Conference Calls [notify_conference_call]	A list of conference calls started using Notify
Notify Calls [notify_call]	A list of calls started using Notify
Notify Call Queue [notify_queue]	A list of calls that are in queue
Notify Call Status [notify_call_status]	List of possible statuses of calls, such as; initiated, ringing, etc.
Notify Client Connected Sessions [notify_client_session]	List of the connected sessions
Notify Conference Call Participants [notify_participant]	List of the participants in a conference call
Notify Conference Call Participant Sessions [notify_participant_session]	List of the associations of a call record and Notify participant record
Notify Messages [notify_message]	List of messages sent from/to Notify
Notify Phone Numbers [notify_number]	List of phone numbers used by Notify to make calls and send messages
Notify Phone Number Groups [notify_group]	List of phone number groups used by Notify to make calls and send messages
Notify Languages [notify_language]	List of the languages that Notify supports when using text-to-speech workflow activities.
Notify Recordings [notify_recording]	List of conference call recordings
Notify Workflow Activity [notify_wf_activity]	List of Notify workflow activities
Notify Audio MIME Types [notify_mime_type]	List of audio file formats

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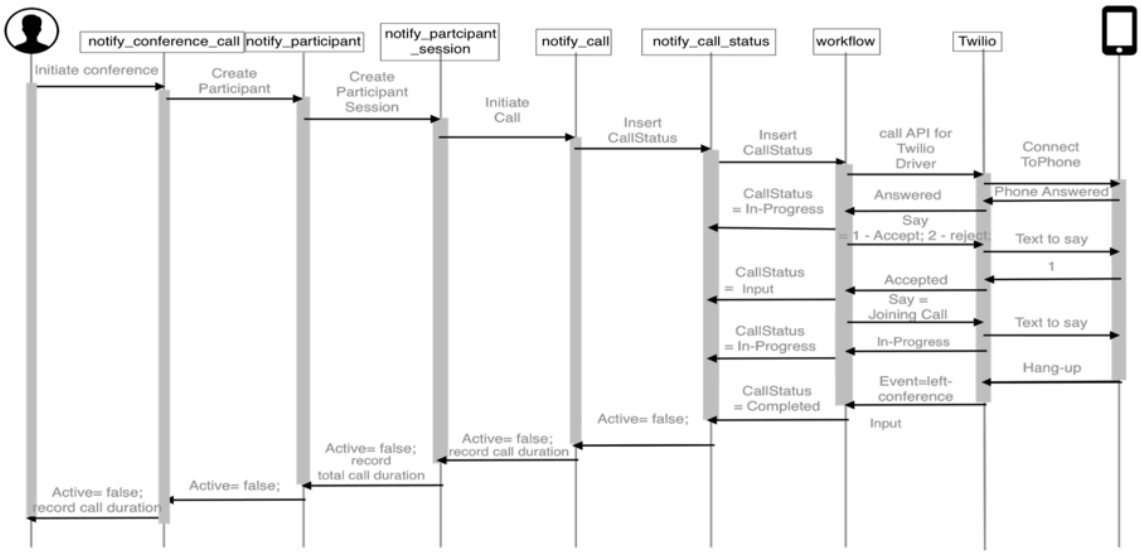
Tables (continued)

Table	Description
Temporary Serialized Notify Action Cache [notify_action]	List of serialized Notify actions waiting to be processed
Notify SMS Template [notify_sms_template]	Contains the templates which are used while sending a Notify SMS.

Notify call sequence



Properties installed with Notify

Notify adds the following properties.

Properties for Notify

Property	Description
sn_twilio_driver.max_conference_participants	Twilio maximum limit for number of participants in the conference call.
com.snc.iam.notify_number	The Notify number to use for conference calls. **Note:** This number must have a group configured with conference call workflows.
glide.notify.sms.max_characters	Maximum number of characters allowed to send SMS messages.
glide.enable.notify_on_task	Use this property to enable Notify integration for Task table and its extensions. Entering phone number in 'glide.notify.task.phone_number' property is equivalent to setting this to true.

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Properties for Notify (continued)

Property	Description
glide.notify.endpoint	If the instance is accessible on public internet using some other name, which can happen if the instance is within a private network and is accessible via a reverse proxy from outside. In that case the public name needs to be provided here. e.g. https://some_public_domain.com
glide.notify.sms.save_confirmation_in_db	Check **Yes**if you want track the confirmation of opt-in/out requests SMS. The confirmations are saved in notify_message table.
com.snc.iam.enable_notify	Use this property to enable Notify integration for Incident Communications Management. Entering phone number in 'com.snc.iam.notify_number' property is equivalent to setting this to true.
com.snc.iam.notify_number	The Notify number to use for conference calls. Note that this number needs to have a group configured with conference call workflows.
com.snc.on_call_rotation.notify_webrtc_number	Specify a valid Notify number with voice capability. This will enable On-Call integration with Notify which allows On-Call users to directly call people on rosters from the browser.
sn_major_inc_mgmt.notify_webrtc_number	Specify a valid Notify Number with voice capability. This will enable a specific Major Incident Management integration with Notify which allows Workbench users to directly call people from the browser.

Business rules installed with Notify

Notify adds the following business rules.

Business rule	Table	Description
No Call Workflows for Shortcodes	[notify_group]	Checks and displays an error if the call is being triggered by a short code.
Update Participant Duration	[notify_participant]	Updates participant duration when it becomes inactive.
Check if Notify call	[notify_participant_session]	Checks if Notify call has valid reference record and updates it if the call is inactive currently.

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Business rule	Table	Description
exists and active		
Update Last Active On	[notify_participant]	Sets the last active before insertion/update of Notify participant.
Show info msg about selection in choice	[notify_group_selector_choice]	Displays a message if either Notify group or conference provider is not selected.
Validate values in the choice	[notify_group_selector_choice]	Checks if either of Notify group or conference provider is filled.
Set scratchpad values	[notify_group_selector_choice]	Checks if conference provider is available by iterating through service provider list.
Show message for empty choices	[notify_group_selector]	Displays an info message if there are no choices for the provider selector.
Clear fields when Manual Selection is set	[notify_group_selector]	Clears out some fields when manual selection is set in Notify group selector table.
Update Participant Duration	[notify_participant_session]	Calculates the duration of participant on conference call.
Update session muted state	[notify_participant]	Sets the value of mute and expelled to true once the conference call participant becomes inactive.
Update conference call	[notify_participant]	Sets the state of conference call based on the participant leaving or joining the call.
Validate Order field value	[notify_group_selector]	Validates order field value to be unique amongst all provider selectors.
Restrict Workflows For only Voice Nums	[notify_number]	Restricts association of voice only capable number with number group having inbound/ outbound SMS workflows.
Restrict Workflows For only SMS Numbers	[notify_number]	Restricts association of SMS only capable number with number group having inbound/ outbound voice workflows.
Validations on default record	[notify_group_selector]	Validates that source table and order field are mandatory in case of default set to false and both fields empty in case of default set to true.

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Business rule	Table	Description
Clearing fields when Default is true	[notify_group_selector]	Clears out some fields when default is set to true.
No Default selector set	[notify_group_selector]	Ensures one active provider selector is set as default.
Check active default selector is unique	[notify_group_selector]	Ensures only one provider selector is set as default.
Process SMS preferences for incoming SMS	[notify_message]	When an SMS preference configuration defined for a particular telephony provider, then apply it for every incoming SMS.
Check default notify group is unique	[notify_group]	Validates that not more than one group is set as default Notify group.
Trigger conference end	[notify_conference_call]	When a conference call ends, triggers the notify.conference.end event
Update Call Active State	[notify_call_status]	Updates the status of the call in notify_call_status with the status received from Twilio.
Update Conference Call Active State	[notify_participant	Updates the active flag in notify_participant table. Also calculates the duration when the call is ended by a participant.
Update Participant Active State	[notify_participant_session]	Updates the active flag for the participant (notify_participant), and calculates the total time on the call upon disconnecting from the call.
Update Participant Session Active State	[notify_call]	Synchronizes the state of the call between notify_call and notify_participant_session. Upon disconnecting from the call, updates notify_participant_session with the duration of the call.
Warn for incorrectly configured workflow	[notify_group]	Checks notify_group table and displays an error if the a workflow is not configured correctly

Manage people and work capabilities

Use these applications to help streamline communications, manage work assignments and interactions, and assess employee skills.

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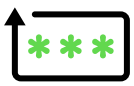
Skills Management	E-signature	Interaction Management
Assess skills in individuals and teams.	Manage signatures for documents or knowledge articles on any device.	Centralize all communications on the platform for improved service call handling.

Password Reset	ServiceNow Voice	
		
Provide secured password reset, user verification options, and more.	Manage third-party call systems and improve the service call experience for users and agents.	

Skills Management

Track the skills that your teams use and need the most, associate skills with groups or individuals, and improve your training and hiring all with this module. Skills Management helps you manage data on various defined proficiencies or sets thereof. Create efficient skill assessments and associate them with teams or single personnel for improved task assignment, find and address knowledge gaps in your organization, and tailor your hiring and training plans.

E-signature

Handle electronic signatures and acknowledgments with E-signature. Use desktop or mobile interfaces to sign documents and knowledge base articles. Tailor roles related to handling signing, and give users the option to provide typed or drawn signatures, credentials, or acknowledgments.

Interaction Management

Handle all your service interactions in one place with this highly flexible, extensible system. Calls, chats, and other contacts are routed and queued through a centralized location with the Interaction Management System (IMS), enabling every product to use the same framework for communication.

ServiceNow Voice

Keep your service call system working efficiently with Voice. This module integrates easily with third-party phone systems, and reduces navigation through multiple networks for more efficient call center interactions. Added metrics and analytics let managers review call data all in one place.

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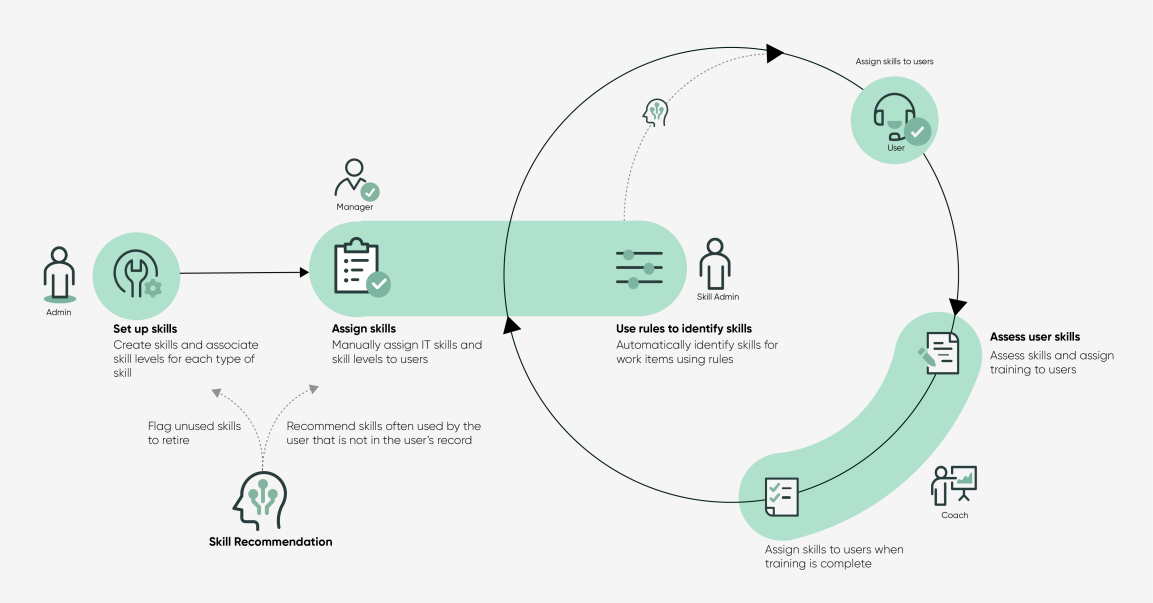
Skills Management

Use Skills Management to associate skills with individual users or groups and assign them to tasks or projects. You can also assess the skills needed for your organization, identify gaps, and implement effective plans for hiring or training of your teams.

Overview



Get started

Explore

Learn how you can implement and manage skills for individuals or teams.

Configure

Plan and configure your implementation.

Integrate

Implement skills across your organization.

Reference

Get details about roles and extension points in Skills Management.

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Troubleshoot and get help

- ServiceNow Community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Exploring Skills Management

Use Skills Management to associate skills with individual users or groups and assign them to tasks or projects. You can also assess the skills needed for your organization, identify gaps, and implement effective plans for hiring or training of your teams.

Important:
Using the Skills Management application, you can create skills and skill categories manually, and also assign them manually to users. Skills Foundation uses Artificial Intelligence (AI) to help your organization leverage skills data for talent management and employee development. When you activate the Skills Foundation plugin (com.sn_skills_int), it also activates the Skills Management plugin (com.snc.skills_management). For information on Skills Foundation, see Skills Foundation.

Skills can contain other skills. For example, if you define network as a skill, you can add router as the skill it contains. A user assigned to a parent skill grants access to a child skill. Once a skill is assigned to a group, all members of the group inherit that skill and any others contained within it. Skills management works similar to ServiceNow platform Create a role.

Using this application, you can:

- Manage skills for agents and your employees from a central location.
- Use a standard way to identify skills for your organization and keep them up to date.
- Group skills into categories and define skill levels to track the expertise of your resources at a granular level.
- Reduce task or project reassignments by assigning tasks to agents and projects to teams that have the right skills to work on those items.
- Identify skill gaps and resolve them by implementing effective plans for coaching and training of resources.
- Manage the effectiveness of your team by evaluating the skills your team has and determining the skills you need for on your projects.

Integration with ServiceNow® applications

A skill is an ability to do something that comes from training, experience, and practice. As a system administrator, you can define skills for your organization and assign it to users and groups from a central location. As an application manager, you can assign users to tasks based on these skills. For example, if you are an IT manager, you can use the Skills Management application to define skills and assign them to users and groups, which facilitates the routing of incidents to agents with relevant skills.

Group skills into categories and define skill levels to standardize skill implementation across your organization.

Use skills from the centralized location in the following applications:

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- IT service management - As an IT manager, reduce your time and costs while resolving incidents by assigning work items to the right agent. Assess the skill gaps that agents have in your team and coach or train agents based on those needs. Identify and define a standard way to keep skill categories and levels consistent within your team.
- Customer service management - As a customer service manager, identify agent skills and automatically route tasks to agents who have the required skill to work on those tasks. Manage your team's effectiveness by understanding what type of skills your employees need to get hired or get trained to take on other roles.
- Field service management - As a field service or customer service manager, use rules to identify skills and skill levels that agents require to resolve work items such as cases, work order tasks, and agent interactions. Automate skill assignment to reduce a manager's work load. Automatically assign tasks to agents using Field Service dynamic scheduling.
- Human resources management - As an HR manager, identify the types of skills your organization needs and make hiring decisions based on those needs. Manage your team's effectiveness by understanding what type of skills your employees need to get hired or get trained to take on other roles.
- Project portfolio management - As a project and portfolio manager, standardize how you categorize skills, define skill level types, and add skill levels for your team. Set up skills for your team in a central location and make them available within your team. Prevent project reassignments by assigning projects to the team members who have the right skills to work on them.

Roles used in Skills Management

Role	Description
Skill administrator [skill_admin]	• Inherits the skill manager [skill_manager] and skill user [skill_user] roles. • Can perform create, read, update, and delete (CRUD) operations on skills, skill levels, skill level types, skill categories, and sub categories.
Skill manager [skill_manager]	• Inherits the skill user [skill_user] role. • Can perform read operations on skills, skill levels, skill level types, skill categories, and sub categories. • Can assign skills to users and groups.
Skill user [skill_user]	Can perform read operations on skills, skill levels, and skill level types.

Activating Skills Management

The Skills Management application is activated when you enable the Skills Management (com.snc.skills_management) plugin.

Configuring Skills Management

Create Skills, identify the Skill Level Type the skill belongs to, and associate Skill Levels for each level type to define a structured skills architecture for your organization.

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For example, you can add French as a skill, Language as the skill level type, and Familiar, Proficient, and Expert as the skill levels.

Identify all the skills you currently have and would require across your organization to start implementing skills in your organization. For example, if you are in Customer Service, you might have agents who have Java as a technical skill and you might need agents who have experience in network administration. If you are in Human Resources, you may have employees who have coaching as a skill and you might need employees who can get new hires on board.

Associate each skill that you have identified with a Skill Level Type. Example, you could associate Java with Programming as the skill level type and Coaching with Leadership as the skill level type.

Define skill levels for each skill level type that you have identified. Example, for the Java skill you can define Novice, Intermediate, Advanced, and Expert as the skill levels.

Define the skill taxonomy

Organize related skills into categories and subcategories so that you can manage skills and create reports quickly and efficiently.

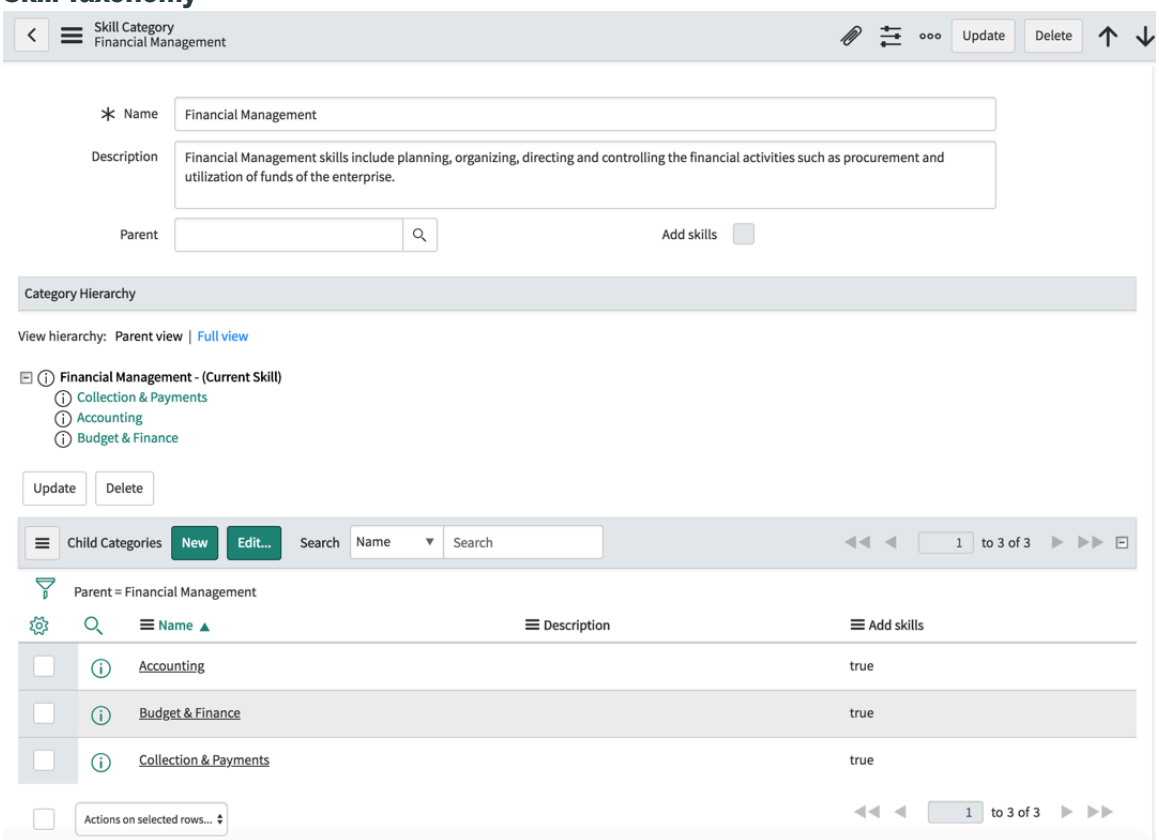
Before you begin

Role required: skill_admin

About this task

A skill category can contain parent and child categories that together create a category hierarchy. You can add skills to the lowest category in the hierarchy.
You can build your skill taxonomy from scratch or use the sample data provided with your application.

Skill Taxonomy



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Procedure

1. Navigate to **All** > **Skills** > **Skill Taxonomy**.
2. In the **Skills Categories** list, select **New**.
3. In the **Name** field, enter a unique name for the category.
4. **Optional:** In the **Parent** field, select a parent category.
5. Right-click the form header and select **Save**.
   The category is added to the **Category Hierarchy**.
6. Add sub-categories or skills.
7. Select **Submit**.

Create skill categories using sample data

Onboard your team quickly using the skill taxonomy framework provided with your application.

Before you begin

Role required: skill_admin

About this task

The sample data provides 150 records that you can use to get started building your skill taxonomy.

Procedure

1. Activate the Skills Library Data for Skills Management (com.snc.skills_management.seed_data) plugin.
2. Navigate to **Skills** > **Skill Taxonomy**.
3. In the **Skill Categories** list, review each category and set the **Add skills** field to **true** for all skill categories you want to add to your application.

Define a skill level type

Define skill levels (for example, beginner, intermediate, advanced) for different skill level types (for example, a language or an IT certification) so you can associate skill levels to users and define skill levels and types required for tasks.

Before you begin

Role required: skill_admin or admin

Procedure

1. Identify skill level types.

   You can group skills that belong to the same category into a skill level type. For example, you could use language as the skill level type if Japanese and French are defined as skills. Take an inventory of every type of skill your organization needs.

2. Add skill level types, define skill levels, and associate them with a skill level type.
   After you add a skill level type, you can define different levels for that type of skill. For example, if you add language as a type of skill, you can associate familiar, proficient, and expert as skill levels. When you select French, for example, as a skill for a user, you will be able to define the user's skill level for French as either familiar, proficient, or expert.

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a. Navigate to **Skills** > **Skill Level Types**.

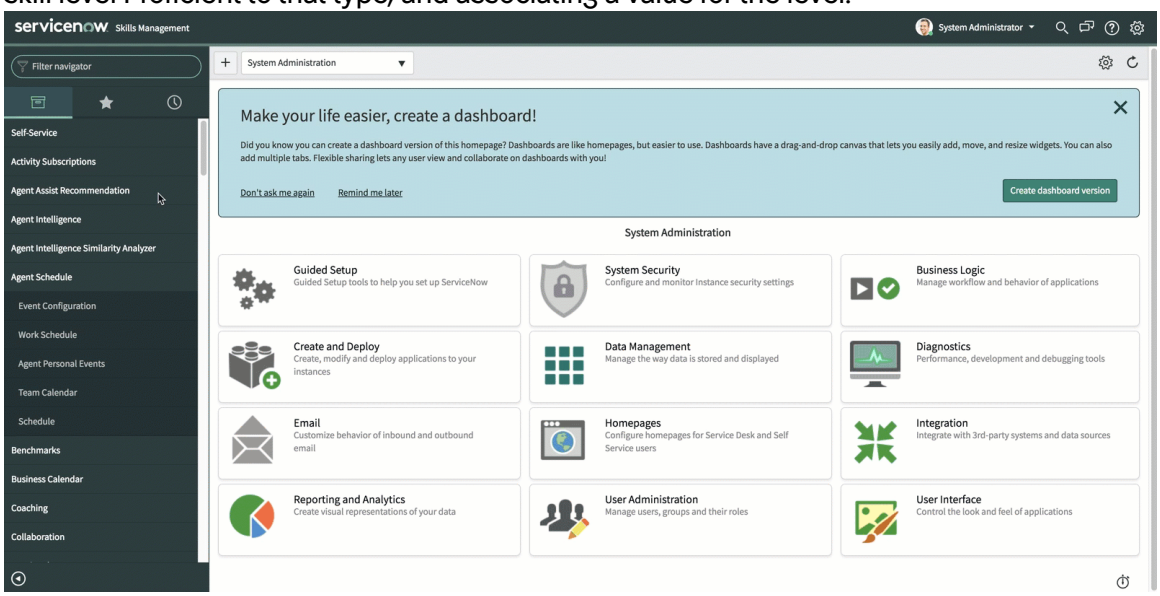
b. Click **New**.

c. Enter a name and description for the skill level type, and then right-click the form and click **Save**.

d. Associate skill levels with this skill type.
By default, skill level types are associated with the **Default** skill level and have a value of 1. You can change the name and value for this default skill level. The value is used to measure skill gaps. For example, if you give a value of 10 for a skill level defined as proficient and a value of 25 for a skill level defined as expert, when you create a skill report to measure gaps, you will see a value of 15 as a measure for the skill gap.

3. Click **Submit**.

Example:
This example shows a system administrator creating the skill level type Language, adding the skill level Proficient to that type, and associating a value for the level.



Add a skill

Create skills to specify the competencies of your users and associate them with users, and configuration items.

Before you begin
Role required: skill_admin or admin

Procedure

1. Identify skills.

   Take an inventory of all skills you currently have and would need across your organization. For example, if you are using Customer Service, you may have agents who have Java as a technical skill and you may need agents who have experience in network administration. If you are using Human Resources, you may have employees who have coaching as a skill and you may need employees who can get new hires on board.

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2. Add skills.

   You can associate each skill with other skills, users, or configuration items. You can assign users to tasks or projects, or identify employees with specific skills using these associations.

   a. Navigate to **Skills** > **All Skills**.

   b. Click **New**.

   c. Enter a name and description for the skill and then right-click the form and click **Save**.

   d. If you want to associate subskills with the skill, click the **Contains Skills** tab and create a new skill or add an existing skill as a subskill.
   The subskill is automatically inherited by the user or group that contains the associated skill.

   e. Specify skills for users by clicking the **Users** tab and creating a new user for the skill or adding existing users.

   f. Associate the skill with configuration items by clicking the **Model** tab and adding one or more configuration items.

3. Click **Update**.

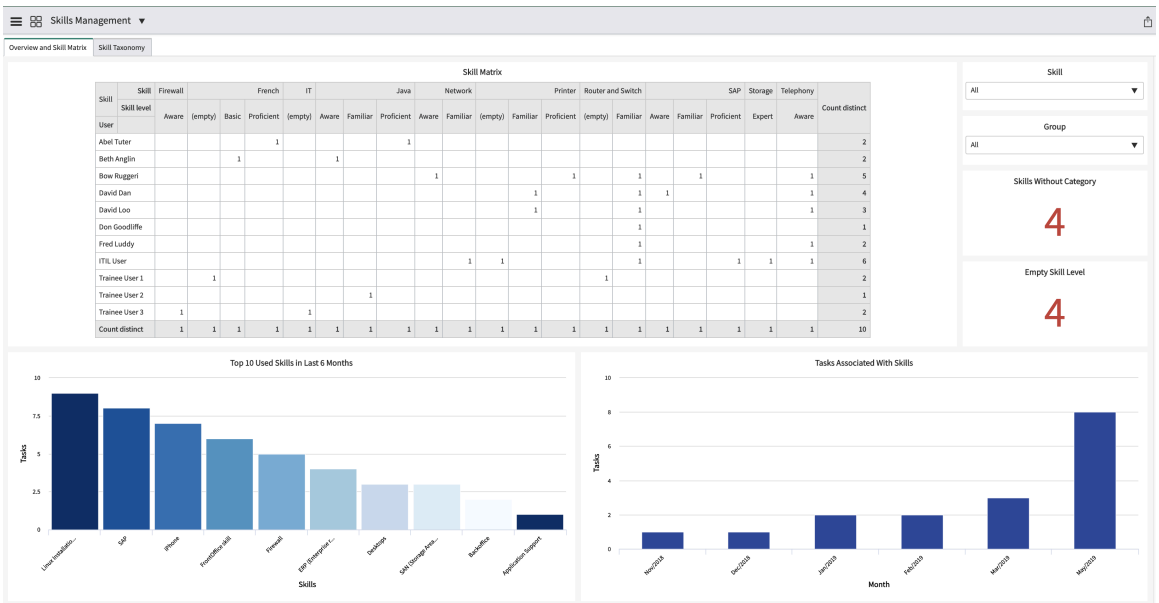
Using Skills Management

Use the Skills Management dashboard to analyze trends in assessing skill gaps in your organization and plan for coaching or training of your employees based on needs. Identify users and teams who have the right skills to work on tasks and projects.

The Skills Management dashboard provides comprehensive reports on skill competencies of users, the tasks that require those skills, and skill gaps you can address to fulfill your organizational needs.

You can access the dashboard by navigating to **Skills** > **Dashboard**.

Overview and Skill Matrix tab



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Skill Taxonomy

You can filter these reports based on the skill category and view reports for each category.

End user and roles

End user and goal	Required role
As a skill manager, you can: • Build your teams based on the skill set your organization needs. • Have visibility into skill competencies of employees. • Analyze skill gaps and plan for coaching or training of your employees based on the needs. • Identify users who have a specific skill or belong to specific skill categories. • Track skill proficiencies of users over time. • Identify key skills being used in solving your business needs and the users with those skills. • Build learning programs based on skill strengths, weaknesses, preferences, gaps, and risks identified for your organization. • Build teams based on skills you need to complete projects. • Evaluate how effectively users solve business needs using their skill	skill_manager

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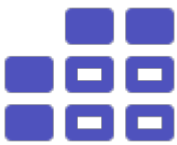
End user and goal	Required role
competencies and provide feedback to implement improvements. • Review how efficiently work assignments are made based on skill levels. • Match user skills with skills needed to complete work items and assign projects to teams based on those skills.	

Data visualizations

Title	Type	Description
Skills Matrix	 Multi-level pivot table	• View competencies for all users in a particular group. • View the competency of all users for a particular skill in a group.
Top 10 skills used in the last six months	 Bar chart	Identify the top 10 skills that are in use and which users have those skills.
Tasks associated with skills	 Bar chart	View the number of tasks that have skills assigned to them. The example report shows data for the last six months.
Users with Skills	 Bar chart	View the total number of users with skills assigned in each skill category.

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Title	Type	Description
Skills in Category	Bar chart	View the total number of skills in the selected category.
List of user skills	List of skills with total count of users for each skill	View number of users available for each skill.

Assigning and Managing skills

Manage skill assignment efficiently by assigning skills to users and analyze the skill coverage of your teams.

Note:
The **Manage skills** page uses the Next Experience user interface. For more information on Next Experience, see Next Experience UI.

You can analyze your teams' skills based on a department. For example, if you select Finance as the department, the page displays all skills that contain Finance skill. When you select a department, the page displays all users from that department. You can also display all users and their skills based on the groups you manage.

If you want to add your own custom group types, your administrator can configure Skills Management extension points to add them.

The skill matrix displays the skill coverage and skill proficiency of all users within a team. If a skill hasn't been added to the user, the skill matrix displays an **Add** button. You can select this button, add the skill, and associate a skill proficiency for the user. If a skill doesn't have the proficiency defined, it displays the skill as acquired. For information on adding skills, see Assign skill proficiency levels for skills.

For each team, the skill coverage bar displays the number of users that have that skill and the number of users in each proficiency. If the skill proficiency isn't defined, it displays the number of users with or without the skill.

You can select the filter icon and narrow down the display of the skill matrix using the Users, Skills, and Location filters.

Assign skill proficiency levels for skills

Add a skill and assign skill levels to users to facilitate the automatic assignment of skill-based tasks to agents.

Before you begin

Role required: skill_manager or skill_admin

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About this task
Only skill administrators can create or edit skills. Skill managers can assign skills to users.

Procedure
1. Navigate to **All** > **Skills** > **Manage IT Skills**.
2. Assign a skill level to a user or add a skill along with the skill level.

Assign skills to tasks
Add skills and the level required for each skill to tasks. Identify whether the skill is mandatory to perform the task.

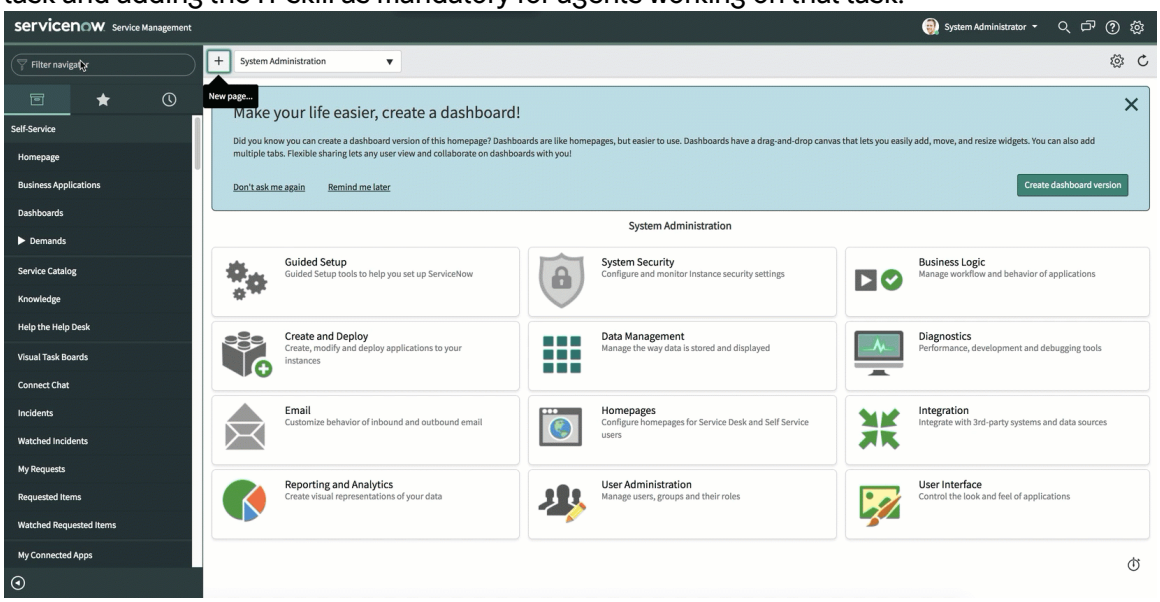
Before you begin
Role required: admin

Procedure
1. Navigate to incident, problem, change request, or any task record to which you want to associate skills.
2. In the related list, select the **Tasks Skills** tab.

> **Note:**
> You must configure the related list and add **Task Skill->Task** to the **Selected** column to display this tab.

3. In the Task Skills table, do the following:
   a. In the **Skill** field, click the lookup icon and select a skill.
   b. In the **Skill level** field, select a level for the selected skill.
   c. In the **Mandatory** field, select **true** if the skill is mandatory for the selected task.
4. Click **Submit**.

Example:
The image below shows an administrator configuring skills for an incident task and adding the IT skill as mandatory for agents working on that task.



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Routing work items to agents based on skills

Use rules to automatically route work items to agents.

You can route work to agents based on their skills using Skill Determination Rules and Advanced work assignments. For more information on routing agents to work items, see Advanced work assignments

Learn how Skill Determination works

Use Skill Determination to add skills to incoming work items so that agents with those skills can work on it.

Skill Determination uses two rules:

- Skill Determination rule—set what skills you want to add to incoming work items.
- Business rule for Skill determination—set criteria for when a business rule must execute.

  When executed, it runs on the source table defined in the Skill Determination rule, triggers the corresponding Skill Determination rule, and adds the skills that are in the Skill Determination rule record to the incoming work item.

The flow chart shows a visual representation of the Skill Determination flow.

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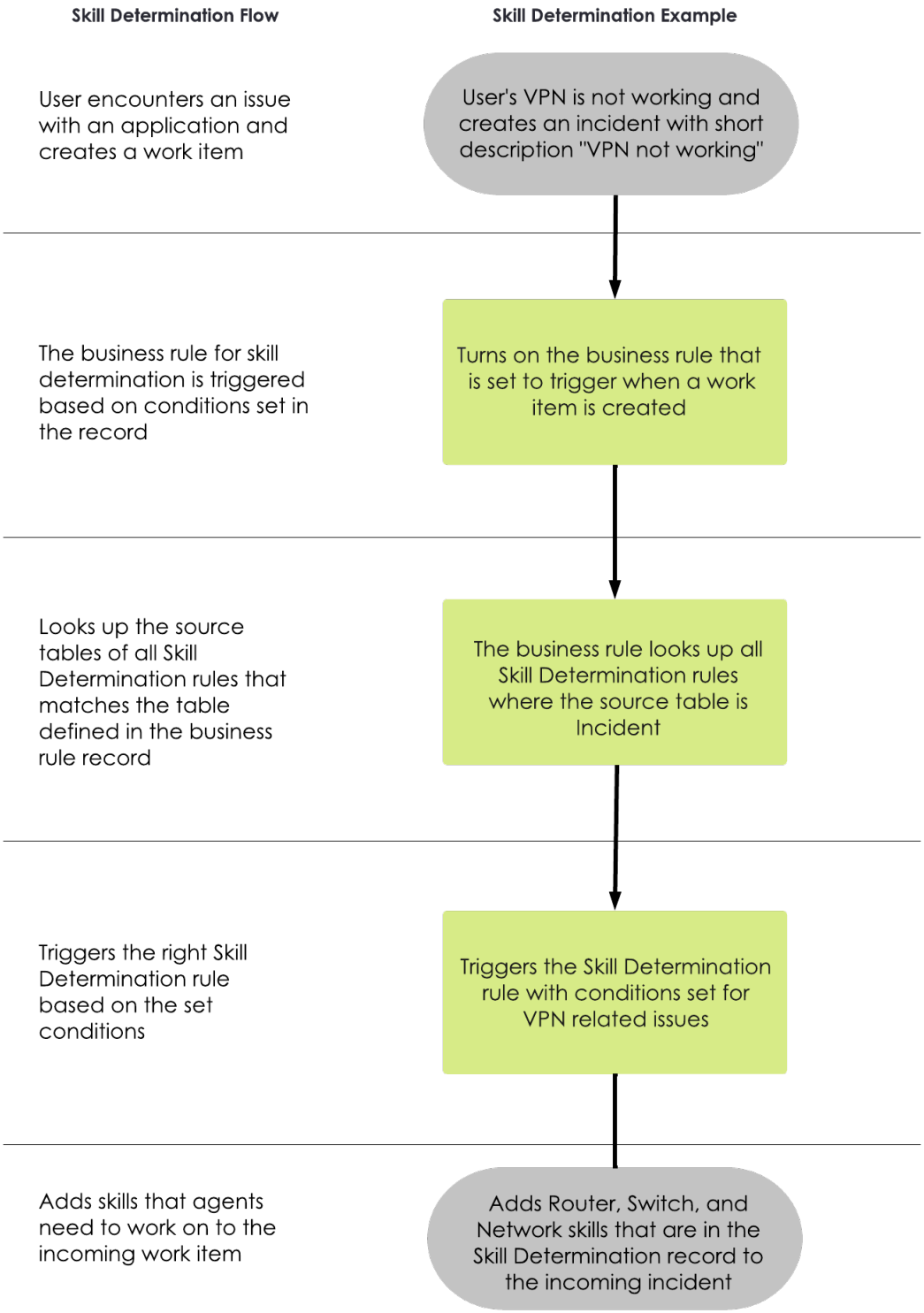

Step	Skill Determination Flow
1.	A user has an issue with their VPN connection and has created an incident with the short description 'VPN not working'. The incident needs agents with **Router, Switch,** and **Network** skills to work on the task.

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Step	Skill Determination Flow
2.	A business rule has been created on the incident table that's set to trigger when an incident is created.
3.	The business rule looks up all Skill Determination rules where the incident table is set as the source table. The business rule then triggers the Skill Determination rule that has one of the conditions set as the **[Short description] [contains] [VPN]**. The Skill Determination rule has the skills **Router, Switch,** and **Network** skills in the Skills related list. When triggered, these skills are added to the incident with the short description 'VPN not working'.

Add a business rule for skill determination

Set up or enable business rules for agents to manage cases, chat interactions, or work order tasks. These business rules trigger Skill Determination rules, ensuring that the required skills are assigned to relevant work items so agents are properly equipped to handle these responsibilities efficiently.

Before you begin

Role required: admin

Enable the Skill Determination [com.snc.skill_determination] plugin.

Procedure

1. Navigate to **All** > **System Definition** > **Business Rules**.

   Note:
   If you want to use the skill determination rules available by default, make sure the **Active** field for that rule is set to **true**. For example, if you want to use the *`Skill determination for interaction`* business rule, make sure that the rule is active.

2. Select **New**.
3. Add details for the business rule.

Field	Description
Name	Descriptive name for the business rule.
Table	Select the table on which you want to run this business rule for skill determination.
Advanced	**a.** Enable the **Advanced** check box. **b.** Select the **Advanced** tab. **c.** In the **Script** field, enter the following code: `(function executeRule(current, previous /*null when async*/ ) { var skillUtils = new sn_skill_rule.SkillDeterminationUtils(); var skills = skillUtils.determineWorkItemSkills(current);`

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Field	Description
	``` skillUtils.assignSkillsToWorkItem(skills, current); })(current, previous); ```

Note:
This script uses the SkillDeterminationUtils utility to identify which skills are needed for the current work item (such as an incident or task) and then assigns those skills to it automatically. This helps ensure that the work item has the correct skill requirements based on its details.

d. In the **When to run** tab, set when you want the business rule to execute. For more information, see Create a business rule.

4. Select **Submit**.

Create Skill Determination rules to assign skills to work items

Create Skill Determination rules to identify skills required by agents to work on work items and automatically associate them to those work items.

Before you begin
Role required: skill_admin or admin

About this task
You can automatically add a skill to a case based on the product associated with the case if you enable the Product to Skill mapping table (Skill Required for Model Maintenance [cmn_m2m_skill_model]).

A skill determination rule is created for every new skill required for a work item.

- If a skill is no longer required for a work item, deactivate or remove the rule applied for the work item.
- If two rules have the same skill associated with one work item and one rule evaluates the skill as mandatory and the other rule evaluates it as optional, then the rule that evaluates the skill as mandatory is always used.

The table describes the types of Skill Determination rules you could create.

Skill Determination Rule Types

Rule Type	Description
Simple	Adds skills to work items based on a set of conditions used to evaluate the source table.
Lookup	Adds skills to work items based on selections from two different tables connected using one or more reference fields.
Advanced	Adds skills to work items using a script.

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Procedure

1. Navigate to **All** > **Skills** > **Skill Determination Rules**.
2. Click **New**.
3. In the **Name** field, enter a name for the rule.
4. Select the **Active** check box to enable the rule to assign skills to work items.
5. From the **Source table** drop-down menu, select the work item source table for this rule.
6. Using the condition builder, select the conditions to evaluate the work item.
7. Create the rule.
8. Click **Submit**.

Qualify and rank users based on skills and skill levels

Rank users so that you can select the right users based on skills needed to complete tasks. Qualify users to work on tasks such as case, work order task, or chat interaction based on the number of skills and skill levels required to work on those tasks.

Before you begin

Role required: skill_admin

About this task

Use the UserSkillAnalyzer API to analyze the skills and skill levels of users and the UserSkillRanking API to rank and assign them to tasks. For example, when you use the Field Service Management application to assign agents to tasks, you can analyze and rank them based on their skills and skill levels using these APIs and use dynamic scheduling to assign them to tasks.

Note:
You must add the Matching Skill Level Gap for Dynamic Scheduling criterion to the task filter to rank agents assessed based on skill gaps. For more information on adding this criterion, see Create a task filter.

Procedure

1. Analyze the skills and skill levels users have to complete work items using the UserSkillAnalyzer API.

   The API performs the following verification to check if users are qualified to be assigned to the work items:

   a. If the user has all mandatory skills required to complete the work item, but does not have the skill level, the agent is not qualified to work on the task if the skill level is mandatory to work on the task.

   b. If the user does not have all mandatory skills required to complete the task, the agent is not qualified to work on the task.

   c. If the user has all skills and the skill levels required to complete the task, the agent is qualified to work on the task.

   d. If the user has all skills required, but not mandatory to complete the task, the agent is qualified to work on the task.

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If the user is qualified to work on the task, the API performs the following verification to analyze gaps in skill level and the total number of skills the users have to execute tasks based on the skill requirements for the work item:

a. Verifies if a work item requires a skill that does not have a level type defined.

b. Verifies if a work item requires a skill that has a level type defined but does not have the skill level defined.

c. Verifies if a work item requires a skill that has the skill level defined, but the agent does not have the skill level defined. If the skill level is mandatory to complete the task, the user who does not have those skill levels will not be assigned to those tasks.

d. Verifies whether a user has all skill levels that are mandatory, but not optional, to perform a task.

2. Rank users qualified to complete work items using UserSkillRanking API.
The API retrieves a list of qualified users based on matching and mandatory skills and skill levels.

Related topics

Dynamic scheduling

Translate text in Skills Management

Translate skills and descriptions when you add new skills in Skills Management.

Before you begin
Role required: skill_admin

Activate the relevant translation plugins. For more information, see Localization Framework.

About this task
Translate skill names and the description using the following fields that support the translated text data type in the Skill [cmn_skill] table:

- **Display Skill Name**

  Auto-populates the corresponding value in the **Name** field.

- **Description**

Procedure

1. Add a skill.
2. For the newly added skills, load the translation to the Translated text [sys_translated.text] table.
3. Set the session language based on the language plugin that you've installed.

> **Note:**
> Every time you add new skills, you must load the translation to the Translated text table and set the session language.

The text in the **Display Skill Name** and **Description** fields are translated.

For more information on translating custom content, see Translating custom content.

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Reference for Skills Management

Validate that Skills Management still works after you make any configuration change such as apply an upgrade or develop an application. Copy and customize these quick start tests to pass when using your instance-specific data.

Skills Management quick start tests require activating the Skills Management plugin (com.snc.skills_management).

Skills Management test suite

Test	Description	Release version
Skills MGMT: User skill level inheritance when user is part of multiple groups	Verify that the user is assigned the highest skill level when the user belongs to multiple groups that have been assigned the same skills with different skill levels.	New York
Skills MGMT: Add skills to lowest level category	Verify that skills can be added to the lowest level category.	New York
Skills MGMT: Create a child category under a parent category	Verify that a lower-level category can be created when the flag for **Add skills** is unchecked in the parent category.	New York
Skills MGMT: Create a skill category	Verify that a skill category can be created on the skill category form.	New York
Skills MGMT: Create skill level type and skill levels	Define the skill level type and different skill levels for the type.	New York
Skill MGMT: Skill level inheritance from group to user	Verify that skill levels can be inherited from a group to the users of the group and that the **Inherited** and **Skill level inherited** fields are set to true.	New York
Skills MGMT: Create a skill from Manage IT Skills user interface.	Verify that you can create a skill from the Manage IT Skills user interface.	Orlando
Skills MGMT: Add skills and skill levels to users in the Manage IT Skills user interface.	Verify that you can add skills and associated skill levels to users in the Manage IT Skills user interface.	Orlando
Skills MGMT: Select a skill and add users to the skill in the Manage IT Skills user interface.	Verify that you can select a skill and add the skill and associated skill levels to one or more users in the Manage IT Skills user interface.	Orlando
Skills MGMT: Select a skill that does not have a skill level and add users to that skill in the Manage IT Skills user interface.	Verify that you can select a skill that does not have a skill level and add the skill to one or more users in the Manage IT skills user interface.	Orlando

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Domain separation and Skills Management

Domain separation is supported in the Skills Management app, and configured to apply to all features of the application. Separation of data is configured along with separation of logic and process.

Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can then control several aspects of this separation, including which users can see and access data.

Support level: Basic

- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

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

How domain separation works in Skills Management

Domain separation is supported in Skill Management with no explicit setup or configuration requirements. Skills, skill categories, skills levels can be created in separate domains, including the global domain. When domain separation is implemented, people with skill app roles can view skill information only in the domain assigned. **Domain** and **Domain Path** columns are available for all Skill tables provided with the base system. The **Domain** column contains the name of the domain to which the event or alert belongs, and the **Domain Path** column contains the unique domain identifier.

Table name	Description
sys_user_has_skill	User skill information
cmn_skill	Main skill table
cmn_skill_category	Define skill categories
cmn_skill_level_type	Define skill level type
cmn_skill_level	Define skill level
sys_group_has_skill	Group skills
cmn_skill_contains	Define skills contained within skills
task_m2m_skill	Task skill information

Note:
If the domain column is not shown, click the **Update Personalized List** icon and add the required column. You can also add the domain path column, if desired.

Use cases:

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- A Skill Manager that belongs to the Acme domain creates a skill and wants to view and associate it to user in the Acme domain. A user must belong to the Acme domain, its parent domain, or the global domain to view the skill record.
- A Skill Manager that belongs to a parent domain tries to view a skill in a child domain. The user of a parent domain can view a skill record of the parent as well as all child domains of that parent.
- A Skill Manager that belongs to a parent domain wants to create/associate a skill on behalf of another user in the Acme domain. A user must belong to the same domain as the user for which the skill record is created.
- A Skill Manager wants to associate a record for an integrated application in the Acme domain. A user must belong to the domain of the integrated application from which a record is associated.
- A Skill Manager has access to multiple domains but wants to update a record with content within a specific domain. The domain specified for the current record drives the functionality of that record and reference fields.

Quick start tests for Skills Management

Validate that Skills Management still works after you make any configuration change such as apply an upgrade or develop an application. Copy and customize these quick start tests to pass when using your instance-specific data.

Skills Management quick start tests require activating the Skills Management plugin (com.snc.skills_management).

Skills Management test suite

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Skill MGMT: Skill level inheritance from group to user	Verify that skill levels can be inherited from a group to the users of the group and that the **Inherited** and **Skill level inherited** fields are set to true.	New York

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Skills Management test suite (continued)

Test	Description	Release version
Skills MGMT: Create a skill from Manage IT Skills user interface.	Verify that you can create a skill from the Manage IT Skills user interface.	Orlando
Skills MGMT: Add skills and skill levels to users in the Manage IT Skills user interface.	Verify that you can add skills and associated skill levels to users in the Manage IT Skills user interface.	Orlando
Skills MGMT: Select a skill and add users to the skill in the Manage IT Skills user interface.	Verify that you can select a skill and add the skill and associated skill levels to one or more users in the Manage IT Skills user interface.	Orlando
Skills MGMT: Select a skill that does not have a skill level and add users to that skill in the Manage IT Skills user interface.	Verify that you can select a skill that does not have a skill level and add the skill to one or more users in the Manage IT skills user interface.	Orlando

Related topics

Quick start tests

Extension points in Skills Management

Use extension points to calls scripts to add custom group types to manage skills.

To see a list of extension points that you can use for Workforce Optimization for ITSM, navigate to **System Extension Points** > **Scripted Extension Points**. In the Extension Points list, open the *sn_skill_cfg_page.ManageSkillsExtnPt* extension point.

Use scripted extension points to integrate customizations without altering the core components in the application code. When customizing a base application, you implement the scripted extension points by creating the custom script includes and registering them against the scripted extension points.

Extension points for event types

Extension point name	Description
sn_skill_cfg_page.ManageSkillsExtnPt	Implement this extension point to customize the logic of creating users by groups for the Manage IT skills page.

Important:
You can configure additional groups using the `sn_skill_cfg_page.ManageSkillsConstants` script include. For information on script includes see, Script includes.

Interaction Management

Interactions provide a centralized location for all communication channels in the platform. Each interaction represents a request for assistance through a given channel, for example, a call

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or a chat. The purpose of Interaction Management is to help get insights into the channel's effectiveness.

Overview of Interaction Management

The ServiceNow AI Platform offers several forms of queuing and communication management, but each system is tightly coupled to the specific area. Interactions offer an alternative, flexible, and more extensible option so that each product area can use the same framework.

Get started

Activate Activate Interaction Management.	Configure Configure interaction components, determine which actions occur depending on the state of the interaction, and configure States determine the behavior for interactions. For each state of the interaction life cycle, you determine which routine actions to perform.
Use Manually create interactions or associate records with an interaction.	Reference Learn about the components installed with Interaction Management.

Troubleshoot and get help

- Virtual Agent interaction records
- ServiceNow Community forums
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Activating the Interaction Management system

An administrator can activate the Interaction Logging, Routing, and Queueing plugin (com.glide.interaction) to access the functionality.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the **Interactions Management** plugin (com.glide.interaction) using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Configuring Interaction Management

You can configure the behavior of an interaction and the types of information that is stored with the record. You can also use interaction wrap up to provide agents with a brief wrap-up period at the end of customer conversations.

Interaction states

Configure the behavior of an interaction by determining the routine behavior for each state that the interaction goes through during the life cycle.

Interaction framework

Configure each of the following interaction components to determine the behavior and life cycle.

- Lists: Configure the interaction list view. You can also extend the interaction table. For more information about configuring lists, see Configuring lists on the ServiceNow AI Platform®.
- Forms: Configure the form view to tailor interactions for each application. For more information about configuring forms, see Configuring forms on the ServiceNow AI Platform®.

Interaction states

States determine the behavior for interactions. For each state of the interaction life cycle, you determine which routine actions to perform. For example, the *`On Created`* state would have a script that creates an interaction and then adds the end user as the 'opened for'. The script then sends a message to the end user to let them know that the interaction has been opened.

Interaction states

State	Description
New	An interaction is inserted into the interaction table.
On Hold	The interaction is waiting for assignment.
Work In Progress	An agent accepts an unassigned interaction.

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Interaction states (continued)

State	Description
Wrap Up	This state indicates that the agent has completed a conversation with a customer and is wrapping up the interaction. This state is available if an interaction wrap up configuration has been created for the specific type of interaction and that configuration is active. For more information, see Interaction wrap up.
Closed Complete	The interaction timed out or the agent or consumer intentionally closed the interaction.
Closed Abandoned	The interaction is closed because the consumer disconnects or is unresponsive.

Interaction context and channel metadata

Context and channel metadata are document ID fields included as part of interactions. Both types of records store information about the interaction.

Context

Context for an interaction tracks the information for an interaction, such as the initial question, asset tagging, or device location. Context records are stored on the interaction_json_blob table by default, however you can use any table to store a context record.

Channel metadata

Channel metadata contains the information needed to interact with the channel on which communication is happening on, for example, the chat or phone channels. Channel metadata can be free-form JSON or a reference to another record.

Interaction wrap up

Interaction wrap up provides agents with a brief wrap-up period at the end of customer conversations. Agents can use this time to complete their work before moving on to assist other customers.

Interaction wrap up is a feature available for all types of interactions. When enabled, an interaction record moves from the Work In Progress to the Wrap Up state at the end of a customer conversation. This brief, configurable period enables agents to complete tasks such as posting work notes and updating record information before moving on to other work items.

While in the Wrap Up state, an agent's capacity is not reduced until the state of the interaction moves to Closed Complete.

Note:
The interaction wrap up feature works with multiple types of communication channels. This feature supports a chat and messaging interactions base system.

Configuring interaction wrap up

Users with the system administrator role create an interaction wrap up configuration for the desired communication channel. Creating a configuration automatically enables the feature and the Wrap Up state for interactions that match the configuration settings.

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The interaction wrap up configuration includes the following information:

- The selected communication channel.
- Additional conditions that apply to the interaction records included in the configuration.
- Whether wrap up is automatically ended by the system and, if automatically ended the duration of the wrap up period.
- Whether a countdown timer that displays the wrap up duration is shown to agents in CSM Configurable Workspace.

The interaction wrap up configuration adds the Wrap Up state to the **State** field on the Interaction record. For more information about the wrap up state, see Interaction states.

Starting wrap up

The wrap up period begins when either the agent or the customer ends a conversation. The system then does the following:

- Moves the state of the interaction from Work in Progress to Wrap Up.
- Starts a countdown timer for the wrap up duration period.

Manually ending wrap up

Ending the wrap up period can be performed manually by the agent or automatically by the system.

Agents can end the wrap up by clicking **End Wrap Up** on the Interaction record, which moves the interaction from Wrap Up to Closed Complete.

Agents can also end the wrap up period by closing the interaction record tab.

- If the interaction is in the Wrap Up state, closing the tab ends the wrap up period and moves the interaction to Closed Complete. The system displays a message to the user about ending the wrap up period.
- If the interaction is in the Work in Progress state, closing the tab skips the wrap up period and moves the interaction to Closed Complete.

Automatically ending wrap up

If an agent has not already ended wrap up, the system can automatically end the wrap up period after a set period of time. Automatic wrap up must be enabled in the interaction wrap up configuration.

- The system starts the wrap up duration timer when the wrap up period starts.
- When the wrap up duration timer reaches zero, the system ends wrap up and changes the state from Wrap Up to Closed Complete.
- The system sets the **System wrap up** field on the Interaction record to True.

Note:
Agents can manually end the wrap up period even if automatic wrap up is enabled.

Interaction form

The Interaction form displays information about a customer interaction.

The interaction form includes the following fields.

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Field	Description
Number	The automatically assigned interaction number.
Type	The type of customer interaction, such as a chat or phone call.
Account	The name of the customer contact's company. This field is filled in automatically if the information is available in the contact record.
Contact	The name of the customer contact.
Consumer	The name of the consumer.
State	The current state of the interaction. For more information, see Interaction states.
Assigned to	The name of the assigned user.
Short description	A brief description of the customer issue.
Work notes	Records information about the interaction and the work being done to resolve the customer issue.
Wrap up duration	If using the Interaction wrap up feature, the system administrator can configure the Interaction form and add the **Wrap up duration** field. This field records the length of time that the Interaction record spends in the Wrap Up state. This is a read-only field. If a duration is not calculated, this field is set to 0. Duration is calculated as the time an interaction is in the Wrap Up state before moving to either Closed Complete or Closed Abandoned. **Note:** If an agent closes the tab and ends the interaction, the wrap up duration is recorded as 0 seconds.
System wrap up	If using the Interaction wrap up feature, the system administrator can configure the Interaction form and add the **System wrap up** field. The system determines if the interaction wrap up was performed manually by an agent (by clicking **End Wrap Up**) or automatically by the system and sets this field accordingly. • Set to **True** when automatic wrap up is enabled and the system moves an interaction from the Wrap Up state to either

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Field	Description
	Closed Complete or Closed Abandoned at the end of the wrap up duration. • Set to **False** when an agent manually wraps up an interaction. The default value for this field is false.

Interaction wrap up timer

The interaction wrap up timer displays a countdown of the wrap up duration period in CSM Configurable Workspace.

The system administrator can configure the display of the wrap up timer by enabling the **Show duration to agent** field on the Interaction Wrap Up Configuration form.

The read-only timer appears in an interaction record's secondary values. Depending on the configuration of the secondary values, these values can be displayed either in the form header or in the contextual side panel.

Note:
The interaction wrap up timer works in both CSM Configurable Workspace and CSM Agent Workspace but the timer display is only available in CSM Configurable Workspace.

The timer counts down the amount of time specified in the **Duration in seconds** field on the Interaction Wrap Up Configuration form. The background color of the timer changes as it counts down the duration.

Timer color	Description
Green	Time remaining is between 100% to 50% of duration.
Yellow	Time remaining is between 50% and 25% of duration.
Orange	Time remaining is between 25% and 0% of duration.
Red	When the timer reaches 0.00, the display turns red and then disappears. The system updates the state of the interaction record to Closed Complete.

Interaction wrap up scheduled job

The interaction wrap up feature includes a scheduled job to close any interactions in the Wrap Up state that were not closed either manually by an agent or automatically by the system.

Ending the wrap up period is typically performed in the following ways:

- Manually by the agent.
- Automatically by the system, if the **Enforce wrap up duration** setting is enabled in the interaction wrap up configuration.
- By closing the workspace tab.

While most interaction records are automatically closed when the configured wrap up period ends, the interaction wrap up feature also includes a scheduled job to close any remaining records. For example, if the **Enforce wrap up duration** setting is not enabled in the configuration and agents close interactions by closing the browser, these interactions can remain in the Wrap Up state.

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The **Fallback Timeout for Interactions in Wrap Up** scheduled job functions as a fail-safe method for closing interaction records that remain in the Wrap Up state. This scheduled job:

- Evaluates interaction records in the Wrap Up state.
- Closes those records that have been in the Wrap Up state longer than the time specified in the Max Wrap Up system property.

The Max Wrap Up system property (**com.glide.interaction.max_wrapup_duration**) defines the length of time that an interaction record can be in the Wrap Up state. The default value for this property is 15 minutes.

The time value set in the Max Wrap Up system property must be greater than the time value set in the **Enforce wrap up duration** field on the Interaction Wrap Up Configuration form.

The default run interval for this scheduled job is five minutes. The system administrator can configure this time interval.

Note:
This scheduled job is inactive by default.

Create an interaction wrap-up configuration

Create a configuration for each type of interaction that uses the interaction wrap up feature.

Before you begin
Role required: admin

About this task
Creating a configuration automatically enables the interaction wrap up feature and adds the Wrap Up state for interactions that match the configuration settings.

Navigate to **All** > **Interactions** > **Wrap Up Configuration** to display the list of wrap up configuration records. These configurations are stored in the Interaction Wrap Up Configuration (interaction_wrap_up_configuration) table.

Procedure

1. Navigate to **All** > **Interactions** > **Wrap Up Configuration**.
2. Click **New**.
3. Fill in the fields on the Interaction Wrap Up Configuration form.

Field	Description
Name	The name of the interaction wrap up configuration.
Table	Read only. The table that stores the interaction records to which this configuration applies.
Application	The application that contains this record. The default is CSM and FSM Configurable Workspace Foundation.
Active	Indicates whether the configuration is active. The default value is true.
Order	The order of the configuration, which is used in evaluation processing of wrap up

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Field	Description
	configuration records. If there are multiple records, the lower order number takes precedence over higher numbers. The default value is 100.
Conditions	Use the condition builder to select the conditions that apply to the interaction records included in this configuration. For example, create a condition for chat interactions: **[Type]** [is] **[Chat]**.
Enforce wrap up duration	Enables the system to automatically end the wrap up period. The default value is false. If enabled, the system automatically ends the wrap up period at the end of the wrap up duration (set in the **Duration in seconds** field) and moves the state of the interaction record from Wrap Up to Closed Complete.
Duration in seconds	The duration of the wrap up period. ○ The default value is 60 seconds. ○ The value must be greater than 0. The system displays this field when you enable the **Enforce wrap up duration** field.
Show duration to agent	Enables a duration countdown timer for the agent. The default value is false. The system displays this field when you enable the **Enforce wrap up duration** field. The interaction wrap up timer display is available in CSM Configurable Workspace.
Enable wrap up codes	Enables wrap up codes in CSM Configurable Workspace. When wrapping up an interaction, agents can select from the configured wrap up codes.
Allowed wrap up codes	The list of wrap up codes that agents can select from when wrapping up an interaction.
Default wrap up code	The default wrap up code that is used if an agent does not select a code before the wrap up duration ends.

4. Click **Submit**.

Create interaction wrap-up codes

Wrap-up codes enable agents to quickly wrap up and close interactions. Agents can select wrap-up codes from the interaction wrap-up modeless dialog.

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About this task
Users with the system administrator role can create wrap-up codes for agents to use during the wrap-up period. When interaction wrap-up codes are enabled, agents can select wrap-up codes from the interaction wrap-up modeless dialog.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Interaction** > **Wrap Up Codes**.
2. Select **New**.
3. Fill in the fields on the Interaction Wrap Up Code form.

Field	Description
Code	The name of the wrap up code.
Application	The application that contains this record. The default is CSM and FSM Configurable Workspace Foundation.
Active	Indicates whether the interaction wrap-up configuration is active. The default value is true.
Description	A brief description of the wrap-up code.

4. Select **Submit**.

What to do next
After creating wrap-up codes, system administrators can enable wrap-up codes in the interaction wrap-up configuration record and select the wrap-up codes that are available to agents. For more information, see Create an interaction wrap-up configuration.

Enable interaction wrap-up codes

Enable interaction wrap-up codes and select the wrap-up codes that are available to agents in the interaction wrap-up modeless dialog.

About this task
Users with the system administrator role can enable wrap-up codes for agents to use during the wrap-up period. When enabled, agents can select wrap-up codes from the configured list in the interaction wrap-up modeless dialog.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Interaction** > **Wrap Up Configuration**.
2. Select a configuration record.
3. In the Duration related list, enable the following fields.
   - **Enforce wrap up duration**
   - **Show duration to agent**

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4. Enter a value in the **Duration in seconds** field.
5. In the Codes related list, enable the **Enable wrap up codes** field.
6. In the **Allowed wrap up codes** field, select the desired codes and move them from the Available column to the Selected column.
7. Select a **Default wrap up code**.
8. Select **Update**.

Using Interaction Management

Most interaction creation takes place in other applications, to control channels. When needed, you can create an interaction from the Interaction application.

For more information about how interaction are created in other applications, see:

- Interaction Management in Service Operations Workspace
- Interaction Management in Source-to-Pay Workspace
- Interaction Management in Supplier Lifecycle Operations
- Interaction management in Accounts Payable Operations
- CSM Interaction record page

Create an interaction

An interaction is a record of a conversation between a requester and a fulfiller (real or virtual). Though most interaction creation takes place in other applications, if needed, you can create an interaction directly from Interaction Management.

Before you begin

Role required: interaction_agent

Procedure

1. Navigate to **All** > **Interaction** > **All**.
2. Select **New**.
3. In the Interaction form, fill in the fields:

Field	Description
Type	Select the type of interaction. For example, chat, phone, and so on.
Opened for	Select the user who started the interaction.
Assigned to	Select the user to whom the interaction is assigned.
State	Select the current state of the interaction.
Short description	Enter the basic details of the interaction.
Work notes	Enter relevant additional information.

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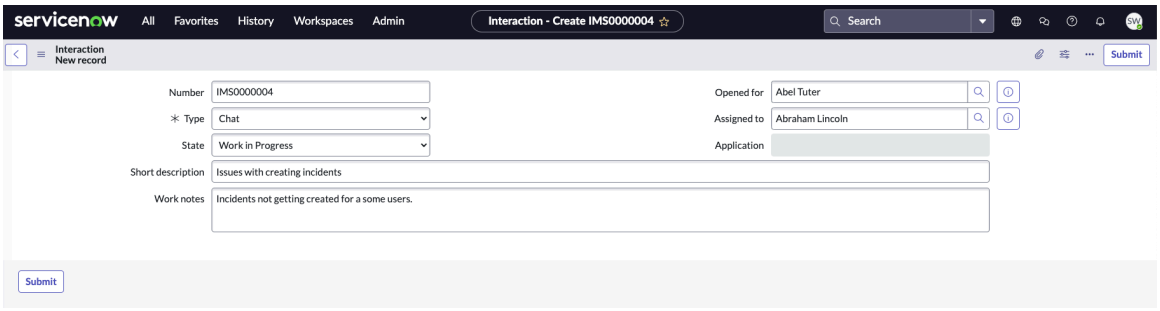
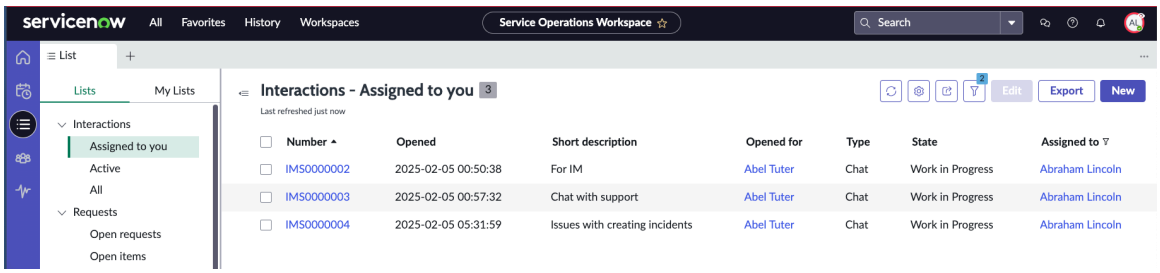
4. Select **Submit**.



Result

The interaction is created and assigned to the selected user.



Associate a record with an interaction

As an agent, you might need to create a record on another table to work on an interaction. You can associate the record with the interaction.

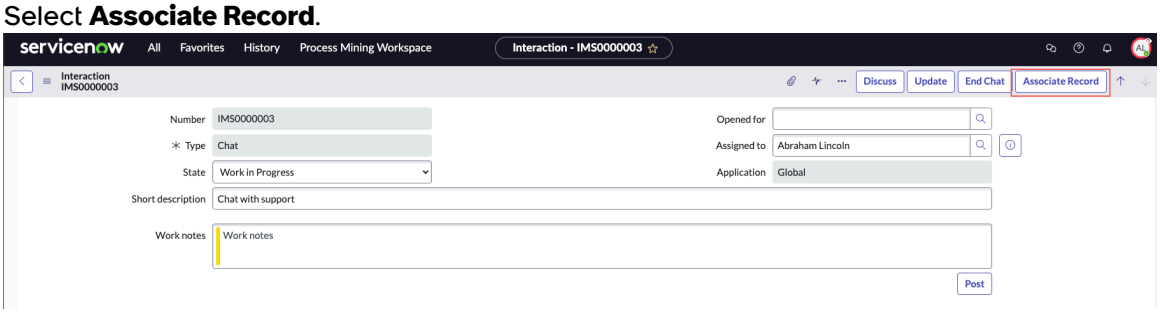
Before you begin

Role required: interaction_agent

Note:
You must also have the roles required to access the records that you want to associate with the interaction.

Procedure

1. Navigate to **All** > **Interaction** > **Assigned to me**.
2. Open the interaction you want to associate with another record.
3. Select **Associate Record**.



4. In the Interaction Related Record form, fill in the fields:

Field	Description
Document table	Select the table where the association is saved.

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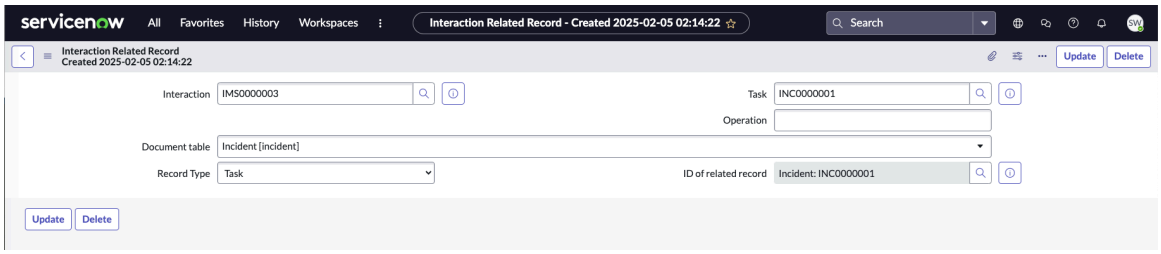
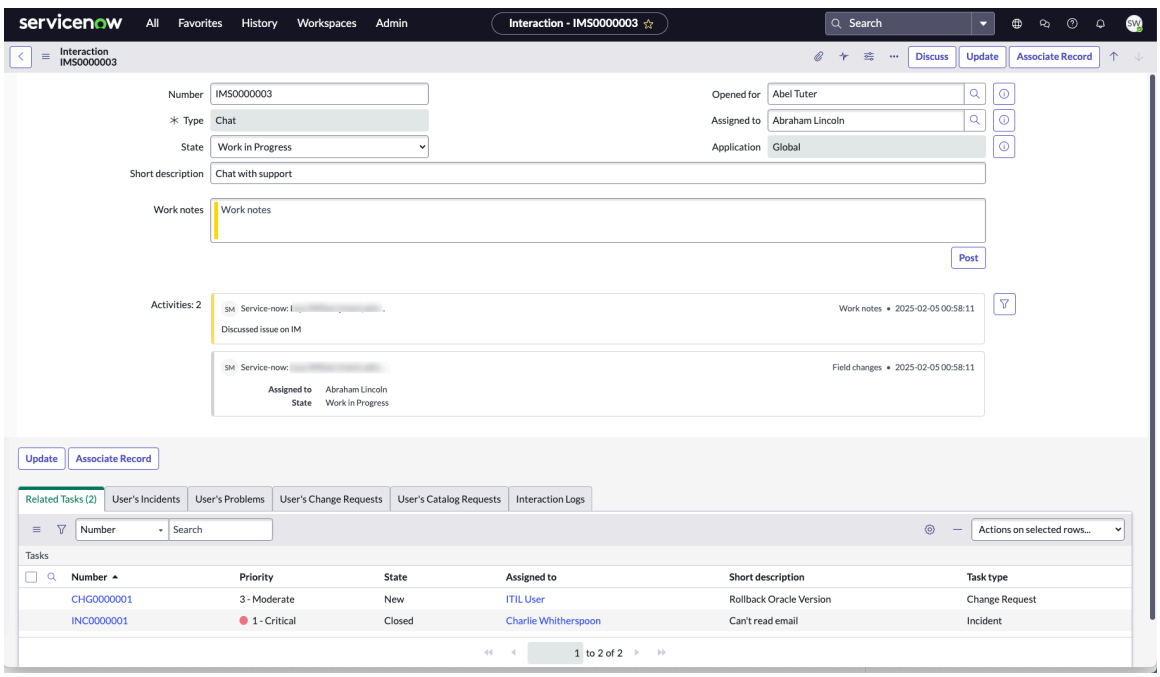
Field	Description
Record Type	Select the type of record that you are associating with the interaction. Record type can be **Task** or **Knowledge**.
Task	Select the task you want to associate with the incident. Task field becomes available when the record type is selected as Task.
Knowledge article	Select the knowledge article you want to associate with the incident. Knowledge article field becomes available when the record type is selected as Knowledge.
ID of related record	Automatically updated with the task or knowledge number.

5. Save the form.



Result

Task type records associated will appear in the Related Tasks related list for the interaction.



Interaction Management reference

Learn about the components installed with Interaction Management.

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Components installed with Interaction Management

Several types of components are installed with activation of the Interaction Logging, Routing, and Queueing plugin, including tables and user roles.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Roles installed

Role title [name]	Description	Contains roles
Interaction Administrator [interaction_admin]	Configure interactions for users.	interaction_agent
Interaction Agent [interaction_agent]	Create and edit interactions. Transfer interactions to different agents or queues.	None

Tables installed

Table	Description
Interaction [interaction]	Table for all interaction records.
Interaction JSON blob [interaction_json_blob]	List of records that store context information for each interaction.
Interaction related record [interaction_related_record]	List of related records that have been associated with an interaction.

Live Feed Core UI

Live Feed is a social IT application that provides a place to post and share content in a ServiceNow® instance.

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed is automatically disabled and will no longer work. See Next Experience UI for more information.

While Live Feed has been discontinued, we are always exploring new ways to enhance our services. Stay tuned for future updates and improvements.

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Get started

Explore Learn about Live Feed concepts and features.	**Activate** Activate Live Feed on your instance.	**Administer** Administer document feeds, record feeds, and notifications.
Use Post in Live Feed and use feeds, teams, hashtags, and records.	**Reference** Get details about domain separation and components, such as tables, user roles, business rules, and script includes.	

Troubleshoot and get help

- Live Feed discussions in the ServiceNow Community
- Contact Customer Service and Support

Exploring Live Feed Core UI

Live Feed content forms a searchable knowledge source for sharing information within an organization.

Live Feed overview

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed is automatically disabled and will no longer work. See Next Experience UI for more information.

While Live Feed has been discontinued, we are always exploring new ways to enhance our services. Stay tuned for future updates and improvements.

Live Feed content forms a searchable knowledge source for sharing information within an organization. Main features include the following:

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- Users can post, reply to, and rate messages, including links and images.
- Administrators can set up automatic messages that are generated when specific records are updated throughout the system.
- Users can subscribe to receive email notifications when new messages are posted.
- Users who take advantage of the accessibility options in the platform can tab through a Live Feed to navigate.

Live Feed includes different types of feeds, including company feeds, group feeds, individual feeds, and record feeds.

Note:
Live Feed v2 is active for all new instances by default. If you are upgrading from an earlier version of ServiceNow®, you need to activate Live Feed v2 to use these features.

Live feed can be domain separated at the data level only. For more information on Live Feed and domain separation, see Domain separation in Live Feed.

Live Feed users

Users

User	Description
Admins	Admins activate and administer Live feed in the following ways: • Add and configure document feeds • Activate and configure record feeds • Set up notifications • Manage Live Feed security
Users	Users can subscribe to feeds, post content, work on records, and use hashtags.

Live Feed benefits

Live Feed benefits

Benefit	Feature	Users
Document feeds allow users to work on tasks and other records through the Live Feed interface. Users can post messages in Live Feed that are automatically maintained as comments or work notes on the record, if the record has these journal fields.	Document feeds	Configuration: Admins Users: anyone
Record feeds allow users to work on tasks and other records through the Live Feed interface. Users can post messages in Live Feed that are automatically maintained as comments or work notes on the record if the record has these journal fields.	Record feeds	Configuration: Admins Users: anyone

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Live Feed benefits (continued)

Benefit	Feature	Users
When a record is inserted or updated on a specific task table and the notification conditions are met, a message is generated and posted to the specified group or to the company feed.	Live Feed table notifications	Configuration: Admins Users: anyone
Users can be combined into teams for the purpose of subscribing to specifically-focused feeds.	Teams in Live Feed	Configuration: Admins Users: anyone
Hashtags are words marked with a hash symbol (#) in messages. Hashtags are a way to categorize messages by keyword or topic for improved search results.	Hashtags in Live Feed	Anyone

What to explore next

To learn more about configuring and using Live Feed, see:

- Activating Live Feed
- Administering Live Feed
- Using Live Feed
- Live Feed reference

Live Feed browser support

The Live Feed v2 plugin does not support Internet Explorer 7 through 9.

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed is automatically disabled and will no longer work. See Next Experience UI for more information.

While Live Feed has been discontinued, we are always exploring new ways to enhance our services. Stay tuned for future updates and improvements.

Users who access the instance from those browser versions can use Live Feed v1 functionality. Users who access the instance from browsers that are compatible with HTML5 can use Live Feed v2 functionality.

Activating Live Feed

Live Feed is active for all instances. An administrator can activate the Live Feed plugin if it is not already active.

Before you begin
Role required: admin

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Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed is automatically disabled and will no longer work. See Next Experience UI for more information.

While Live Feed has been discontinued, we are always exploring new ways to enhance our services. Stay tuned for future updates and improvements.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Administering Live Feed

Administrators and users with the live_feed_admin role can configure Live Feed security and provide access to Live Feed from content management pages. Administrators can also set up Live Feed table notifications.

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed is automatically disabled and will no longer work. See Next Experience UI for more information.

While Live Feed has been discontinued, we are always exploring new ways to enhance our services. Stay tuned for future updates and improvements.

Document feeds

A document feed is a Live Feed group that is associated with a record, such as an incident or change.

Document feeds allow users to work on tasks and other records through the Live Feed interface. Users can post messages in Live Feed that are automatically maintained as comments or work notes on the record, if the record has these journal fields.

The benefits of using document feeds include the following.

- Improving communication between users working on the same record.
- Improving visibility into progress for end users.
- Providing a single place to see updates on multiple records.
- Saving conversation history in the record so that knowledge is not lost in an email chain.

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To use document feeds, activate the Live Feed Document plugin, which is active by default in new instances. See Use Live Feed to work on records to learn how to use this feature.

The system automatically creates a document group for the feed when a user follows or shows a record on Live Feed. The system also creates a document group when a user creates a new record on a table that has Live Feed enabled.

The following list describes features of the document feed group.

- Is unlisted; it does not appear when users view all groups on Live Feed.
- Automatically approves membership for every user who can access the record.
- Uses the record number as the group name.
- Uses the record short description as a group description.
- Maintains all messages posted to Live Feed on the record, if the record has a journal field for comments. If the record has a standard text field for comments, each live post overwrites the field value.
- Maintains all messages posted on the record in Live Feed if the record has a journal field for comments. When the group is created, existing messages are added to the document feed.

A user who participates in Live Feed becomes a member of the group.

Related topics

Activate a plugin

Add a Live Feed UI action on a table

You can add UI actions on a table to allow users to follow records in live feed.

Before you begin

Role required: ui_action_admin or admin

Procedure

1. Navigate to **System Definition** > **UI Actions**.
2. Open one of the Live Feed UI actions, for example, the *Follow on Live Feed* list UI action.
3. In the *Table* field, select the table name.
4. Right-click the header and select **Insert** to create a copy of the UI action for the desired table.
5. Repeat steps 1 – 4 for all Live Feed UI actions.

Configure document feeds

You can configure a table to support document feeds.

Before you begin

Role required: personalize_dictionary or admin

Procedure

1. Add Live Feed to a form header.
2. Add *Follow on Live Feed* and *Show Live Feed* as list and form UI actions.

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Security configuration for document feeds

Document feeds honor the access control rules (ACLs) for the associated record. Users can only view messages on the document feed if they have access to the same information on the record.

Consider the following examples:

- If an ACL allows a user to read and create comments on an incident, then the user can view and add messages posted as comments on the incident feed.
- If an ACL restricts a user from reading work notes, then the user cannot view messages posted as work notes on the incident feed.

Note:
Access control rules are only checked when a user first accesses the document feed. After users view the feed, an administrator must remove them manually to change their access.

Disable a record feed

You can disable Live Feed functionality from the form of any table.

Before you begin
Role required: personalize_dictionary or admin

Procedure

1. Navigate to **System Definition** > **Dictionary**.
2. Open the dictionary entry for the table.
3. Add `live_feed=false` in the **Attributes** field.
4. Click **Update**.

Note:
If the Collaboration feature is activated, you can remove the show Live Feed icon from all form headers. Set the *`glide.live_feed.task_header_button`* property to **collaboration**.

Disable a document feed

You can disable a document feed from the form of any table.

Before you begin
Role required: personalize_dictionary or admin

Procedure

1. Navigate to **System Definition** > **Tables**.
2. Open the table record.
3. Clear the **Live feed** check box.
4. Click **Update**.

Business rule installed with Live Feed Document

This business rule is installed with Live Feed Document. There are no tables, roles, or notifications installed with it.

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Business rule	Description
Live Feed integration	Writes journal comments to the Live Feed if there is a group for this record.

Record feeds

A record feed is a Live Feed group that is associated with a record, such as an incident or change.

Record feeds allow users to work on tasks and other records through the Live Feed interface. Users can post messages in Live Feed that are automatically maintained as comments or work notes on the record if the record has these journal fields.

You can use record feeds to do the following:

- Improve communication between users working on the same record.
- Improve visibility into progress for end users.
- Provide a single place to see updates on multiple records.
- Save feed history in the record so that knowledge is not lost in an email chain.

Activate the Live Feed Document plugin

The Live Feed Document plugin is active by default.

Before you begin

Role required: admin

About this task

Administrators can enable record feeds in an instance by activating the Live Feed Document plugin, which activates the Live Feed plugin if it is not active. For upgrades, administrators must activate the plugin.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Configure record feeds

Configure a table to support record feeds. You can add the Show Live Feed button in the form header and add the UI actions Follow on Live Feed and Show Live Feed as List and Form.

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By default, the Show Live Feed icon appears on the form header for all tables that extend task, including the Incident, Change Request, and Problem tables, and in the list and form context menus for all task tables.

Add Live Feed to a form header

Add the **Live Feed** button in the form header for a table.

Before you begin
Role required: admin

Procedure

1. Type `sys_properties.list` in the Application Navigator.
2. Open the record for *`glide.live_feed.task_header_button`*.
3. In the **Value** field, change the value to `both`.

   Note:
   By default, the value is `collaboration` so that the property is supported in the Collaboration (com.glide.collaboration) plugin. Changing the value to `both` allows the system property to be supported in Collaboration and Live Feed.

4. Click **Update**.
5. Navigate to **System Definition** > **Tables**.
6. Open the table record.
7. If the **Live feed** check box does not appear on the form, configure the form layout to add the **Live feed** field.
8. On the form, select the **Live feed** check box.
9. Click **Update**.
   Alternatively, you can add **live_feed=true** to the **Attributes** field in the dictionary entry for the table.

Result
The **Live Feed** button appears on the overflow menu of the form header.

Add Live Feed to a context menu

Add Live Feed UI actions on a table.

Before you begin
Role required: admin

Procedure

1. Navigate to **System Definition** > **UI Actions**.
2. Open one of the Live Feed UI action, for example, **Follow on Live Feed**.
3. In the **Table** field, select the table name.
4. Right-click the header and select **Insert** to create a copy of the UI action for the desired table.
5. Repeat steps 1 – 4 for all Live Feed UI actions.

Disable a record feed

You can disable Live Feed functionality from the form of any table.

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Before you begin
Role required: personalize_dictionary or admin

Procedure

1. Navigate to **System Definition** > **Dictionary**.
2. Open the dictionary entry for the table.
3. Add `live_feed=false` in the **Attributes** field.
4. Click **Update**.

> **Note:**
> If the Collaboration feature is activated, you can remove the show Live Feed icon from all form headers. Set the *glide.live_feed.task_header_button* property to **collaboration**.

Configure security

Record feeds honor the access control rules (ACLs) for the associated record.

Users can only view messages on the record feed if they have access to the same information on the record. For example:

- If an ACL allows a user to read and create comments on an incident, then the user can view and add messages posted as comments on the incident feed.
- If an ACL restricts a user from reading work notes, then the user cannot view messages posted as work notes on the incident feed.

> **Note:**
> Access control rules are only checked when a user first accesses the record feed. After users view the feed, an administrator must remove them manually to change their access.

Live Feed table notifications

Live feed table notifications generate automatic Live Feed messages. The Live Feed plugin must be activated to use table notifications.

When a record is inserted or updated on a specific task table and the notification conditions are met, a message is generated and posted to the specified group or to the company feed. Table notifications are supported for all task tables and all task types by default.

Administrators and users with the live_feed_admin or chat_admin roles can set up table notifications for any table in an instance.

Set up table notifications for task tables

You can set up a table notification for a task table to enable automatic Live Feed messages.

Before you begin
Role required: live_feed_admin or chat_admin

Procedure

1. Navigate to **Live Feed** > **Feed Administration** > **Table Notifications**.
2. Click **New** or select a notification to open it.
3. Complete the form.

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Live Table Notification fields

Field	Description
Table	Select the table for which notifications are generated. **Note:** The list shows only tables and database views that are in the same scope as the table notification.
Post to chat rooms	Select the check box to generate the notification in chat rooms that are associated with the record, This applies to task records only and requires that the Chat plugin is active.
Post to Live Feed	Select the check box to generate the notification on Live Feed. If record feeds are not set up and the **Feed group** field is blank, the notification is posted to the company feed.
Record Feeds	Select the fields to post for record feeds. This field is available only if **Post to live feed** is selected.
Application	Select the application that contains this record.
Active	Select the check box to enable the notification.
Insert	Select the check box to generate the notification when a record is inserted into the database.
Update	Select the check box to generate the notification when a record is updated.
Feed	Select the Live Feed team to which you want to post messages. This field is available only if **Post to Live Feed** is selected. Clear the field to post notifications on the company feed.
Conditions	Create the condition that must be met to generate the notification. If you add a condition statement, the system evaluates the condition first and parses the **Before script** field only if the condition is met. You may choose to leave this field blank and include conditions in the script.
Description	Enter a description of the table notification.

Message	Construct the automatic message you want to generate. You can include field values as variables and a link to the record.
	
	To add a variable, position the cursor in the text and then click the field name in the **Select variables** field. To add a link to the record, enter `${URI}` in the message text as shown in the following example.
	
	`High priority incident opened: ${URI}`
	`Short description: ${short_description}`
	
	Note:
	For security reasons, any HTML code is automatically stripped out of a message before it is posted.

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Field	Description
Before script	Create a script that runs before a notification is generated. The script runs only if the condition evaluates to true or is empty. The following variables are available in the script. ○ *current*: the GlideRecord object that triggered the notification. ○ *changedFields*: an ArrayList of fields changed on submit. Use changedFields.contains('fieldname') to check for change. ○ *answer*: set answer to false to cancel the notification. ○ *profileSource*: set to a valid GlideRecord object to define the profile that is posting the message. ○ *profileID*: set to a live_profile sys_id to define the profile that is posting the message; by default it is the current record. Overrides profileSource if both are specified. Any custom variable created in the script is also exposed to the message in the form of *${myVariableName}*.

4. Click **Submit** or **Update**.

Set up table notifications for non-task tables

Table notifications are supported for all task tables by default, and you can set up a table notification for any other table.

Before you begin
Role required: live_feed_admin or chat_admin

Procedure
1. Navigate to **System Definition** > **Business Rules**.
2. Open the *Live Feed events* business rule.
3. In the Advanced section,select and copy the text in the **Script** field.
4. Click the back arrow on the top, left to exit the record and return to the Business Rules list.
5. Click **New**.
6. Enter the following values at the top of the form.
   - **Name**: Enter a name, such as `Live Feed events for my table`.
   - **Table**: Select the table for which you are setting up a notification.
   - **Active** and **Advanced**: Select these check boxes.
7. In the **When to run** section, enter the following values.
   - **When**: Select **before**.
   - **Insert**, **Update**, and **Delete**: Select the check boxes.
8. In the **Advanced** section, paste the script from the *Live Feed events* business rule into the script box.
9. Click **Submit**.
   The *Live Feed events* business rule runs on the non-task table. It fires the *live_feed.update* event, which is associated with the *Live Feed Update* script action. The script action sets up variables and processes the table notifications.

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What to do next

After saving the business rule, create a Live Feed table notification record for the new table as you would for a task table.

Live Feed table notification examples

The following examples demonstrate how to set up different types of table notifications that are useful for Live Feed.

Workaround posted

This example demonstrates a table notification that generates an automatic message on Live Feed whenever a workaround is added to an open problem.

- **Table**: Problem [problem]
- **Active**: Select the check box.
- **Update**: Select the check box.
- **Post to Live Feed**: Select the check box.
- **Conditions**: [State] [is] [Open]
- **Description**: `Workaround Posted`
- **Message**:

```
${sys_updated_by} posted a workaround for ${URI}.
Short description: ${short_description}
```

- **Before script**:

```
// only post to Live Feed when the Workaround field changes
answer  = changedFields. contains ( "work_around" ) ;
```

Related topics

Live Feed table notifications

Problem resolved (advanced)

This advanced example demonstrates a table notification that generates an automatic message on Live Feed whenever a problem is closed.

It also adds a message about the assigned user and posts the message from the assignment group profile instead of the problem record.

- **Table**: Problem [problem]
- **Active**: Select the check box.
- **Update**: Select the check box.
- **Post to Live Feed**: Select the check box.
- **Conditions**: [Problem State] [is] [Closed/Resolved]
- **Description**: `Problem Resolved`
- **Message**:

```
Problem ${number} - ${short_description} has been resolved.
 ${fixedByMsg}
```

- **Before script**:

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```
//cancel if we didn't just change the problem state if
 ( !changedFields. contains ( "problem_state" ) )
answer  = false ;

 //if we have an assigned_to value add a comment about who it
 was //create a new variable fixedByMsg that we can access from
 the message
fixedByMsg  = "" ; if ( !current. assigned_to. nil ( ) )
fixedByMsg  = " Thank you " + current. assigned_to.
 getDisplayValue ( ) ;

 //make the message appear to come from the assignment group if
 we have one if ( !current. assignment_group. nil ( ) )
profileSource  = current. assignment_group. getRefRecord
 ( ) ; //need GlideRecord object
```

Related topics

Live Feed table notifications

Opportunity won (non-task)

This example demonstrates a table notification on a non-task table. It generates an automatic message on Live Feed whenever a sales opportunity is won, if you have activated the Sales Force Automation plugin.

Create a business rule on the Opportunity [sales_opportunity] table that matches the **Live Feed events** business rule on the task table.

Create a table notification with the following values:

- **Table**: Opportunity [sales_opportunity]
- **Active**: Select the check box.
- **Update**: Select the check box.
- **Post to Live Feed**: Select the check box.
- **Conditions**: [State] [is] [Closed Won]
- **Description**: `Opportunity won`
- **Message**:

```
${owner} closed a sale with ${account}!
```

- **Before script**:

```
//make the message appear to come from the assigned salesperson
 if there is one if ( !current. owner. nil ( ) )
profileSource  = current. owner. getRefRecord ( ) ; //need
 GlideRecord object
```

Related topics

Live Feed table notifications

Related feeds table notification

This example demonstrates table notifications to be sent out to related feeds.

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For this example, whenever the status of a story changes to **Complete**, a table notification message is sent to the related sprint, release, or epic. Messages are posted only if the related feed already exists; this notification does not create a new feed.

- **Table**: Story [rm_story]
- **Active**: Select the check box.
- **Update**: Select the check box.
- **Post to Live Feed**: Select the check box.
- **Record feeds**: Move **Sprint**, **Release**, and **Epic** to the **Selected** column.
- **Conditions**: [State] [changes to] [Complete]
- **Description**: `Story is done; message to Epic, Release, and Sprint`
- **Message**:

```
${URI} status changed to ${state}
```

Live Feed security and table access

By default, administrators and users with the live_feed_admin role can configure live feed security and view all Live Feed tables.

You can also modify the following Live Feed tables:

- Live Table Notification [live_table_notification]: Set up automatic messages that are generated when specific records are updated throughout the system.
- Live Feed Message [live_message]: Modify only if necessary, such as to delete an inappropriate message or restore a message that a user accidentally deleted. This table is typically managed by system functionality.

Extending or modifying data in any Live Feed chat table is not recommended.

Limit Live Feed access by role

All active users in the instance have access to Live Feed by default.

Before you begin

Role required: live_feed_admin and admin

Procedure

1. Complete the following steps to define the roles that allow users to see the Live Feed module.
   a. Perform the appropriate action for your version of the UI:
      - Core UI: Navigate to **System Definition** > **Application Menus**, and then select **Live Feed**.
      - UI15: Right-click the icon beside the Live Feed module and select **Edit Module**.
   b. Enter the roles that have access in the **Roles** field.
   c. Click **Update**.
2. Complete the following steps to define the roles that allow users to see live feed from a mobile device.

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a. Navigate to **System Definition** > **Applications (Mobile)**.

b. Click **Live Feed**.

c. Enter the roles that have access in the **Roles** field.

d. Click **Update**.

3. Use the following settings in the Access Control form to create access control rules to limit who can view the live_feed pages.
   - **Type**: ui page
   - **Operation**: read
   - **Name**: create one access control rule record for each of the following pages
     - live_feed
     - live_feed_small
     - $live_feed
     - $live_feed_small
   - **Requires role**: in this related list, add roles to define who can access the Live Feed pages. Users who do not have these roles cannot access Live Feed.

Manage Live Feed message content

Users can remove their own messages from feeds. If necessary, administrators can remove inappropriate messages that are posted by any user.

Before you begin

Role required: live_feed_admin and admin

About this task

For security reasons, any HTML code is automatically stripped out of a message before it is posted. This measure ensures that users cannot modify any page settings by posting a message.

Procedure

1. Navigate to **Live Feed** > **Feed Administration** > **Messages**.
2. Open the message to be removed.
3. In the **State** field, select **deleted**.
   You may need to configure the form to add this field.
4. Click **Update**.

Live Feed team security

You can restrict who can create teams by modifying an access control rule.

Modify the following access control rule:

- **Table**: Live Group Profile [live_group_profile]
- **Operation**: create

Restrict hashtag renaming

You can restrict who can rename hashtags.

You restrict hashtag rename by modifying the following access control rule:

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- **Table**: Live Tag [live_tag]
- **Operation**: write

Provide access to Live Feed from CMS pages

You can provide access to Live Feed from pages built in the Content Management System (CMS). For example, allow an end user to access your company feed via the ESS portal.

Before you begin

Role required: content_admin or admin

About this task

The ESS Portal template includes the **Portal - Live page** and **Live Feed** dynamic blocks. To provide access to Live Feed from CMS pages, add the Live Feed dynamic block to a CMS page or include **Portal - Live page** in a site.

Procedure

1. Navigate to **Content Management** > **iFrames**.
2. Click **New**.
3. Enter the iFrame block details.

iFrame block fields

Field	Description
Name	Enter a unique name such as **Live Frame**.
Frame Name	Enter a frame name, such as **live_frame**.
URL	https://INSTANCE/live_feed.do?sysparm_doctype=true where INSTANCE is your instance URL (example, [instance name] .service-now.com)
Application	Displays scoping information.
Sizing	Select **Fixed Size** and enter height and width pixel dimensions according to the page where you plan to display the feed (for example, width of 1024 and height of 768).

4. Click **Submit**.
5. Add the block to a page.

Related topics

Administering Live Feed

Content Management System

Using Live Feed

Live Feed provides many methods you can use to share content with others in your organization.

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Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed is automatically disabled and will no longer work. See Next Experience UI for more information.

While Live Feed has been discontinued, we are always exploring new ways to enhance our services. Stay tuned for future updates and improvements.

Depending on your role, there are several different types of feeds you can access, teams you can join and share information with, and hashtags you can use for categorizing messages.

Note:
Live Feed v2 is active for all new instances by default. If you're upgrading from an earlier version of ServiceNow, you need to activate Live Feed v2 to use these features.

Use hashtags in Live Feed

Hashtags are words marked with a hash symbol (#) in messages. Hashtags are a way to categorize messages by keyword or topic for improved search results.

For example, to identify messages associated with VPN questions, add the hashtag #VPN in the message text.

Note:
Many of these features are part of Live Feed v2. If you are using Live Feed v1, or have not activated Live Feed v2, see Legacy Live Feed.

Tag messages

To tag a keyword or topic in a message, enter a # symbol before the word. A link to the hashtag is added beneath the message and all feed users can search and filter by the hashtag to find the message.

Follow these tips for using hashtags effectively:

- Limit the number of hashtags per message (no more than 3 is a good guideline).
- Use hashtags only in messages that are relevant to the tagged topic.
- Write a message first, and then add hashtags only if they add value. Answer the question, "What are you working on?", rather than "What hashtags apply to what you're working on?"
- Use camel case to create a hashtag that is more than one word long. For camel case, remove the space and use an uppercase letter to start each word. For example, to create a topic about the service desk, use #ServiceDesk.

View an available hashtag

View a hashtag from any feed.

Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Hashtags** in the sidebar.

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Any hashtags already defined are displayed. Up to 36 hashtags can be displayed, and options are available for searching and sorting the hashtags. When searching, you do not need to include the hash symbol (#).

3. Click a hashtag to view all messages containing that hashtag.

Change a hashtag name and merge a hashtag

Over time, users may create many hashtags with similar names, such as competitive, competitor, and competition. To combine hashtags for better searching and filtering, change the names of similar hashtags to a standard name.

Before you begin
Role required: admin

About this task
Administrators can restrict who can rename hashtags.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Hashtags** in the sidebar to reveal the currently defined hashtags.
3. Turn off the filter to show all hashtags.
4. Point to the hashtag you want to change.
   If you have the rights to edit hashtags, an edit tag displays.
5. Click the edit tag icon.
6. Enter a new hashtag name.
7. Press **Enter**.
   - If the new name is different than the other hashtags, the new hashtag name replaces the old hashtag name on the list and in the text of any messages that include the hashtag.
   - If the name is the same as one of the existing hashtags, the hashtags will be merged. For example, if you have two hashtags called **Competitive** and **Competitors**, and you change the name of **Competitors** to **Competitive**, all of the messages previously tagged **Competitors** are changed to **Competitive** and the **Competitors** hashtag is removed.

Note:
If a hashtag is removed from the message, renaming that hashtag does not change the message text.

Add an image to a hashtag

You can add an image at the domain level of already defined hashtags if you have the admin role.

Before you begin
Role required: admin

Procedure

1. Click **Hashtags** in the sidebar.
2. Select the appropriate hashtag.
3. Do one of the following:

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- Locate the image in your file system, and then drag-and-drop the image onto the add an image icon ().
- Click the add an image icon (), select the image file, and click **Open**.

4. To change the image, simply drag-and-drop a new image onto the old one, or click on the existing one and select a new image.

   When you view a message that contains a hashtag with an image, that image appears in the hashtag heading bar.

   Message with tag icon

Follow and unfollow a hashtag

You can view all postings assigned a specific hashtag by following the hashtag. You can also unfollow the hashtag if you no longer want to view those postings.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Hashtags** in the sidebar.
3. Select the hashtag you want to follow.
4. Click **Follow**.
   A confirmation message appears.
5. Click **X** to dismiss the message.
   To unfollow a hashtag, repeat the same steps and click **Unfollow**.

Remove a hashtag from a posted message

As a participant in a conversation, you can remove hashtags from messages that have already been posted.

Before you begin
Role required: admin

Procedure

1. Navigate to the posted message.
2. Click **Hashtags** in the message posting.

   The hashtags associated with the message display, along with the removal icon.

3. Click the removal icon.

Use teams in Live Feed

Users can be combined into teams for the purpose of subscribing to specifically-focused feeds.

Teams can be created based on any criteria that makes sense for your organization. For example, you can create a team called IT Developers and subscribe the team to feeds such as Coding Standards, AngularJS Development, and ServiceNow Customization Best Practices. When a new developer is added to the IT Developers team, that user automatically has rights to participate in all of the feeds followed by the team.

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Automatic team creation

If you create a record on a table that has Live Feed enabled, such as the Incident table, and click Follow/Show Live Feed for the record, a record feed is created for the record.

The record feed name is based on the table name.

Reply to email notifications using email

After receiving an email about a posted message or a reply, you can post your reply to Live Feed by responding to the email.

The body of the email reply is posted as a response to the Live Feed message. Any attachments that you include in your reply email are also posted in the Live Feed reply.

Create a Live Feed team

When you create a team, you become the team administrator.

Before you begin
Role required: admin

About this task
As team administrator, you can do the following:

- Modify team properties
- Accept or reject membership requests
- Remove members from the team
- Delete the team

Procedure

1. Navigate to **Live Feed** > **Teams**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
3. Click **Create Team**.
4. Enter a **Name** to appear at the top of the feed and in messages posted to the team. This name links to the team feed.
5. Enter a **Description** to appear at the top of the feed and under the team name in the list of all teams.
6. Select the access level for the team:
   - **Public Team**: In the list of all teams, any user can see the name of this team. Any user can also see the feed and join the team. Messages in a public team appear in the Company Feed with a link to the team feed.
   - **Private Team**: In the list of all teams, any user can see the name of this team, but not the feed. Messages in private teams do not appear on the Company Feed.

     When **Private Team** is selected, the **Show this team for anyone to find and request to join** check box is displayed. Select this check box to allow any user to search for this team and request to join it. Clear the check box to allow only invited users to see the feed and join the team.
7. Click **Create**.

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The team is created with you as the team administrator.

Note:
A team administrator can create one or more group feeds specifically for the members of this team by clicking the **Group Feeds** tab and **Create Group Feed**. Additionally, the team can be invited to join a feed. Having multiple feeds for the team facilitates focused discussions on topics of interest to the team and allows the team to selectively invite other teams and members to collaborate on specific feeds.

Join a team

You can join a public team, accept an invitation, or request access to a team.

Before you begin
Role required: admin

About this task
As a team member, you can:

- View messages posted to the team (team feed). Non-members can also view the feed for a public team.
- View a list of team members.
- Invite another team to join the team.
- Subscribe to team email notifications.
- Leave the team.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Teams** and click **All Teams**.
   - If you received an invitation, click **Accept**. You can **Decline** the invitation if you do not want to join the team.
   - If the team is public, click **Join**.
   - If the team is private, click **Request**. The team administrator receives an email notification and must accept your request before you can join the team.

View a team feed

View a team feed to see messages belonging to that team.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
   - To view a team you belong to, select the team name.
   - To view a public team you do not belong to, select **All Teams** and then click the team name.

     You must be a member to view the feed for a private team.

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View a team member

View a list of members belonging to a Live Feed team.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
3. From the team list, select the team name.
   You must be a member of the team to view the members.
4. Click **Members**.
   The list of team members appears, organized by team administrators and team members.

Invite a new member

You can invite another user to join a team.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
3. From the team list, select the team name.
4. Click the **Pending members** tab.
5. In the **Add User** field, enter the name of the user you want to invite.
   The invited member's picture displays.

Remove a member

If you're a team administrator, you can remove any member from the team.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
3. From the team list, select the team name.
4. Click the **Members** tab.
5. Click **Remove** below the member name.
6. Click **Remove** again in the confirmation box that opens.

Note:
You can remove members regardless of their current state. That is, you can remove members who have already joined the team or whose membership is pending.

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Subscribe to team and email notification

Users can subscribe and unsubscribe to receive email notifications generated by feeds the team participates in.

Before you begin
Role required: none

About this task
Email notifications are generated whenever actions such as posting messages, replies, likes, polls, and @mentions are performed.

All notifications related to a top-level message, such as replies, mentions, and likes, are sent out with the same subject. The subject line defaults to **Live Feed** followed by the beginning of the subject line from the top-level message. For example, if the subject of the feed is **IT Support**, the email notification's subject will be **Live Feed IT Support**.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Teams** and select the team name.
3. Click the subscribe icon .
   You can click the unsubscribe icon to stop receiving email notifications.

Subscribe a team to feed notification

A team administrator can subscribe a team to specific feeds so the members of the team receive email notifications.

Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Teams** and select the team name.
   You can use the advanced search to locate team of which you are the administrator.
3. Click **Feeds**.
4. Click the subscribe icon beside the feed name.
   You can click the unsubscribe icon to stop receiving email notifications.

Leave a team

You can give up membership to a team by leaving that team.

Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
3. Click **Leave** beside the team name.

Modify a team

If you are team administrator, you can modify an existing team.

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Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
3. From the team list, select the team name.
4. Click the edit icon.
5. Modify the team properties as needed.
6. Click **Save**.

Manage a membership request

When a user requests membership to a private team, the team administrator receives an email.

Before you begin
Role required: admin

About this task
If you are the team administrator, you can manage membership requests.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Teams** and select the team name.
   If one or more users have been invited to the team, the **Pending members** tab shows the number of invitations sent.
3. Click **Pending members**.

   This shows the users who have received invitations, but who have not yet accepted.
4. You can cancel a user's invitation by clicking **Remove**.
5. You can invite another user to the team by entering their name in the **Add user** field and clicking the Invite memberbutton.

Delete a team

If you are the team administrator, you can delete a team.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. In the sidebar, click your profile picture, then select the **Teams** tab.
3. From the team list, select the team name.
4. Click the edit icon.
5. Click **Delete**.
6. Click **Yes** to confirm deletion.
   The team is deleted from Live Feed. Messages posted to a private team are deleted; messages posted to a public team remain on the company feed without a team link.

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If you delete a team that is associated with an active record, such as an incident that has not yet been closed, the team becomes active again when any user modifies that record or follows the record on Live Feed. The first user who modifies the record becomes the team administrator. The previous messages that existed as part of the record feed are not deleted.

Use Live Feed to work on records

A record feed is associated with a record, such as an incident or change.

Record feeds help users collaborate on records by providing a place for anyone who can access the record to share messages and post attachments specific to that record.

With record feeds, users can:

- Follow record feeds and post messages in Live Feed. These messages can also be automatically maintained in the comments or work notes journal fields on records.
- View Live Feed from records.
- Work on multiple records from **My Feed**.
- Access Live Feed team functions, such as sending invitations and subscribing to email notifications.

Any users with access to the record can also use the record feed. By default, record feeds are available on the incident, change, and problem tables. Administrators can configure record feeds for additional tables.

How Document Feeds Work

The Live Feed application creates a document group for each document feed. The document group:

- Automatically approves membership for every user who can access the record.
- Uses the record number as the group name.
- Uses the record short description as a group description.
- Maintains all messages posted on the record in Live Feed (if the record has a journal field for comments). When the group is created, existing messages are added to the document feed.
- Lists the group when users select **View all groups** on their Live Feed interface, unless the record associated with the document feed has been closed. When the state of the record is closed, the Live Feed group becomes inactive and unlisted.
- Automatically adds users to the document group when they view the record.

Document Group Creation

When a user follows or shows a record on Live Feed, a Live Feed group is automatically created and associated to the record (if one does not already exist). The user becomes a member of the group and can use Live Feed to work on the record. If the user can access work notes on the record, the user also becomes a group administrator.

A Live Feed group is also automatically created when a user creates a record on a table that uses document feeds, such as the Incident table. The user who creates the record becomes the administrator of the group, and any other user who modifies the same record automatically joins the group.

Add Live Feed to a homepage

Add Live Feed to a homepage so it is the first thing you see when you log in.

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Before you begin
Role required: admin

Procedure

1. Click **Add** content at the top of the homepage.
2. Select **Live Feed** in the left panel.
3. On the bottom of the window, click **Add here** in the appropriate layout position, then close the window.

> **Note:**
> Administrators can add Live Feed to a global homepage to make it available for all homepage users by default. By default, users with any role can add Live Feed to their homepage. Administrators can restrict this ability.

Modifying and deleting document feeds

The user who creates a record feed becomes the group administrator, which allows the user to modify the following record feed properties.

- **Name**: Default value is the record number.
- **Description**: Default value is the record short description.
- **Picture**: Default value is a thumbnail image of the record.

Feed administrators can also delete the feed. When deleted, the feed is removed from Live Feed but messages remain in the journal field of the associated record.

Viewing Live Feed from records

Interact with the record feed in any form that has Live Feed enabled.

The record feed appears in a pop-up window. The record feed also appears on the record form's activity formatter if the administrator enables the record feed system property (`glide.ui.show_live_feed_activity`).

To access a record feed from the form, do one of the following:

- Click the **Show Live Feed** button in the form header. This displays the Live Feed pop-up.
- Right-click the form header and select **Show Live Feed**. This also displays the Live Feed pop-up.
- Scroll down to the activity formatter area on the form. Click one of the following tabs:
  - **Live Feed**: click to show a text box to type in the feed.
  - **Activity**: click to show the activity summary. The activity filter determines the content in the activity summary.

If the activity formatter or the **Live Feed** and **Activity** tabs are not visible, administrators can do the following:

- Configure the form layout and add **Activities (filtered)** to the form. This adds the activity formatter.
- Personalize the form layout and add **Activities (filtered)** to the form. This adds the activity formatter.

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- Go to **System Definition** > **Tables**, access the table associated with the record, and verify that the live_feed dictionary attribute is set to true on the form. This adds Live Feed to the activity formatter.
- Go to **Live Feed** > **Feed Administration** > **Properties** and enable the following property:**Toggle the display of the Live Feed tab in the activity formatter**

Working with record feeds

When a user follows a record, the user becomes a member of a private group for the record.

Team members can do the following:

- View the record feed from Live Feed.
- View a list of group members (other users who are following the record).
- Invite another user to join the group. Only users who have access to the record have access to the record feed.
- Subscribe to email notifications.
- Leave the team to stop following the record.

Follow a record feed from a form

You can follow records that have a record feed associated with them from within the record form.

Before you begin
Role required: none

Procedure

1. Navigate to the record in a list or form.
2. Click the **Show on Live Feed** icon in the header.

Follow a record feed from a list

You can follow records that have a record feed associated with them when viewing a list of records. This method allows you to select multiple records to follow.

Before you begin
Role required: none

Procedure

1. Navigate to a list of records (for example, **Assigned to me**).
2. Select the **Action** check box beside each record to follow.
3. In the **Actions** choice list, select **Follow on Live Feed**.

Post a message to a record feed

Use Live Feed to post a message to a record feed.

Before you begin
Role required: none

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Procedure

1. Open the record feed in one of the following ways:
   - From your homepage (must already be following the record)
   - As a team in Live Feed (must already be following the record)
   - From My Live Feed (must already be following the record)
   - From the **Live Feed** pop-up window
   - From the **Live Feed** tab on the activity formatter
   - Click the **Show Live Feed** buttonin the form header.
2. Compose the message and add images and links.
3. In the To list, select the record where you want to post the message.

   Note:
   Applies to Live Feed only.

4. **Optional:** Select the **Work Notes** check box to post the message as a work note.
   Only users with access to work notes on the record can post and see work notes. This option is only available for records that have a journal field.
5. Click **Post**.

   Note:
   If the record has journal fields for comments or work notes, your message is automatically added to the appropriate field on the record. If the record has a standard text field for comments on the activity formatter, each live post overwrites the field value. Comments added through Live Feed start with #LiveFeed on the activity formatter.

Use feeds in Live Feed

Feeds allow users to create focused discussions in Live Feed.

Live feed includes different types of feeds. The user who creates a group or record feed becomes the feed administrator. This user configures the access level for the feed:

- **Public**: any user can see the name on the list of all feeds, view the feed, and join it. Messages appear on the company feed with a link to the public feed.
- **Private**: any user can see the name on the list of all feeds, but only invited members can view the feed and join. Messages do not appear on the company feed.

Note:
The concept of groups changed in Live Feed v2.

Create a group feed

Group feeds are created by users so that members with similar interests can find that information in one place. Individual users or teams can join group feeds.

Before you begin
Role required: admin

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Group Feeds** and click **All Feeds**.

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3. Click **Create Group Feed**.
4. Enter the feed name and description.
   These will appear in the list of group feeds.
5. Indicate how members can join the feed:
   - **Public Feed**: Select this to allow anyone to view and join the group feed.
   - **Private Feed**: Select this to restrict membership to only members invited by the administrator.

     When **Private Feed** is selected, the **Show this feed for anyone to find and request to join** check box is displayed. If it is selected, any user can search for this group feed and join it. If the check box is not selected, only users who are invited can see the feed and join the group feed.
6. Click **Create**.

Create record feeds

When a user views a record on a table that has Live Feed enabled, such as the **Incident** `[incident]` table, the user can click the **Show Live Feed** button at the top of the form to automatically create a record feed.

When a user who has write access to a record's **work_notes** journal field clicks the **Show Live Feed** button, that user becomes the record feed administrator. If, for example, a customer calls technical support to report an incident and the customer clicks **Show Live Feed** on a record, a record feed is created, but the customer is not the record feed administrator. When a support representative later opens the incident and participates in the record feed, the user becomes the feed administrator.

Record feeds are, by default, private unlisted. That is, only invited members can see the name of the record feed in the list of feeds, and join it. Record feed administrators, however, have the ability to change the access level at any time. This can be helpful if, for example, a user is working on a sales opportunity and wants customers to be able to participate in a record feed without granting them access to the records.

Control how Live Feed is enabled for records

A property called *glide.ui.show_live-feed_activity* controls whether Live Feed is automatically enabled for all records.

This glide record is disabled by default. If the property is enabled, a record feed is automatically created whenever a record is viewed, and you become a member of that feed.

A second property, *glide.live-feed.auto_join_document_group*, enables automatic membership to a record feed whenever the associated document is visited and the user clicks **Show Live Feed**.

View the activity stream in record feeds

When you view record feeds, Live Feed displays the activity stream for the document.

For example, for an incident feed, the screen displays recent activity for the incident. The activity stream is updated whenever anything is changed in the associated record.

Note:
The information in the activity stream is subject to the same ACL rules as those for viewing the underlying document.

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Participate in a feed

When you join a feed, you become a feed member.

Before you begin
Role required: none

About this task
Feed members can do the following:

- View messages posted to the feed. Non-members can also view the messages for a public feed.
- View a list of feed members.
- Invite another user to join the feed.
- Subscribe to feed email notifications.
- Leave the feed.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**, and then click **All Feeds**.
   - If you received an invitation, click **Accept**. You can **Decline** the invitation if you do not want to join the feed.
   - If the feed is public, click **Join**.
   - If the feed is private, click **Request**. The feed administrator receives an email notification and must accept your request before you can join the feed.

Mark a feed as a favorite

Top-level messages in feeds can be marked as favorites on a per user basis only.

Before you begin
Role required: none

About this task
You can also search for messages marked as favorites, and remove the favorite designation as needed.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**, and then click **All Feeds**.
3. In the list of feeds, click the star iconadjacent to the feed name you want to mark as a favorite.

   To unfavorite a message, click the star iconof a message that is already a favorite.

View a feed

You have several options for viewing a feed.

Before you begin
Role required: none

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Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**.
   This displays a list of feeds you belong to and an option to view all feeds.
   - To view a feed you belong to, select the feed name.
   - To view a public feed you do not belong to, select **Show All** and then click the feed name. You must be a member to view the feed for a private feed.

Note:
If you navigate away from the Live Feed application and then back again, the system displays the feed you last visited if you are a member of it.

View a feed member

View a specific member of a group feed.

Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**.
   This displays a list of feeds you belong to and an option to view all feeds.
3. Click the feed name.
   The list of feed members appears, organized by feed administrators and members.

Invite a new member to a group feed

The feed administrator can invite another user or a group to join a feed.

Before you begin
Role required: none

About this task
When a team is added to a feed, all members of the team also indirectly become members of the feed. Only users, and not teams, can be the feed administrators. A team member who is following a feed can become administrator by directly inviting another user to the feed.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**, and then select the feed name.
3. Click the **Pending members** tab.
4. In the **Add user or team** field, begin entering a user or team name and select a user or team from the suggestion list.
   The invited user or team members receive an email notification.

Invite a new member to a record feed

The feed administrator can invite another user or a team to join a record feed.

Before you begin
Role required: none

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About this task

When a team is added, each of the individual members of the team become members of the feed. That is, if Team ABC is added to a feed, the feed does not show that Team ABC is a member. Instead, the feed shows each of the individual members of Team ABC as members of the feed.

When users are invited, their membership state is initially **Invited**. When they accept the invitation, the system checks their access to the **work_notes** journal field. If they have write access, they become administrator members; otherwise, they become active members.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click **Record Feeds** and select the record feed name.
3. Click the **Pending members** tab.
4. In the **Add user or team** field, begin entering a user or team name and select a user or team from the suggestion list.

   If you invite a team, the individual members of the team are invited.

   The invited users receive an email notification.

Remove a member from a feed

The feed administrator can remove any member from the feed.

Before you begin

Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**, and then select the feed name.
3. Click the **Members** tab.
4. Locate the member you want to remove and click **Remove**.

Subscribe to a feed

Direct members of a feed can subscribe and unsubscribe to the feed in order to receive email notifications whenever any activity in the feed occurs, such as new messages being posted, replies, likes, polls, and @mentions.

Before you begin

Role required: none

About this task

Individual indirect members—that is, members of a team that is participating in a feed—cannot subscribe or unsubscribe from a feed directly. If the team administrator subscribes the team to a feed, the individual members receive an email notification for activities in the feed such as new messages being posted, replies, likes, polls and @mentions.

All notifications related to a top-level message, such as replies, mentions, and likes, are sent out with the same subject. The subject line defaults to **Live Feed** followed by the beginning of the subject line from the top-level message. For example, if the subject of the feed is **IT Support**, the email notification's subject will be **Live Feed IT Support**.

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Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**, and then select the feed name.
3. Click the subscribe icon.

   You can click the unsubscribe icon to stop receiving email notifications.

> **Note:**
> If a team is subscribed to receive email notifications for a feed, but a member of the team did not subscribe to the team, that member does not receive the email notifications.

Navigate between Live Feed and other modules

If you are participating in a feed and navigate to another module, when you return to Live Feed it displays the feed you were previously viewing if it is public or if it is a private feed that you are a member of.

For example, assume you are viewing a public feed and then navigate to a particular incident record. Upon returning to Live Feed, the feed you were previously viewing opens. If you were last viewing a private feed that you are not a member of, returning to Live Feed opens the Company Feed.

Leave a feed

Members can choose to leave a group feed.

Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**, and then select the feed name.
3. Click **Leave**.

> **Note:**
> If you leave a feed associated with a record, such as an incident, you automatically rejoin that feed if you modify the associated record again.

Delete a feed

If you are a feed administrator, you can delete the feed.

Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click either **Group Feeds** or **Record Feeds**, and then select the feed name.
3. Click **Delete**.
4. Click **Yes** to confirm deletion.
   The feed is deleted from Live Feed. Messages posted to a private feed are deleted. Messages posted to a public feed remain on the Company Feed without a feed link.

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Live Feed UI overview

The Live Feed user interface provides many methods you can use to share content with others in your organization.

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed is automatically disabled and will no longer work. See Next Experience UI for more information.

While Live Feed has been discontinued, we are always exploring new ways to enhance our services. Stay tuned for future updates and improvements.

Update your Live Feed profile

Your profile information includes a photo or image, and tabs for different types of information including messages, feeds, teams, followers, and those who are following you. You can update your profile information and picture at any time.

Before you begin

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed is automatically disabled and will no longer work. See Next Experience UI for more information.

While Live Feed has been discontinued, we are always exploring new ways to enhance our services. Stay tuned for future updates and improvements.

Role required: none

About this task

You can provide details about yourself, such as your role in your organization. You can also update your profile picture. However, only admins can delete a profile picture.

Note:
The functionality described here applies to HTML5-compliant browsers, such as Chrome, Firefox, Safari, and IE10 and above.

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click your name or title displayed with your picture.
   The profile record opens.
3. Click the pencil icon next to **About Me** and type a short description about yourself that you want to share with others who view your profile.
   This is text that you might not necessarily want to change on a regular basis.
4. You can change your profile photo using either of the following two methods:

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- Hover over the existing picture (or tap the photo in the case of the smartphone or tablet interface) to display the **Upload a picture** link. Select the link, navigate to the location of the photo you want to use, and then select **Open**.
- Locate the photo file you want to use on your computer, and then drag-and-drop it over the existing photo.

Note:
Your profile picture is used by the Connect and legacy chat features as well, if they are activated.

Work with Live Feed messages

This portion of the UI gives the user access to various types of messages and tools for grouping and categorizing messages. Also included are methods for identifying which user feeds you are following and which users are following you.

Tools for working with Live Feed messages

Menu section	Description
	• *My Live Feeds*: These are custom feeds that allow you to customize Live Feed to view the content that is most important to you. • *Company Feed*: This feed displays all posts, except those posted to private or unlisted groups. • *Group Feeds*: These feeds are created by users. Record Feeds: These feeds are associated with a record, such as an incident or change. • *Record feeds*: These feeds help users collaborate on records by providing a place for anyone who can access the record to share messages and post attachments specific to that record. • *People*: This option displays people who are following the current user and people the current user is following. • *Teams*: This option is used to combine users into groups for the purpose of subscribing to specifically-focused conversations. • *Hashtags*: Hashtags are words marked with a hash (#) symbol in messages. Hashtags are used to categorize messages by keyword or topic for improved search results messages filtered from all conversations that include specific hashtags.

View another Live Feed user

When a requester user, one that has no ServiceNow role, is viewing a feed and points to another user's picture, information for the user appears from the Business Card view of the User [sys_user] table.

Before you begin

Role required: none

About this task

Admins can change the amount of information that is displayed for users with different roles.

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Procedure

1. Select a profile picture in your feed.

   A user summary displays.

2. Select the profile picture to view the full profile.
   Use the tabs to view different types of information about the user.

Follow other Live Feed users

As you use Live Feed, you can follow the message threads of other users.

Before you begin
Role required: none

Procedure

1. Navigate to a thread that the user you want to follow is engaged in.
2. Click that user's name or point to the user's picture.
   A **Follow** link appears in the user's profile.
3. Click **Follow**.
4. To stop following the user, navigate to **People** > **Following**.
5. Click **Unfollow**.
6. To view people who are following you, navigate to **People** > **Followers**.

Select feeds

A feed is a stream of related messages. You can use the feed selector to switch between feed types and to view specific group feeds and record feeds.

Before you begin
Role required: none

Procedure

1. Use the **Search** field to locate any type of feed.
   As you type in the **Search** field, the results are dynamically displayed. For example, if you type *INC*, records that are incidents are forced to the top of the results list.
2. You can also select the following types of feed information.

Feeds types

Feed	Description
My Live Feeds	Displays the following posts: ○ messages from users you follow ○ messages with hashtags you follow
Company Feed	Displays all posts, except those posted to private or unlisted groups.
Add Group Feed	Allows you to add a group feed.

Follow feeds

You can view users who are following you or other users you are following.

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Before you begin
Role required: none

Procedure

1. Click **People** in the sidebar.

   The system shows 10 most recent followers or users you are following.

2. Click the Show More link if either list contains more than 10 users.

> **Note:**
> If you are following a particular user whose profile changes, that user moves to the front of the Following list. This alerts you to changes in the profile of a user you are following.

Bookmark feeds and hashtags

The Live Feed interface uses the standard bookmarking functionality for feeds and hashtags.

Before you begin
Role required: none

Procedure

Drag-and-drop group feeds and hashtags from the Feed Summary section to the Edge for quick access.

Add Live Feed to your homepage

You can add Live Feed to your own homepage or to a global homepage.

Before you begin
Role required: none

Procedure

1. Navigate to a homepage.
2. Click the add content icon () in top left corner of the homepage.
3. Select Live Feed in the left panel.
4. On the bottom of the window, click **Add here** in the appropriate layout position, then close the window.

> **Note:**
> Administrators can add Live Feed to a global homepage to make it available for all homepage users by default. Users with any role can add Live Feed to their homepage; however, administrators can restrict this ability.

Post content in Live Feed

In Live Feed, you can post new messages and replies to existing messages for all users in the feed. You can also send a reply message to a team or record.

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Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed is automatically disabled and will no longer work. See Next Experience UI for more information.

While Live Feed has been discontinued, we are always exploring new ways to enhance our services. Stay tuned for future updates and improvements.

Attachments in feeds

In addition to entering text, you can attach files, such as images, documents, and spreadsheet files in any ServiceNow supported file type to Live Feed messages.

Administrators can manage attachment file settings, such as supported file types and maximum attachment file size, by editing system properties.

You can also include links to user-defined URLs and knowledge articles contained in your instance's knowledge base.

Note:
The functionality described here applies to HTML5-compliant browsers, such as Chrome, Firefox, Safari, and Internet Explorer 10 and above. Significant differences while using different browsers are highlighted.

Post a Live Feed message

You can post a message to open a new feed.

Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Click the feed to which you want to post your message, for example My Live Feed, Company Feed, and so on.
3. Enter a message in the **Share your thoughts** field.
   Use hashtags, if you want.
4. As needed, click the poll, attachment, or screenshot icon , , to add a poll, attachment, or screenshot image, respectively.
5. Click **Post**.

Reply to a Live Feed message

To participate in an existing thread of a feed, you can compose and submit a reply message. By default, the message is visible to all members of the feed.

Before you begin
Role required: none

Procedure

1. Navigate to **Live Feed** > **Live Feed**.
2. Locate the message you want to reply to.
3. Type your reply in the message box and click **Reply**.

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As needed, you can add hashtags, attachments, links, or knowledge base articles.

4. To limit who can view the reply to a single individual, select a user from the **To** choice list.
5. Click **Reply**.
6. To view additional replies, click **Show all replies**.
   By default, 7 replies are visible for each message. Any reply to a reply includes a **Threads** link.
7. Click **Threads** to view all of the replies within the selected reply in reverse chronological order within the **Message Thread** pop-up window, similar to an email thread.

Attach a file to a post or reply

You can attach files to a post by dragging a file into a post or pasting an image from the clipboard.

Before you begin
Role required: none

About this task
Use the paperclip icon to drag files into a post. Additionally, you can paste images into a post or reply from the clipboard.

Procedure

1. Do one of the following:
   - While composing a post or reply (see Reply to a Message), locate one or more images or other supported types of files, and drag them into the message box.
   - Click the paperclip icon in the message box, navigate to the location of the files you want to attach, select them, and click **Open**.
2. To add more files, drag-and-drop additional files into the text box below the displayed files or images, or click the plus sign.
3. If you want to delete an attachment before posting the message, click the trashcan icon adjacent to the attachment.
4. Enter a comment to share your thoughts about the image.

   Note:
   The **Post** button is enabled only after you add the comment.

5. Click **Post** or **Reply**.
6. If you added files that do not contain previews and then posted the message, they will be listed in the message box with a **Download** link.
7. Click the link to download the files.

Copy an image from the clipboard

In addition to adding files to a message, you can also copy images to the clipboard and paste them into a message or reply.

Before you begin
Role required: none

Procedure

1. Click into the **Comment** box and add a comment.

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2. Click the **Add an image** button.
   The **Screenshots** dialog box opens.
3. Right-click the **Paste an image here** box and select **Paste** to paste the image from the clipboard.
4. To add another image, repeat the previous steps.
5. When you finish pasting images into the message, click **Done**.
6. To change the link text, click **Pasted Image** and enter a new label.
7. When you finish, click **Post** or **Reply**.
8. To remove an image, click the trash can icon adjacent to the link.
9. To make changes to an existing image, click the edit icon .

Note:
The copy/paste functionality is supported in Chrome, Firefox, and Internet Explorer 11.

Add a link to a post or reply

Add or modify a link to a Live Feed post.

Before you begin
Role required: none

Procedure

1. Click into the **Comment** box.
   The **Add a link** button appears.
2. Click the **Add a link** button.
   The **URL** and **Link text** fields appear.
3. Enter the URL and the text you want to appear as the link.
4. To add another link, click the link icon under the **URL** field.
5. When you have finished entering your message, click **Post** or **Reply**.

To remove a link, click the trash can icon adjacent to the link. To make changes to an existing link, click the edit ( ) icon.

Add a knowledge article link to a post or reply

Use the ID of a knowledge article to post it as a reply to a Live Feed conversation.

Before you begin
Role required: none

Procedure

1. While composing a post or reply, type the ID of the knowledge article you want to link to.
   You do not need to identify the knowledge article ID as a hyperlink. Live feed recognizes it as such and automatically converts it into a link when the message is posted.
2. When you are finished entering your message, click **Post** or **Reply**.

Add a poll to a message

When you are posting a message, you have the option of creating a poll in order to record your viewers' opinions. As users take the poll, their feedback statistics are displayed within the feed.

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Before you begin
Role required: admin

Procedure

1. Open the feed where you want to create a message with a poll.
2. Enter the message with an invitation to take the poll in the **Share your thoughts** box.
3. Click the poll () icon.
4. In the **Question** field, enter the question on which you are soliciting opinions.
5. In the **Option** fields, enter possible responses to the query.
6. To add more response options, click **Add more options**.
7. Click **Post**.
   After the poll is posted, users who view the message can vote. After they vote, their pictures appear next to their response, with others who have voted for the same option.

   An email notification with the poll result is sent to all participants of the poll informing them that the poll is closed.

Add mentions to a message

An @mention is any posted update that contains @username anywhere in the body of the message.

Before you begin
Role required: none

About this task
The user's name, with a link to that user's feed, is inserted into the message. Additionally, the mentioned user receives an email notification about the mention. This is a great way of bringing attention to other members in a conversation. All @mentions are included in the logged-in user's My Feed.

> **Note:**
> If an @mention is used by a member of a team, only members of that team appear in the auto-suggest list.

Procedure

1. While entering a message or reply in a conversation, type `@username` anywhere in the message.
   As you type, an auto-suggest list appears with names and pictures of users that match your entries. For example, if you type `@t`, the auto-suggest list shows the pictures and names of all users with names that start with T.
2. Click the user you want to add.
   That user's name is inserted into the @mention in the body of the message.

> **Note:**
> My Feed displays @mentions of you and the teams you're a member of. Profile feeds for another user display only @mentions of that user.

Like a message

Like a message to provide feedback to the author.

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Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Live Feed** > **Live Feed**.
2. Click **Feeds**.
3. Locate the feed that contains the message you want to like.
4. Under the message title, click **Like**.
   If the message has previously been liked, the number of likes for a message displays next to the Like link.

   For a top-level message, the profile pictures of the first 5 users who liked a message are displayed. Any additional users who liked the message can be viewed by hovering over the **# more** link. If the logged-in user has liked the message, that user's image will appear first, followed by the image of the user who last liked the message.

   For a reply, you must hover your mouse pointer over the **count** link to view the users who liked the message.

   Note:
   After a message has been liked, it cannot be unliked.

Delete a message

Users can delete any of their own posts or replies. A conversation administrator can also delete messages.

Before you begin
Role required: none

Procedure

1. Hover over the message you want to delete.
2. Click the trash can icon in the upper-right-hand corner of the message box.
3. Click **Delete** in the confirmation box.
   The message disappears from the feed.

Live Feed reference

Topics in this section describe domain separation in Live Feed, as well as the various components that are installed with it.

Important:

Core UI is required to use Live Feed. Live Feed is not supported in Next Experience. If you turn on Next Experience, Live Feed is automatically disabled and will no longer work. See Next Experience UI for more information.

While Live Feed has been discontinued, we are always exploring new ways to enhance our services. Stay tuned for future updates and improvements.

Domain separation in Live Feed

This is an overview of domain separation and Live Feed. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

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Overview

Support: Level 2

Parent and child domains define the Live Feed content that can be viewed and shared with other users.

- A user in a parent domain can see users and content within their domain and within all child domains that are lower in the domain hierarchy.
- A user in a child domain can see users and content within their domain but cannot see the parent domain or other child domains at the same level in the domain hierarchy.

Enable domain separation for Live Feed

Domain separation for the Live Feed application is available starting with the Eureka release. For users upgrading to Eureka, a sys_domain column is added to existing live feed-related database tables. For existing database records, the value of the sys_domain field is set to empty (global). This allows the domain separation feature to work with existing Live Feed records.

Show or hide the Live Feed application for a domain

The administrator can Live Feed visibility for a domain. This includes:

- Displaying Live Feed in the application navigator.
- Following a document feed for a record.
- Viewing Live Feed from a record.

Use Live Feed with domain separation

All of the Live Feed features are available to users within a domain and work the same way, with some exceptions to visibility.

- *Posting and sharing content*
  - Users in a child domain can interact with other users in the same domain. This includes posting and replying to messages, deleting messages, attaching files and links, and rating content.
  - Users in a parent domain can interact with other users in the same domain and with users in any child domains. Messages that are added to child threads by parent users are given the visibility of the child domain, not the parent domain.
- *Viewing content*
  - Users in a child domain can view content that resides within their domain. This includes filtering by feed, sorting, searching, and viewing older messages.
  - Users in a parent domain can view content that resides within their domain and within any child domains.
  - My Feed shows messages, teams, and hashtags based on the user's domain. Showing another user's feed only shows posts visible in the current user's domain.
- *Using hashtags*
  - Hashtags are separated by domain. Users in a child domain can use all of the hashtag functions within their domain. This includes tagging messages, viewing available hashtags, changing hashtag names, and searching and filtering by hashtag.
  - Users in a parent domain can use all of the hashtag functions within their domain and can see hashtags in any child domains.

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- *Using teams*
  - Teams are separated across domains. Users in a child domain can join and follow teams within their domain, and can invite other users within their domain to join teams.
  - Users in a parent domain can join and follow teams that belong to their domain or to any child domains.
- *Exceptions to teams*
  - New teams are created in the user's domain. However, if the team has a record associated with it, the team is created in record's domain.
  - New threads in an existing team are created in the domain of the existing team.
  - When a user is creating a new team from a document, if the document domain is not empty or global, the team domain needs to be changed to be the document's domain.
  - For a document-generated team, when the domain of the document changes, the domain of all related Live Feed records changes as well.
- *Subscribing to email notifications*

  Users can subscribe to email notifications from users and teams within their domain only.

Related topics

Live Feed security and table access

Limit Live Feed access by role

Manage Live Feed message content

Live Feed team security

Restrict hashtag renaming

Domain separation

Components installed with Live Feed

Several types of components are installed with Live Feed.

Demo data is available with Live Feed.

Tables installed with Live Feed

The Live Feed plugin includes the following tables.

Table	Description
Link attachments [live_link]	Stores links and attachments that are added to messages.
Live Favorite [live_favorite]	Stores the favorite conversations, user groups, and messages.
Live Feed Searches [live_feed_search]	Stores Live Feed text searches. Access at **Live Feed** > **Feed Administration** > **Search Log**.
Live Follows	Maintains users' follow preferences for user feeds.

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Table	Description
[live_follow]	
Live Group Profile [live_group_profile]	Stores conversation properties, including name, description, and public status. Also stored are user group properties, such as name, description, and public status.
Live Group Member [live_group_member]	Maintains the member lists for conversation and user group.
Live Mention [live_mention]	Stores the profiles mentioned in a message. References sys_user table.
Live Message Tag [live_message_tag]	Stores messages associated with user-created tags. Appears as a related list on Live Tag records.
Live Messages [live_message]	Stores messages. References sys_user table. Access at **Live Feed** > **Feed Administration** > **Messages**.
Live Poll [live_poll]	Stores a poll question.
Live Poll Cast [live_poll_cast]	Stores profiles of users who voted for a particular option in a poll.
Live Poll Options [live_poll_option]	Stores poll options.
Live Profiles [live_profile]	Stores user Live Feed profiles. References sys_user table. Access at **Live Feed** > **Feed Administration** > **Profiles**.
Live Table Notification [live_table_notification]	Generates automatic table notifications, such as when a user reads Live Feed for the first time and when a high priority incident is opened. Access at **Live Feed** > **Feed Administration** > **Table Notifications**.
Live Tag [live_tag]	Maintains user-created tags. Access at **Live Feed** > **Feed Administration** > **Tags**.
Live Tag Follows [live_tag_follow]	Maintains users' follow preferences for tags.
Messages Liked by [live_message_like]	Maintains like ratings for posts. Access at **Live Feed** > **Feed Administration** > **Likes**.

User roles installed with Live Feed

The Live Feed plugin includes the following user roles.

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To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

live_feed_admin

Can manage Live Feed functions. Users with the live_feed_admin role can set up table notifications for non-task tables, limit Live Feed access by role, and manage Live Feed message content.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

chat_admin

Can manage chat functions (if the Chat plugin is activated). Users with the chat_admin role can change chat room message read access and define chat room access rights.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

Script includes installed with Live Feed

The Live Feed plugin installs the following script includes.

Name	Description
LiveMsgUtil	Provides helper functions for working with live_message records.
LiveFeedFilter	Queries filters for working with live_feed records.
LiveFeedUtil	Provides helper functions for working with live_feed records.

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Business rules installed with Live Feed

The Live Feed plugin includes the following business rules.

Business rule	Table	Description
Feed Group Creator Becomes Admin	Live Group Profile [live_group_profile]	Designates the group creator as the group administrator.
Live Feed events	Task [task]	Runs on task insert, update, and delete. Triggers event associated with the Live Feed Update Script action that processes Live Table Notifications to auto-generate Live Feed messages.
Live feed member update events	Live Group Member [live_group_member]	Generates a notification event when member state changes (invited, accepted, declined, left, rejected, request, request_accepted).
Live feed integration	Journal Entry [sys_journal_field]	Writes journal comments to the Live Feed if there is a group for this record.
Live feed new member events	Live Group Member [live_group_member]	Generates a notification event when new members are added.
Live Feed profile events	Live Profile [live_profile]	Runs on live_profile insert/update/delete, triggers event associated with the Live Feed Update script action that processes Live Table Notifications to auto-generate Live Feed messages.
Live Feed message events	Live Feed Message [live_message]	Runs on live_message, notification event trigger for new live messages.
Live message like events	Message Liked by [live_message_like]	Runs on live_message_like, notification event trigger for new like records.
LiveFeed Group Member Visibility 2.0	Live Group Member [live_group_member]	Ensures users can only see the members list for public groups and groups they belong to.
LiveFeed Group Profile Validation	Live Group Profile [live_group_profile]	Ensures that a public group is visible.
LiveFeed Group Profile Visibility 2.0	Live Group Profile [live_group_profile]	Ensures that the list of all groups only displays public groups, private groups that are visible, and groups the user belongs to.
LiveFeed Membership Changes	Live Group Member	Enforces that only the group administrator and users with live_feed_admin role can manage membership for a group.

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Business rule	Table	Description
	[live_group_member]	
LiveFeed Single Group Membership	Live Group Member [live_group_member]	Ensures that a user is not added multiple times to the same group.
Live Message Likes	Live Message Like [live_message_like]	Updates the number of likes for a message.
LiveFeed Join Group Check	Live Group Member [live_group_member]	Ensures that users can not automatically join private visible groups.
Update Follow/ Follower Counts	Live Follow [live_follow]	Updates the following/followers counts.
Live Feed Group	Assessable Record [asmt_assessable_record]	Creates/Deletes a Live Feed group for an assessable record
Live Feed Message Visibility	Live Feed Message [live_message]	Ensures user's access to Live Feed messages

Email notifications installed with Live Feed

The Live Feed plugin includes the following email notifications.

Email notification	Description
Live Feed Feed Member Accepted	Sends an email to the administrator when a user has accepted to join the feed.
Live Feed Feed Member Declined	Sends an email to the administrator when a user has declined to join the feed.
Live Feed Feed Member Invited	Sends an email to a user when they have been invited to join a feed.
Live Feed Feed Member Left	Sends an email to the administrators when a user has left the feed.
Live Feed Feed Member Removed	Sends an email to user when they have been removed from the feed.
Live Feed Feed Member Request	Sends an email to administrators when an user requests to join a feed.
Live Feed Feed Member Request Accepted	Sends an email to the user when their request to join a feed is accepted.
Live Feed Feed Request Rejected	Sends an email to the user when their request to join a feed has been rejected by an administrator.

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Email notification	Description
Live Feed MsgReply Subscription	Sends an email when a reply or reply_to_reply message is inserted into the thread of a message in a feed.
Live Feed Team Member Accepted	Sends an email to administrators when a user accepts an invitation to join a team.
Live Feed Team Member Declined	Sends an email to administrators when a user declines an invitation to join a team.
Live Feed Team Member Invited	Sends an email when a user is invited to join a team.
Live Feed Team Member Left	Sends an email when a user leaves a team.
Live Feed Team Member Removed	Sends an email when an administrator has removed a user from a team
Live Feed Team Member Request	Sends an email when a user requests to join a team.
Live Feed Team Member Request Accepted	Sends an email when a user's request to join a team is accepted.
Live Team Member Request Rejected	Sends an email when a user's request to join a team is rejected.
Live Message All Subscription	Sends an email to subscribed users when any message (new or reply) is posted.
Live Message Feed Subscription	Sends an email when a new message is inserted into a feed.
Live Message Liked	Sends an email to the creator of a message when another user likes the message.
Live Message Mention	Sends an email to a user when that user is mentioned in a message.
Live Message New Posts Subscription	Sends an email to subscribed users when a new (not reply) message is posted.
Live Message Reply	Sends an email to all users in a feed thread when a user posts a reply (live_message.replied event).

E-signature

Sign electronic documents from any desktop or mobile device with e-signature. E-signature is a scoped application that enables users to sign managed documents or knowledge articles with their typed or drawn e-signature, credentials, or as an acknowledgment.

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Get started

Activate	Use	Reference
Activate e-signature.	Create or modify e-signature templates.	Learn about the components installed with e-signature.

Troubleshoot and get help

- ServiceNow Community forums
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Activating e-signature

You can activate the e-signature plugin (com.snc.esign) if you have the admin role. This plugin includes demo data and activates related plugins if they are not already active.

Before you begin

Role required: admin

About this task

E-signature activates these related plugins if they are not already active.

Plugins for E-signature

Plugin	Description
ServiceNow document viewer [com.snc.documentviewer]	Document viewer is a platform feature that will enable users to view enterprise class documents inline within the platform attachment instead of downloading it to the local device and then opening the documents with a locally installed viewer.
Managed documents [com.snc.document_management]	Managed Documents application. To enable the ability to publish to the knowledge base, activate the knowledge document plugin.
Signature pad [com.snc.signaturepad]	Provides a tool to allow a digital signature in a .pdf document. The Human Resources application uses this with various documents.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

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You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.

3. Select **Install** to start the installation process.

Note:
When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Using e-signature

Users with the assigned e-signature roles can create templates for documents that require an electronic signature.

Role assignment

Before you begin using e-signature, you must assign the e-signature roles to the appropriate roles, groups, or users in your application. See Components installed with e-signature for more information.

How to use e-signature templates

Users with the e-signature administrator [sn_esign.admin] or manager [sn_esign.config_manager] role can create e-signature templates. Each e-signature template pairs a document type to sign (managed document or knowledge article) with a signature type (signature, credential, or acknowledgment). For example, you could create an e-signature template for a non-disclosure agreement that requires a typed or drawn signature. For more information, see Create or modify an e-signature template.

You can then use the e-signature template in task forms to request electronic signatures from users. In the HR Service Delivery application, for example, you can add HR tasks to HR cases or configure HR task templates to request electronic signatures per the selected e-signature template. See E-signature for HR for HR-specific examples.

Create or modify an e-signature template

Create or modify an e-signature template to define an electronic document and signature configuration for use in task forms.

Before you begin

Role required: sn_esign.admin or sn_esign.config_manager

Each template is associated with a document type such as a managed document or knowledge article, and you can configure the template so that the signatory is required to sign the document with their typed or drawn signature, credentials, or as an acknowledgment.

Procedure

1. Navigate to **All** > **E-signature** > **E-signature template**.
2. Click **New** or open a record.
3. Fill in the fields on the form.

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E-signature template form

Field	Description
Name	Name of the e-signature template.
Task table	Task table that the e-signature template is associated with.
Document type	Document type of the e-signature template. Select one of the following: ○ **HR document template**: Make sure that the **Task table** field is set to HR Task [sn_hr_core_task]. The HR document template that the signatory will sign is selected on the HR case form. See Select an HR document template for an e-signature task for more information. ○ **Knowledge article**: In the **Knowledge article** field, select the knowledge article that the signatory will sign. ○ **Managed document**: In the **Managed document** field, select the managed document that the signatory will sign.
Signature type	Signature type of the e-signature template. Select one of the following: ○ **Acknowledgment**: The signatory acknowledges the document by accepting and completing the task. **Note:** This option is not available for HR document templates. ○ **Credential**: The signatory signs the document with their credentials. **Note:** This option is not available for HR document templates. ○ **Signature**: The signatory signs the document with their typed or drawn signature.
Acknowledgment text	Adds a check box with accompanying acknowledgment text that the user must select before the signing is completed. This option can be used with any signature type. **Note:** Acknowledgment text is limited to 1,000 characters.

4. Click **Submit** or **Update**.

What to do next

You can use the e-signature template in task forms to request electronic signatures from users.

Using e-signature template for non-HR tasks

Create or modify an e-signature template to define an electronic document and signature configuration for use in non-HR task forms.

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Before you begin
Role required: sn_esign.admin or sn_esign.config_manager

Procedure
1. Create an e-sign template on the required task table (for example, Incident).
   See Create or modify an e-signature template. Select **Managed Document** in **Document type** and **Signature** in **E-signature type**.
2. Configure the task form (for example, Incident form) by adding the **E-Signature Template** field.
3. Configure the related lists on the task form by adding E-signature history.
4. Select the e-sign template that you have created in the **Template** field.
5. Assign a group and a user to the task.
   To retrieve the signature log, navigate to **System Logs** > **Signature Images (signature_image table)**. Also, you can view the E-signature history in the related list.

What to do next
When a user receives the task and moves the task to Work in Progress state, the **Sign document** option is available for the user to sign the document.

E-signature reference
Activating the e-signature plugin installs additional roles and tables.

Components installed with e-signature
Several types of components are installed with activation of e-signature, including tables and user roles.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available for this feature.

Roles installed

Role title [name]	Description	Contains roles
E-signature administrator [sn_esign.admin]	Can manage the e-signature module.	sn_esign.config_manager
E-signature manager [sn_esign.config_manager]	Can manage the e-signature configurations.	None

You can assign these roles to the appropriate roles, groups, or users in your application.

- To assign a role to another role, see Add a role to an existing role.
- To assign a role to a group, see Assign a role to a group.
- To assign a role to a user, see Assign a role to a user.

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For further information on user administration and how to manage users, see User administration.

Tables installed

Table	Description
E-Signature Configuration [sn_esign_configuration]	E-signature configuration table.
E-Signature Acknowledgement [sn_esign_acknowledgement]	E-signature acknowledgment table.

For further information on table administration and how to manage data, see Table administration.

ServiceNow Voice

Integrate a third-party phone system with your ServiceNow® Voice instance to drive the efficiency of your call center without having to navigate through multiple systems while attending a call. Help managers analyze the calls and view call metrics at one place.

ServiceNow Voice in action

Here's an overview on how ServiceNow Voice is integrated with Amazon Connect. ServiceNow Voice with Amazon Connect

Explore	Set up	Integrate
Learn about how customers, agents, and managers use ServiceNow Voice.	Set up ServiceNow Voice.	Extend ServiceNow Voice capabilities by integrating with other applications.

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Use	Reference	
Receive inbound calls, place outbound calls, and monitor calls.	Get details about components such as roles, contact flows, and operation handlers.	

Additional resources

Voice API on the ServiceNow® Developer Site

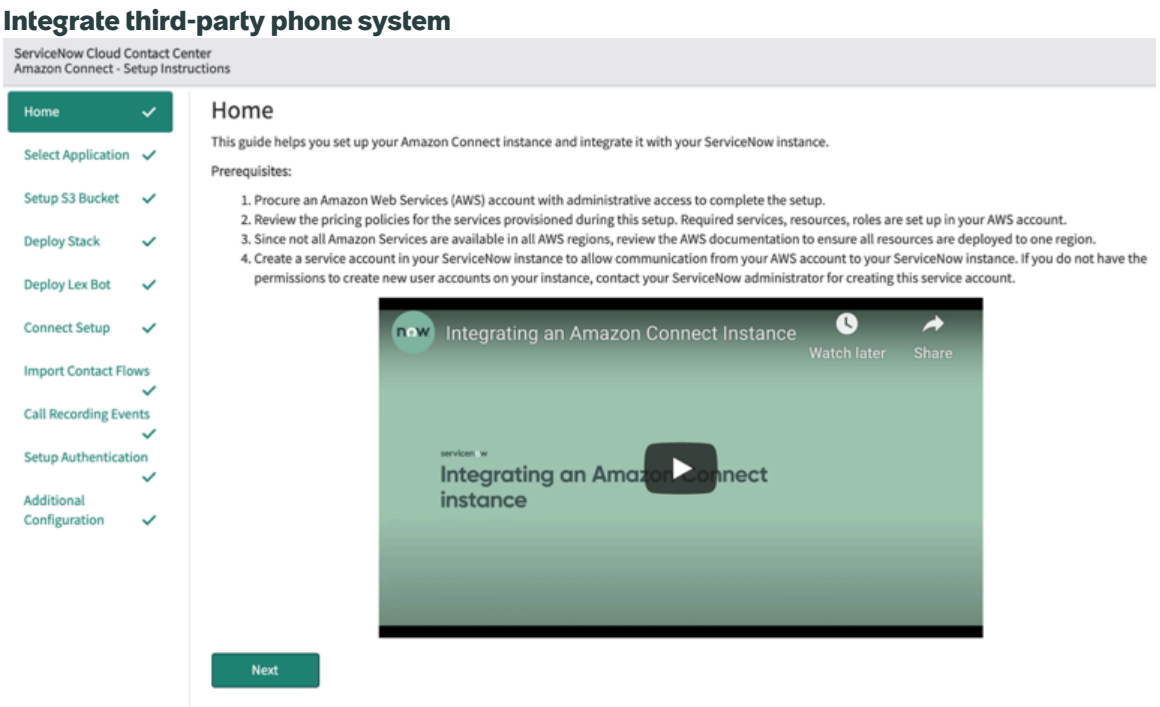
Exploring ServiceNow Voice

Use ServiceNow Voice to facilitate inbound and outbound telephone calls by integrating your ServiceNow instance with a third-party phone system such as Amazon Connect.

Key features

Integrate a third-party phone system with Voice in the ServiceNow instance

Provide a seamless inbound and outbound voice call experience for your callers and agents using third-party systems. See the ServiceNow Store for a full list of integrations.



Display relevant data for an agent at the right time

Display relevant data in an interaction for an agent to help a customer during a call.

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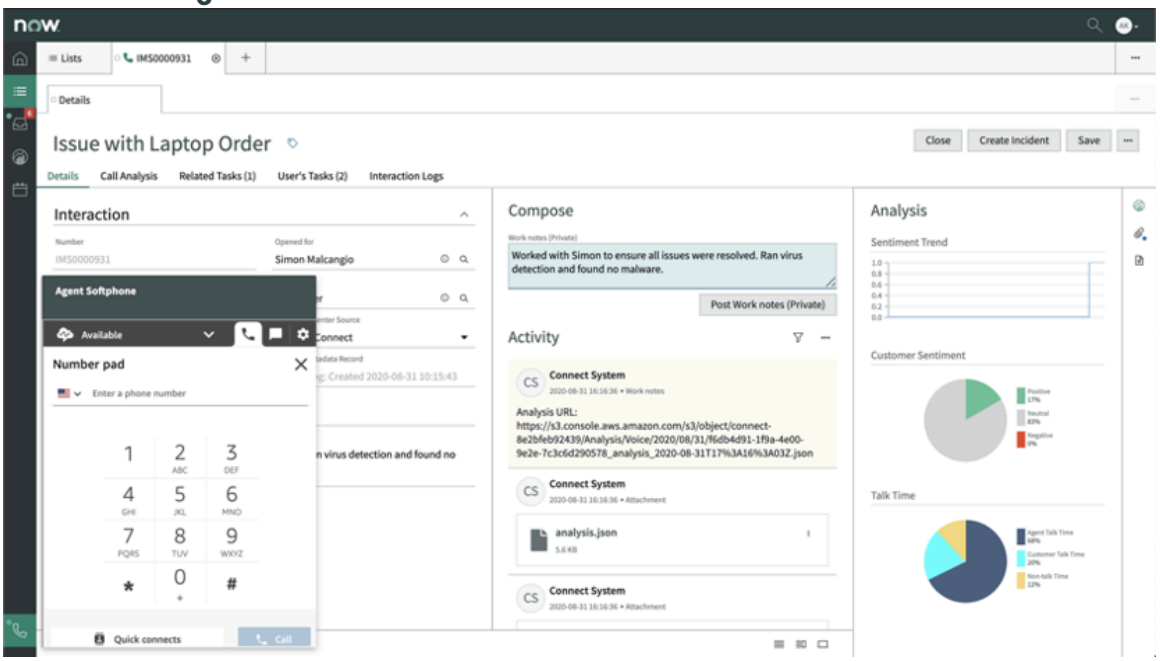
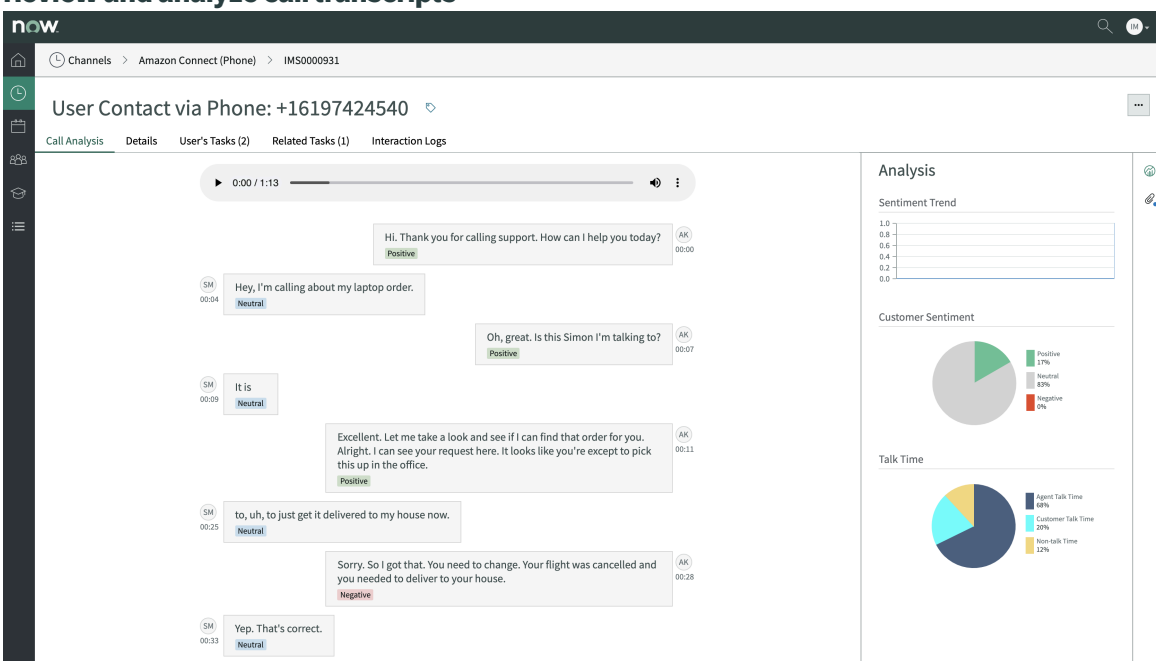
Route calls to agents



Analyze recording and call metrics of interactions

Within your ServiceNow instance, access recordings, call metrics, and call transcripts of agents to analyze interactions.

Review and analyze call transcripts



As an admin, you can:

- Use pre-built instructions and templates to integrate your ServiceNow instance with a third-party phone system such as Amazon Connect.
- Use pre-built operation handlers that invoke interactions to fulfill requests between a third-party phone system and Voice.

As a manager, you can:

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- View the call transcript and recording for coaching.
- View call metrics (for example, agent call time) for reporting.
- Analyze agent conversations and provide feedback for quality assurance.

As an agent, you can:

- Get calls routed to your assigned queues and accept or reject the calls via the integrated softphone from within the ServiceNow instance.
- Transfer a call to another agent or to a queue using **Quick connect**.
- Get the context of caller information before accepting a call.
- View real-time transcripts of calls while interacting with a customer. For more information about real-time transcripts, see
- Collaborate with managers who can analyze your conversations and provide feedback for quality assurance.
- Manage presence states within the ServiceNow instance. For information about the presence states of an agent, see Agent Inbox controls.
- Access and use your softphone directly from within the ServiceNow interface using the OpenFrame integration. For information about OpenFrame, see OpenFrame overview.

As a caller, you can:

- Create a task using voice-based interactions. For example, create an incident or a case, or unlock your account.
- Get your requests fulfilled within the integrated ServiceNow instance through bot interactions using the voice or dual-tone multi-frequency (DTMF) inputs. These bot interactions are defined in contact flows in the third-party phone system.
- Speak to an agent who can help fulfill a request.

Inbound call workflow for the integration of Voice with Amazon Connect

When a caller contacts the call center, using the voice or dual-tone multi-frequency (DTMF) inputs from a caller, a contact flow is invoked in the Amazon Connect instance based on the caller context such as language. An interaction record is created for this call.

- The caller request will invoke an operation handler in the ServiceNow instance.
- The request can be resolved by an automated interaction with a bot. If the caller request is not resolved by an automated interaction with bot, then the call is queued for the next available agent. An agent then receives the call and interaction, and resolves the request.

Here is an example workflow.

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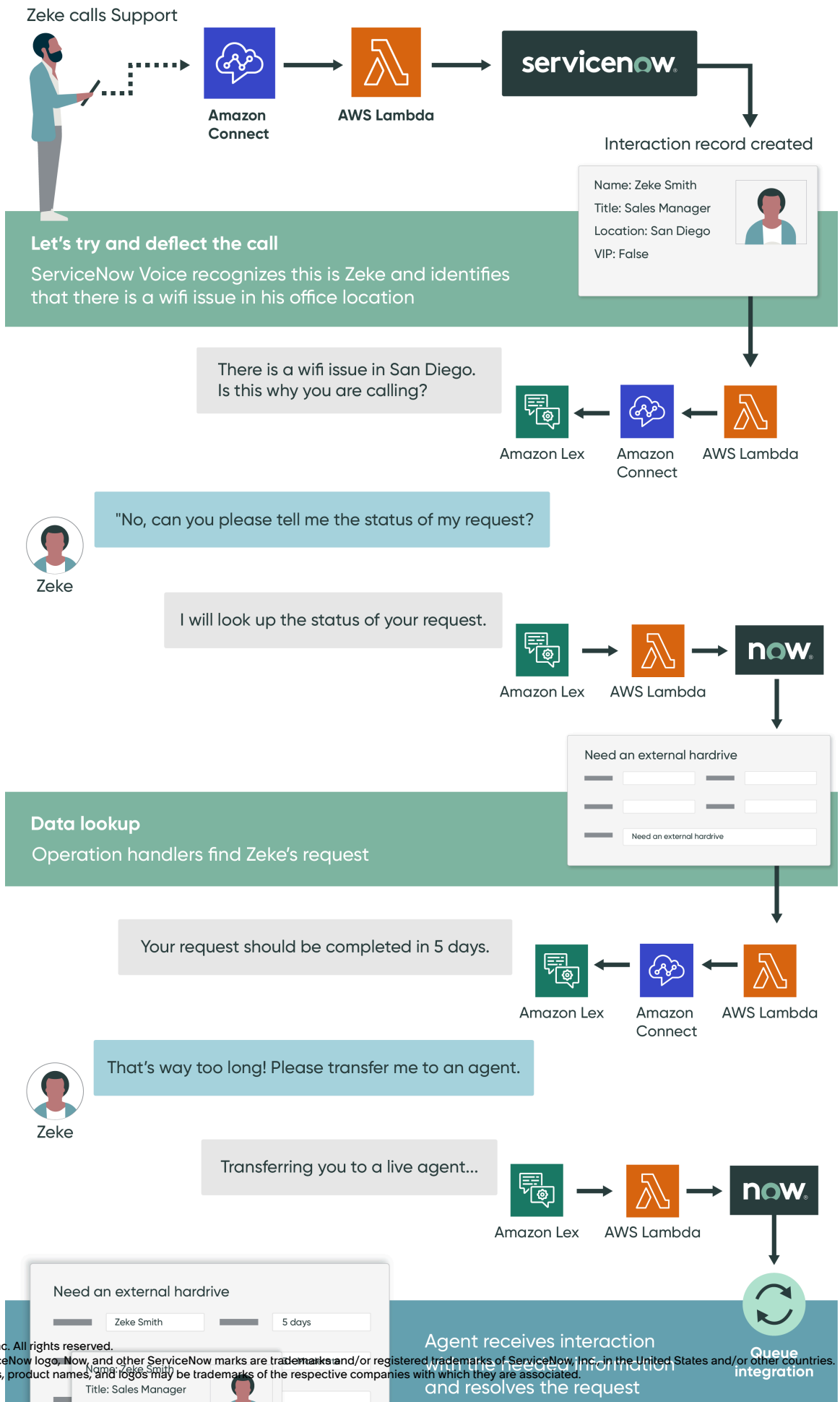
servicenow

Amazon Connect Integration



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Setting up ServiceNow Voice

Enable ServiceNow Voice and integrate it with a third-party phone system such as Amazon Connect.

When you set up a third-party phone system and integrate it with the ServiceNow instance, an agent can accept an incoming call or make an outbound call from the ServiceNow instance using the integrated softphone. This experience is based on the configurations made within the third-party phone system.

Get started with Voice

1. Procure a license for a ServiceNow application, such as ITSM or CSM, which includes ServiceNow Voice.
2. Install the ServiceNow Voice applications in ServiceNow® Store. For information about this installation, see Install ServiceNow Voice applications.
3. Sign up and create an account with a third-party phone system. By default, Amazon Connect is supported. For information about creating an Amazon Web Services (AWS) account, see the Amazon documentation.
4. Configure the framework for the third-party phone system within the ServiceNow instance. By default, the framework is supported for Amazon Connect. For information about this configuration, see Integrate ServiceNow Voice with Amazon Connect.

Install ServiceNow Voice applications

You can install the ServiceNow Voice applications if you have the admin role. The application includes demo data and installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Confirm that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Your organization must have purchased a license for a ServiceNow application, such as ITSM or CSM, which includes the ServiceNow Voice SKU.
- You should install at least one content pack, for example, CSM or ITSM.

Role required: admin

About this task

The following ServiceNow Voice applications should be installed.

ServiceNow Voice applications

Application	Description	Components installed
ServiceNow Voice [sn_cti_core]	Provides the framework that supports the integration with your third-party phone system.	For information about the components installed with this application, see Components installed with ServiceNow Voice Core.
ServiceNow Voice with Amazon Connect	Integrates Amazon Connect with ServiceNow Voice Core.	For information about the components installed with this application, see

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ServiceNow Voice applications (continued)

Application	Description	Components installed
[sn_cti_amzn_cct]		Components installed with Amazon Connect Integration with ServiceNow Voice.
ServiceNow Voice UI Components [sn_cti_ux]	Enables call recording, transcription, and sentiment analysis for ServiceNow Voice with Workspace experience.	None
ServiceNow Real Time Transcription [sn_cti_amzn_cct] (Available for ServiceNow Voice for Customer Service Management only.)	Enables real-time call transcription so that the agent can see the call transcript while on a call with the customer.	[sn_cti_csm_cnt.enable_ims_update]

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find these applications using the filter criteria and search bar.
   - ServiceNow Voice (sn_cti_core)
   - ServiceNow Voice with Amazon Connect (sn_cti_amzn_cct)
   - ServiceNow Voice UI Components (sn_cti_ux)

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. In the Application installation dialog box, review the application dependencies.

   Dependent plugins and applications are listed if they will be installed, are currently installed, or need to be installed. If any plugins or applications need to be installed, you must install them before you can install the Voice applications.
   - ServiceNow Voice (sn_cti_core)
   - ServiceNow Voice with Amazon Connect (sn_cti_amzn_cct)
   - ServiceNow Voice UI Components (sn_cti_ux)

   For the complete Voice experience, install ServiceNow Voice for ITSM or ServiceNow Voice for CSM applications. For information about these installations, see Install ServiceNow Voice for ITSM and Install ServiceNow Voice for CSM.
4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data are the sample records that describe application features for common use cases. Load the demo data when you first install the application on a development or test instance.
5. Select **Install**.

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Domain separation and ServiceNow Voice

Domain separation is supported for ServiceNow Voice. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Basic

- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

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

Domain-separated tables

- CTI Instance [sn_cti_instance]
- CTI Component Logging Configuration [sn_cti_log_cfg]
- Operation Handler [sn_cti_operation_handler]
- Provider Component [sn_cti_provider_component]
- Provider Configuration [sn_cti_provider_config]
- Provider Message Transformer [sn_cti_provider_msg_transformer]
- CTI user [sn_cti_user]
- AWS Resource [sn_cti_aws_resource]
- Amazon Connect Instance [sn_cti_connect_instance]

Related topics

Domain separation for service providers

Configuring a phone PIN

You can set up or reset a phone PIN that can be used for caller authentication during a call with an agent.

If the **Require authentication** field is set to **true** for an operation handler, the corresponding operation is invoked only after the caller enters the PIN.

Important:
It is applicable for both ServiceNow Voice for ITSM and ServiceNow Voice for CSM applications.

Reset the phone PIN for a caller

Reset the phone PIN for a caller if the caller's account is locked.

Before you begin

Role required: sn_cti_core.user_manager

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About this task

Procedure

1. Navigate to **All** > **ServiceNow Voice - Core** > **User Pin Reset**.
2. For the required CTI user, Click the preview icon and open the record to reset the PIN.
   a. In the **PIN** field, enter the new PIN.
   b. Clear the **Disabled** check box.
   c. Click **Update**.

Set or reset the phone PIN

Set up or reset your phone PIN that can be used for caller authentication when you call an agent.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **ServiceNow Voice - Core** > **My Phone PIN**.
2. On the Request Phone PIN form, enter the PIN and re-enter it.
3. Click **Submit**.

Configure the E.164 format for a consumer phone number

Ensure that all the necessary information for a phone number is included and properly formatted to successfully route an international call over a territory's public telephone network. Provide the E.164-compliant formatting and validation for phone number.

Before you begin
Role required: admin

About this task
An E.164 phone number field displays the following field types:

- A list for the phone number territory
- An input box for entering phone numbers

The E.164 format that does not contain any dashes or spaces and must include the + sign. For example, +14152223456.

Procedure

1. Navigate to **All** > **Customer Service** > **Consumers**.
2. Select the required consumer record.
3. On the Consumer form, right-click any phone field and select **Configure Dictionary**.
4. On the Dictionary Entry form, for the **Type** field, select **Phone Number (E164)**.
5. Click **Update**.

Result
After this configuration, when entering the consumer phone number in the phone field, select the territory and enter the corresponding phone number. The same format is reflected in Agent Workspace.

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Configuring CTI component logging

Configure CTI component logging to enable component logging to the system logs.

Before you begin

Role required: admin

About this task

You can create logs for the following components:

- Operation handler
- Provider component
- Provider configuration
- Provider message transformer

Note:
Do not leave the log configurations on in a production instance, since this can impact performance.

Procedure

1. Navigate to **All** > **ServiceNow Voice Core** > **Log Configuration** > **New**.
2. Select the component, component table, and log level you want to configure.
3. Choose the log level option.
   Options include the following:
   - Off
   - Error
   - Warn
   - Info
   - Debug
4. Click **Submit**.
5. Create a separate record for each type of component table you want to log.
   If there are multiple logging configurations, the final log level is the selected component's log level, based on the following prioritization:
   a. Operation handler
   b. Provider message transformer
   c. Provider component
   d. Provider configuration
6. To view the logs, navigate to **All** > **System Logs** > **System Log** > **All**.
   You can see the logs from the invoked *sn_cti* modules, including the date created, log level, log message, and source. In the system logs, the message log level is always **info**. For basic logs from *sn_cti_core* without any logging configuration, the log level varies.

For an entry on *sn_cti_log_cfg.list* for an operation handler with **warn** log level logger located in the operation handler, the code is as follows:

```
var log= ctx.getLogger();
log.warn("CTX Logger Demo from Operation Handler");
```

Sample output:

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```
cti_core::
 P:c4bae70xxxxf6a9a|C:bxxxx44|T:793cxxxx7b|O:6fb1xxxx4006dabb45v
c::CTX Logger Demo from Operation Handler
```

- P: Provider
- C: Component
- T: Transformer
- O: Operation handler

Configure Real Time Transcription for ServiceNow Voice Customer Service Management

Configure settings in your Amazon Connect instance, and in your ServiceNow instance to allow agents to see a real time transcription of voice calls with customers.

Before you begin

- An Amazon Connect instance set up using the guided setup.
- Real Time Transcription is only available for ServiceNow Voice for Customer Service Management
- Role required: admin

About this task

For new deployments, the Real-Time Transcription feature is enabled during the guided setup for Voice for Customer Service Management.

If you have already deployed Voice for CSM and are upgrading, go through all of the steps for Setting up ServiceNow Voice, and Set up Real-Time Transcription for ServiceNow Voice before completing the setup on Amazon Connect.

Procedure

1. Go to your Amazon Connect instance.
2. Enable Contact Lens in the Amazon Connect instance.
   See the Amazon documentation for full instructions. Also refer to the Contact Lens documentation for more information about Contact Lens for Amazon Connect.
   a. On the "Set recording and analytics behavior block", enable Contact Lens.
   b. Enable speech analytics with real-time and post-call analytics.
3. Go to the **Setup Guide** for Amazon Connect.
4. Complete the instructions in the Real Time Transcription section.

Set up Real-Time Transcription for ServiceNow Voice

Set up the properties in the Amazon Connect integration in order to enable Real-Time Transcription.

Before you begin

Role required: admin

About this task

For new deployments, the Real-Time Transcription feature is enabled during the guided setup for ServiceNow Voice.

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If you have already deployed ServiceNow Voice and are upgrading, go through all of the steps for Setting up ServiceNow Voice, and the steps in this procedure, before completing the setup on Amazon Connect.

Procedure

1. Add the system property `sn_cti_csm_cnt.enable_ims_update` and set it to **true**.
   For more information on adding a new system property, see Add a system property.
2. Navigate to **All** > **Amazon Connect integration** > **View instances**.
3. Choose your instance, and click on the **Setup guide** related link.
4. Select the checkbox at the top of the setup guide to enable Real Time Transcription setup.
   Once you select the Real Time Transcription checkbox, agents can see the conversation panel in their workpace.
5. Proceed through the setup guide.
   Even if you have already set up your Amazon Connect integration, you must complete the setup tasks again, due to changes in the Lambda Cloudformation Template and contact flow.
6. In the **Setup Authentication** step, create a user with "Web Service Only access".
   This user is intended only for communication between ServiceNow and Amazon Connect.
   a. Go to the **Roles** related list.
   b. Edit the user, and add the role `interaction_integration_user`.
   c. Click **OK**.

What to do next

Proceed with the setup tasks on your Amazon Connect instance detailed in the setup guide.

Configure Real Time Transcription for ServiceNow Voice for IT Service Management

Configure settings in your Amazon Connect instance, and in your ServiceNow instance to allow agents to see a real time transcription of voice calls with customers.

Before you begin

- An Amazon Connect instance set up using the guided setup.
- Real Time Transcription is only available for ServiceNow Voice for Customer Service Management
- Role required: admin

About this task

For new deployments, the Real-Time Transcription feature is enabled during the guided setup for Voice for IT Service Management.

If you have already deployed Voice for IT Service Management and are upgrading, go through all of the steps for Setting up ServiceNow Voice, and Set up Real-Time Transcription for ServiceNow Voice before completing the setup on Amazon Connect.

Procedure

1. Go to your Amazon Connect instance.
2. Enable Contact Lens in the Amazon Connect instance.
   See the Amazon documentation for full instructions. Also refer to the Contact Lens documentation for more information about Contact Lens for Amazon Connect.

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a. On the "Set recording and analytics behavior block", enable Contact Lens.

b. Enable speech analytics with real-time and post-call analytics.

3. Go to the **Setup Guide** for Amazon Connect.
4. Complete the instructions in the Real Time Transcription section.

Set up Real-Time Transcription for ServiceNow Voice for IT Service Management

Set up the properties in the Amazon Connect integration in order to enable Real-Time Transcription for IT Service Management.

Before you begin

Role required: admin

About this task

For new deployments, the Real-Time Transcription feature is enabled during the guided setup for ServiceNow Voice.

If you have already deployed ServiceNow Voice and are upgrading, go through all of the steps for Setting up ServiceNow Voice, and the steps in this procedure, before completing the setup on Amazon Connect.

Procedure

1. Add the system property `sn_cti_itsm_cnt.enable_ims_update` and set it to **true**.
   For more information on adding a new system property, see Add a system property.
2. Navigate to **All** > **Amazon Connect integration** > **View instances**.
3. Choose your instance, and click on the **Setup guide** related link.
4. Select the checkbox at the top of the setup guide to enable Real Time Transcription setup.
   Once you select the Real Time Transcription checkbox, agents can see the conversation panel in their workpace.
5. Proceed through the setup guide.
   Even if you have already set up your Amazon Connect integration, you must complete the setup tasks again, due to changes in the Lambda Cloudformation Template and contact flow.
6. In the **Setup Authentication** step, create a user with "Web Service Only access".
   This user is intended only for communication between ServiceNow and Amazon Connect.
   a. Go to the **Roles** related list.
   b. Edit the user, and add the role `interaction_integration_user`.
   c. Click **OK**.

What to do next

Proceed with the setup tasks on your Amazon Connect instance detailed in the setup guide.

Scripting for operation handlers

You can use the APIs in the ServiceNow Voice framework to create a seamless voice call experience for your callers and agents.

The *`CTIOperationRequest`* API provides methods to set and get data on the current CTIOperationRequest object. For information on this API, see CTIOperationRequest - Scoped, Global.

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The *CTIOperationResponse* API provides methods to set and get data on the current CTIOperationResponse object. For information on this API, see CTIOperationResponse - Scoped, Global.

The *CTI API* provides REST resources that enable Computer Telephony Integration (CTI) providers to interact with the Voice framework. For information about this API, see CTI API.

Provider configuration in Voice

For both inbound and outbound calls, a provider configuration contains settings about the involved components and message transformers for a specific third-party phone system provider. Any request from that phone system provider is handled within ServiceNow based on these settings.

To view the available provider configurations, navigate to **ServiceNow Voice - Core** > **Provider Configurations**.

Any request from a third-party phone system is passed into a ServiceNow instance through the *CTI Operation* endpoint of the *CTI API*. For information about this API, see CTI API. Based on the provider and the component specified in the endpoint, the corresponding message transformers are invoked to perform the following:

- Transform the request from the third-party phone system before passing the request to an operation handler.
- Transform the response from the operation handler before passing it on to the third-party phone system.

Provider component

For each component or node available in the third-party phone system, a provider configuration contains a provider component. It contains a mapping between the component and a message transformer.

To view the available provider components, navigate to **ServiceNow Voice - Core** > **Provider Components**.

Message transformer

A message transformer defines how a request and response can be transformed between a third-party phone system and the ServiceNow instance.

- The **Input Transformer** field has a script that defines how a request from a third-party phone system should be transformed within the ServiceNow instance before passing the request to an operation handler.
- The **Output Transformer** field has a script that defines how the response from the operation handler should be transformed before passing it on to the third-party phone system.

To view the available message transformers, navigate to **ServiceNow Voice - Core** > **Provider Message Transformers**.

Provider configuration for the integration of Voice with Amazon Connect

For the ServiceNow Voice integration with the ServiceNow Voice with Amazon Connect application, the *AWS Connect Default Handler* provider component is available by default.

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Note:
The ServiceNow Voice with Amazon Connect integration with ServiceNow application [sn_cti_amzn_cct] must be installed from the ServiceNow® Store. For information on installing this application, see Install ServiceNow Voice applications.

For each node that can be used an integration point between Amazon services and the ServiceNow instance, the following provider components and the corresponding message transformers are available.

Provider components and message transformers

Node	Provider component	Message transformer
Get Customer Input	sn_aws_connect_lex_intent_processor_component	AWS - Lex - Intent - Message Transformer (SN Proxy)
Invoke AWS Lambda Function	sn_aws_connect_lambda_proxy_component	AWS - Connect - Lambda - Message Transformer

When a customer dials using a phone number, a call is placed through the Amazon Connect 's phone system. Using one of its components, Amazon Connect provides the request to the ServiceNow instance through the *CTI Operation* endpoint of the *CTI API*. For information about this API, see CTI API. Based on the provider and the component specified here, the corresponding message transformers are invoked to perform the following:

- Transform the request from Amazon Connect before passing the request to an operation handler.
- Transform the response from the operation handler before passing it on to Amazon Connect.

Extension points in Voice

Using extension points, you can call the custom scripts to extend the functionality of ServiceNow Voice. While integrating a third-party phone system with ServiceNow Voice, you can invoke extension points using the *CTI API* to handle events in ServiceNow Voice.

By using extension points, you can easily integrate customizations without having to alter the base code. You can extend standard base functionality using customized scripts. For more information, see Using extension points to extend application functionality.

To view the extension points that are available by default, navigate to **System Extension Points** > **Scripted Extension Points** and group by the ServiceNow Voice application.

Note:
You should install the ServiceNow Voice, ServiceNow Voice for ITSM, ServiceNow Voice for CSM, and ServiceNow Voice with Amazon Connect applications from the ServiceNow® Store. For information about these installations, see Install ServiceNow Voice applications, Install ServiceNow Voice for ITSM, and Install ServiceNow Voice for CSM.

Extension points in Voice

Extension point	Description
sn_cti_core.clickToCallContextMap	Enables the copying of application-specific field values to interaction records for ServiceNow Voice outbound calls.

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Extension points in Voice (continued)

Extension point	Description
sn_cti_core.CTICallAnalysisExtractor	Defines how the transcription and the recording data is retrieved for an interaction based on the third-party phone system integrated with ServiceNow Voice.
sn_cti_core.SoftPhoneEventSink	Defines if the third-party phone system can handle an event. Maps events from the Softphone interface to back-end events.

Using Voice

Agents can use ServiceNow Voice to receive inbound calls and make outbound calls with a seamless voice call experience. Managers can use this application to monitor and analyze calls.

Receiving inbound calls in ServiceNow Voice

An agent can receive inbound calls using the Agent Softphone interface to handle a caller's request.

As an agent, you should have any of the following roles to receive an inbound call:

- sn_openframe.user and interaction_agent
- If the Advanced Work Assignment plugin (com.glide.awa) is installed, awa_agent & awa_integration_user.

After a customer dials in, the corresponding contact flow is invoked in Amazon Connect. Through the configured nodes, the request is forwarded to an operation handler in the ServiceNow instance.

If an agent is available, the agent can receive the call and handle the request using Agent Softphone interface. For information about the presence states of an agent, see Agent Inbox controls .

Interaction record states

If	Then the interaction
The interaction has just been created, is currently in a call tree being deflected by an IVR flow, or has not yet been routed and assigned to an agent	Is in **New** state.
The Lex Bot deflects the call or the user disconnects the call any time before the call enters the queue	Moves to **Closed Complete** state.
The interaction gets assigned to an agent	Moves to **Work in Progress** state.
The user disconnects the call while waiting in the queue	Moves to **Closed Abandoned** state.

Initiating outbound calls with ServiceNow Voice

Improve your productivity as an agent by initiating outbound calls to connect with customers using the click-to-call feature in the ServiceNow Voice application.

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As an agent, you can initiate outbound calls using the click-to-call feature when accessing the phone number of a user. The phone number of a user, if available, is displayed on the ServiceNow application UIs. Example application UIs include the contact details on a Case form, the user record on an Incident form, the Consumer form, the Contact form, and other application UIs.

Note:

- If not available, you can add the **Caller** field to an incident form.
- The phone number of a user should be in the E.164 format. For information about configuring a phone number in this format, see Configure the E.164 format for a consumer phone number.

You should have any of the following roles to initiate an outbound call:

- sn_openframe.user and interaction_agent
- If the Advanced Work Assignment plugin (com.glide.awa) is installed, awa_agent & awa_integration_user.

You can click the link to the user's phone number displayed on the application UI. The user record must have the mobile phone, business phone, or both. The Agent Softphone pop-up window is displayed letting you know that the call will be recorded, and then the user's number is connected. An interaction record of type Phone is created for the call and is in the **Work in Progress** state.

For ServiceNow Voice Core, if the `createConversation` flag is set to true, a conversation record is created for an outgoing call.

For ServiceNow Voice with Customer Service Management, if the `sn_cti_csm_cnt.enable_ims_update` flag is set to true, a conversation record is created for an outgoing call.

For ServiceNow Voice with IT Service Management, if the `sn_cti_itsm_cnt.enable_ims_update` flag is set to true, a conversation record is created for an outgoing call.

The following agent presence states are configured by default for the Voice application and are displayed in your Agent Workspace Inbox.

Agent Workspace Inbox statuses

Status	Description
CallingCustomer	Indicates that you are in the process of connecting with a customer. After the call is connected, the status appears as **Busy**.
Busy	Indicates that you are on the call.
AfterCallWork	Indicates that you ended the call and right now working on updating the task such as case details. The status is displayed after you click **End call** in the Agent Softphone pop-up window.
Available	Indicates that you are available to accept another task such as a case.

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Agent Workspace Inbox statuses (continued)

Status	Description
	The status is displayed after you click **Clear contact** in the Agent Softphone pop-up window.
FailedConnectAgent	Indicates that you were unable to connect with the customer. After the call doesn't go through, the status appears as **Available**.

Note:
The Agent Workspace Inbox statuses are synchronized with your Advanced Work Assignment (AWA) activity.

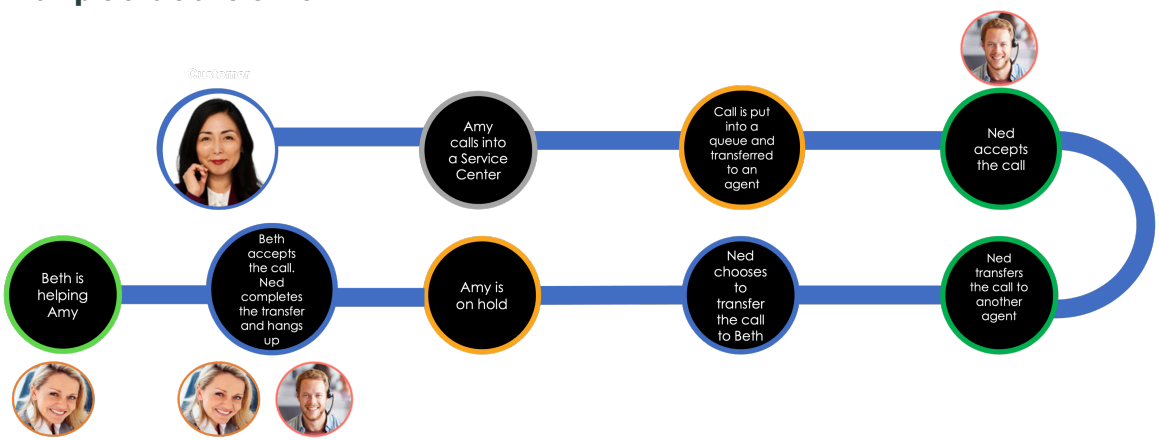
The activity stream of the associated interaction record is populated with your status details, the URL to the call recording, contact trace record, and call transcript.

Transferring a call to an agent or queue

When on a call with a customer, an agent can transfer the call to another agent or to a queue to get more assistance for the customer.

This feature is available for ServiceNow Voice for Customer Service Management. See Integrating ServiceNow Voice with CSM for more information.

Example of a transfer flow



1. Navigate to **All** > **Workspace Experience** > **CSM/FSM Configurable Workspace**.
2. Ned uses the Agent Softphone to accept an incoming call from a customer.
3. To transfer the call, Ned clicks **Quick connects** and choose either another agent or a queue (for example "Billing queue"). The transfer begins, and **INTERNAL-TRANSFER** displays on the softphone. The customer is placed on hold until the next agent accepts the call.
4. Once the next agent (Beth) selects **Join**, and joins the call, the first agent (Ned) can either remain on the call or leave the call.
5. When the Ned leaves the call, the call is reassigned to the Beth on the interaction record.

Integrating Voice with other applications

You can extend the capabilities of ServiceNow Voice for inbound and outbound calls by integrating with other applications.

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Integrate ServiceNow Voice with Amazon Connect

Connect ServiceNow Voice of your ServiceNow instance with the Amazon Connect instance to provide a seamless inbound and outbound voice call experience for your callers and agents.

Before you begin

- Procure an Amazon Web Services (AWS) account with the administrative access to complete the integration setup between Amazon Connect and ServiceNow. For information about creating the AWS account, see the Amazon documentation.
- Review the pricing policies for the services provisioned during this setup. Required services, resources, roles are set up in your AWS account.
- Create a service account in your ServiceNow instance to allow communication from your AWS account to your ServiceNow instance. If you do not have the permissions to create service accounts on your instance, contact your ServiceNow administrator for creating this service account.

Role required: sn_cti_amzn_cct.admin

Note:
ServiceNow Voice with Amazon Connect integration is not supported for AWS GovCloud.

Procedure

1. Log in to your Amazon Web Services (AWS) account and setup an Amazon Connect instance. For instructions on setting up this instance, see the Amazon Connect documentation.
2. Integrate the Amazon Connect with your ServiceNow instance.

   a. Log in to your ServiceNow instance.

   b. Navigate to **Amazon Connect Integration** > **Setup Instance**.

   c. On the form, fill in the fields.

Amazon Connect Instance form

Field	Description
Name	Name of the Amazon Connect instance.
AWS ARN	Amazon resource name of the Amazon Connect instance. For information on AWS ARN, see the Amazon Connect documentation.
Active	Option that indicates if the record is active.
Override Params	Option to edit the domain for Amazon Connect instance parameters. You should select this option only when you want to integrate the ServiceNow instance with an Amazon Connect instance created before introducing the new domain for the Amazon Connect console. For information about this new domain, see the Amazon Connect documentation.

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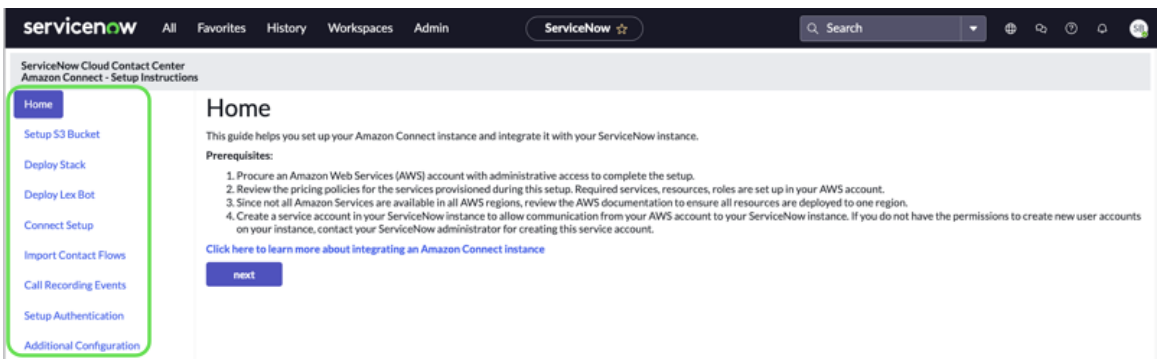
Field	Description

Instance Params	Auto-generated parameters based on the name of the Amazon Connect instance.
	
	For example, here are the Amazon Connect instance parameters before and after introducing the new domain for the Amazon Connect console.
	
	▪ Before introducing the new domain
	
	`{"ccpHost":"acmesupport.awsapps.com","ccpUrl":"https://acmesupport.awsapps.com/connect/ccp-v2","audioRecordingUrlPrefix":"https://acmesupport.awsapps.com/connect/get-recording?format=wav&callLegId="}`
	
	▪ After introducing the new domain
	
	`{"ccpHost":"acmesupport.my.connect.aws","ccpUrl":"https://acmesupport.my.connect.aws/ccp-v2","audioRecordingUrlPrefix":"https://acmesupport.my.connect.aws/get-recording?format=wav&callLegId="}`

3. Configure the Amazon Connect components in your ServiceNow instance.



   a. Navigate to **Amazon Connect Integration** > **View Instances**.

   b. Select the instance you want to configure.

   c. Click the **Setup Guide** related link.

   d. Work through the guided setup steps in the order displayed, and complete the instructions for components specified in each section.

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Steps to configure Amazon Connect components

Guided setup step	Description
Select Application	Select an application for which you want to configure the Amazon Connect components.
Setup S3 Bucket	Host content that can be deployed by Amazon CloudFormation. For more information on creating an S3 bucket, see the Amazon documentation
Deploy Stack	Set up a collection of the required Amazon Web Services (AWS) resources. For more information on stacks, see the Amazon documentation. You can deploy the AWS stack using AWS CloudFormation templates. ▪ Use AWS Cloud Formation template to describe AWS resources and properties ▪ Use AWS Cloud Formation stack to provision the resources described in the template **Note:** If you are upgrading from a previous release, point your existing deployment of Lambda function running on Node.js 10.x to point it to Node.js 14.x. For more information, see the Amazon documentation.
Deploy Lex Bot	Build voice-based conversational interfaces for your users. For more information on Lex Bot, see the Amazon documentation
Connect Setup	Integrate with your ServiceNow instance with AWS services

Import Contact Flows	▪ To enable Advanced Work Assignment (AWA) Voice Routing, check the checkbox under the **AWA Voice Routing** heading. Complete the steps specified in the setup guide:
	  ▪ Complete AWS Lambda and Oauth credential setup.
	  ▪ Download the recommended hold music using the link in the setup guide (you can choose your own hold music, but it cannot be longer than 5 seconds).
	  ▪ Upload the hold music. See the AWS documentation.
	▪ Define a call tree for inbound and outbound calls between Amazon Connect and your ServiceNow instance. For more information on contact flows, see the Amazon documentation.
	▪ Based on your subscription, you have default inbound and outbound contact flows. For example, for the integration of ServiceNow Voice with ITSM applications, see Components installed with ServiceNow Voice for ITSM.
	▪ For an inbound contact flow, create queues to route contacts from AWS queues to ServiceNow queues. For information on creating queues in AWS, see the Amazon documentation.

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Guided setup step	Description
	▪ Set up call transfer flows through Amazon Connect using Transfer to Agent Flow and Transfer to Queue Flow. The transfer flows are reusable and can also be applied to ServiceNow Voice for ITSM. ▪ Amazon Connect (Phone) is a placeholder phone channel for Amazon Connect integration. For queues that you implement in your Amazon Connect instance, you can use this channel to create corresponding Advanced Work Assignment queues. For an example implementation, see Associate Amazon Connect queues for ITSM to a ServiceNow instance or Associate Amazon Connect queues for CSM to a ServiceNow instance.
Setup Real Time Transcription	Set up the properties in the Amazon Connect integration in order to enable Real-Time Transcription. Refer to Configure Real Time Transcription for ServiceNow Voice Customer Service Management for configuration instructions.
Call Recording Events	Send recording events to the ServiceNow instance by enabling call recording on your Amazon Connect instance. For more information on recording behavior, see the Amazon documentation
Setup Authentication	Integrate your Amazon Connect instance with your ServiceNow account by creating a service account
Additional Configuration	▪ Use the Amazon Connect softphone interface Launch the Amazon Connect softphone interface within ServiceNow UI by configuring OpenFrame. The OpenFrame configuration created in your ServiceNow instance enables agents to launch the softphone from within the ServiceNow interface. You can also configure user groups to restrict this configuration to specific agent user groups. **Note:** Agents should log in to the softphone interface in a separate browser tab using the Amazon Connect credentials or SSO credentials (if configured). Once logged in, the softphone can be launched and used within the ServiceNow interface. ▪ Use ICC voice controls with Amazon Connect To use the native voice control in ServiceNow Workspace, follow the steps in the **Enable Interaction Controls** section of the guided setup. **Note:** If a queue with the same ServiceNow Voice External ID is already mapped to an Amazon Connect queue, update the Provider Queue ID field on the existing record instead of creating a duplicate queue. See Interaction Controls Component (ICC) for voice calls.

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Configure a contact flow for an automated caller interaction

Invoke an automated caller interaction with bots to fulfill the caller's request within the ServiceNow instance.

Before you begin

Role required: sn_cti_core.admin

About this task

When a caller contacts the call center, using the voice or dual-tone multi frequency (DTMF) inputs from caller, a contact flow is invoked in the Amazon Connect instance based on the caller context. The contact flow contains nodes that act as integration points between Amazon services and the ServiceNow instance. Based on the nodes defined in the contact flow, the corresponding operation handlers are triggered in the ServiceNow instance. The caller then gets the response that is defined in the operation handler. For information about contact flows, see the Amazon documentation.

In the ServiceNow base system, a few operation handlers are available by default. For information on operation handlers, see ServiceNow Voice reference.

Procedure

1. **Optional:** If you do not want to use a default operation handler, create and configure an operation handler in the ServiceNow instance.

   a. Navigate to **ServiceNow Voice - Core** > **Operation Handlers**.

   b. Click **New**.

   c. On the form, fill in the fields.

Operation Handler form

Field	Description
Operation Name	Name of the operation that you want to automate.
Type	Type that specifies how the operation is implemented. ▪ Script: Implementation is included in a script. ▪ Forward to Handler: Request is forwarded to an operation handler, which is invoked by lookup on the sys_id of that handler. This scenario is possible when you have different intents for similar operations, for example, Create an HR incident and Create incident. ▪ Forward to Operation: Request is forwarded to an operation handler, which is invoked by lookup on the name of the handler and then name resolution to find the handler. ▪ Integration Hub - Action: Calls an Integration Hub action. ▪ Integration Hub - Subflow: Calls an Integration Hub flow or subflow.
Application	Application associated with the operation handler.
Domain	Domain associated with the operation handler.
Active	Option to activate the operation handler.

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Field	Description
Require Authentication	Option to enable authentication for the operation handler. **Note:** If this option is selected, the corresponding operation is invoked only when a valid authentication token is passed in the request. It is supported by an authentication operation handler that supports pin-based authentication, which can be leveraged in your contact flows. For information about configuring the PIN, see Configuring a phone PIN.
Description	Summary about the operation handler.
Script	Script that contains the operation implementation and the response for the caller. This field appears when **Script** is selected for **Type**.
Forward To	Operation handler to which you want to forward the request. This field appears when **Forward to Handler** or **Forward to Operation** is selected for **Type**.
Integration Hub - Action	(Optional) Integration Hub action that you want to call to complete the request. This field appears when **Integration Hub - Action** is selected for **Type**.
Integration Hub - Flow/ SubFlow	(Optional) Integration Hub flow or subflow that you want to call to complete the request. This field appears when **Integration Hub - Subflow** is selected for **Type**.

d. Click **Submit**.

2. Create a contact flow in Amazon Connect to define an end-to-end customer experience.

For information about creating a contact flow, see the Amazon documentation.

When building a contact flow within Amazon Connect, use any of these nodes to trigger operation handlers defined in the ServiceNow instance. These nodes act as integration points between Amazon services and the ServiceNow instance.

Nodes in contact flows

Node	Description	Configuration
Get Customer Input	Invokes a Lex Bot. The operation handler that is triggered is based on the name of the intent associated with the Lex Bot. For information about	**a.** Create an intent for the required Lex Bot in your Amazon Connect instance. For information about creating an intent, see the Amazon documentation. **b.** Specify the following information in the intent.

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Node	Description	Configuration
	this node, see the Amazon documentation. **Note:** This node can be used when the integration is between Amazon Lex and the ServiceNow instance.	▪ Intent name: Name of the intent. **Note:** This intent name should match an operation handler in the ServiceNow instance with the same name, or name + '_<suffix>' where suffix can contain any five uppercase alpha characters. ▪ Sample utterances: Caller utterances that trigger the operation handler. ▪ Lambda initialization and validation: If the operation handler being invoked requires authentication, select the **Initialization and validation code hook** check box and select the deployed AWS Lambda function. ▪ Lambda function: Deployed AWS Lambda function that is invoked. **c.** Save, build, and publish the intent. **d.** Open the required contact flow in the contact flow designer in your Amazon Connect instance. **e.** Click the Get Customer Input node and specify the Lex Bot details in the **Amazon Lex** section. **f.** Click **Save**.
Invoke AWS Lambda Function	Invokes an AWS Lambda function. The operation handler that is triggered is based on the *sn_operation* parameter set on the node in the contact flow. For information about this node, see the Amazon documentation.	**a.** Open the required contact flow in the contact flow designer in your Amazon Connect instance. **b.** Click the Invoke AWS Lambda Function node and specify the following input parameters. ▪ Destination key: sn_component, Value: Component from where the Lambda function is invoked. For example, sn_aws_connect_lambda_proxy_component.

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Node	Description	Configuration
	Note: This node can be used to for data dips (for example, authorizing a caller) where the integration is between the call center and the ServiceNow instance. The data dip configuration allows a caller to enter information, such as an account number, to route calls to a particular queue. Using this number, you can look up the first name of the caller and create an interaction record after the call is initiated. Also, you can customize the greeting with the caller name later in the flow.	▪ Destination key: sn_operation, Value: Name of the operation handler that you want to invoke. For example, interactionEvent. ▪ (optional) Destination key: queueName, Value: Name of the queue that you want to transfer the flow to. **Note:** This parameter is used to invoke the workItemEvent operation handler. ▪ (optional) Destination key: queueId, Value: ARN of the queue that you want to transfer the flow to. **Note:** This parameter is used to invoke the workItemEvent operation handler. ▪ (optional) Destination key: authToken, Value: AuthToken received via authentication call. This parameter is required for invoking an operation handler that requires authentication. ▪ (optional) Destination key: interactionId, Value: Interaction ID received via interactionEvent call. **c.** Click **Save**.

3. Ensure that a caller's phone number is associated with the contact flow after it is created and published.

   This process ensures that each time the caller calls, the corresponding contact flow is invoked. For information about associating a phone number with a contact flow, see the Amazon documentation.

   Note:
   For a sample implementation of invoking operation handlers in a contact flow, you can refer to the default contact flows. For information on default contact flows, see Components installed with ServiceNow Voice for ITSM and Components installed with ServiceNow Voice for CSM.

Integrating ServiceNow Voice with ITSM

Route calls coming through the ServiceNow Voice to specific phone queues based on user preference, utterances, or any other ServiceNow data to optimize incident resolution.

Sample ITSM contact flow

Use the inbound **(ServiceNow ITSM Inbound Demo Flow)** and outbound **(ServiceNow ITSM Outbound Demo Flow)** Amazon Connect ITSM sample contact flows that come with the Voice integration to get you up and running quickly. The sample flow allows you to deflect voice calls or route them based on the caller context to different queues. When a call comes through the

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ServiceNow Voice, the Amazon Connect application uses data dips to identify the caller and then deflect the call or route it to the right agent. For more information on integrating ServiceNow Voice with Amazon Connect see, Integrate ServiceNow Voice with Amazon Connect.

Callers can access status updates or make updates to their records when they are authenticated.

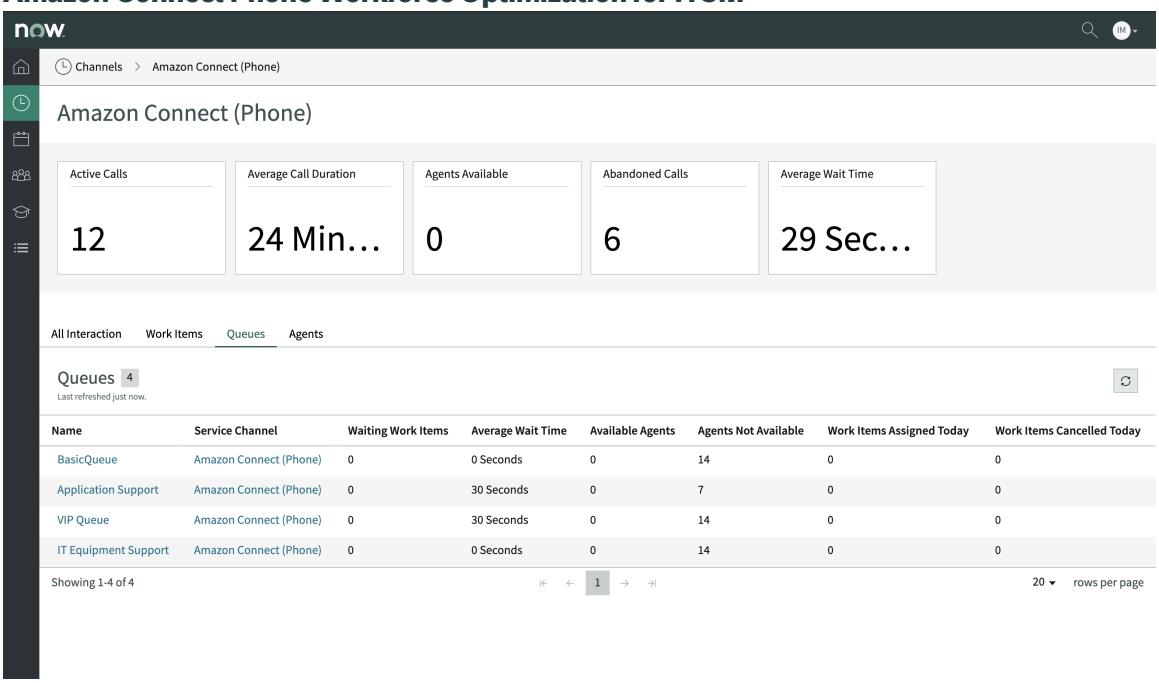
PIN-based authentication

Callers can use PIN-based authentication to access the phone channel. Managers can set or reset the PIN for the users who can also set or reset their phone PIN. For more information, see Configure a phone PIN.

Workforce Optimization for ITSM

Integrate Voice with Workforce Optimization for ITSM to visualize call metrics from Amazon Connect. The Voice uses Advanced Work Assignment to display the call metrics and active calls along with all other Channel metrics in the Manager Workspace.

Amazon Connect Phone Workforce Optimization for ITSM



Install ServiceNow Voice for ITSM

You can install the ServiceNow Voice for ITSM application (sn_cti_itsm_cnt) if you have the admin role. This plugin installs the ITSM content for integration between ServiceNow Voice and a third-party phone system.

Before you begin

- Confirm that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Your organization must have purchased ITSM Pro subscription, which includes the ServiceNow Voice SKU.
- ServiceNow Voice for ITSM requires the following ServiceNow Store application. Ensure that this application is installed before you install ServiceNow Voice for ITSM.

Required ServiceNow Store applications

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Amazon Connect Integration with ServiceNow Voice (sn_cti_amzn_cct)

Integrates the ServiceNow instance with the Amazon Connect server.

Role required: admin

About this task

The following items are installed with ServiceNow Voice for ITSM application (sn_cti_itsm_cnt):

- Contact flows
- Operation handlers

For more information, see Components installed with ServiceNow Voice for ITSM.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the ServiceNow Voice for ITSM application (sn_cti_itsm_cnt) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. In the Application installation dialog box, review the application dependencies.

   Dependent plugins and applications are listed if they will be installed, are currently installed, or need to be installed. If any plugins or applications need to be installed, you must install them before you can install ServiceNow Voice for ITSM application (sn_cti_itsm_cnt).
4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data are the sample records that describe application features for common use cases. Load the demo data when you first install the application on a development or test instance.
5. Select **Install**.

Real time transcriptions for ServiceNow Voice for IT Service Management

Agents can see a transcript of voice calls while interacting with customers. Real time transcription allows agents to better understand caller issues, and allows managers to gain insights into caller trends and agent training gaps.

Inbound call example flow for customers and agents

The below examples illustrate common scenarios for using real-time transcriptions for inbound calls. The caller calls in and requests to speak to an agent. As soon as the call begins, the agent can see the transcript of the call in chat panel as they work with the caller. The real time transcript is not visible to the caller, however, the transcript can help the agent better understand the caller issue and refer back to the conversation for clarification.

Personas:

- Agent
- Caller

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Example Caller flow for inbound calls.

1. Customer dials an Amazon Connect customer service number.
2. Confirm the approval for recording (press 1#).
3. Give instruction: “Speak to a live agent”.
4. Provide a subject for the customer service agent: “Router Issue”.
5. Confirm the subject and wait for the agent to pick up the call.

Example Agent flow for inbound calls.

1. Log in to your ServiceNow instance and open the Configurable Workspace
2. Log in to Amazon Connect.
3. Set status to **Online**.
4. Wait for a call alert and answer the call.
5. A new interaction with the subject and chat panel opens with the real time transcript.

Outbound call example flow for agents

The below example illustrates a common scenario for using real-time transcriptions in outbound calls. The agent contacts the caller, and as soon as the call starts, the agent can see the transcript of the call in chat panel as they work with the caller. The real time transcript is not visible to the caller, however, the transcript can help the agent better understand the caller issue and refer back to the conversation for clarification.

Persona: Agent.

1. Log in and open the Configurable Workspace.
2. Log in to Amazon Connect.
3. Set status to **Online**.

An interaction is created with the subject “outbound call to `<customer name>`”, and a chat panel opens with the transcript.

Enable native voice control in Service Operations Workspace

Enable the native voice control to allow the agents to manage the calls using the Interaction Controls Component and the Customer History tab component.

Before you begin

Role required: admin

About this task

This page variant is available to users when:

- The Interaction Controls Component plugin (com.app_interaction_control) is installed.
- Interaction controls in the OpenFrame configuration are enabled.

When the following conditions are met, the agent sees the SOW voice interaction record page with the Interaction Controls Component and the Customer History tab component.

- The interaction is of type phone.
- The **Enable interaction controls** field on the OpenFrame Configuration record is enabled.
- The agent belongs to the **User Group** selected on the OpenFrame Configuration record.

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The agent can switch between phone interactions and chat interactions. If an interaction is of type chat, the agent sees the CSM default record page.

Procedure

1. Navigate to **All** > **OpenFrame** > **Configurations**.
2. Select a configuration record.
   For example, select **CTI**.
3. Select the **Enable interaction controls** check box to enable interaction controls for OpenFrame.
4. Select a group from the available **User Group** column and move it to the **Selected** column.
   This is the group of users to whom the OpenFrame configuration applies.
5. Unlock the URL field, and add a third-party URL.
   You can get this URL from your contact center provider admin.
6. Select **Update**.

Integrating ServiceNow Voice with CSM

Access the CSM -specific contact flows and operation handlers when you integrate the ServiceNow Voice application with the Customer Service Management application.

The ServiceNow Voice for CSM application provides seamless interactive voice response (IVR) and calling experiences for your customers and agents by integrating a cloud contact center provider with the robust capabilities of the Customer Service Management application.

Overview

The ServiceNow Voice for CSM application provides the following Customer Service capabilities for the integration with a cloud call center provider such as the Amazon Connect service:

- A bot building framework to automate interactions with consumers and customer contacts.
- An inbound contact flow to define the customer experience in an IVR.
- An outbound contact flow to connect with consumers and customer contacts from the phone number field displayed in any of the ServiceNow application UIs.
- Operation handlers to configure automated interactions for customer service cases.
- A phone PIN setup option for consumers and customer contacts.
- Amazon Connect phone queues for the Workforce Optimization for Customer Service application.

To get started with the ServiceNow Voice for CSM application, see Install ServiceNow Voice for CSM.

Key features

Customer experience

Engage via voice-based interactions using a natural language process to do the following:

- Create a case
- Update and check case status
- Speak with an agent
- Request a call back from an agent

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Agent experience

- Preview caller information displayed in Agent Workspace before accepting an inbound call.
- Indicate your presence in the Agent Workspace Inbox with voice as a service channel when the Agent Workspace Inbox is integrated with the Agent softphone.
- View real-time transcripts of calls while interacting with a customer. For more information about real-time transcripts, see Real time transcriptions for ServiceNow Voice for Customer Service Management
- Transfer calls to another agent or to a queue, and include transcripts and interaction history with the transfer.
- Make outbound calls to connect with a customer and automatically capture interaction details to simplify data entry.

Manager experience

- Review call transcripts, sentiments, and recordings to explore coaching opportunities for agents.
- Use call metrics, such as the agent call time, to report on agents.
- Monitor real-time phone metrics captured in a unified dashboard by using the Workforce Optimization for Customer Service application.

> **Note:**
> This feature is available when the Workforce Optimization for Customer Service application is enabled for the Customer Service Management application.

ServiceNow Voice for CSM user roles

The users with the roles listed in the following table can use the ServiceNow Voice for CSM application.

Roles required for ServiceNow Voice for CSM

Roles	Tasks
agent_workspace_user	Initiate or accept voice calls to understand customer issues and resolve issues.
sn_customerservice_manager	View details of voice calls using the interaction record of the Phone type.
sn_customerservice.consumer, sn_customerservice.customer	Initiate or accept voice calls to create and track one's own customer service cases.

Example workflow

The following example workflow shows the use of the ServiceNow Voice for CSM application in resolving a customer issue:

1. A customer is in an IVR call using the ServiceNow Voice for CSM application.
2. The ServiceNow Voice for CSM application identifies the customer and starts an interaction.
3. A welcome message is read out to the customer including announcements, if any.

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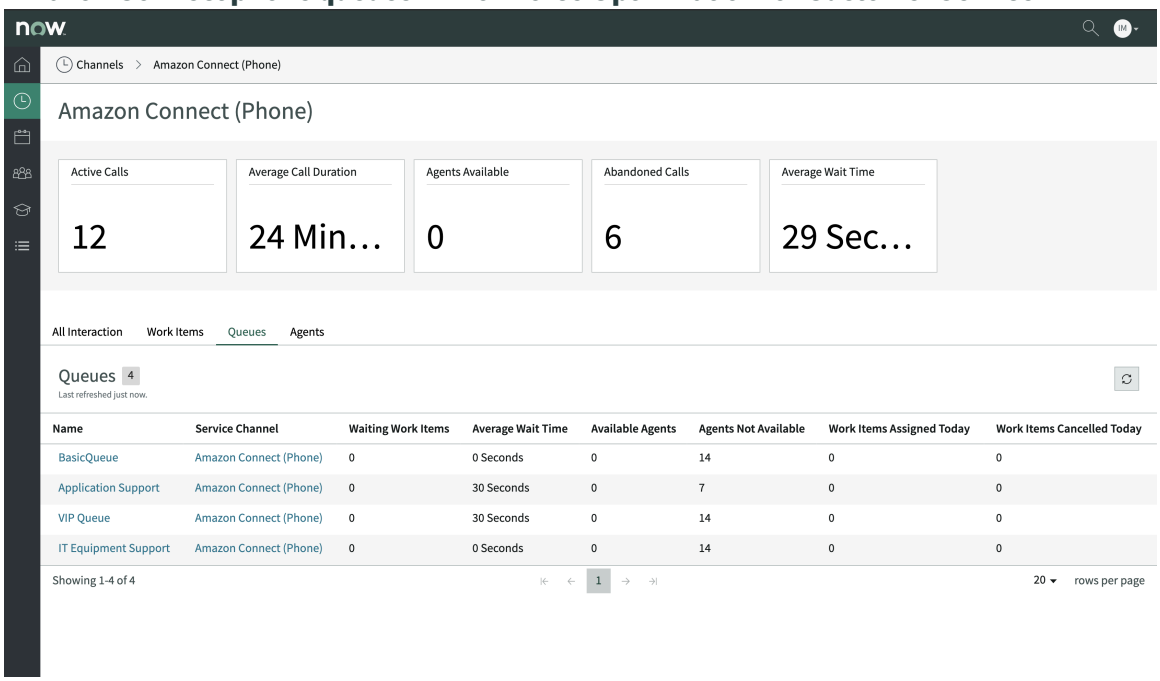
4. Based on customer identification, the Cloud Call Center for CSM application addresses the call.
   - If the caller is identified as an existing customer who has a customer contact or consumer record with the phone number details available in the Customer Service Management application, a personal greeting is read to the caller and the automated interactions are made available.
   - If the caller is not identified, the call is routed to a live agent.
5. The ServiceNow Voice for CSM application identifies the customer intent using automated interactions, and then based on the interaction responses, either creates or updates a case.

Note:
This step in the flow applies only when the caller is an existing customer.

Workforce Optimization for Customer Service

Integrate Voice with Workforce Optimization for Customer Service to visualize call metrics from the Amazon Connect service. Voice uses the Advanced Work Assignment feature to display the call metrics and active calls along with all other Channel metrics in the Manager Workspace. For more information, see Using Voice with Workforce Optimization for Customer Service.

Amazon Connect phone queues in Workforce Optimization for Customer Service



Related topics

- Setting up ServiceNow Voice
- Using Voice
- Components installed with ServiceNow Voice for CSM

Install ServiceNow Voice for CSM

You can install the ServiceNow Voice for CSM application (sn_cti_csm_cnt) if you have the admin role. The application installs related ServiceNow® Store applications if they are not already installed.

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Before you begin

- Confirm that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- ServiceNow Voice for CSM requires the following ServiceNow Store applications. Ensure that this application is installed before you install ServiceNow Voice for CSM.

  Required ServiceNow Store applications

  Customer Service plugin (com.sn_customerservice)

  Installs the Customer Service Management application.

  Amazon Connect Integration with ServiceNow Voice (sn_cti_amzn_cct)

  Integrates the ServiceNow instance with the Amazon Connect server.

Role required: admin

About this task

The following items are installed with ServiceNow Voice for CSM:

- Contact flows
- Operation handlers

For more information, see Components installed with ServiceNow Voice for CSM.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the ServiceNow Voice for CSM application (sn_cti_csm_cnt) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you may have to request it from the ServiceNow Store.

   Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. In the Application installation dialog box, review the application dependencies.

   Dependent plugins and applications are listed if they will be installed, are currently installed, or need to be installed. If there are any plugins or applications that need to be installed, you must install them before you can install ServiceNow Voice for CSM.
4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data are the sample records that describe application features for common use cases. Load the demo data when you first install the application on a development or test instance.
5. Select **Install**.

What to do next

To set up Voice for CSM, see Setting up ServiceNow Voice

Configuring the phone PIN settings for ServiceNow Voice

Use a#PIN-based authentication mechanism for enabling a customer contact or consumer to connect with the ServiceNow Voice for CSM #application.

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An authentication mechanism for inbound dialing enables protecting the details of customer contacts and consumers from unauthorized users. When using the ServiceNow Voice for CSM application, you as an administrator can configure the PIN-based authentication mechanism available within the ServiceNow Voice for CSM application or set up a custom authentication mechanism.

The PIN-based authentication mechanism available within the ServiceNow Voice for CSM application enables customer contacts and consumers to use a custom phone PIN for accessing details related to their customer service cases during inbound dialing.

By default, the **My Phone PIN** link in the Additional Configuration section of the setup guide for configuring the Amazon Connect components enables the PIN-based authentication mechanism. For more information about the setup guide, see Integrate ServiceNow Voice with Amazon Connect.

Note:
The **My Phone PIN** link for customer contacts and consumers is available only with the sample CSM -specific contact flows.

To enable a PIN-based authentication mechanism, the **My Phone PIN** link in the setup guide uses the predefined Setup PIN record producer that is configured by default for consumers and customer contacts. As an administrator, you can edit the Setup PIN record producer to add any additional ServiceNow roles, include the record producer in a service catalog, and display the service catalog as a module on a customer-facing portal. Customers can then use the module to configure and reset their phone PIN. For more information, see Record Producer and Set up a service catalog.

Real time transcriptions for ServiceNow Voice for Customer Service Management

Agents can see a transcript of voice calls while interacting with customers. Real time transcription allows agents to better understand customer issues, and allows managers to gain insights into customer trends and agent training gaps.

Inbound call example flow for customers and agents

The below examples illustrate common scenarios for using real-time transcriptions for inbound calls. The customer calls in and requests to speak to an agent. As soon as the call begins, the agent can see the transcript of the call in chat panel as they work with the customer. The real time transcript is not visible to the customer, however, the transcript can help the agent better understand the customer issue and refer back to the conversation for clarification.

Personas:

- Customer Service Agent
- Customer

Example Customer Flow for inbound calls.

1. Customer dials an Amazon Connect customer service number.
2. Confirm the approval for recording (press 1).
3. Give instruction: “Speak to a live agent”.
4. Provide a subject for the customer service agent: “Router Issue”.
5. Confirm the subject and wait for the agent to pick up the call.

Example Agent Flow for inbound calls.

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1. Log in to your ServiceNow instance and open the Configurable Workspace
2. Log in to Amazon Connect.
3. Set status to **Online**.
4. Wait for a call alert and answer the call.
5. A new interaction with the subject and chat panel opens with the real time transcript.

Outbound call example flow for agents

The below example illustrates a common scenario for using real-time transcriptions in outbound calls. The agent contacts the customer, and as soon as the call starts, the agent can see the transcript of the call in chat panel as they work with the customer. The real time transcript is not visible to the customer, however, the transcript can help the agent better understand the customer issue and refer back to the conversation for clarification.

Persona: Customer Service Agent.

1. Log in and open the Configurable Workspace.
2. Log in to Amazon Connect.
3. Set status to **Online**.

An interaction is created with the subject "outbound call to `<customer name>`", and a chat panel opens with the transcript.

Integrating ServiceNow® Voice with Virtual Agent

ServiceNow® Voice with Virtual Agent allows you to use the ServiceNow Virtual Agent conversation as an IVR (Interactive Voice Response) in phone and to use the existing ServiceNow Advanced Work Assignment to find an agent in case of an escalation and allows agents to work in ServiceNow Workspace to manage the incoming cases on the queue.

The ServiceNow Voice for Virtual Agent application provides seamless interactive voice response (IVR) and calling experiences for your customers and agents when integrated with a Contact Center In Zurich release, we have Amazon Connect, a pre-built adapter integrating the ServiceNow Voice with Virtual Agent to provide the robust capabilities of the Virtual Agent application.

To use our pre-built adapter connector with ServiceNow Voice with Virtual Agent, install the Virtual Agent API (sn_va_as_service) plugin.

Key features

User experience

- Have Virtual Agent answer calls and interact with end users for automated deflection on the phone channel.
- Complete workflow including case lookup, interaction, and task management using Virtual Agent.
- Enable agents to interact with users on the phone on workspace in case of any escalations.
- Receive calls in inbox that are routed via the Advanced Work Assignment rules.

Calling and routing

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- Make outbound calls via click to call or via auto-connecting the Omnichannel Callback feature.

  For more information, see Configure Conversational IVR with Amazon Connect.

- Transfer to external phone number using the Amazon Connect Softphone.
- Skills-based call assignment using the Advanced Work Assignment.

Artificial intelligence

- Match intent and entity using ServiceNow Virtual Agent.
- Analyze sentiments of the utterances.
- Real-time transcription and storage of the recording.

User benefits

- Account log in using voice to receive enterprise service.
- Callback options.

Example workflow

The following example workflow shows the use of ServiceNow Voice for Virtual Agent application in resolving a customer issue.

- A customer is in an IVR call using the ServiceNow Voice for Virtual Agent application.
- The ServiceNow Voice for Virtual Agent application identifies the customer and starts an interaction.
- A welcome message is read out to the customer including announcements if any.
- Based on customer identification, the ServiceNow Voice for Virtual Agent application addresses the call.
  - If the caller is identified as an existing customer who has a customer contact or consumer record with the phone number details available in the ServiceNow Voice for Virtual Agent application, a personal greeting is read to the caller and the automated interactions with Virtual Agent conversations are made available.
  - If the caller is not identified, the caller is presented with the guest topics and the live agent topic. The caller can select the live agent topic to route themselves to a live agent.
- The ServiceNow Voice for Virtual Agent application identifies the customer intent using automated interactions, and the Virtual Agent conversations guide customers to complete the workflow, including changing records, passwords or hearing about a case status.

> **Note:**
> This step in the flow applies only when the caller is an existing customer.

Related topics

Conversational IVR with Amazon Connect

Integrate Advanced Work Assignment AWA Voice routing

Provide customers the ability to use AWA as the routing engine for ServiceNow Voice on Amazon Connect.

Before you begin
ServiceNow Voice for Amazon Connect offers two call routing options:

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- Amazon Connect native Voice routing
- Advanced Work Assignment AWA Voice routing

When using the AWA Voice routing, calls are held in the Amazon Connect queue until the AWA queue settings determine their routing. This allows flexible call management using either the built-in Amazon Connect routing or the more advanced AWA routing capabilities.

Role required: sn_cti_amzn_cct.admin

Procedure

1. Navigate to **Amazon Connect Integration** > **View Instances**.
2. Select the instance you want to configure.
3. Click the **Setup Guide** related link.
4. Go to the **Import Contact Flows** section of the setup guide.
5. To enable Advanced Work Assignment (AWA) Voice routing, check the checkbox under the **AWA Voice Routing** heading.
   Complete the steps specified in the setup guide:
   a. Complete AWS Lambda and OAuth credential setup.
   b. Download the recommended hold music using the link in the setup guide (you can choose your own hold music, but it cannot be longer than 5 seconds).
   c. See the AWS documentation to upload the hold music.
6. Set up AWA queue to route Amazon Connect phone calls.
   To setup AWA, see Get started with Advanced Work Assignment.

What to do next

For more information about integrating ServiceNow® Voice with Amazon Connect, see Integrate ServiceNow Voice with Amazon Connect.

Integrating ServiceNow Voice for HR

The ServiceNow Voice for HR Agent Workspace provides seamless interactive voice response (IVR) and calling experiences for your employees and agents by integrating a cloud contact center provider with the robust capabilities of the Agent Workspace for HR Case Management.

The ServiceNow Voice for HR provides the following capabilities:

- An inbound contact flow to define the employee experience in an IVR.
- An outbound contact flow to connect with employee contacts from the phone number field displayed in any of the ServiceNow application interfaces.
- Operation handlers to configure automated interactions for employee service cases.

Employee experience with ServiceNow Voice for HR

The following example provides an overview of how an employee uses ServiceNow Voice for HR to resolve their HR requests and issues.

An employee calls the general HR phone number with a request. The employee provides information via the interactive voice response (IVR). Using the provided information, ServiceNow Voice for HR tries to identify the caller.

If the caller is identified as an existing employee in HR Agent Workspace, Voice reads a personal greeting to the employee and offers automated interactions to enable the employee to

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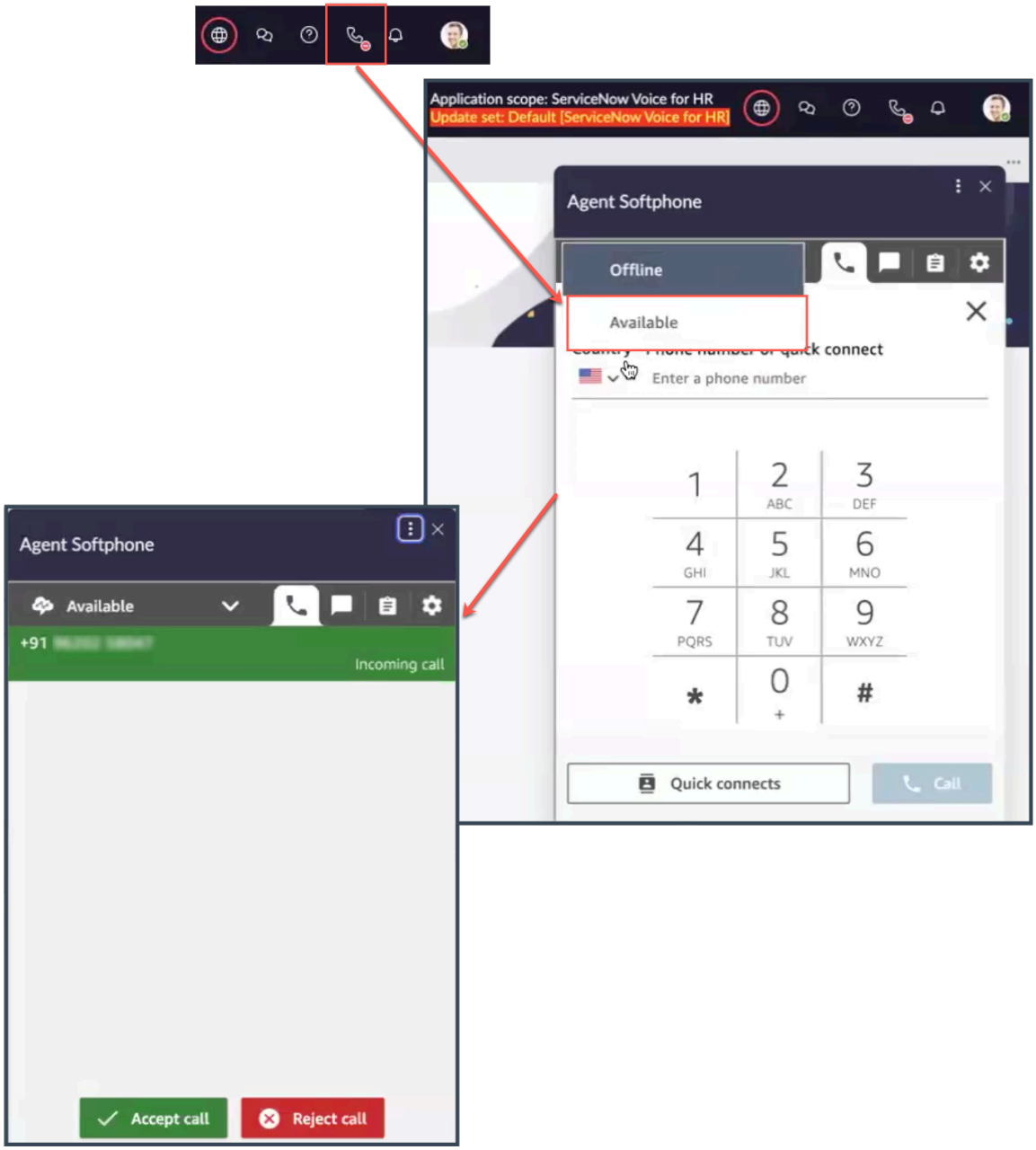
independently address their request. If the employee cannot resolve their request using the IVR, the system routes the call to a live agent.

If the caller is not identified, the call is routed to a live agent.

Agent experience with ServiceNow Voice for HR

Once installed, ServiceNow Voice appears as a pop-up in the HR Agent Workspace where agents can do the following:

- Indicate availability to receive calls on the agent softphone



- Preview caller information before accepting an inbound call.

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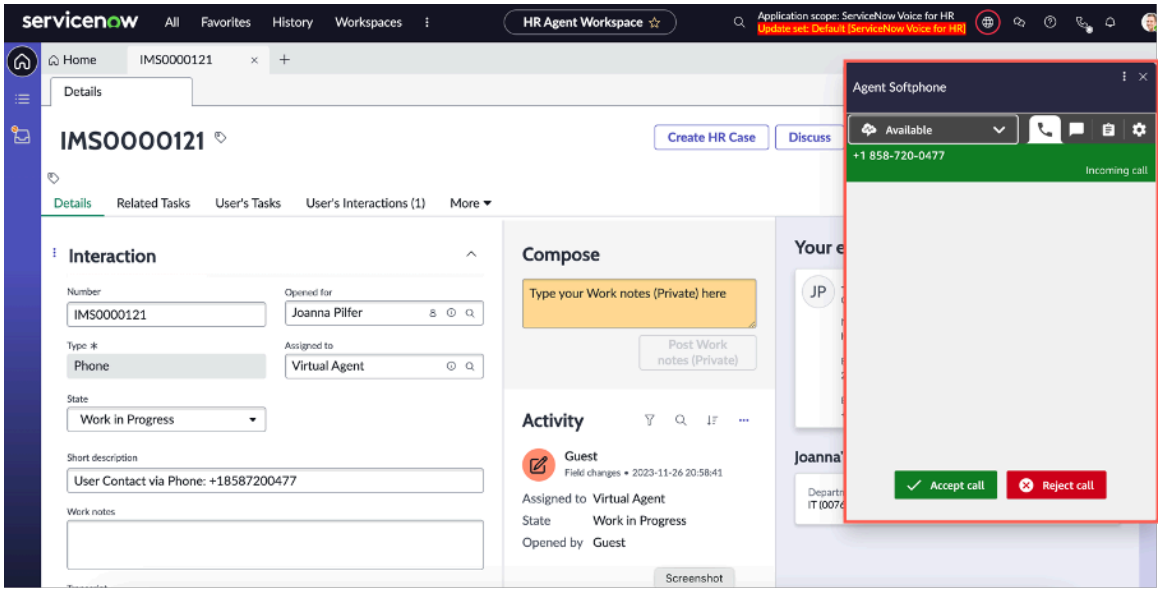
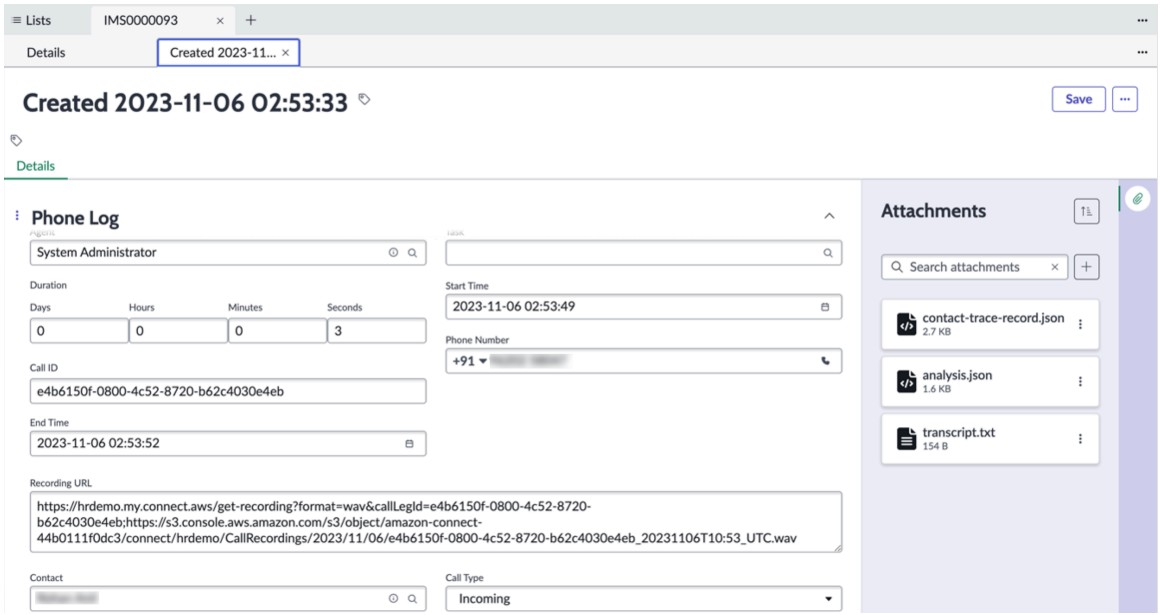


- View the call transcript, hear the recording, and review the call analysis in the interaction related list.



- Make outbound calls to connect with a employee and automatically capture interaction details to simplify data entry

Configuration

ServiceNow Voice for HR (sn_cti_hr_cnt) is activated from the store and requires the following dependency applications:

Application	Description
ServiceNow Voice with Amazon Connect [sn_cti_amzn_cct]	Integrates the ServiceNow instance with the Amazon Connect server. For information about the components installed with this application,

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Application	Description
	see Components installed with Amazon Connect Integration with ServiceNow Voice
Agent Workspace for HR Case Management [sn_hr_agent_ws]	Enables call recording, transcription, and sentiment analysis for ServiceNow Voice with Workspace experience.
ServiceNow Voice for HR Agent Workspace [sn_cti_hr_cnt]	Provides the framework that supports the integration with your third-party phone system.

You must install the dependency applications first, then install ServiceNow Voice for HR. For more information, see Install ServiceNow Voice for HR.

ServiceNow Voice for HR creates an interaction record for every call between an employee and an HR agent with the IMS prefix. These records contain related lists of details relating to the employee and interaction. To maximize the full feature capability, add the Interaction record to the HR Agent workspace. For more information, see Add Interaction Related Records to HR Agent workspace.

Install ServiceNow Voice for HR

You can install ServiceNow Voice for HR if you have the admin role. The application includes demo data and installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow® Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Your organization must have purchased the Agent Workspace for HR Case Management (sn_hr_agent_ws) subscription.
- Ensure that Amazon Connect Integration with ServiceNow Voice (sn_cti_amzn_cct) is installed. For more information, see Install ServiceNow Voice applications.

Role required: admin

About this task

Follow the steps below to install these applications to use ServiceNow Voice for HR.

The following items are installed with ServiceNow Voice for HR:

- Contact flows
- Operation handlers

For more information, see Components installed with ServiceNow Voice for HR Agent Workspace.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the ServiceNow Voice for HR Agent Workspace (sn_cti_hr_cnt) using the filter criteria and search bar.

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You can search for the application by its name or ID. If you cannot find the application, you may have to request it from the ServiceNow Store.

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

3. In the Application installation dialog box, review the application dependencies.

   Dependent plugins and applications are listed if they will be installed, are currently installed, or need to be installed.

4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data are the sample records that describe application features for common use cases. Load the demo data when you first install the application on a development or test instance.
5. Select **Install**.

What to do next

Follow these steps to Integrate ServiceNow Voice with Amazon Connect.

Add Interaction Related Records to HR Agent workspace

ServiceNow Voice for HR creates an interaction record for every call between an employee and an HR agent, which contain related lists of details relating to the employee and interaction. To maximize the full feature capability, add the Interaction record to the HR Agent workspace.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Interaction** > **All**.
2. Open any IMS record.
   If there are no records, create a dummy record.
3. Click **Additional actions** > **Configure** > **Related lists**.
4. Select the **HR Workspace** view.
5. Locate the **Interaction Related Record -> Interaction** option and add it to the **Selected** list.

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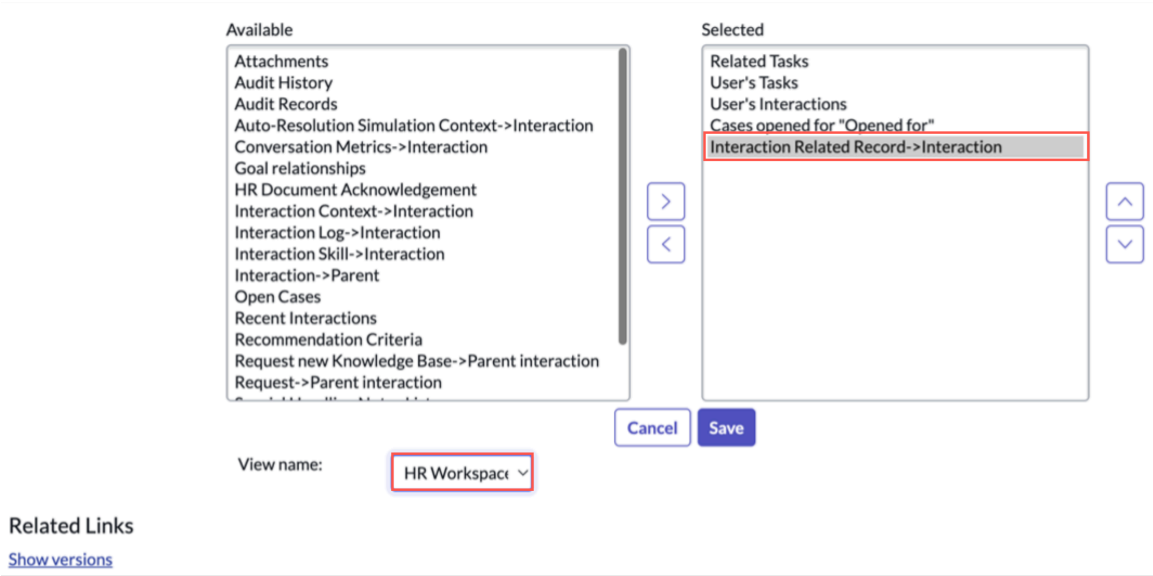

6. Click **Save**.

ServiceNow Voice reference

Reference topics provide additional information about components installed with ServiceNow Voice.

Components installed with ServiceNow Voice Core

Several types of components are installed with activation of the ServiceNow Voice Core application (sn_cti_core), including user roles, plugins, and operation handlers.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Roles installed

Role title [name]	Description	Contains roles
CTI service account [sn_cti_core.service]	Allows communication between the third-party phone system instance and the ServiceNow instance.	sn_openframe_api_user
CTI admin [sn_cti_core.admin]	Creates the framework for integration with a third-party phone system.	None
CTI user manager [sn_cti_core.user_manager]	• Can access the Call Analysis tab and interaction to analyze transcripts, recordings, and sentiments. • Can manage the CTI-enabled user PIN.	None

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Plugins installed

Plugin	Description
Interaction Management (com.glide.interaction)	Enables interaction logging, routing, and queueing
Openframe (com.sn_openframe)	Provides an interface to integrate a communication frame to place and receive calls.

Operation handlers installed

Operation handlers are defined in the ServiceNow instance to run a script based on the intent of the caller and provide response to the caller.

Plugin	Description
$transcript	Saves the call transcript
$query2ssml	Securely queries tables and returns the response as ssml
workItemEvent	If the Advanced Work Assignment plugin (com.glide.awa) is installed, creates a work item on Advanced Work Assignment table before routing the call to agent, and associates an interaction with the work item. **Note:** In a contact flow, invoke this operation handler in the Invoke AWS Lambda Function node just before transferring the flow to a queue
interactionEvent	Defines the life cycle of the an Amazon Web Services (AWS) interaction event, such as initiating an interaction and associating an agent and caller to the interaction
authenticate	Authenticates a user based on the PIN. For information on PIN configuration, see Configuring a phone PIN.
fetchVoiceInteraction	Fetches interaction and processes createConversation flag for creating conversation.

Components installed with Amazon Connect Integration with ServiceNow Voice

Several types of components are installed with installation of the Amazon Connect Integration with Voice application (sn_cti_amzn_cct), including user roles, plugins, and operation handlers.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Roles installed

Role title [name]	Description	Contains roles
Amazon Connect administrator	Configures the integration with the Amazon Connect instance.	sn_cti_core.admin

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Role title [name]	Description	Contains roles
[sn_cti_amzn_cct.admin]		

Plugins installed

Plugin	Description
ServiceNow Voice - Core (sn_cti_core)	Provides the framework that supports the integration with your third-party phone system.
Openframe (com.sn_openframe)	Provides an interface to integrate a communication frame to place and receive calls.

Operation handlers installed

Operation handlers are defined in the ServiceNow instance to run a script based on the intent of the caller and provide response to the caller.

Plugin	Description
$connect.kinesis.event	Receives and processes the call trace record that is created by Amazon Connect in the Amazon Kinesis stream.
$connect.s3.event	Receives and processes JSON events from the S3 buckets where the call recording, transcript and analysis data is created and stored. Associates this information with an interaction and Openframe call log records.
createPhoneLog	Creates a PhoneLog for each call transfer and links the Phone Log to the Interaction Related Record

Components installed with ServiceNow Voice for ITSM

Several contact flows and operation handlers are installed with activation of the ServiceNow Voice for ITSM application (sn_cti_itsm_cnt).

Contact flows installed

These contact demo flows are a quick way to set up inbound and outbound flow logic required by Amazon Connect.

Contact flow	Description
ServiceNow ITSM Inbound Demo Flow	Contains the call tree for inbound calls. When a caller contacts the call center, using the voice or dual-tone multi frequency (DTMF) inputs from caller, the contact flow is invoked in the Amazon Connect instance based on the caller context. This contact flow contains nodes that act as integration points between Amazon services and the ServiceNow instance. Depending on the nodes defined in the contact flow, the corresponding operation handlers are triggered in the ServiceNow instance.

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Contact flow	Description
	The caller then gets the response that is defined in the operation handler. Both real-time transcription (RTT), and advanced work assignment (AWA) are supported when configured during setup.
ServiceNow ITSM Outbound Demo Flow	Contains the call tree for outbound calls. It specifies the whisper message that a caller hears before getting connecting to an agent. Real-time transcription (RTT) is supported when configured during setup.

Operation handlers installed

Operation handlers are the bridge between the Amazon Connect instance and your ServiceNow instance.

Operation handler	Description
sn_FallbackIntent	Captures the user input
manageIncident	Manages an existing incident
unlockAccount	Unlocks a user account
unlockAccount.DialogCodeHook	Validates incoming info related to account unlocking
announcements	Makes announcement for a caller
announcements.DialogCodeHook	Validates incoming info for announcement creation
manageIncident.DialogCodeHook	Initializes the Amazon Connect instance and validates incoming calls
createIncident	Creates an incident
createIncident.DialogCodeHook	Validates incoming info for incident creation
createITSMInteraction	Creates interaction records for inbound calls
fetchITSMInteraction	Gathers details to help create outbound interactions

Components installed with ServiceNow Voice for CSM

Several contact flows and operation handlers are installed with Cloud Call Center for CSM application (sn_cti_csm_cnt).

Contact flows installed

Contact flow	Description
ServiceNow CSM Inbound Demo Flow	Contains the call tree for inbound calls. When a caller contacts the call center, using the voice or dual-tone multi frequency (DTMF) inputs from caller, the contact flow is invoked in the Amazon Connect instance based on the caller context. This contact flow contains nodes that act as integration points between Amazon services and the ServiceNow instance. Based on the nodes defined in the contact flow, the corresponding operation handlers are triggered in the ServiceNow instance. The caller then gets the response that is defined in the operation handler.

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Contact flow	Description
ServiceNow CSM Outbound Demo Flow	Contains the call tree for outbound calls. It specifies the whisper message that a caller hears before getting connecting to an agent.
ServiceNow CSM Transfer to Agent Flow	The call is relocated to another persona using call transfer functionality. A new PhoneLog is created with each transfer. The PhoneLog also includes any attachments associated with the interaction. Call transfers can be done with either incoming and outgoing calls.
ServiceNow CSM Transfer to Queue Flow	The inbound call is relocated to a queue using call transfer functionality. A new PhoneLog is created with each transfer. The PhoneLog also includes any attachments associated with the interaction. Call transfers can be done with either incoming and outgoing calls.

Operation handlers installed

Operation handler	Description
$csm.connect.s3.event	Receives and processes events from S3 buckets where connect audio, transcript and analysis data is created and stored and tries to associate with interaction and openframe call log records. This is CSM operation handler for the new data model with conversation as metadata
$csm.connect.kinesis.event	Handler to process CTR events from Kinesis stream for CSM integration with VA Conversations
speakToCSMAgent	Enables customer contacts and consumers to speak with a live agent.
createCSMCase	Enables customer contacts and consumers to create a customer service case.
manageCSMCase	Enables customer contacts and consumers to update an existing case.
csmAnnouncements	Makes announcements for a caller.
createCSMInteraction	Creates an interaction record in the ServiceNow instance for the incoming calls.
updateCSMInteraction	Updates an existing interaction record in the ServiceNow instance for the incoming calls.
fetchCSMInteraction	Fetches interaction and processes sn_cti_csm_cnt.enable_ims_update sys property for creating conversation.

Components installed with ServiceNow Voice for HR Agent Workspace

Several contact flows and operation handlers are installed with ServiceNow Voice for HR Agent Workspace.

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Contact flows installed

Contact flow	Description
ServiceNow HR Inbound Demo Flow	Contains the call tree for inbound calls. When a caller contacts the call center, using the voice or dual-tone multi frequency (DTMF) inputs from caller, the contact flow is invoked in the Amazon Connect instance based on the caller context. This contact flow contains nodes that act as integration points between Amazon services and the ServiceNow instance. Based on the nodes defined in the contact flow, the corresponding operation handlers are triggered in the ServiceNow instance. The caller then gets the response that is defined in the operation handler.
ServiceNow HR Outbound Demo Flow	Contains the call tree for outbound calls. It specifies the whisper message that a caller hears before getting connecting to an agent.

Operation handlers installed

Operation handlers are reusable code components that get executed on the ServiceNow instance. They work on the request/response message exchange pattern.

Operation handler	Description
createHRInteraction	Creates an interaction record in the ServiceNow instance for the incoming calls.
fetchHRInteraction	Fetches interaction and processes sn_cti_hr_cnt.enable_ims_update sys property for creating conversation.

ServiceNow AI Platform Additional Capabilities

Explore additional ServiceNow ServiceNow AI Platform capabilities features.

Connect

Connect to your coworkers and participate in conversations while you work.

Orchestration

Extend automation capabilities to external services.

Task Communications Management

Create communications plans for any event.

Connect

ServiceNow Connect is a real-time messaging platform that connects you to your coworkers, bypassing email and static documents. Connect integrates with other features within the system, such as Visual Task Boards, Human Resources Management, and Customer Service

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Management. The Connect interface overlays the standard interface, which allows users to participate in conversations while they work.

Orchestration

Take the power of ServiceNow beyond the ServiceNow AI Platform. Orchestration extends the platform's automation capabilities to external instances, with activity packs to automate IT and business processes. Create more activities and packs using Activity Designer and Scoped Applications, and track data flow through your external activities with Databus.

Task Communications Management

Define and implement communications plans based on any event you choose. The Task Communications Management app assists event-based communication through Slack, SMS, and email. Define plans, connect plans with task tables, and ensure easy collaboration and issue resolution.

Connect

ServiceNow® Connect is a real-time messaging platform that connects you to your coworkers, bypassing email and static documents.

Connect integrates with other features within the system, such as Visual Task Boards, Human Resources Management, and Customer Service Management. The Connect interface overlays the standard interface, which allows users to participate in conversations while they work.

Connect contains the following features:

- Connect Chat: Enables users to chat with individuals and groups, quickly share files, and collaborate on any record by connecting with the right people instantly.
- Connect Support: Enables support agents to provide real-time assistance to end users, using queues. Requires the Connect Support plugin.

Core UI is required to use Connect.

Important:
Connect is not supported in Next Experience. If you turn on Next Experience, Connect functionality will no longer work. See Next Experience.

Note:
Connect does not replace legacy chat but offers some of the same functionality. Do not use these features concurrently

Explore	Set up	Administer
• Upgrade to New York • Connect interface • Connect Chat • Connect Support	• Activate Connect • Activate Connect Support • Supported browsers for Connect Chat	• Properties for Connect • Connect actions • Configure the fields on a record card in Connect • Properties for Connect Support
Use	**Develop**	**Troubleshoot and get help**

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- Start a direct or group conversation
- Follow a record in Connect
-
- Developer training
- Developer documentation
- Ask or answer questions in the Connect community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Supported browsers for Connect Chat

The system supports Connect Chat on most modern browsers.

Important:

Core UI is required to use Connect Chat. Connect Chat is not supported in Next Experience. If you turn on Next Experience, Connect Chat will no longer work. See Next Experience UI for more information.

- The latest public release of Firefox or Firefox ESR
- The latest public release of Chrome
- Safari version 9.1 and later
- Microsoft Edge version 90

Activate Connect

Connect is active by default on new instances. For upgraded instances, you can activate the Connect plugin (com.glide.connect) if you have the admin role.

Before you begin

Role required: admin

About this task

If you used Collaboration in the Fuji release, the Connect plugin is activated automatically.

Important:
Connect is not supported in Next Experience. If you turn on Next Experience, Connect functionality will no longer work. See Next Experience.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

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Note:
When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Related topics

List of plugins

Properties installed with Connect

Properties are added with activation of Connect.

Note:
To open the System Property [sys_properties] table, enter `sys_properties.list` in the navigation filter.

Name	Description
collaboration.email_interval	Sets the number of minutes the system waits before sending a Connect notification email to an inactive user. • **Type**: integer • Default value: 3 • Location: **Collaborate** > **Administration** > **Properties** • Learn more: Configure the email notification interval
collaboration.frameset	Determines whether the Connect overlay is visible (enabled). This property also impacts Connect Support. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Administration** > **Properties** • Learn more: Disable the Connect overlay
collaboration.polling_interval	Sets the number of seconds the system waits between polling for new Connect messages. This property also impacts Connect Support. • **Type**: integer • Default value: 10 • Location: System Property [sys_properties] table
connect.notification.audio_alert	Specifies the audio file to play to notify users of new messages, support conversation transfers, and @mentions in Connect. This property's value must point to the **Name** field of a record in the Audio File

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Name	Description
	[db_audio] table. This property also impacts Connect Support. • **Type**: string • Default value: connect_alert.mp3 • Location: **Collaborate** > **Administration** > **Properties** • Learn more: Customize the Connect audio notification sound
connect.retrieve_external_link_content	Enables Connect to render URLs for external sites as links. When this property is disabled, URLs that point anywhere outside the instance appear as plain text. This property also impacts Connect Support. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Administration** > **Properties**
connect.roles	Determines which user roles are required to access Connect. When the value is blank, no role is required. This property also impacts Connect Support. **Note:** If you choose to restrict Connect access to specific roles, consider updating the role requirements for Connect modules and other access points. • **Type** : string • Default value: <empty> • Location: **Collaborate** > **Administration** > **Properties**
glide.connect.enabled	Hides the **Create or Join Chat Room** related link, which appears on the Incident form when legacy chat is enabled. Legacy chat and Connect Chat should not be used concurrently and this property should not be modified. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Administration** > **Properties**
glide.connect.chat.disabled	Disables and hides all UI elements related to Connect. • **Type**: true | false • Default value: false • Location: System Property [sys_properties] table

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Name	Description

glide.live_feed.task_header_button	Determines whether the show Live Feed icon ( ) and **Follow** button are available in the form header of tables that have the *live_feed=true* dictionary attribute.
	• **Type**: choice list
	• Default value: collaboration
	• Other possible values:
	  ○ **both**: enables both the show Live Feed icon and the **Follow** button.
	  ○ **live_feed**: enables the show Live Feed icon.
	  ○ **none**: disables both the show Live Feed icon and the **Follow** button.
	• Location: **Collaborate** > **Administration** > **Properties**
	• Learn more: Configure record conversations

Activate Connect Support

The Connect Support plugin (com.glide.connect.support) is no longer available.

Before you begin

Important:

This plugin is no longer available. In Paris and future releases, Connect Support no longer receives enhancements or non-priority bug fixes. Consider migrating to ServiceNow® Advanced Work Assignment and Agent Chat in workspace to automatically assign chat requests and other work items to agents. For details, see Migrate from Connect Support to Advanced Work Assignment and Agent Chat.

If you are currently using the legacy chat feature to provide help desk support, close any open help desk chats before activating Connect Support. Legacy chat and Connect Support should not be used concurrently. When you activate Connect Support, the system automatically sets the state of all Chat Queue Entry [chat_queue_entry] records to **Closed Complete**. This ends any open help desk chats. For more information, see Migrate from legacy chat to Connect Support.

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

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Note:
When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Properties installed with Connect Support

Properties are added with activation of Connect Support.

Name	Description
connect.support.conversation_limit	Determines how many support conversations an individual agent can have at one time. When the value is set to **-1**, an agent can participate in an unlimited number of conversations. • **Type**: integer • Default value: -1 • Location: **Collaborate** > **Support Administration** > **Properties**
connect.support.idle.delay	Determines how many seconds a user must be inactive in a support conversation before an idle countdown timer appears. • **Type**: integer • Default value: 120 • Location: **Collaborate** > **Support Administration** > **Properties**
connect.support.idle.count_down	Determines how many seconds the idle countdown timer remains open after it appears. If the idle user does not dismiss the timer before the countdown completes, the system closes the support session. • **Type**: integer • Default value: 60 • Location: **Collaborate** > **Support Administration** > **Properties**
connect.support.show_agent_avatar	Determines whether an agent's avatar is shown in a support conversation (enabled). When the property is disabled, users see the agent's name only.

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Name	Description
	• **Type**: true | false • Default value: true • Location: **Collaborate** > **Support Administration** > **Properties**
connect.support.user.closed.conversation_limit	Determines how many closed conversations appear in a user's support conversation history. When the value is set to **0**, all previous conversations appear in the history. • **Type**: integer • Default value: 0 • Location: **Collaborate** > **Support Administration** > **Properties**
glide.connect.support.enabled	Disables or enables Connect Support. When the property is enabled, the **Service Desk Chat** button in the Employee Self-Service portal opens the conversation in Connect Support, rather than legacy chat. Additionally, the Support tab appears in the Connect sidebar. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Support Administration** > **Properties**
glide.connect.support.reflect_system_messages	Controls whether Connect Support reflects system messages in records created from a support chat, for example, transfer notices, automated queue messages, etc. • **Type**: true | false • **Default value**: false • Location: System Property [sys_properties] table

Additional plugins for Connect Support

Additional plugins are available for Connect Support. These plugins integrate Connect Support with other features and provide capabilities to track performance metrics.

You must have the admin role to activate these additional plugins. For details, see Activate a plugin .

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Additional plugins for Connect Support

Plugin	Description
Connect Support and Service Portal Integration [com.glide.connect.support.service-portal]	Adds Connect Support components for use in the Service Portal.
Connect Support Manager's Dashboard [com.glide.connect.managers_dashboard]	Provides a homepage for Connect Support, and all required configuration records. Though the plugin name contains the term dashboard, the plugin does not provide functionality related to Performance Analytics dashboards. Homepages are similar to dashboards, but do not require Performance Analytics roles to view. **Note:** The Connect Support Manager's Dashboard plugin does not activate Connect Support automatically. You must activate Connect Support to collect data for the homepage.
Human Resources Application: HR Connect [com.snc.hr.hr_connect]	Sets up a human resources (HR) chat queue and makes it available on the HR Service Portal. **Note:** This plugin does not appear in the **System Definition>Plugins** list. Contact ServiceNow personnel to activate it. If not already active, the Human Resources Application: HR Connect plugin activates the Human Resources Application: Core [com.snc.hr.core] plugin that provides basic HR features.
Performance Analytics - Content Pack - Service Desk Chat [com.snc.pa.chat]	Provides the **Service Desk Chat Monitor** dashboard, which analyzes key Connect Support metrics and indicators. The Performance Analytics - Content Pack - Service Desk Chat plugin activates the Connect Support Manager's Dashboard [com.glide.connect.managers_dashboard].
Performance Analytics - Context Sensitive Analytics for Chat [com.snc.pa.chat.context_sensitive_analytics]	Provides in-form analytics for Connect Support. These analytics are available as a related link on the Chat Queue Entry [chat_queue_entry] form, and also as the **Context Sensitive Analytics - Chat** dashboard. The Performance Analytics - Context Sensitive Analytics for Chat plugin activates the Performance Analytics - Content Pack - Service

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Additional plugins for Connect Support (continued)

Plugin	Description
	Desk Chat [com.snc.pa.chat] plugin if it is not already active.

Connect interface

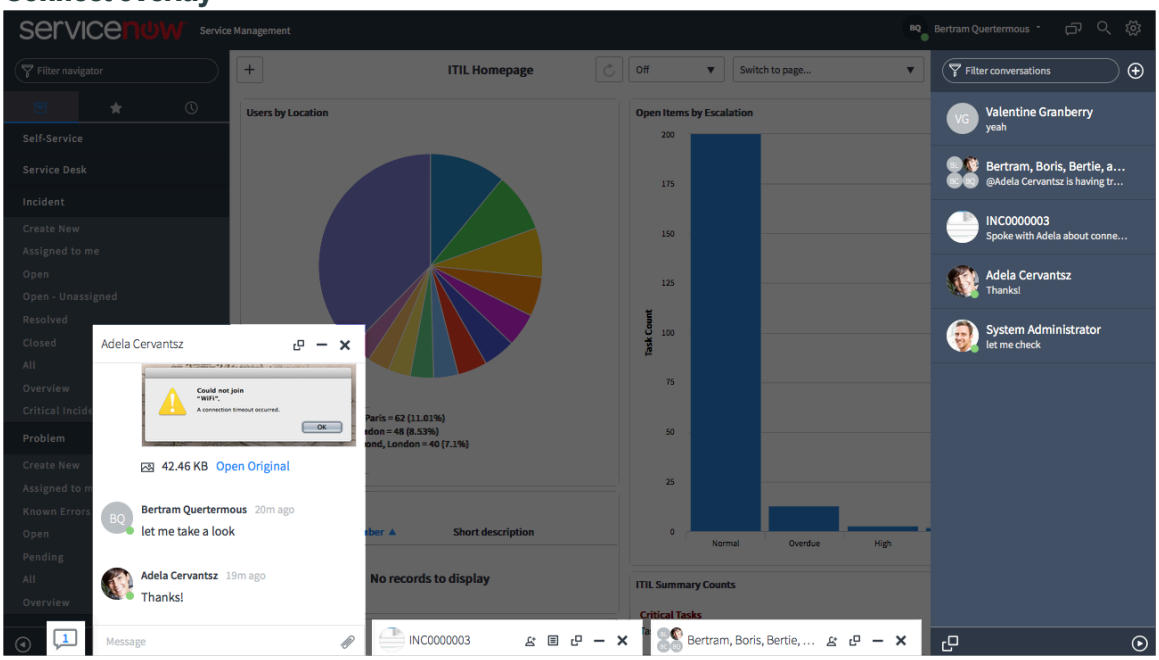
Users can work in a compact view of Connect, which overlays the standard user interface, or in a full-screen workspace.

Connect Chat and Connect Support share the same interface, so support agents can keep track of all their conversations in one place.

Connect overlay

The Connect overlay appears over the standard user interface. It consists of the Connect sidebar, which is the primary interface for Connect Chat and Connect Support, and any Connect mini windows that are open. Each mini window contains a header, a conversation area, and a message field.

Connect overlay



Note:
An administrator can disable the Connect overlay so users can only use the Connect workspace, a full-screen interface with additional Connect tools.

Connect sidebar

The Connect sidebar is the primary interface for Connect Chat and Connect Support. It lists your conversations and provides access to create conversations.

The sidebar is collapsed by default. Click the toggle Connect sidebar icon ( ) in the banner frame to expand or collapse the sidebar, which appears on the right edge of the interface.

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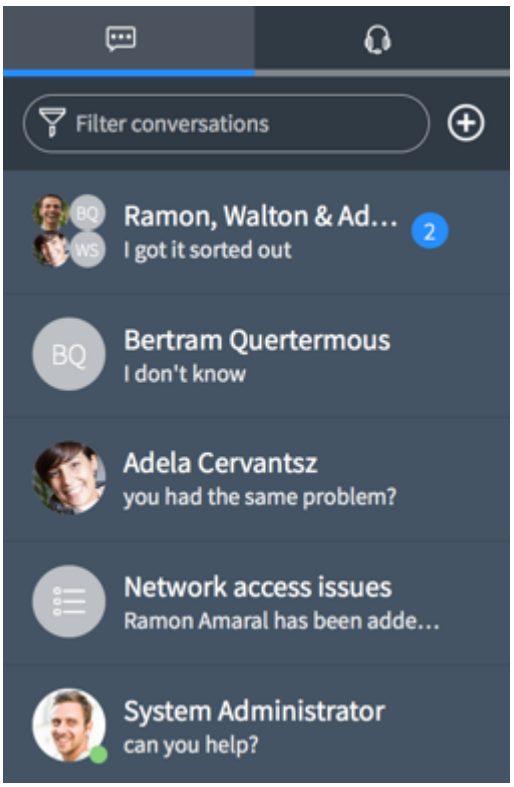
Connect Chat

The chat view of the sidebar is available to all users. If Connect Support is enabled, users must click the chat tab of the sidebar, which is represented by a speech bubble icon. If Connect Support is not enabled, there are no tabs in the sidebar and the chat view displays by default.

The chat view of the sidebar lists all your current Connect Chat conversations. It also contains a filter tool and a button to create conversations.

Chat view of the Connect sidebar



If you have unread messages in a conversation, a number appears by the conversation in the sidebar. Point to a conversation and click the **x** icon to remove the conversation from the sidebar.

Connect Support

The support view of the sidebar is available when Connect Support is activated. The support view is visible only to users who are agents for at least one support queue. Users must click the support tab of the sidebar, which is represented by a headset icon.

The support view displays **Queues** to which you belong. It also displays your open support conversations under **Cases**.

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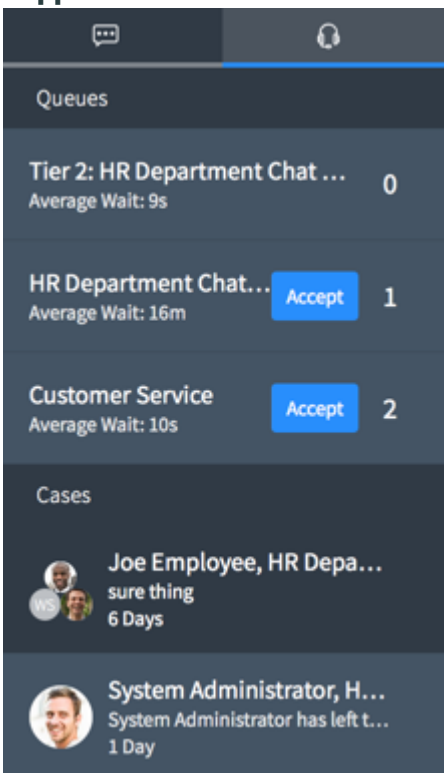
Support view of the Connect sidebar



If you have unread messages in a conversation, a number appears by the conversation in the sidebar.

Connect mini windows

When you open a Connect Chat or Connect Support conversation in the Connect overlay, it opens in a Connect mini window. Each mini window contains a header, a conversation area, and a message field.

Several icons appear in the mini window header and by the message field.

Note:
The icons you see for each conversation depend on the conversation type and other conditions.

Chat mini window icons

Icon	Name	Description
	Add user	Add a user to the conversation. This icon is visible for group and record conversations only. Administrators can enable this icon for Connect Support conversations.
	View document	View the record associated with the conversation. This icon is visible for record and support conversations only.
	New window	Open the conversation in the Connect workspace, a full-screen window with additional Connect tools.
	Collapse/ Expand conversation	Hide or show the conversation. Alternatively, click anywhere in the mini window header to the left of the icons.

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Chat mini window icons (continued)

Icon	Name	Description
	Close window	Close the mini window. The conversation remains in the Connect sidebar and the history is preserved when you reopen the conversation. You can also close a mini window by pressing the Escape key.
	Connect actions	Open the Connect actions menu, which contains options like **Transfer** and **Create Incident**. This icon is visible only when Connect actions are available for the conversation. By default, this icon is visible for support conversations only. Administrators can add options to this menu by creating Connect actions.
	Message type	Choose whether messages are added to the associated record as comments or work notes. This icon is visible only for record and support conversations.
	Attach file	Attach and send a file. Select one or more files and click Open. You can also add an attachment by dragging and dropping it directly in the conversation.

Connect workspace

The Connect workspace is a full-screen view of all your Connect Chat and Connect Support conversations in one place. It contains the conversation pane, which displays the conversation header and an expanded version of the mini window, and the conversation tools area.

To open the Connect workspace, navigate to **Collaborate** > **Connect Chat** or click the new window icon ( ) in a Connect mini window. If you do not have any recent conversations, a screen appears with helpful information about Connect.

The Connect workspace is composed of the following elements.

Connect workspace elements

Element	Description
Sidebar	Provides access to conversations. The Connect sidebar behaves the same way in the workspace as it does in the Connect overlay. The only difference is that the sidebar appears on the left edge of the Connect workspace. For more information about using the sidebar, see Connect sidebar.
Conversation pane	Displays the currently selected conversation.
Conversation tools	Provides quick access to key information, conversation members, attachments, and notification preferences for the currently selected conversation. Some of the conversation tools vary depending on the type of conversation.

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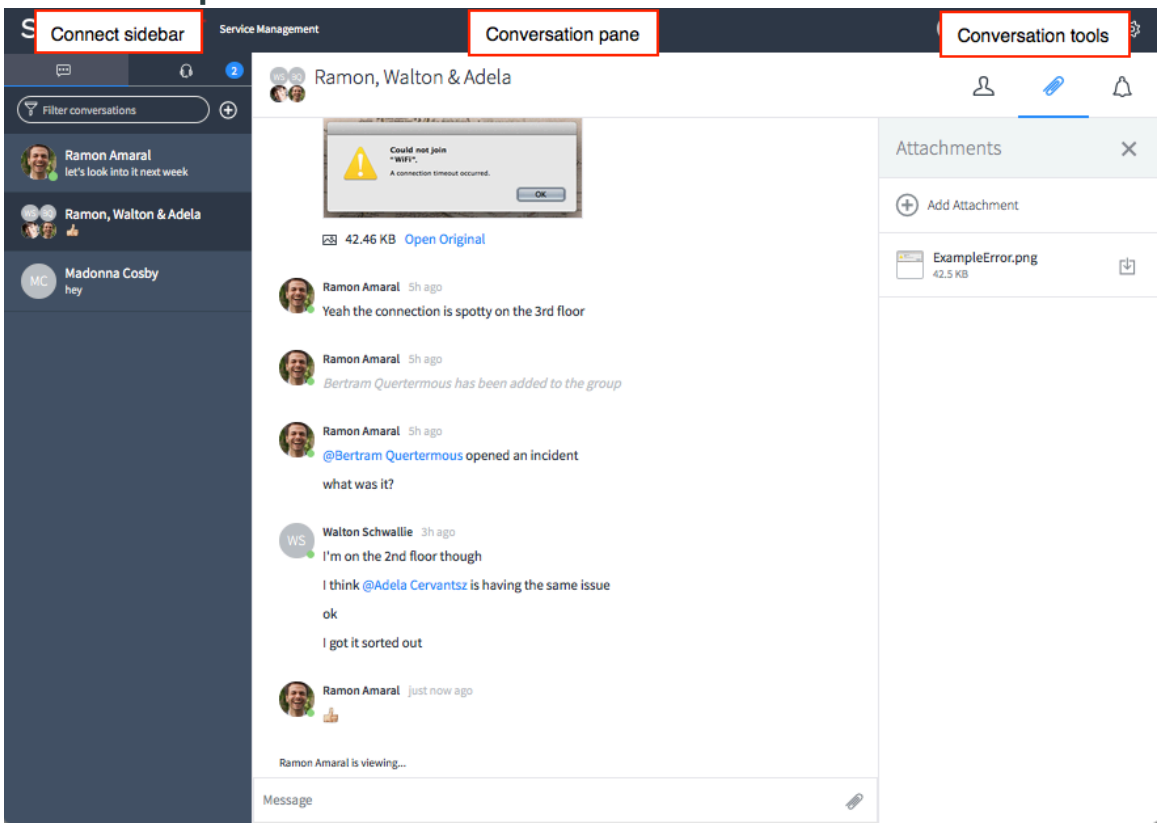
Connect workspace



Conversation pane

The conversation pane of the Connect workspace displays the conversation header and an expanded version of the mini window.

The header displays basic conversation details like the avatar and name. You can edit these details for group or record conversations.

Below the header, messages appear in chronological order. You can enter messages in the text entry field at the bottom of the window.

Connect conversation tools

The conversation tools area in the Connect workspace contains several tabs, each represented by an icon.

Click an icon to open the tab. Click the same icon again to hide the tab. The tabs you see for each conversation depend on the conversation type and other conditions.

Conversation tool tabs

Tab icon	Tab name	Description
ⓘ	Info	Contains the following sections, each of which appears only if it contains information. • **Record**: Lists details about the record the current conversation follows, such as record number, state, assignee, and short description. The fields displayed in this section vary by the type of record. This section is available only for record conversations.

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Conversation tool tabs (continued)

Tab icon	Tab name	Description
		• **Related Records**: Lists Visual Task Boards and task records that have been referenced in the conversation, such as incidents, problems, or changes. When you send a record number as a message or drag a record in a conversation, it appears as a link. The list displays the short description for each task. Click a task to open the record in a new browser tab. Only conversation members who have rights to view the tasks can access them. • **Links**: Lists URLs that have been referenced in the conversation. Click a link to open the destination page in a new browser tab. This tab is not available for support conversations.
	Record	Displays a compact form view of a record created from the current conversation, such as an incident. If more than one record has been created from the conversation, there is a separate record tab for each one. These tabs are available only for support conversations.
	Knowledge Base	Displays a compact view of the knowledge homepage. For more information, see Share knowledge in a Connect Support conversation.
	Members	Lists all members of the current conversation. You can add or remove conversation members for group and record conversations.
	Attachments	Lists all attachments in the conversation. Click an attachment to open it. Click **Add Attachment** to upload an attachment.
	Notification preferences	Contains settings to control which notifications you receive for the current conversation. For more information, see Edit which notifications you receive for a conversation.

Enable or disable Connect notifications globally

You can edit your Connect notification settings globally to enable or disable mobile, desktop, email, or audio notifications for all your Connect Chat and Connect Support conversations.

Before you begin

Role required: none

About this task

By default, Connect mobile, email, and audio notifications are enabled globally. You must enable desktop notifications.

An administrator can customize the sound used for audio notifications.

Note:
You receive mobile notifications only if you have installed the ServiceNow mobile app.

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Procedure

1. In the banner frame, click the gear icon ( ) to open the system settings.
2. In the system settings window, click the **Notifications** tab.
3. In Notifications by Category, navigate to **Connect**.
4. Enable or disable Connect mobile, desktop, email, or audio notifications.
5. **Optional:** Configure the following system notifications.
   For more information on how to configure system notifications, see Apply notification conditions.

Notification	Description
Activity Stream @Mention Email	Sends an email alert to a user anytime they get @mentioned in an activity stream
Collaboration Offline Group Message(s)	Sends email to offline users who are members of a group conversation after a certain number of minutes determined by the *collaboration.email_interval* property to limit spam. **Note:** It takes 90 seconds after a user logs out for the system to register that the user is offline. If a message is sent to the user within 90 seconds of them logging out, then the user does not receive the notification.
Collaboration Offline Message Bundle	Sends email to offline users after a certain number of minutes determined by the *collaboration.email_interval* property to limit spam. **Note:** It takes 90 seconds after a user logs out for the system to register that the user is offline. If a message is sent to the user within 90 seconds of them logging out, then the user does not receive the notification.
ConnectMessagePushNotification	Uses a push notification to inform users when there are new messages in a conversation
ConnectNotificationPushNotification	Uses a push notification to inform a user when they have been @Mentioned in a record

What to do next

Edit which notifications you receive for a specific conversation.

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Connect notification browser support

The following browsers support Connect chat notifications.

Connect chat browser support

Browser	Enable notification steps
Chrome	1. From a Chrome window, click the Chrome menu in the upper right corner. 2. Go to **Settings** > **Show advanced settings...** > **Privacy** > **Content settings**. 3. In the Content settings window, from the notifications section, select your notification settings.
Mozilla Firefox (starting with version 44)	Manage browser notification settings using the information icon next to the URL.
Safari (starting with OS X Mavericks)	1. From a Safari window, open **Preferences**. 2. Select the notifications tab. 3. Select **Allow** or **Deny** to control which websites have access to notifications.
Microsoft Edge	Notifications are enabled by default on Windows 10 PCs and tablets starting with EdgeHTML 14. For more information, see https://blogs.windows.com/msedgedev/2016/05/16/web-notifications-microsoft-edge/#pVkwubg7uvROayyl.97.

Note:
Internet Explorer does not support Connect notifications out of box.

Edit which notifications you receive for a conversation

You can control which types of Connect notifications you receive for each conversation and when you receive them.

Before you begin

Role required: none

About this task

Connect can send mobile, desktop, email, and audio notifications to inform you of messages and other activity, when you are not actively viewing Connect. You can edit your notification preferences in each conversation to control which notifications you receive for the conversation and under what circumstances. For example, if you are a member of a large group conversation, you might want to receive mobile, desktop, and email notifications for all activity, and audio notifications only when someone mentions you. You might also want to disable a certain type of notification entirely for a conversation.

By default, you receive mobile, email, and audio notifications for all activity in every conversation you belong to. You must enable desktop notifications manually. Not all browsers allow desktop notifications. For more information, see Enable or disable Connect notifications globally.

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An administrator can customize the sound used for audio notifications.

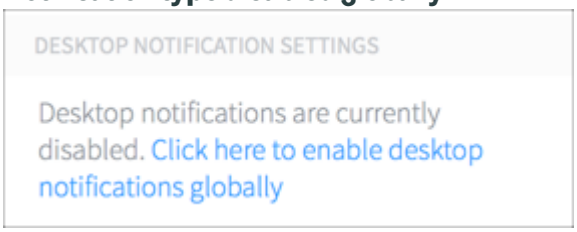
Note:
You receive mobile notifications only if you have installed the ServiceNow mobile app.

Procedure

1. Open a conversation in the Connect workspace.
2. In the conversation tools to the right of the conversation, click the notification settings tab ( ).
3. Edit the following settings according to your preferences.

Note:
If a notification type is disabled globally, a link to enable that type appears. You must click the link before you can edit conversation-specific notification settings.

Notification type disabled globally



Mobile Notification Settings	Choose to receive push notifications: ○ For all activity ○ Only when @ mentioned (this option is not available for direct conversations) ○ Never
Desktop Notification Settings	Choose to receive desktop notifications: ○ For all activity ○ Only when @ mentioned (this option is not available for direct conversations) ○ Never
Email Settings	Choose to receive email notifications: ○ For all activity ○ Only when @ mentioned (this option is not available for direct conversations) ○ Never
Audio Notification Settings	Choose to receive audio notifications: ○ For all activity ○ Only when @ mentioned (this option is not available for direct conversations) ○ Never
System Message Notifications	Enable or disable system message notifications, which are automatically

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	generated by events like conversation membership changes and Visual Task Board updates. This option is not available for direct conversations.

Upload a profile picture

You can upload a profile picture in your Live Feed profile to use as an avatar in Connect Chat and Connect Support conversations.

Before you begin

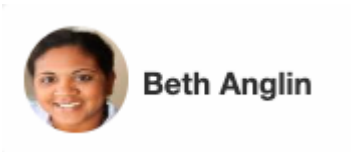
Role required: none

About this task

Users who do not have profile pictures are represented by an avatar with their initials. Administrators can upload a profile picture in a user record which displays if there is no Live Feed photo.

Procedure

1. Navigate to **All** > **Collaborate** > **Live Feed**.
2. Click the tile with your picture or initials and title.



3. Use one of the following actions to add your photo.
   - Locate the photo file you want to use and drag it over the existing photo.
   - Point to the existing picture (or tap the photo in the smartphone or tablet interface) to display the **Upload a picture** link. Click the link, navigate to the location of the photo you want to use, and click **Open**.

Related topics

Update your Live Feed profile

Drag a file into a Connect conversation

Drag and drop functionality in Connect Chat and Connect Support provides an easy way to share external attachments and links or items from within your instance.

Before you begin

Role required: none

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About this task
You can drag several things from within an instance, including items from the application navigator, records or breadcrumbs from lists, and Visual Task Boards from the My Task Boards page.

Procedure

Drag an item in a Connect mini window.

To drag a record from a list, drag the reference icon ( ), the record number, or a reference column value.

Connect accepts the same file extensions as the platform. For more information, see Add and manage attachments.

Share a Visual Task Board in a Connect conversation

You can share a Visual Task Board in a Connect Chat or Connect Support conversation.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **Self-Service** > **Visual Task Boards**.
2. Drag a task board to a Connect mini window.
   A link to the task board appears in the conversation. The task board is also listed in the conversation tools, which are visible in the Connect workspace. Only conversation members who are members of the board can access it. If you share a task board in a Follow a record in Connect, it appears as a URL in the record activity stream.

Related topics

Connect

Visual Task Boards

Mention a user in a Connect conversation

You can get someone's attention in a group conversation by mentioning them.

Before you begin
Role required: none

About this task
Users can set their notification preferences so they receive notifications only when they are mentioned. Mentioning a user creates a shortcut to view their basic information and send them a direct message.

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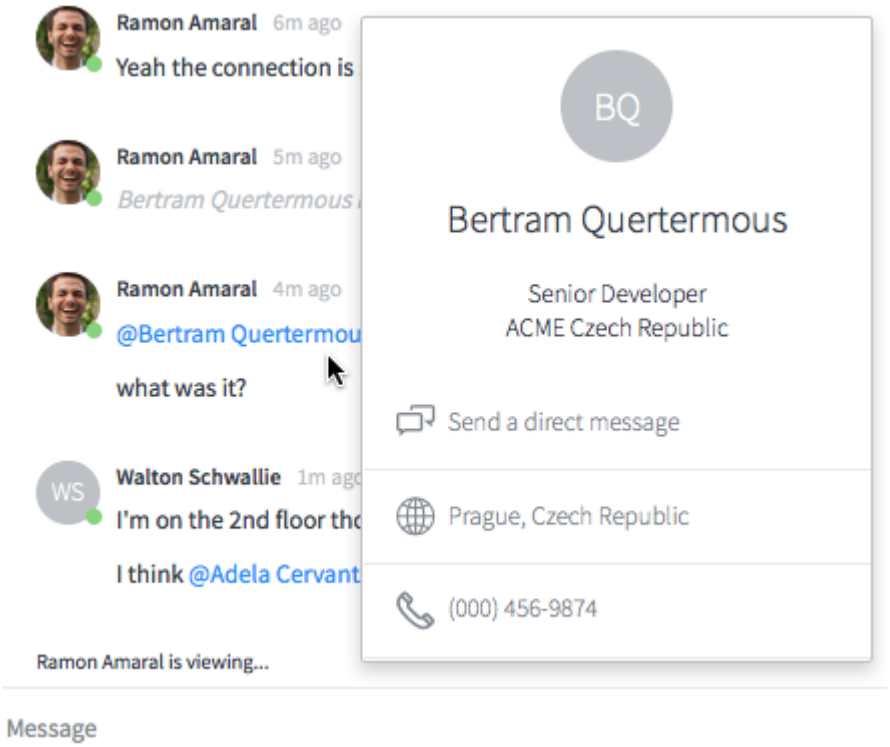

Procedure

1. Open a Connect group conversation.
2. In the message field, type the @ character.
   A suggestion menu appears with the names of the conversation members.
3. Select the person you want to mention and send the message.

Connect administration

Administrators can configure various performance settings and features that impact both Connect Chat and Connect Support.

Note:
There are also administrative options specifically for Connect Chat or Connect Support. For more information, see Connect Chat administration and Connect Support administration.

Properties for Connect

The Connect Properties page provides several configuration options for Connect.

Important:

Core UI is required to use Connect Chat. Connect Chat is not supported in Next Experience. If you turn on Next Experience, Connect Chat will no longer work. See Next Experience UI for more information.

Users with the admin role can access these properties by navigating to **Connect** > **Administration** > **Properties**.

Note:
Many of the properties also impact Connect Support.

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Properties for Connect

Property	Description
Disable Presence glide.ui.presence.disabled	Turns off user presence globally when enabled. Enabling this property turns off user presence throughout the platform, not just in Connect. • **Type**: true | false • Default value: false • Location: **Connect** > **Administration** > **Properties** • Learn more: User presence
Enable Connect in the frameset collaboration.frameset	Determines whether the Connect overlay is visible (enabled). This property also impacts Connect Support. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Administration** > **Properties** • Learn more: Disable the Connect overlay
Enable Connect to retrieve external link metadata in order to render richer content in messages with links to YouTube, news articles, images, etc. glide.ui.url.external, glide.ui.url.external.content	Enables Connect to render URLs for external sites as links. When this property is disabled, URLs that point anywhere outside the instance appear as plain text. This property also impacts Connect Support. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Administration** > **Properties**
Number of minutes to wait before collecting unread messages and sending an email to offline users. collaboration.email_interval	Sets the number of minutes the system waits before sending a Connect notification email to an inactive user. • **Type**: integer • Default value: 3 • Location: **Collaborate** > **Administration** > **Properties** • Learn more: Configure the email notification interval
Maximum number of latest conversations to show during search. (Default = 50)	Sets the number of results that appear when you search conversations in Connect. In the System Properties [sys_properties] table, this property appears as *connect.search.conversation_limit*.

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Properties for Connect (continued)

Property	Description
	• Type: integer • Default value: 50
Audio file to play to notify users of new messages, support conversation transfers and @mentions in Connect. This property's value should point to the 'name' field of an audio file in the db_audio table. connect.notification.audio_alert	Specifies the audio file to play to notify users of new messages, support conversation transfers, and @mentions in Connect. This property's value must point to the **Name** field of a record in the Audio File [db_audio] table. This property also impacts Connect Support. • **Type**: string • Default value: connect_alert.mp3 • Location: **Collaborate** > **Administration** > **Properties** • Learn more: Customize the Connect audio notification sound
Comma separated allow list of roles able to access Connect. Empty allows all roles. connect.roles	Determines which user roles are required to access Connect. When the value is blank, no role is required. This property also impacts Connect Support. **Note:** If you choose to restrict Connect access to specific roles, consider updating the role requirements for Connect modules and other access points. • **Type** : string • Default value: <empty> • Location: **Collaborate** > **Administration** > **Properties**
Determine whether or not a button is shown in task forms to view the Collaboration document conversation or Live Feed Record Feed related to the task. Note: The Collaboration button will only be enabled if the frameset view is also enabled with collaboration.frameset = true glide.live_feed.task_header_button	Determines whether the show Live Feed icon ( ) and **Follow** button are available in the form header of tables that have the *live_feed=true* dictionary attribute. • **Type**: choice list • Default value: collaboration • Other possible values: ○ **both**: enables both the show Live Feed icon and the **Follow** button. ○ **live_feed**: enables the show Live Feed icon. ○ **none**: disables both the show Live Feed icon and the **Follow** button.

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Properties for Connect (continued)

Property	Description
	• Location: **Collaborate** > **Administration** > **Properties** • Learn more: Configure record conversations
Disable the legacy chat "Create or Join Chat Room" link on the Incident form (Must have Chat plugin enabled to see link) glide.connect.enabled	Hides the **Create or Join Chat Room** related link, which appears on the Incident form when legacy chat is enabled. Legacy chat and Connect Chat should not be used concurrently and this property should not be modified. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Administration** > **Properties**

Configure the polling interval

The polling interval determines how frequently the system polls for new Connect messages.

Before you begin

Role required: admin

About this task

The default interval is 10 seconds. You can change this value. The shorter the polling interval, the more frequently the system checks for new messages and the greater the impact on performance.

Note:
This setting impacts Connect Chat and Connect Support.

Procedure

1. Navigate to **sys_properties.list**.
2. Locate the *collaboration.polling_interval* property.
3. Set the **Value** to a different number of seconds.
   Setting the polling interval to a value smaller than 2 is likely to tax the system too heavily, while a value greater than 10 is likely to result in a poor user experience.

Disable the Connect overlay

The Connect overlay is enabled by default and is integrated with the standard user interface. You can disable the Connect overlay.

Before you begin

Role required: admin

About this task

To disable the Connect overlay and remove the toggle Connect sidebar icon from the banner frame, set the *collaboration.frameset* property to **false**.

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Procedure

1. Navigate to **All** > **Connect** > **Administration** > **Properties**.
2. Locate the property called **Enable Connect in the frameset** (*collaboration.frameset*) and clear the check box.
3. Click **Save**.

Result

When the frameset is disabled, any Connect chats open in the Connect workspace. For more information on completely disabling Connect Chat, see Disable Connect Chat.

Customize the Connect audio notification sound

You can replace the default Connect audio notification sound with an audio file of your choice.

Before you begin

Role required: admin

Upload the audio file you want to use as the notification sound.

Role required: admin

About this task

The audio notification sound is used for all Connect conversation types, including Connect Support conversations.

Procedure

1. Navigate to **All** > **System UI** > **Audio Files**.
2. Locate the audio file you want to use as the notification sound and copy the **Name** value.
3. Navigate to **Connect** > **Administration** > **Properties**.
4. Locate the property called **Audio file to play to notify users of new messages, support conversation transfers and @mentions in Connect** (*connect.notification.audio_alert*) and replace the default value with the name of the audio file.
5. Click **Save**.

Result

End users receive audio notifications when sending and receiving support chats. Support agents only receive audio notifications for inbound chats when the chat window is not in focus.

Administer Connect actions

You can create or modify Connect actions to provide custom functionality in Connect Chat or Connect Support conversations.

Before you begin

Important:

Core UI is required to use Connect Chat. Connect Chat is not supported in Next Experience. If you turn on Next Experience, Connect Chat will no longer work. See Next Experience UI for more information.

If you want to customize the icon for a Connect action, navigate to **Collaborate** > **Administration** > **Action Icons** to view the available icons and their class names. Note the class name of the icon you want to use.

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Role required: admin

About this task

The Connect action menu appears by the message entry field when one or more Connect actions are available for a conversation, based on defined conditions. When a user selects a Connect action, the system runs the script defined for that action.

Procedure

1. Navigate to **Connect** > **Administration** > **Actions**.
2. Click **New** or open an existing record to edit a table.
3. On the form, fill in the fields.

Connect Action form

Field	Description
Condition	JavaScript condition statement that must return true for the action to be available in a conversation. For example, to show the action in Connect Support conversations only, enter `conversation.type === "support"` or `conversation.table === 'chat_queue_entry'`. For information about the *`conversation`* object, see the GlideConversation API reference documentation.
Hint	This field is not used.
Icon Class Name	Class name of the icon to use. To view all available icons and their class names, navigate to **Collaborate** > **Administration** > **Action Icons**.
Order	Order of the action relative to other items in the Connect action menu.
Script	Script to execute when the action is run. For example, to create a new incident that is based on the conversation, enter the following code: `response.newRecord("incident",{ short_description: conversation.document.short_description ||"", caller_id: conversation.document.opened_by });` For information about the *`response`* object, see the ConnectActionResponse API reference documentation. **Note:** You can only create a Connect action that is based on a task table.
Shortcut	Text that triggers the action when entered after the "/" character in a conversation.
Title	Text that appears in the Connect action menu. The title for each Connect action should be unique.

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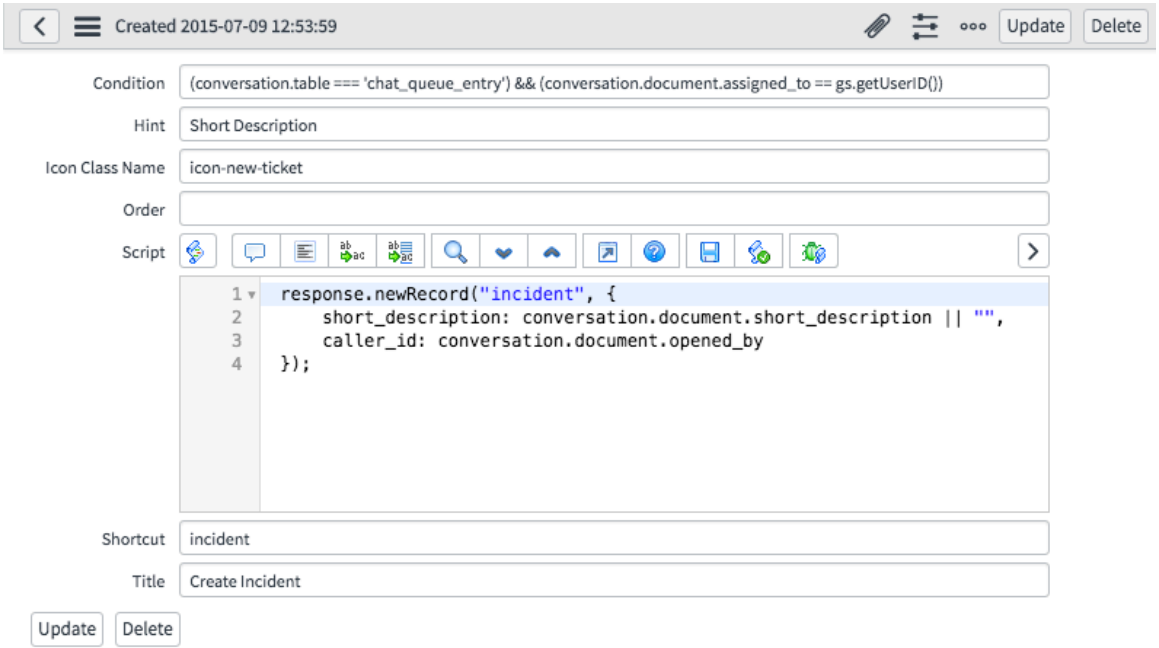
Result

Connect Actions form



Configure the fields on a record card in Connect

When a record is either linked to or created from a Connect Chat conversation, the details of the record display as a card in the chat window.

Before you begin

Role required: admin

About this task

The card view only applies to the full Connect Chat page and the end-user view of Connect Support conversations.

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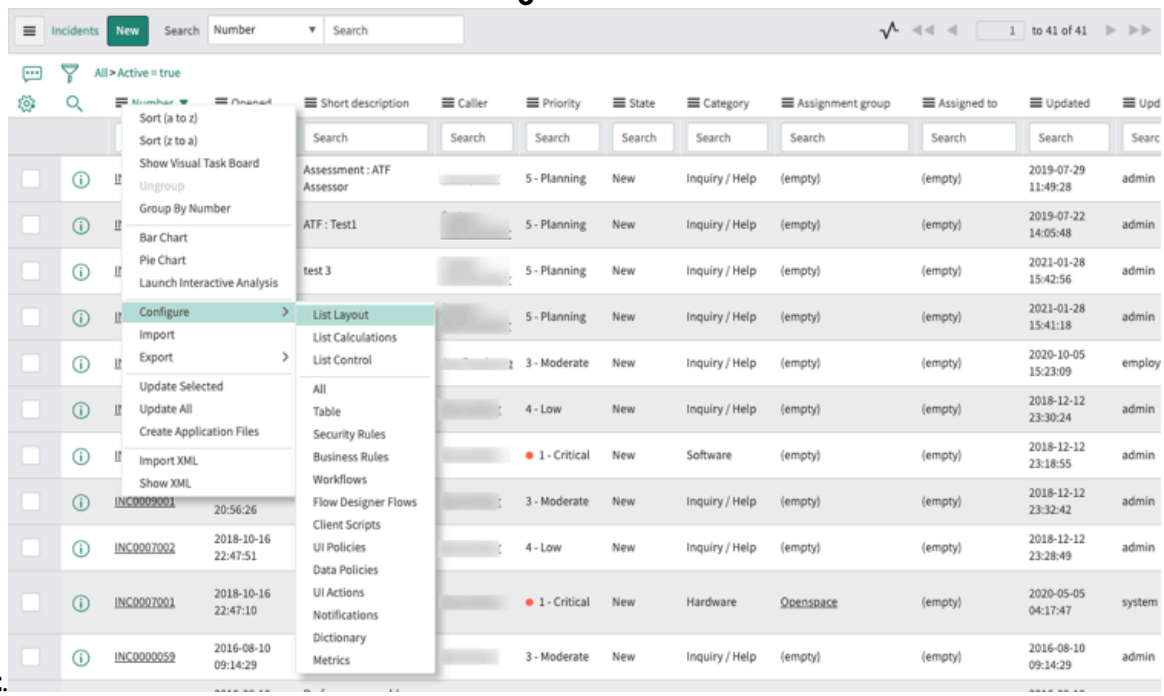
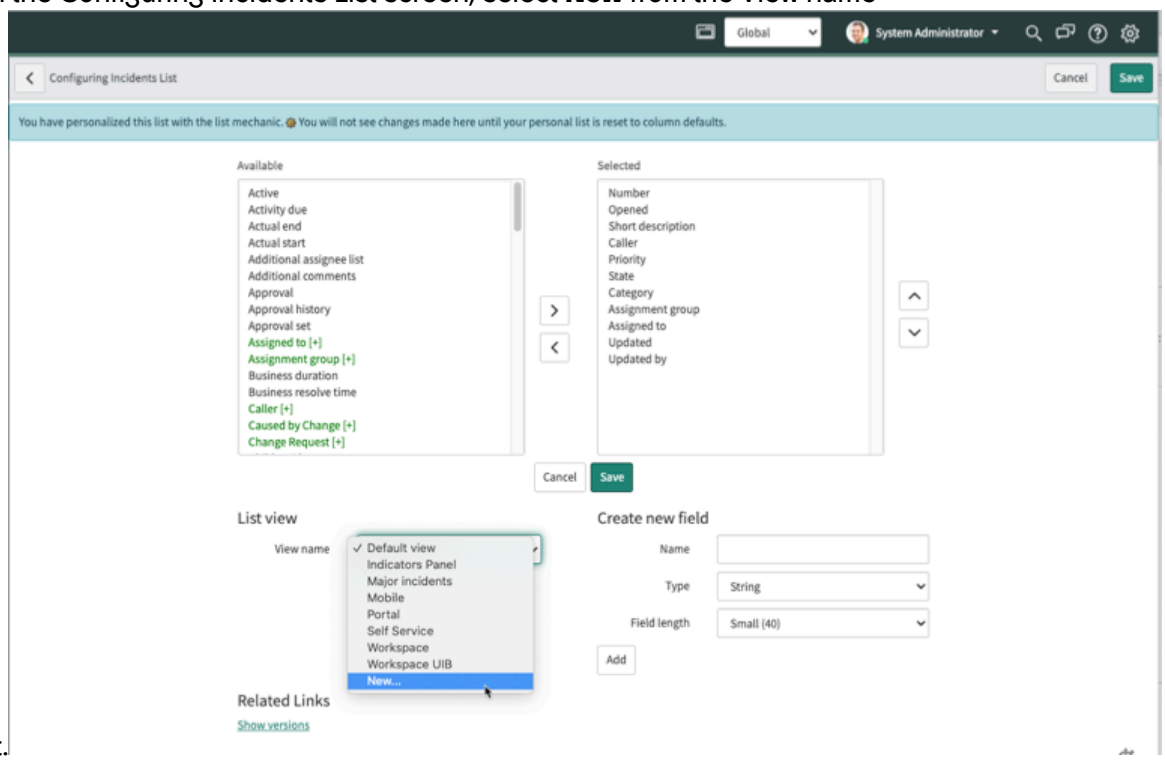
Procedure

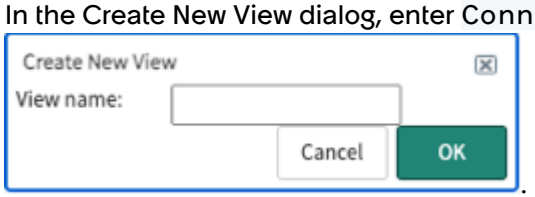
1. Select the menu icon (☰) on any of the column names of the incident list view.
2. Right-click on the column name and select **Configure** > **List Layout**.



3. On the Configuring Incidents List screen, select **New** from the View name list.



4. In the Create New View dialog, enter `Connect` in the View name field.



For more information on creating a form view, see Create and delete views .

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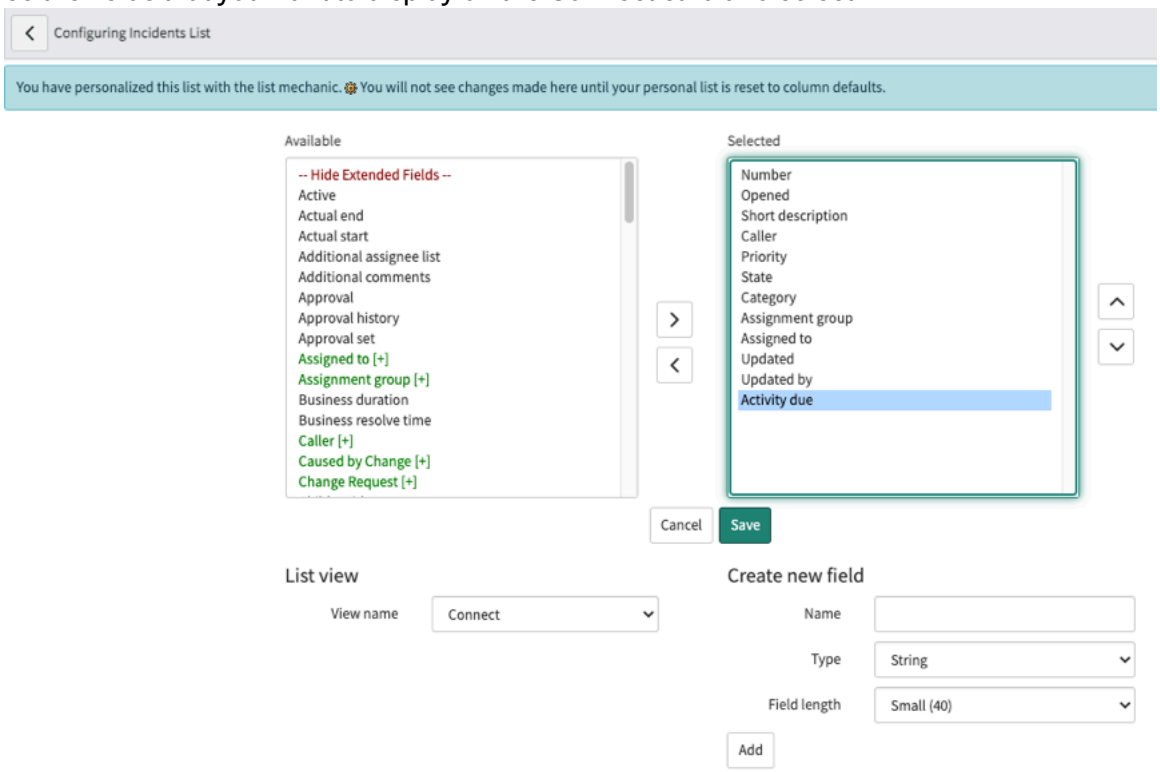
You cannot remove the Author or the Updated fields from the card regardless of whether they are on the view or not. The card always shows the Short Description field in the top even if it is in a different order in the list.

5. Choose the fields that you want to display on the Connect card and select



Save.

6. Validate that the card displays the fields in a Connect Chat conversation.

Disable specific URLs for Connect

Prevent users from accessing certain websites by disabling linking to specific Top-Level Domains (TLDs).

Before you begin

Role required: admin

Procedure

1. In the navigation filter, type `sys_properties.list`.
2. Search for the *`glide.ui.url.external.top_level_domains`* system property.
3. In the value field, remove any TLDs that you do not want your users to have access to.
   For example, remove any TLDs that are commonly used for restricted websites, such as `xxx` or `adult`.

   The list of TLDs is based on the top 200 most common domains.

Result

Any TLD not included in the value field becomes unclickable in Connect.

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Connect Chat

Connect Chat is a real-time messaging tool that enables users to chat with individuals and groups, quickly share files, and collaborate on any record by connecting with the right people instantly.

Important:

Connect Chat is not available in Next Experience. Starting with Zurich, certain Connect Chat functions are available in Next Experience by using Sidebar. See KB1123615 – Moving from Connect Chat to Sidebar or Next Experience for more information about the differences between Connect Chat and Sidebar.

Connect Chat animates communication around records, Visual Task Boards, topics of interest, or groups of people.

Features include:

- Direct conversations between two users.
- Group conversations between three or more users.
- Conversations linked to records. Comments and work notes appear in conversations in real time and users can update the record directly from the conversation.
- Drag-and-drop sharing of links, files, and records.

Core UI is required to use Connect Chat.

This video demonstrates how to use Connect Chat.

How to use Connect Chat

This video demonstrates how to use Connect Support.

How to use Connect Support

Note:
Connect Chat does not replace legacy chat but offers some of the same functionality. The features should not be used concurrently.

Connect Chat use

All users have access to Connect Chat, a convenient way to stay updated on all the people and documents you work with in a familiar chat interface.

You can start using Connect Chat right away with virtually no setup. Connect Chat supports a few different types of conversations so you can use it as a social tool or a quick way to follow specific records.

Start a direct or group conversation

You can start a conversation with one or more users in Connect Chat.

Before you begin

Important:

Core UI is required to use Connect Chat. Connect Chat is not supported in Next Experience. If you turn on Next Experience, Connect Chat will no longer work. See Next Experience UI for more information.

Role required: none

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About this task

A conversation between two users is called a direct conversation. A conversation between three or more users is called a group conversation.

Procedure

1. In the chat view of the Connect sidebar, click the plus icon (**+**) by the filter.
   A Connect mini window appears.
2. In the **To** field, enter the name of the user you want to chat with.
   Suggestions appear as you type.
3. **Optional:** Enter additional names to create a group conversation.
   You can add or remove group conversation members later. You cannot add members to a direct conversation after you create it.
4. Press the Enter key to shift focus to the message field.
5. Send a message to create the conversation.
   The conversation is added to the Connect sidebar for quick access.

Follow a record in Connect

You can follow a record in Connect Chat to track activity as it happens, in a familiar chat interface. When you follow a record, you become a member of a record conversation.

Before you begin

Important:

Core UI is required to use Connect Chat. Connect Chat is not supported in Next Experience. If you turn on Next Experience, Connect Chat will no longer work. See Next Experience UI for more information.

Role required: whichever role is required to access the record you want to follow in Connect

About this task

You must first activate the Connect (com.glide.connect) plugin to complete this task.

Any record conversation you create in Connect becomes a record feed in Live Feed, and vice versa. Unlike direct or group conversations, all messages in record conversations are comments or work notes.

Note:
By default, record conversations are enabled for all tables that extend Task [task]. Administrators can enable record conversations for additional tables or disable them if desired.

Procedure

1. Navigate to a task record.
2. Do one of the following actions.

Option	Description
Follow the record	In the form header, click **Follow**. The system adds you as a member of the record conversation, but does not open the

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Option	Description
	conversation. You can open the conversation from the Connect sidebar.
Follow the record and open a chat mini win dow	**a.** In the form header, click the down arrow in the **Follow** button. **b.** Select **Open Connect Mini**. The system adds you as a member of the record conversation and opens it in a Con nect mini window.
Follow the record and open the Connect workspace	**a.** In the form header, click the down arrow in the **Follow** button. **b.** Select **Open Connect Full**. The system adds you as a member of the record conversation and opens it in the Con nect workspace, the full-screen view.

The **Follow** button is relabeled **Following**.

3. Add comments or work notes to the record directly from Connect.
   Any comments or work notes added to the record appear in the record conversation. Likewise, comments and work notes you add to the conversation appear on the record.
   a. In the record conversation, by the text entry field, click the message type icon ( ).
   b. Select **Comment** or **Work Note**.
   c. Enter a message.
   By default, record conversation messages are added as work notes.

Note:
If you add an attachment to a record conversation, it is attached to the underlying record as well.

What to do next
Edit your notification settings for the record conversation.

Related topics
Live Feed Core UI

Edit basic conversation details

In Connect Chat, you can customize the avatar, name, and description for a group or record conversation.

Before you begin
Role required: none

About this task
These details are not editable for direct conversations.

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Note:
The name and description for a record conversation default to the record name and short description. However, editing the name or description for a record conversation does not change anything on the underlying record.

Procedure

1. Open the a group or record conversation in the Connect workspace.
2. Click anywhere in the conversation header to the left of the icons.
   A pop-up appears to edit conversation details.
3. Edit the conversation image, name, and description as needed.
4. Click **Save**.

Add or remove conversation members

In Connect Chat, any member of a group or record conversation can add or remove other conversation members. In a direct conversation with only two people, you cannot add members to the conversation after you create it.

Before you begin
Role required: none

Procedure

1. Open a group or record conversation in the Connect workspace.
2. In the conversation tools to the right of the conversation pane, click the member list tab ( ).
3. Do one of the following actions.

Option	Description
Add a member	**a.** Click **Add Member to Group**. **b.** Use the search field to find and select a user.
Remove a member	**a.** Point to a member name. **b.** Click the minus icon (**-**).

Create a Connect conversation from a Visual Task Board

Create a Connect Chat conversation from a Visual Task Board to collaborate with board members and keep track of activity as it happens.

Before you begin
Role required: none

About this task
When you create a conversation from a task board, all the board members become members of the conversation. The members are synchronized between the task board and the conversation. For example, if you remove a user from the conversation, the system automatically removes the user from the board as well.

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Procedure

1. Navigate to **All** > **Self-Service** > **Visual Task Boards**.
2. Open a task board.
3. In the board header, click the connect with board members icon ().
   The system automatically opens a record conversation for the board. Each board member becomes a member of the conversation.

Related topics

Connect Chat

Visual Task Boards

Connect Chat administration

Administrators can configure various performance settings and features of Connect Chat.

Note:
There are also settings that apply to both Connect Chat and Connect Support. For more information, see Connect administration.

Configure the email notification interval

The email notification interval determines how long the system waits before sending a Connect Chat email notification to an inactive user.

Before you begin
Role required: admin

About this task
The default interval is 3 minutes. You can change this value.

Procedure

1. Navigate to **All** > **Connect** > **Administration** > **Properties**.
2. Locate the property called **Number of minutes to wait before collecting unread messages and sending an email to offline users.** (*`collaboration.email_interval`*) and set the value to a different number of minutes.
3. Click **Save**.

Result
When an offline user is sent a Connect message, the collaboration.new_offline_message event fires. The system waits the amount of time provided in the collaboration.email_interval property, then triggers the collaboration.notify_offline_user and collaboration.notify_offline_user.group events (depending on if the conversation was peer to peer or a group conversation).The sysevent_email_action record listens for collaboration.notify_offline_user(.group) then builds an email notification containing all the messages from the last collaboration.email_interval minutes that the user has received in that conversation.

Enable record conversations for a table

Record conversations are enabled for all tables that extend Task [task] by default. You can configure record conversations for additional tables that extend Task.

Before you begin
Role required: admin

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About this task

To create record conversations, users must have access to the **Follow** button in the form header. To show the button and thus enable record conversations for a table, the following conditions must be true.

- The *live_feed* dictionary attribute must be set to **true** for the table. By default, *live_feed=true* for all tables that extend Task [task].
- The *glide.live_feed.task_header_button* property must be set to **both** or **collaboration**. By default, *glide.live_feed.task_header_button* is set to **collaboration**.

Procedure

1. Navigate to the list view of a table for which you want to enable record conversations.
2. Perform the appropriate action for the list version.
   The list of dictionary entries for the table appears.
3. Open the dictionary entry that has **Type** set to **Collection**.
   The Dictionary Entry form appears.
4. In the **Attributes** related list, click **New**.
   The Dictionary Attribute form appears.
5. In the **Attribute** field, enter `Live feed`.
6. In the **Value** field, enter `true`.
7. Click **Submit**.
8. Navigate to **Collaborate** > **Administration** > **Properties**.
9. Locate the property called **Determine whether or not a button is shown in task forms to view the Collaboration document conversation or Live Feed Record Feed related to the task** (*glide.live_feed.task_header_button*).
10. Ensure the property is set to **both** or **collaboration**.
    The *glide.live_feed.task_header_button* property also controls whether the show Live Feed icon ( ) appears. If the property is set to **collaboration**, the show Live Feed icon does not appear on form headers.

Related topics

Dictionary attributes

Prevent users from following records in Connect for all tables

Users can follow records in Connect for any table that extends Task [task] by default. You can disable this functionality for all tables.

Before you begin

Role required: admin

About this task

To disable record conversations for all tables, prevent the **Follow** button from appearing in all form headers by editing the *glide.live_feed.task_header_button* property.

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Procedure

1. Navigate to **sys_properties.list**.
2. Locate the *glide.live_feed.task_header_button* property.
3. Set the **Value** to **live_feed**.

Prevent users from following records in Connect for a specific table

Users can follow records in Connect for any table that extends Task [task] by default. You can disable this functionality for a specific table.

Before you begin
Role required: admin

About this task
To disable record conversations for a specific table, prevent the **Follow** button from appearing in form headers for the table. To do so, set the *live_feed* dictionary attribute to **false** for the table.

Procedure

1. Navigate to the list view of a table for which you want to disable record conversations.
2. Perform the appropriate action for the list version.
   The list of dictionary entries for the table appears.
3. Open the dictionary entry that has **Type** set to **Collection**.
   The Dictionary Entry form appears.
4. In the **Attributes** related list, locate the **Live feed** dictionary attribute.
5. Set the **Value** to **false**.

   Setting the dictionary attribute to **false** also removes the show Live Feed icon ( ) for the table.

Related topics

Dictionary attributes

Disable Connect Chat

You can disable Connect Chat to prevent users from being able to chat within the platform.

Before you begin
Role required: admin

About this task
Disabling Connect Chat hides the Connect Chat sidebar icon. Users who try to access Connect Chat from the navigation pane receive a message that says Connect has been disabled.

Procedure

1. In the navigation filter, type `sys_properties.list` and press Enter.
2. Search for the *glide.connect.chat.disabled* property.
3. Set the property value to **true**.

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Connect Support

Connect Support is a real-time messaging tool that enables support agents to easily track their support cases, find solutions, and resolve problems quickly.

Important:

Starting in Utah, Connect Support has been deprecated and is no longer supported or available for new activation. For similar capabilities, please move to Advanced Work Assignment and Agent Chat. For details, see Move from Connect Support to Advanced Work Assignment and Agent Chat.

Connect Support builds on the messaging platform provided with Connect. For general information about the Connect interface, setup, and administration, see Connect. When Connect Support is enabled, users designated as support agents can access the support tab of the Connect sidebar.

Using Connect Support:

- Administrators can create chat queues and enable users to access live support.
- Support agents can monitor the queues to provide instant support.
- Users can share links, files, and records using drag-and-drop.

Core UI is required to use Connect Support.

Note:
Connect Support does not replace legacy chat but offers some of the same functionality. Do not use the features concurrently.

Monitor incoming Connect Support conversations

In the support tab of the Connect sidebar, you can monitor the queues for which you are an agent and accept incoming conversations.

Before you begin

Role required: none

About this task

Note:
The support tab is visible only if you are an agent for one or more queues.

Procedure

1. Navigate to **All** > **Connect** > **Connect Support**.
   The Connect workspace opens in a new tab.
2. Click the support tab of the Connect sidebar, indicated by a headset icon ( ).
   The support tab displays **Queues** to which you belong. It also displays your open support conversations under **Cases**. When a user starts a support conversation or an agent transfers a conversation to a queue, any agent who belongs to the associated queue can accept the conversation. An agent can also request to transfer a conversation directly to you.

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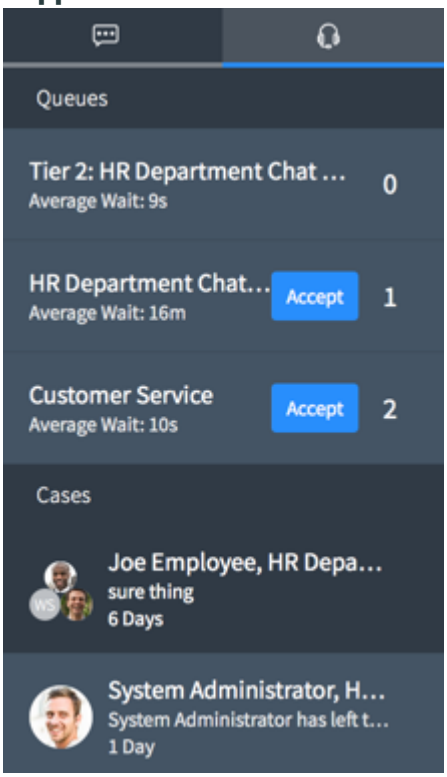
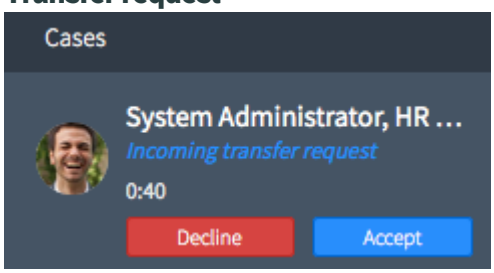
Support tab of Connect sidebar



3. Accept a conversation in one of the following ways.

Option	Description
Accept a conversation from a queue	Under **Queues**, click **Accept** by the queue. The conversation opens in the conversation pane and an entry appears in the **Cases** section of the sidebar.
Accept a transfer request	Under **Cases**, click **Accept** by a transfer request. **Transfer request**  The conversation opens in the conversation pane. The agent who transferred the conversation can stay in the conversation.

4. Respond to the user and help resolve the issue.
   By default, your messages are added to the conversation record as comments and are visible to the user.

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5. **Optional:** Initiate a Zoom meeting to help resolve customer issues faster.
   For more information, see Initiate Zoom meetings from chats.

Related topics

Configure a survey in the Connect chat support

Share knowledge in a Connect Support conversation

The support view of the Connect workspace has a built-in knowledge tool that makes it easy to search for knowledge articles and share them in a conversation.

Before you begin

Role required: none

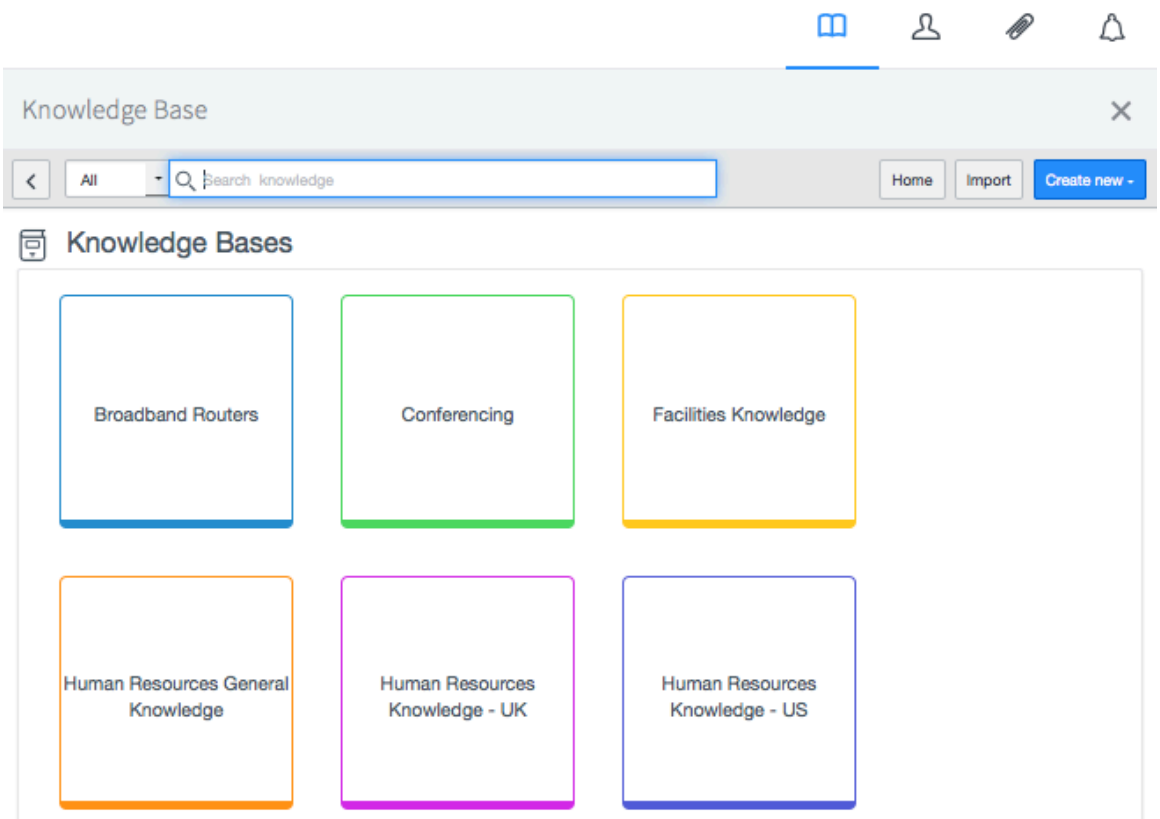
About this task

Use the knowledge tool to research user questions and provide solutions quickly and easily.

Procedure

1. Open a support conversation in the Connect workspace.
   The knowledge tool is not available in Connect mini windows.
2. In the conversation tools area to the right of the conversation pane, click the knowledge base tab, which is represented by an open book icon.

   The knowledge homepage appears in the conversation tools pane.



3. Search for articles related to the user's issue.

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For more information about finding knowledge, see Search using Knowledge Management v3.

4. To share an article in the conversation, drag a knowledge article link to the conversation pane and drop it anywhere in the drop zone that appears.

Transfer a Connect Support conversation to a different agent or queue

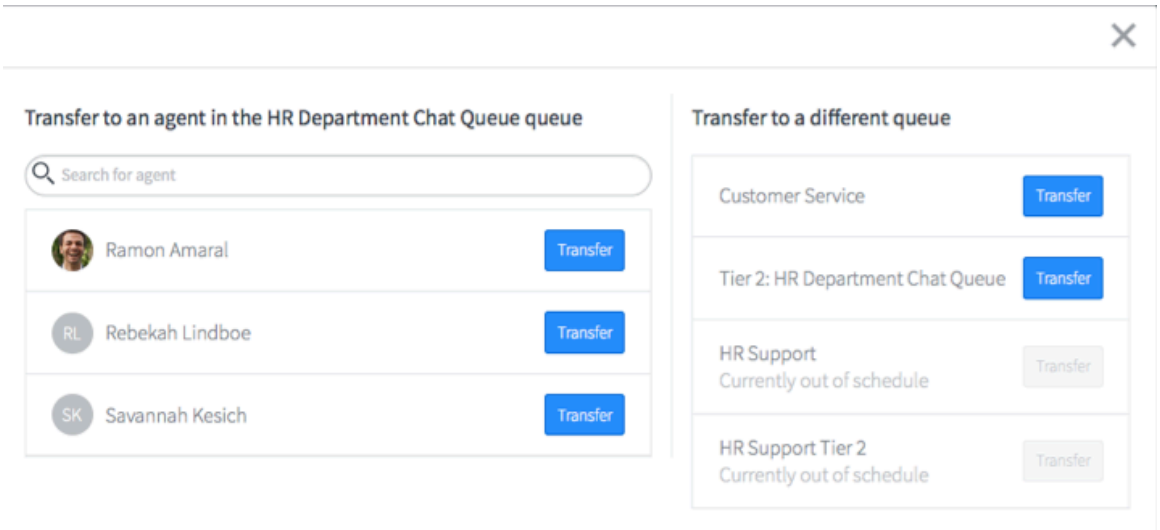
You can transfer a Connect Support conversation to a different agent in the queue or to a different queue.

Before you begin

Role required: none

Procedure

1. Open a Connect Support conversation.
2. At the bottom of the conversation, click the menu icon ( ) to open the Connect actions menu.
3. In the Connect actions menu, select **Transfer**.
   A transfer dialog box opens.



4. Do one of the following actions.

Option	Description
Transfer the conversation to an agent	**a.** To start the transfer request, click **Transfer** by an agent's name. Be sure to choose an agent who is online. A green dot on their avatar indicates that a user is online. You can cancel the transfer any time before it is accepted.

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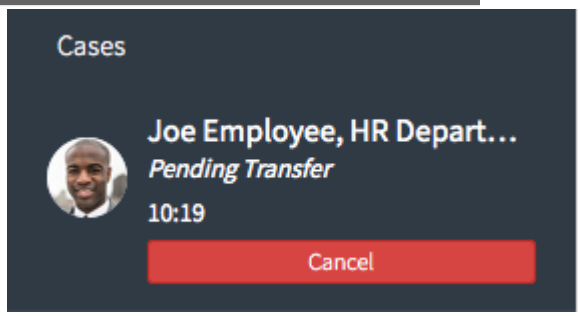
Option	Description
	 **b.** When the transfer is accepted, select one of the following options in the dialog box that appears. ▪ Stay: Remain in the conversation, which is also known as a warm transfer. This option is ideal if you want to provide the new agent with background information or introduce the user to the new agent. ▪ Leave: Exit the conversation, which is al so known as a cold transfer.
Transfer the conversation to a queue	Click **Transfer** by a queue. The system automatically removes you from the conversation and the conversation enters the queue you selected.

Add a user to a Connect Support conversation

You can add additional users to a Connect Support conversation.

Before you begin

An administrator must enable the *glide.connect.support.add_members* property before users can be added to conversations.

Role required: none

Procedure

1. Open a group or record conversation in the Connect workspace.
2. In the conversation tools to the right of the conversation pane, click the member list tab ( ).
3. Do one of the following actions.

Option	Description
Add a member	**a.** Click **Add Member to Group**. **b.** Use the search field to find and select a user.
Remove a member	**a.** Point to a member name. **b.** Click the minus icon (**-**).

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Option	Description
	The assigned support agent cannot be re moved from a Connect Support conversation.

Note:
Only the assigned support agent can create an incident from the Connect Support conversation.

Escalate a Connect Support conversation

If an escalation path is defined for a Connect Support conversation, you can use a shortcut to escalate a Connect Support conversation to a different queue.

Before you begin

Define an escalation path for the queue, using the **Escalate to** field on the Chat Queue [chat_queue] table. For more information, see Administer Connect Support queues.

Procedure

1. Open a Connect Support conversation.
2. At the bottom of the conversation, click the menu icon ( ) to open the Connect actions menu.
3. In the Connect actions menu, select **Escalate**.
   A confirmation dialog box appears.
4. In the dialog box, click **Escalate**.
   The system automatically removes you from the conversation and the conversation enters the escalated queue.

Connect Support chat states

Connect Support chats move through specific states.

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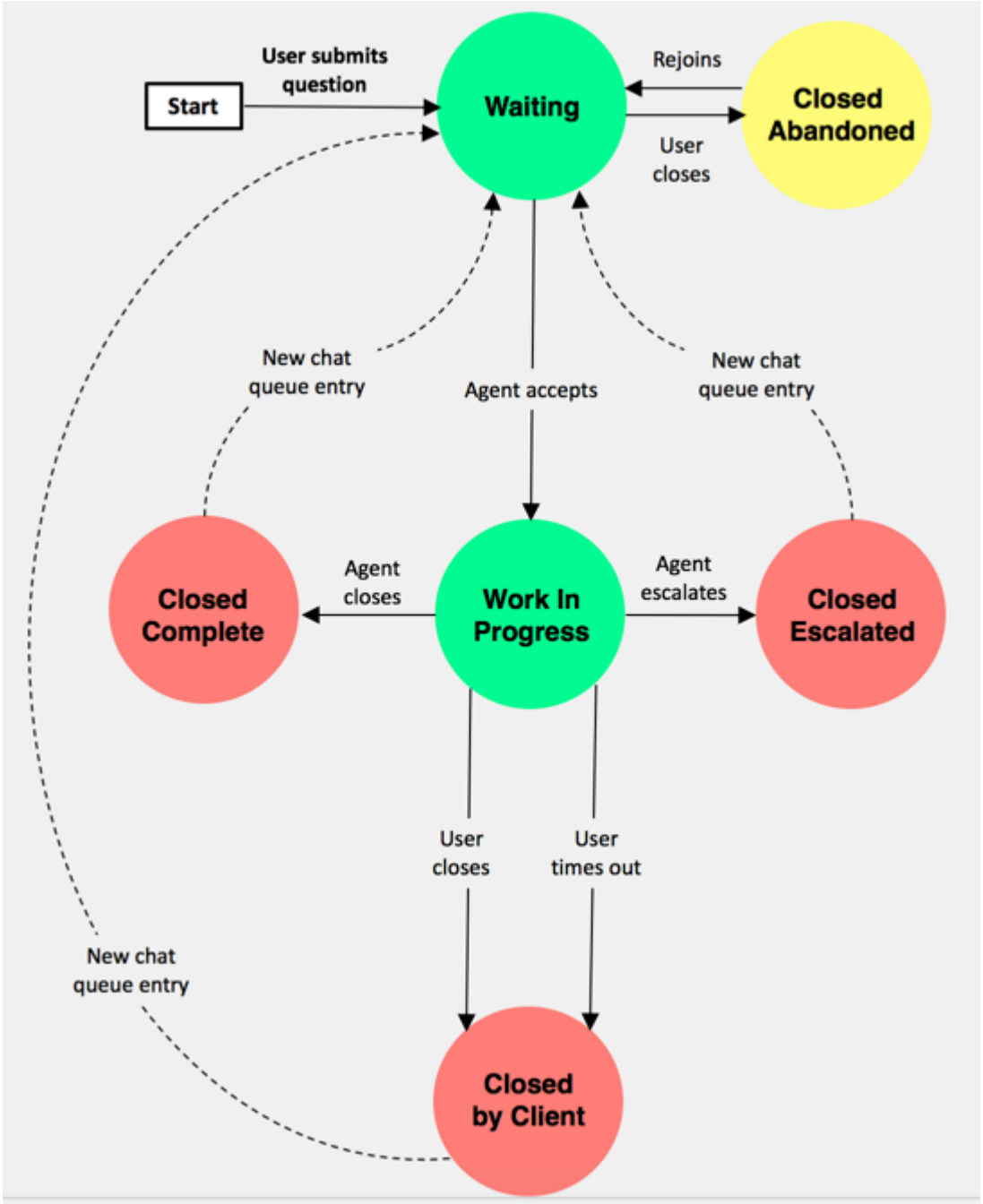
Connect Support states diagram



Connect Support chat states

Composite state	State	Definition
Active	Waiting	• Requester/end user enters a queue by sending a message. Agent has not yet accepted it. • Requester/end user rejoins a session that is in a Reopenable state.

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Connect Support chat states (continued)

Composite state	State	Definition
	Work in Progress	• Agent accepts a chat from a queue. Both requester and agent engage in a chat session. • Requester/end user temporarily leaves an ongoing conversation; requester or agent does not end the session; requester rejoins session.
Reopenable	Closed Abandoned	Requester/end user clicks **End Chat** button before agent accepts the request.
Permanently closed	Closed by Client	• Requester/end user clicks **End Chat** button after agent accepts the request. • Requester/end user times out.
	Closed Escalated	Agent escalates an ongoing conversation by performing the Escalate action from the menu icon.
	Closed Complete	• Agent ends the session. • During a chat, if an agent creates an incident or case and closes it, the chat session closes automatically.

Connect Support administration

Administrators can configure various performance settings and features of Connect Support.

Note:
There are also settings that apply to both Connect Chat and Connect Support. For more information, see Connect administration.

Migrate from legacy chat to Connect Support

Connect Support is an extension of Connect. Users designated as support agents have access to the support tab of the connect sidebar. Do not use Connect Support concurrently with legacy chat.

Before you begin

Role required: admin

Before you activate Connect Support, inform your support agents to close out any existing chats.

Legacy chat uses a different field to determine which state a help desk chat is in. A fix script is included in the Connect Support plugin that circumvents this issue by closing out any existing help desk chat sessions. Manually closing out any existing chats before allowing this script to run helps prevent any loss of chat information.

If you do not close out existing help desk chats, your metrics and chat queue will not work accurately.

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Procedure

1. Activate the Connect Support plugin.
   When you activate the Connect Support plugin, the *glide.connect.support.enabled* property redirects the legacy chat URL to Connect Support.

   For more information, see Activate Connect Support.

2. Hide the Social IT application.
   Activating Connect Support does not completely eliminate the legacy chat module. To prevent users from using the legacy chat, hide the Social IT application menu. For more information, see Enable or disable an application menu or module .

Properties for Connect Support

The Connect Support Properties page provides several configuration options specifically for Connect Support.

Important:

Starting with Utah, Connect Support has been deprecated. For similar capabilities, please move to Advanced Work Assignment and Agent Chat. For details, see Move from Connect Support to Advanced Work Assignment and Agent Chat .

These properties are available for Connect Support.

Properties for Connect Support

Users with the admin role can access these properties by navigating to Connect > Support Administration > Properties.

Note:
The Connect Properties page contains many general Connect properties that impact Connect Support.

Property	Description
Should Connect be used for handling chat queue entries glide.connect.support.enabled	Disables or enables Connect Support. When the property is enabled, the **Service Desk Chat** button in the Employee Self-Service portal opens the conversation in Connect Support, rather than legacy chat. Additionally, the Support tab appears in the Connect sidebar. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Support Administration** > **Properties**
Number of support conversations an individual agent can have at one time (-1 is unlimited) connect.support.conversation_limit	Determines how many support conversations an individual agent can have at one time. When the value is set to **-1**, an agent can

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Properties for Connect Support

Users with the admin role can access these properties by navigating to Connect > Support Administration > Properties.

Note:
The Connect Properties page contains many general Connect properties that impact Connect Support.

(continued)

Property	Description
	participate in an unlimited number of conversations. • **Type**: integer • Default value: -1 • Location: **Collaborate** > **Support Administration** > **Properties**
Show agent avatar in Connect Support conversations. connect.support.show_agent_avatar	Determines whether an agent's avatar is shown in a support conversation (enabled). When the property is disabled, users see the agent's name only. • **Type**: true | false • Default value: true • Location: **Collaborate** > **Support Administration** > **Properties**
Number of seconds to wait (without user interaction), before presenting end users with an idle countdown timer connect.support.idle.delay	Determines how many seconds a user must be inactive in a support conversation before an idle countdown timer appears. • **Type**: integer • Default value: 120 • Location: **Collaborate** > **Support Administration** > **Properties**
Number of seconds to count down from before marking end user as having left their support session connect.support.idle.count_down	Determines how many seconds the idle countdown timer remains open after it appears. If the idle user does not dismiss the timer before the countdown completes, the system closes the support session. • **Type**: integer • Default value: 60 • Location: **Collaborate** > **Support Administration** > **Properties**

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Properties for Connect Support

Users with the admin role can access these properties by navigating to Connect > Support Administration > Properties.

Note:
The Connect Properties page contains many general Connect properties that impact Connect Support.

(continued)

Property	Description
Limits the number of closed conversations that the support user can see. (0 = unlimited) connect.support.user.closed.conversation_limit	Determines how many closed conversations appear in a user's support conversation history. When the value is set to **0**, all previous conversations appear in the history. • **Type**: integer • Default value: 0 • Location: **Collaborate** > **Support Administration** > **Properties**

Administer Connect Support queues

You can define the support agents, default messages, schedule, and escalation path for each Connect Support queue.

Before you begin
Role required: admin

About this task

Note:
Both Connect Support queues and legacy chat queues are stored on the Chat Queue [chat_queue] table. Do not use Connect and legacy chat concurrently.

Procedure

1. Navigate to **All** > **Connect** > **Queues**.
2. Click **New** or open an existing queue from the list.
3. Complete the Chat Queue form, as appropriate.

Chat Queue form

Field	Description
Name	Name of the queue.
Active	Not used in Connect.
Assignment group	User group that contains the support staff for the queue. Any user in the group can view the queue in the Connect sidebar and accept chats. No other users can access the queue. This field must be populated.

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Field	Description
Average wait time	Average time it takes for an agent to accept a chat in the queue. This value is automatically calculated. Do not manually edit.
Confirm problem	Not used in Connect.
Escalate to	Different queue to which an agent can escalate a chat. For example, there is a queue for high priority support chats. When a queue is defined in this field, agents can access the **Escalate** option in conversations.
Initial agent response	Message that users see when an agent accepts their chat. For example, **Thank you for contacting support. We are looking into your question now and will be with you shortly.**
Not available	Message that users see when they attempt to start a chat outside the defined queue **Schedule**. You can use HTML to format the message and include links or media.
Question	Initial phrase that users see when they start a new chat in the queue. For example, **How can I help you?**
Schedule	Schedule that defines when the queue is available. Leave the field blank to make the queue available all the time. Users cannot start a new conversation in the queue outside the schedule hours.

4. Manage the HR chat queue

Make a Connect Support queue accessible to end users

To make a Connect Support queue accessible to end users, use the accepted URL format.

Before you begin

Create a queue. Create agents for the queue by assigning users to the assignment group associated with the queue.
Role required: admin

About this task

For example, you might create a module or add a link to a portal. The accepted URL format is `https://<instancename>.service-now.com/$chat_support.do?queueID=<sys_id>`.

Procedure

1. Navigate to **All** > **Connect** > **Administration** > **Queues**.
2. Right-click the name of the queue to which you want to link.
3. In the context menu, select **Copy sys_id**.
4. Follow browser instructions to copy the sys_id if browser security measures restrict this function.
5. Preview the support queue by navigating to `https://<instancename>.service-now.com/$chat_support.do?queueID=<sys_id>`.
6. Create a module or other link to the queue using the URL.

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Add a scripted extension point for Connect Support chats

Implement the `ConversationServerInteractionService` extension point, which enables you to create custom scripts that use context variables from pre-chat surveys presented to requesters in the Agent Chat client.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Extension Points** > **Scripted Extension Points** and select the `ConversationServerInteractionService` scripted extension point.
2. Click the **Create implementation** related link to create a new custom script include.
3. In the Script Include form, create the code that uses the pre-chat context variables to route chats to the appropriate Connect Support queue.
4. Click **Update**.

Result

The custom script is created and registered against the `ConversationServerInteractionService` scripted extension point.

Connect Support metrics

Optional plugins provide a homepage and Performance Analytics dashboards, which contain helpful Connect Support metrics.

The reporting homepage is ideal for support managers who want a simple solution to track the recent performance of the support organization. The Performance Analytics dashboards provide a more full-featured solution for support managers who want to analyze trends over time.

Users with the admin role can activate the following plugins to use these features.

Connect Support homepage and dashboard plugins

Plugin	Description
Connect Support Manager's Dashboard [com.glide.connect.managers_dashboard]	Provides a homepage for Connect Support, and all required configuration records. Though the plugin name contains the term dashboard, the plugin does not provide functionality related to Performance Analytics dashboards. Homepages are similar to dashboards, but do not require Performance Analytics roles to view.
Performance Analytics - Content Pack - Service Desk Chat [com.snc.pa.chat]	Provides the **Service Desk Chat Monitor** dashboard, which analyzes key Connect Support metrics and indicators.
Performance Analytics - Context Sensitive Analytics for Chat [com.snc.pa.chat.context_sensitive_analytics]	Provides in-form analytics for Connect Support. These analytics are available as a related link on the Chat Queue Entry [chat_queue_entry] form, and also as the **Context Sensitive Analytics - Chat** dashboard.

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Note:
For more information about these plugins, including which other plugins they activate, see Additional plugins for Connect Support.

Related topics

Performance Analytics concepts

Use the Connect Support homepage

Use the Connect Support homepage to view key indicators and metrics related to support conversations, queues, and agents.

Before you begin
Activate the Connect Support Manager's Dashboard plugin (com.glide.connect.managers_dashboard) to view this homepage.
Role required: chat_admin

About this task
The homepage is called **Service Desk - Chat**.

Procedure

1. Navigate to **All** > **Connect** > **Support Administration** > **Reporting Dashboard**.

   Note:
   Though the module name contains the term dashboard, the module does not provide functionality related to Performance Analytics dashboards. Homepages are similar to dashboards, but do not require Performance Analytics roles to view.

   The Connect Support homepage, which is called **Service Desk - Chat**, opens.
2. Click a widget to drill down into its data.

Use the Connect Support dashboards

Use the Connect Support dashboards in Performance Analytics to understand trends in your support organization's performance over time.

Before you begin
Activate one or both of the following plugins, according to your analytics needs:

- Performance Analytics - Content Pack - Service Desk Chat (com.snc.pa.chat)
- Performance Analytics - Context Sensitive Analytics for Chat (com.snc.pa.chat.context_sensitive_analytics)

Role required: both chat_admin and pa_viewer

About this task
The Performance Analytics - Content Pack - Service Desk Chat plugin (com.snc.pa.chat) includes the **Service Desk Chat Monitor** dashboard, which contains the following tabs:

- **Chat Monitor By State**: Contains metrics related to closed support conversations.
- **Overview**: Contains several metrics related to support conversations, queues, and agents.
- **KPI Process**: Contains metrics that are key performance indicators (KPIs) of the Connect Support process, including the average queue response time, the average duration of support conversations, and the number of new support conversations per day.

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The Performance Analytics - Context Sensitive Analytics for Chat plugin (com.snc.pa.chat.context_sensitive_analytics) includes the **Context Sensitive Analytics - Chat** dashboard. The dashboard contains additional metrics related to support queues, including the number of support conversations closed.

Note:
You must license Performance Analytics to collect scores for the indicators on the dashboards. Without Performance Analytics premium, the dashboards display the indicators with no data.

Procedure

1. Navigate to **All** > **Performance Analytics** > **Dashboards**.
   The last dashboard you viewed opens.
2. In the dashboard picker, under the **Connect Chat** group, select the dashboard you want to view.
3. View the indicators.

Related topics

Performance Analytics concepts

Configure the add support users property

To enable support agents to add users to a Connect Support conversation, add the *glide.connect.support.add_members* property.

Before you begin
Role required: admin

Warning:
Enabling the *glide.connect.support.add_members* property can negatively impact instance performance if there are large numbers of users logged in to the instance.

About this task
When the *glide.connect.support.add_members* property is added and enabled, support agents can add users to a support conversation. Any added user can also add other users. Only the assigned agent can create an incident from the chat. When non-support agents are added to a chat, the chat appears in their chat tab.

Note:
Make sure you are in the Global scope when adding this property.

Procedure

1. Enter `sys_properties.list` in the navigation filter.
   The entire list of properties in the System Properties [sys_properties] table appears.
2. Verify that the property does not exist by searching for the property name.
   If the property does exist, update the property with the information in the following table.
3. Select **New**.
4. Complete the form.

Service Desk Chat Platform Analytics Solutions

Platform Analytics Solutions contain preconfigured dashboards. These dashboards contain actionable data visualizations that help you improve your business processes and practices.

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Platform Analytics data visualizations use Performance Analytics indicator data to show you data over time, helping you analyze your business processes and identify areas of improvement. With Platform Analytics Solutions, you can get value from Performance Analytics for your application with minimal setup. You can always create your own objects as well.

To enable the solution for Service Desk Chat, an admin can navigate to **Performance Analytics** > **Guided Setup**. Click **Get Started** then scroll to the section for Service Desk Chat. The guided setup takes you through the entire setup and configuration process.

Related topics

Activate your Performance Analytics subscription

Connect Support and Service Portal

Use Connect Support in your portal to allow your users to ask questions or submit requests to support agents. You configure the instance options to control the appearance of your widget and how it functions.

The Connect Support and Service Portal integration creates a Connect Support widget that you can add to a page in the Service Portal.

Configure Connect Support widget instance options

You can control the appearance of your widget and how it functions by configuring the instance options.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Service Portal** > **Service Portal Configuration** and open the Service Portal Designer.
2. From the Service Portal Designer, select the page you added the Connect Support widget to. If you have not yet added the widget to a page, see Create and edit a page using the Service Portal Designer for more information.
3. Click the edit icon in the corner of the widget to open the instance options menu.
4. Complete the fields using the following table.
   Depending on the functionality you want to add, you may not need to add all these fields.

Connect Support widget instance options

Field	Description
Bootstrap color	Select a color for your widget from a list of common bootstrap colors. Themes control the overall color of a widget, but if you want your widget to be a specific color, you can select it from the list.
Queue URL	The URL for the Connect Support chat queue that you want questions to be directed to. For example, htts://<instancename.service-now.com/$chat_support.do?queueID=<sys_id>
Queue Name	The name of the queue you want the questions to be directed to. You can find a list of queue names in **Collaborate** > **Connect Support** > **Queues**.
Queue ID	The sys_id of the queue you want questions to be directed to. You can find this ID by going to the support queue and either copying the queue ID from the support link, or by selecting **Copy sys_id** from the context menu.

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Field	Description
Message	The text for the button in the Connect Support widget
Window	Use this option to open the chat in another tab rather than in a new window.
Title	The name in the widget header

Classic Orchestration

ServiceNow® Orchestration extends the workflow engine to manage processes and to automate things outside of a ServiceNow instance.

Orchestration is available as a separate subscription from the rest of the ServiceNow platform. See Activate Orchestration for details.

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Introduction to Orchestration

Orchestration automates simple or complex multi-system tasks on remote services, servers, applications, and hardware.

An Orchestration process can cross all management disciplines and interact with hosted services and all types of infrastructure elements. These capabilities provide a powerful system for managing IT and Business processes quickly and reliably.

Orchestrated solutions aide collaboration among teams by providing reusable data and versioning for both the workflows and the activities within them. Subject matter experts can create activities that are reusable to numerous workflow developers. When an activity requires a change, developers can see the downstream implication of the change immediately by knowing which workflows use the activity. Well-designed orchestrations never fail and apply human tasks to address errors as they arise.

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Orchestration tools

Orchestration can make calls outside of a ServiceNow instance, directly to web services or through a MID Server to systems within corporate firewall. Orchestration also enables the creation reusable activities that wrapper Java Script functions for manipulating things inside the platform. Orchestration extends the Workflow editor by providing these features:

- Activity packs containing ready-to-use activities.
- Activity Designer, which enables developers to create custom activities without an over dependence to create scripts to orchestrate to third-party systems.
- Ability to create activity packs using Scoped Applications.
- A Databus for following the flow of data across orchestration activities.

Orchestration Core provides entitlements to use specific applications:

Client Software Distribution

An application that automates software delivery from the Service Catalog. Provides OOB support for SCCM. Partner solutions support Macs using JAMF. Other third-party solutions provide support through the extension framework.

Configuring Password Reset

An application for users to reset their password in Active Directory. It can expand to communicate with other third-party systems.

Orchestration ROI

Enables users to evaluate estimated costs and actual costs for tasks, automate these tasks, and track the ROI of these tasks.

Systems that Orchestration can automate

Orchestration can automate tasks such as employee onboarding, user access rights, server management, managed file transfers, and Security Operations Orchestration activities . For example, you might use the Active Directory and Exchange activities provided in the base Orchestration system to set up network accounts and mailboxes for new employees.

If Orchestration does not provide the activities you need for an integration, create the necessary activities using the templates in the Orchestration Activity Designer. The external systems that Orchestration can automate for:

- Any system exposing web services (SOAP, REST)
- Any system accessible from the command line (such as a UNIX system accessible through SSH, a Windows system enabled for PowerShell remoting or WMI)
- Numerous proprietary services: Windows Active Directory, Microsoft Exchange mail servers, InfoBlox, and F5 Networks.

> **Note:**
> For a full list of Activity Pack service offerings, see Orchestration Core Activity Packs.

- Any filesystem accessible by SFTP
- Any database with a compliant JDBC driver
- Additional Activity Packs are also available with other ServiceNow products, such as Security Operations

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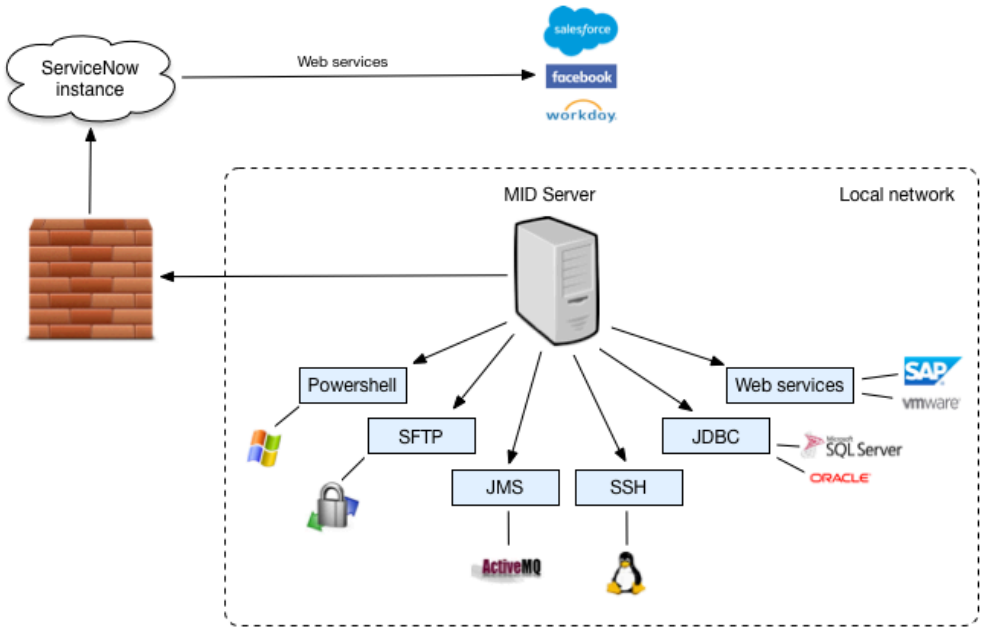
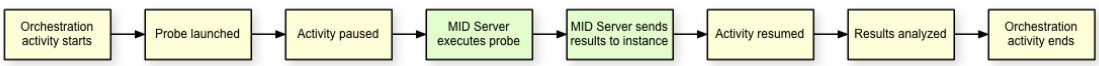
Orchestration capabilities



Orchestration workflow

When an Orchestration activity starts within a workflow, Orchestration launches a Discovery probes and sensors and writes a probe record to the ECC Queue. The workflow pauses as the MID Server picks up the request and executes the probe. When the probe reports back, the workflow resumes as the results are analyzed. The workflow can exit or continue at this point.

Orchestration workflow



Domain separation and Orchestration

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

Support level: Standard*

- Includes **Basic** level
- Business logic: Processes can be created or modified per customer by the service provider. The use cases reflect proper use of the application by multiple service provider customers in a single instance.
- The owner of the instance needs to be able to configure MVP business logic and data parameters per tenant as expected for the specific application.

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Use case: As an admin, I need the ability to make comments mandatory on close of a record for one tenant, but not for another.

Related topics

Domain separation for service providers

Activate Orchestration

The Orchestration (com.snc.runbook_automation) plugin is available within a separate subscription from the rest of the ServiceNow platform.

Before you begin

To purchase a subscription, contact your ServiceNow account manager. The account manager can arrange to have the plugin activated on your organization's production and subproduction instances, generally within a few days.

If you don't have an account manager, decide to delay activation after purchase, or want to evaluate the product on a subproduction instance without charge, follow these steps.

Role required: none

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

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4. Select **Submit**.
   After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

List of Orchestration plugins

This table lists all plugins available for Orchestration and their dependencies.

These Orchestration plugins are available for purchase or can be requested as part of your Orchestration subscription. Contact your account representative for details.

Name	Description	Dependencies
Orchestration [com.snc.runbook_automation]	Main plugin for the Orchestration feature. This plugin extends Workflow to automate operations with external systems. Use this plugin to orchestrate business services, applications, and infrastructure.This plugin automates operations such as deployments, configurations, and information gathering. Orchestration can automate Web Services and uses MID Servers to execute commands on devices inside an enterprise's network.	• Orchestration - ROI • Orchestration - Runtime
Orchestration - Active Directory [com.snc.orchestration.ad]	Installs the Active Directory activity pack. These activities create, delete, and manage objects in Windows Active Directory.	Orchestration
Orchestration - Asset Lease Management [com.snc.orchestration.asset_lease_management]	Provides the software lease functionality for Client Software Distribution. Allows users to select the start and end dates of software leases and to request an extension of a lease. **Note:** This plugin is not automatically enabled when Orchestration is active.	None
Orchestration - Azure Active Directory [com.snc.orchestration.azure.ad]	Installs the Azure AD activity pack. These activities automate employee onboarding and offboarding functions on Azure Active Directory and manage Office 365 licensing.	Orchestration
Orchestration - Client Software Distribution [com.snc.orchestration.client_sf_distribution]	Allows the distribution of software from the service catalog using third party distribution management systems, such as Microsoft System Center Configuration Manager (SCCM)	• Orchestration - System Center Configuration Manager

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Name	Description	Dependencies
	Note: This plugin is not automatically enabled when Orchestration is active.	• Orchestration - Asset Lease Management • Service Catalog Scoped API • Software Asset Management
Orchestration - Exchange [com.snc.orchestration.exchange]	Installs the Exchange activity pack. These activities manage Microsoft Exchange mail systems.	Orchestration
Orchestration - F5 network management [com.snc.orchestration.f5]	Installs the F5 Network Management activity pack. These activities configure elements of an F5 load balancer, including pools, pool members, and the virtual servers contained in the pool.	Orchestration
Orchestration - Infoblox DDI Activity Pack [com.snc.orchestration.infoblox]	Installs the Infoblox DDI activity pack. These activities support Infoblox DDI management.	Orchestration
Orchestration - PowerShell [com.snc.orchestration.powershell]	Installs the PowerShell activity pack. These activities control and automate the administration of Windows machines and applications, using the Windows .NET Framework.	Orchestration
Orchestration - Probe [com.snc.orchestration.probe]	Installs the Probe activity pack. These activities run ServiceNow® probes on target hosts to return specific information.	Orchestration
Orchestration - ROI [com.snc.runbook_automation.roi]	Installs an Orchestration application that estimates savings resulting from automated tasks in an instance and computes actual savings. Orchestration - ROI is activated automatically with a base Orchestration subscription.	• Performance Analytics • Cost Management
Orchestration - ROI Premium [com.snc.runbook_automation.roi_premium]	Installs a premium dashboard that displays detailed reports on calculated savings for automated tasks over time. The Orchestration - ROI Premium plugin requires purchase and activation of the Performance Analytics - Premium plugin to display its reports. **Note:** This plugin is not automatically enabled when Orchestration is active.	• Orchestration - ROI • Performance Analytics - Premium

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Name	Description	Dependencies
Orchestration - Runtime [com.snc.runbook_automation.runtime]	Enables other applications on the ServiceNow® platform to distribute and use orchestration content without requiring an Orchestration subscription. The Orchestration - Runtime plugin displays the Orchestration activities shipped with these applications in the Workflow Editor and allows customers to modify the activities without requiring an Orchestration license.	• Workflow Runtime Engine • Core Automation
Orchestration - SFTP [com.snc.orchestration.sftp]	Installs the SFTP File Transfer activity pack. These activities manage files and directories on an SFTP server and move files from one SFTP server to another.	Orchestration
Orchestration - SSH [com.snc.orchestration.ssh]	Installs the SSH activity pack. These activities read, write, and copy files, and reset user passwords on Linux computers.	Orchestration
Orchestration - System Center Configuration Manager [com.snc.orchestration.sccm_mgmt]	Installs the System Center Configuration Manager (SCCM) activity pack. These activities manage software deployments and collections on an SCCM server.	Orchestration

Orchestration Runtime plugin

The Orchestration – Runtime plugin enables other applications on the ServiceNow® platform to automate tasks, without requiring an Orchestration subscription.

The Orchestration – Runtime plugin can be activated as part of another plugin or application. It is used by strategic technology partners and ServiceNow applications to distribute activity packs to customers who may not own Orchestration. For example, the Security Incident Response Management (SIRM) application provides orchestration content, which includes activities that are available from the **Packs** tab in the Workflow Editor. Customers who purchase SIRM can consume and modify the activities that SIRM ships without having to purchase an Orchestration license.

Included with the plugin

The Orchestration – Runtime plugin provides access to the **Packs** and **Data** tabs in the Workflow Editor. This plugin gives users access to custom activities for their applications and enables them to reuse data from the Databus. This plugin does not provide access to custom Orchestration activity packs or to the activity designer. The **Custom** tab in the Workflow Editor is not available without an Orchestration subscription.

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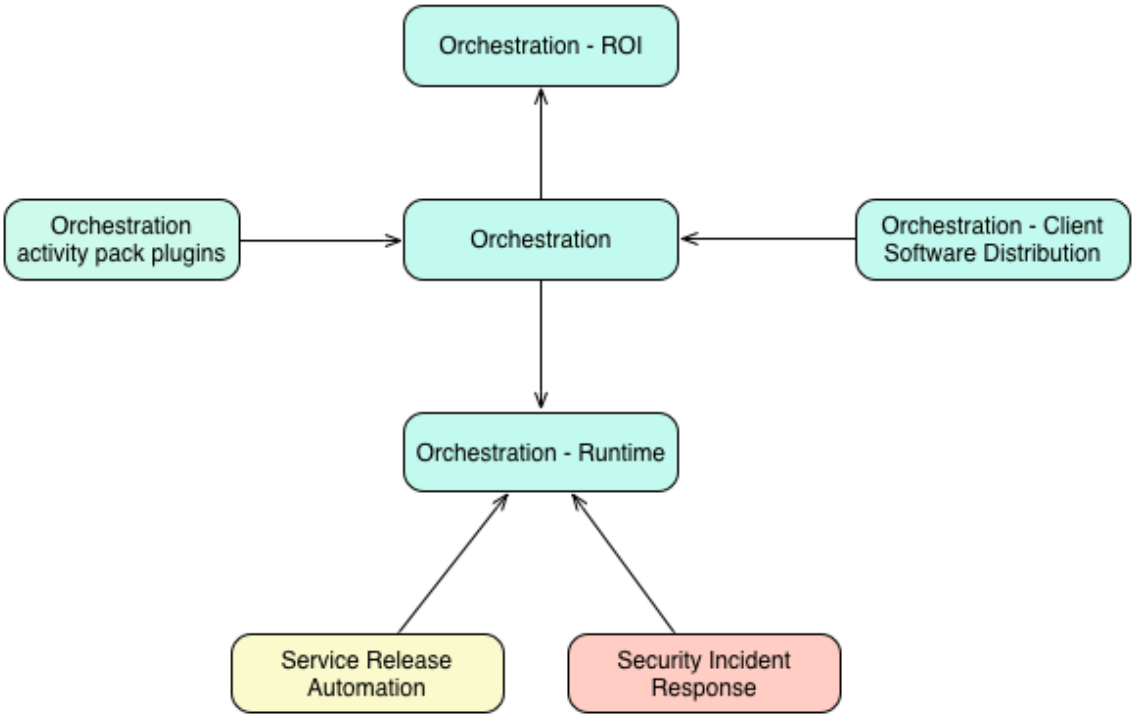
Orchestration plugin relationships



Dependencies

The Orchestration – Runtime plugin activates these application plugins:

- Security Incident Response Orchestration
- Service Release Automation

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Access to activities

Custom activities shipped with ServiceNow® applications are available in the **Packs** tab of the Workflow Editor for use in workflows. To edit these activities, navigate to **Orchestration** > **Activity Designer Activities** and select the activity you want to modify. For information about the provider templates used to create these activities, see Orchestration custom activity templates.

List of Orchestration activities

Use Orchestration activities in a Workflow to integrate with third-party systems.

Several Orchestration activities have been rewritten as Application scope activities using the activity designer and grouped into activity packs. Other non-scoped activities are deprecated and may or may not appear in the Workflow Editor. However, all deprecated activities still function in existing workflows that use them.

Global activities

These activities run in the global scope only. Any activities you create in the global scope are organized in the Global category in the **Packs** and **Custom** tabs in the Workflow Editor.

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Activity	Description
Test Server Alive	Runs a command (including shell scripts) on a Linux or UNIX computer via SSH to validate whether the target system is alive.

Active Directory (AD) activities

All AD Orchestration activities were rewritten in the Geneva release as scoped activities and are available in the Active Directory activity pack. All previous version AD activities that were built on activity definitions are deprecated and are unavailable for use in new workflows.

Activity	Description
Create AD Object	Creates a user account in Windows Active Directory when a user account is created in a ServiceNow instance.
Disable AD User Account	Marks a Windows Active Directory user account disabled, making it inactive.
Enable AD User Account	Enables a Windows Active Directory user account, making it active.
Query AD	Retrieves entries from the Windows Active Directory based on a search filter.
Remove AD Object	Deletes a user account from Windows Active Directory.
Reset AD User Password	Resets the password of a user account in Windows Active Directory.
Change AD User Password	Changes the password of a user account in Windows Active Directory.
Update AD Object	Updates a user account in Windows Active Directory.
Is AD Account Locked	Determines if an Active Directory user account is locked.
Unlock AD Account	Unlocks a locked Active Directory user account.

Azure AD

All these activities are scoped and part of the Azure AD activity pack. They do not have legacy versions.

Activity	Description
Add User to Group	Adds a user to an existing security group in Azure Active Directory.
Assign User License	Assigns an extra Office 365 software license to the named user.
Create User	Creates a user for the Azure Active Directory tenant.

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Activity	Description
Delete User	Deletes the named user's account from the Azure Active Directory tenant.
Get User Info	Returns the named user's information from the Azure Active Directory.
Remove User from Group	Removes an existing user from a security group in Azure Active Directory.
Remove User License	Revokes the specified Office 365 software license for the named user.
Reset User Password	Changes the named user's Azure Active Directory password.

F5 Network Management activities

All these activities are scoped and part of the F5 Network Management activity pack. They do not have legacy versions.

Activity	Description
Add F5 Pool	Creates the load balancer pool.
Check F5 Pool	Checks the status of a pool to validate whether it is available to accept traffic.
Delete F5 Pool	Deletes an F5 pool.
Add F5 Pool Member	Adds a member to an F5 pool.
Get F5 Pool Member	Returns the pool members and verifies the pool status.
Delete F5 Pool Member	Deletes an F5 pool member.
Add F5 Virtual Server	Adds a virtual server.
Modify F5 Virtual Server	Configures a virtual server assigned to an F5 pool with irules and a vlan.
Delete F5 Virtual Server	Deletes a virtual server from an F5 pool.
Add F5 Profile to Virtual Server	Adds a profile to a virtual server assigned to an F5 pool.

Infoblox activities

All these activities are scoped and part of the Infoblox DDI activity pack. They do not have legacy versions.

Activity	Description
DHCP Reserve IP v4 Address Range	Reserves an IP address range for DHCP use.
DHCP Delete IP Reservation	Deletes IP reservations in DHCP using either an IPv4 or IPv6 address range.
DHCP List IP Reservations	Generates a list of all the DHCP range reservations on a specific Infoblox server.

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Activity	Description
List DNS C-records	Retrieves all canonical (CNAME) records from a specified Infoblox server.
Register DNS A-record	Creates a DNS A record on a specified Infoblox server.
Register DNS C-Record	Creates a DNS canonical (CNAME) record on a specified Infoblox server.
List DNS Record	Generates a list of all the DNS entries on a specific Infoblox server.
DNS Delete	Deletes DNS records of any type from in Infoblox server, such as C and A records.
IPAM Register IP Address	Registers an IP address in a network using Infoblox IPAM.
IPAM Reserve IP Address	Reserves an IP address in a network using Infoblox IPAM.
IPAM List IP Reservations	Returns an array of all IP Address within the named Infoblox Server.
IPAM Delete	Deletes an IP Address within a named Infoblox server.
Create Network	Creates networks on a specified Infoblox server.
Get Network Details	Retrieves the information about a specific network on an Infoblox server.
Delete Network	Deletes a network from an Infoblox server.
List Registered Networks	Retrieves all the networks associated with an Infoblox server.

Microsoft Exchange activities

All Exchange Orchestration activities were rewritten in the Geneva release as scoped activities and are available in the Exchange activity pack. All previous version Exchange activities that were built on activity definitions are deprecated and are unavailable for use in new workflows.

Activity	Description
Create Address List	Creates an address list that acts as an alias for emailing all users in the group. This alias cannot be used to manage user permissions.
Delete Address List	Removes an existing address list from an Exchange server.
Get Address List	Retrieves all attributes from the specified Exchange address list.
Move Address List	Moves an Exchange address list to another location in the address hierarchy.
Set Address List	Modifies an Exchange address list.
Update Address List	Adds or removes users from the specified address list and immediately applies any cached address list changes to the server.
Create Mailbox	If a user does not exist, creates a new Active Directory user and associated Exchange mailbox.

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Activity	Description
Delete Mailbox	Deletes the Exchange mailbox of an Active Directory user.
Disable Mailbox	Disables the mailbox associated with a specified Active Directory account.
Enable Mailbox	Creates a mailbox for an existing Active Directory user.
Get Mailbox	Gets the mailbox for the specified user or all mailboxes on an Exchange server.
Set Mailbox	Modifies the settings of an existing Exchange mailbox.

PowerShell activities

These PowerShell activities were rewritten as scoped activities and are available in the PowerShell activity pack. All previous version PowerShell activities that were built on activity definitions are deprecated and are unavailable for use in new workflows.

Activity	Description
Install Windows App	Installs an application on a Windows target machine.
Join Domain	Joins a Windows machine to a domain.
Restart Windows Server	Restarts a Windows server using PowerShell.
Uninstall Windows App	Uninstalls an application from a Windows target machine.
Change Service State	Starts or stops a Windows service on a remote system.

Probe activities

These probe activities were rewritten as scoped activities and are available in the Probe activity pack. All previous versions of these activities that were built on activity definitions are deprecated and are unavailable for use in new workflows.

Activity	Description
Resolve DNS Name	Resolves an IP address or a fully qualified domain name (FQDN) into one or more IP addresses.
SNMP Query	Queries an SNMP device.

SCCM activities

All these activities are scoped and part of the SCCM activity pack. They do not have legacy versions.

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Activity	Description
Add to Device Collection	Adds a device to a Microsoft System Center Configuration Manager (SCCM) device collection.
Add to User Collection	Adds a user to a Microsoft System Center Configuration Manager (SCCM) user collection.
Get Applications	Returns a list of all the applications available on a Microsoft System Center Configuration Manager (SCCM) server.
Get Deployments	Returns the list of deployments performed by Orchestration using a Microsoft System Center Configuration Manager (SCCM) server.
Get Device Collections	Returns the list of available device collections on a Microsoft System Center Configuration Manager (SCCM) host.
Get User Collections	Returns the list of available user collections on a Microsoft System Center Configuration Manager (SCCM) host.
Remove from Device Collection	Removes a device from a Microsoft System Center Configuration Manager (SCCM) device collection.
Remove from User Collection	Removes a user from a Microsoft System Center Configuration Manager (SCCM) user collection.

SSH activities

These SSH activities were rewritten as scoped activities and are available in the SSH activity pack. The SSH activities not converted to scoped activities were moved to the Orchestration - Deprecated category, but are still available for all workflows.

Activity	Description
File Copy	Copies a file on a Linux or Unix computer, via SSH.
File Read	Reads a file on a Linux or Unix computer, via SSH.
File Write	Writes a file on a Linux or UNIX computer.
File Replace String	Finds and replaces a string in a file on a Linux or UNIX computer.
Files Compare	Compares two files on a Linux or Unix computer, via SSH.

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Activity	Description
Reset Linux User Password	Resets the password for a given user on a Linux computer.
Secure Copy	Copies a file from one host to another, without storing the copied file on the MID Server.

SFTP activities

All these activities are scoped and part of the SFTP File Transfer activity pack. They do not have legacy versions.

Activity	Description
Copy File	Copies a file from an SFTP server (source host) to another SFTP server (target host).
Create Directory	Creates a directory on an SFTP server.
Get File List	Returns a list of files from a given directory and its subdirectories on an SFTP server (source host).
Remove File or Directory	Removes a file or a directory on an SFTP server, including subdirectories, when configured.
Rename File or Directory	Renames a file or directory to a new name on an SFTP server.
Set File Attributes	Sets common file attributes, such as timestamps, size, permissions, and UID/GID, for a file or directory on an SFTP server.

Deprecated activities

These activities have been removed from the Workflow Editor and are not available for new workflows, but continue to work normally in existing workflows. You can reactivate the deprecated activity or duplicate the functionality of a deprecated activity as a scoped activity by recreating it using the activity designer.

Activity	Description
Run Probe	Launches a MID Server probe on behalf of a document.
SOAP Request	Executes a SOAP request on a target server. The SOAP Message activity replaces this activity.
Run Command	Runs a command (including shell scripts) on a Linux or UNIX computer.
Run SCP	Uses Secure Copy Protocol (SCP) to copy a file from one computer to another, including the directory in which the file resides. The Secure Copy activity replaces the Run SCP activity.
Run Powershell	Executes Windows PowerShell commands on a MID Server.

Available activity packs

Activity packs are available with your subscription to Orchestration.

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Before you begin
Role required: admin

About this task
The following activity packs are available and active with your Orchestration subscription:

- Orchestration - Active Directory (com.snc.orchestration.ad)
- Orchestration - Azure Active Directory (com.snc.orchestration.azure.ad)
- Orchestration - Exchange (com.snc.orchestration.exchange)
- Orchestration - SFTP (com.snc.orchestration.sftp)
- Orchestration - Infoblox DDI Activity Pack (com.snc.orchestration.infoblox)
- F5 Network Management activity pack (com.snc.orchestration.f5)
- Orchestration - SSH (com.snc.orchestration.ssh)
- Orchestration - PowerShell (com.snc.orchestration.powershell)
- Orchestration - System Center Configuration Manager (com.snc.orchestration.sccm_mgnt)

Procedure
1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

4. Select **Submit**.
After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

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Deprecated Orchestration activities

These Orchestration activities have been deprecated.

Run Probe

The Run Probe activity launches a MID Server probe on behalf of a document. All Orchestration activities that launch a probe on a target machine are based on the Run Probe activity. Your ServiceNow instance must have access to a MID Server configured to use SSH to run this activity.

Important:
This activity is deprecated and is unavailable for new workflows. To replace the functionality of this probe, use the Probe activity template to create a custom activity. Workflows from a previous release that use the Run Probe activity can continue to do so.

Run Probe input variables

Field	Description
Probe	Select a MID Server probe from the list. This is the name of the probe as it appears in the `discovery_probes` table.
Source for probe	Enter the IP address of the host system against which the probe runs (the probe's target).
Sensor script	The script to run using the results of the probe. The output from the probe is contained in a variable called `output`. Any error from the probe is contained in a variable called `error`.

SOAP Request

The SOAP Request activity executes a SOAP request on a target server.

Important:
This activity is deprecated and is replaced by the SOAP Message workflow activity activity. Workflows from a previous release that use the SOAP Request activity can continue to do so. However, this activity is not available for new workflows.

SOAP Request input variables

Field	Description
SOAP URL	The SOAP endpoint.
Username	User name for basic authentication credentials.
Password	Password for basic authentication credentials.
Envelope Script	Script for setting up parameters for the web service.
Sensor Script	The script to execute after the request has been made and a response has been received.

Reactivate a deprecated activity

Orchestration activities that were converted to activity packs are deprecated for upgraded and new instances but can be reactivated for use in new workflows.

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Before you begin

Role required: workflow_admin, admin

Note:
Reactivation of deprecated activities for use in new workflows is discouraged. Legacy activities cannot use the unique features of the scoped applications, such as reuse of data from the databus and input variable testing.

Procedure

1. Navigate to **All** > **Workflow** > **Administration** > **Activity Definitions**.
2. In the list of activities, clear the condition **Category !=deprecated** from the filter.
3. Open the definition record for the activity you want to reactivate.
4. Select the **What to Display** tab.
5. In the **Category** field, replace the value **deprecated** with another category.
   This can be an arbitrary string.
6. Click **Update**.
   The system creates a new category using the value provided and reactivates the activity, which becomes available in the **Core** tab of the Workflow Editor.

SOAP Message workflow activity

The **SOAP Message** activity uses SOAP messages defined in the System Web Services plugin and can call the messages using a MID Server.

Your instance must have access to a MID Server configured to use SOAP.

Input variables

SOAP Message activity input variables

Field	Parameter	Description
SOAP Message	soap_message	The SOAP Message defined under the System Web Services plugin's Outbound SOAP Message [sys_soap_message] table. (**System Web Services** > **Outbound** > **SOAP Message**)
SOAP Message Function	soap_message_function	The function to call that is defined in the SOAP Message. Functions are listed in the **SOAP Message Functions** related list in each SOAP Message record.
SOAP Endpoint	soap_endpoint	Endpoint to use instead of the **SOAP endpoint** value in the SOAP Message Function record. Leave this field blank to use the defined endpoint in the SOAP Message Function record.
Variables	variables	Variables to substitute into the SOAP **Envelope** defined in the SOAP Message Function record. Use this format for the string: `name1=value1, name2=value2, . . .` If either the name or value contains a comma or equal sign, escape these characters with a backslash.
Use MID Server	use_midserver	Check box for using a MID Server to send the SOAP message. A MID Server might be necessary to reach an

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SOAP Message activity input variables (continued)

Field	Parameter	Description
		endpoint within a firewall or a sub-network that is not visible from the instance. If this check box is selected (true), but no MID Server is defined in the **MID Server** field, workflow automatically attempts to find a MID Server.
MID Server	midserver	Name of the MID Server to use. This field appears when you select the **Use MID Server** check box. The workflow ignores this parameter if the *use_midserver* parameter is disabled. **Note:** You can only select a specific MID Server in the legacy SOAP message activity and REST messages. These legacy activities do not use the MID Server selection available starting with the Istanbul release.
Sensor Script	sensor_script	The script to execute after the request has been made and a response has been received. You can access the full XML response body from the *activity.output* object.

Probes used by Orchestration

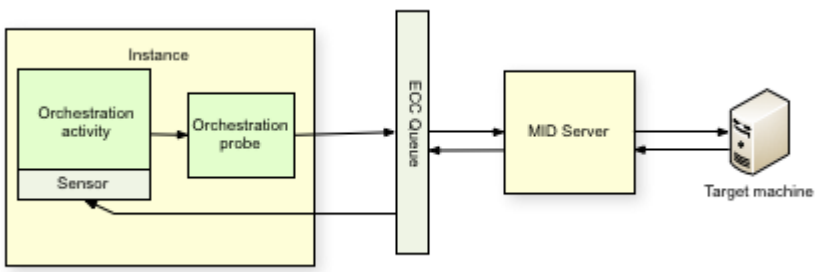
Certain probes, controlled by MID Servers, perform Orchestration tasks on remote computers, such as restarting a server or creating virtual machines from templates.

How Orchestration probes work

When a Workflow executes an Orchestration activity, that activity launches a probe, which writes an *output* record to the ECC Queue. The MID Server selected for the activity checks the ECC Queue for assignments, and then executes the appropriate probe to do the work on the target machine. The information about the activity (machine restarted, files copied, etc.) that is returned from the target machine by the probe is written to the ECC Queue as an *input* record. This information is then sent from the ECC Queue to a sensor that is built into the Workflow activity. The Workflow is updated, and the next activity is executed.

Note:
The probe parameters are set by the activities that launch the probe.

How Orchestration uses probes



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Probe List

The base system includes the following Orchestration probes (**Orchestration** > **Definition** > **Probes**).

Probe List

Probe Name	ECC Queue Topic	ECC Queue Name	Description
Command	Command		A probe that runs a local command on the MID server.
DNS Name Resolver	DNSNameResolver		A probe that resolves a fully qualified domain name (FQDN) into an IP address. The probe executes MID Server queries in parallel. It utilizes DNS lookup by the MID Server host OS to make use of the OS maintained DNS cache. It also leverages the hosts file on the OS.
SCPCommand	SCPCommand		A probe that copies files securely from one machine to another. The copy function is performed using the MID Server as a tunnel.
Shazzam	Shazzam		A probe that identifies active devices.
SNMPProbe	SNMP	SNMP Query	This is a generic SNMP probe.
SOAPProbe	SOAPProbe		A probe that sends a SOAP request to target machine.
SSHCommand	SSHCommand		A probe that executes shell scripts from a command line after logging in to a target machine via SSH.
SSHCommandLong	SSHCommandLong		A probe that executes long running shell scripts from a command line after logging in to a target machine via SSH.
VMWare	VMWareProbe		A generic VMware probe that executes the MID Server script include in the *ECC queue name* that is set by a VMware Orchestration activity. This probe can run any MID Server script include.
Windows - PowerShell	PowerShell	Windows - PowerShell	A probe that runs a Windows PowerShell script on the MID Server. The PowerShell script is provided as the value of a parameter with name ending in *.ps1*. Two variables are available to the script:

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Probe List (continued)

Probe Name	ECC Queue Topic	ECC Queue Name	Description
			• *$computer*: The computer pointed to as the source for this probe • *$cred*: A PowerShell credential, using a user name and password from the Credentials table, that logs into *$computer* successfully.

PowerShell activities

PowerShell is built on the Windows .NET Framework and is designed to control and automate the administration of Windows machines and applications.

PowerShell must be installed on any MID Server that uses these activities. MID Servers using PowerShell must be installed on a supported Windows operating system. ServiceNow supports PowerShell 3.0 to 5.1.

The ServiceNow Orchestration plugin adds these basic PowerShell activities to workflows. For instructions on using activities from the PowerShell activity pack, see PowerShell activity pack

Legacy Run PowerShell activity

The Run PowerShell activity executes Windows PowerShell commands on a MID Server.

Important:
This activity is deprecated and is unavailable for new workflows. To replace the functionality of this activity, use the Powershell activity template to create a custom, scoped activity. Workflows from a previous release that use the Run PowerShell activity can continue to do so.

Result Values

The workflow designer can assign a result value using activity.result from within a script field of the activity. By default, the success or failure of the PowerShell commands used determines the result value of the Run PowerShell activity. Possible result values are:

- Success
- Failure

Scratchpad Entries

Information written to *stdout* by the executing script is captured and returned to the activity in the *activity.output* variable. This information can be parsed, processed, or saved (to a scratchpad variable, for example) for future processing in the activity's sensor script.

An example would be to run the get-date command to get the MID Server's current time. This sensor script saves the full output received, but we can process it to return and save only the time.

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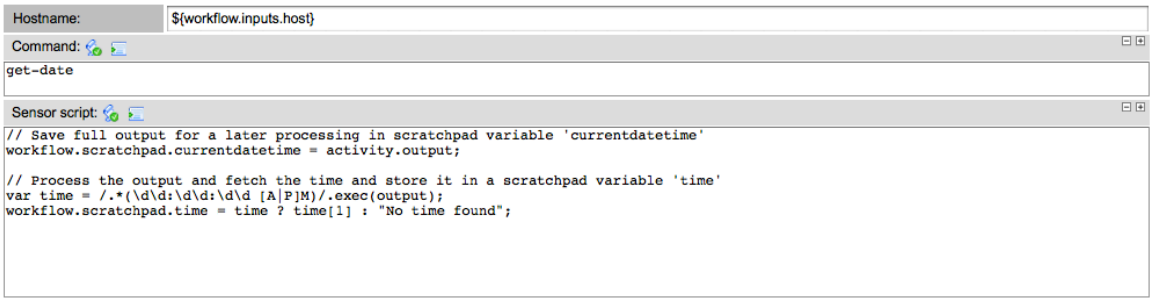
PowerShell activity



Note:
This is an over-simplified example. In most cases, the script operates against some remote Windows computer. However, the principal is the same – whatever is written to `stdout` is returned in `activity.output` and available to process.

Input Variables

Input Variables

Field	Description
Hostname	IP address of the target Windows machine. This value is mapped to the *$computer* variable for use in commands (see the example in the **Command** field). A PowerShell credential variable called *$cred* that is based on information in the ServiceNow Credentials table will authenticate on the computer pointed to by **Hostname**.
Command	Enter the PowerShell command to run. For example, to execute a simple WMI query against a remote machine pointed to by the *hostname* variable, the command is: `get-wmiobject <class> -computer $computer -credential $cred` If no credentials authenticate on the computer, the command runs in the context of the MID Server user. You cannot run both a command and a script file. Specifying a command hides the *Script file* variable.
Sensor script	The script to run using the results of the probe. The output from the probe is contained in a variable called *output*. Any error from the probe is contained in a variable called *error*.
Script file	The Enable script file synchronization for Windows enhanced security. You cannot run both a script file and a command. Selecting a script file hides the *Command* variable.
PowerShell script variables	Additional parameters, in JSON format, used by the specified script file.

States

The activity state tells the workflow engine what to do with the activity.

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States

State	Description
Executing	The workflow engine knows to start the onExecute function of the activity.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activty, was cancelled.

Add workflow variables for the command line using the normal workflow variable syntax. In the example above, if the <class> was in a workflow input variable called *myclass*, the command would look like:

```
get-wmiobject $ {workflow. inputs. myclass } -computer $computer
 -credential $cred
Similarly  if the variable  is a scratchpad variable named
 myclass , the command would look like :
get -wmiobject $ {workflow. scratchpad. myclass } -computer
 $computer -credential $cred
```

HResult codes

When a PowerShell script encounters an error, the Windows machine may return an HResult code as part of the error message.

PowerShell activities can read and interpret this code. Not all PowerShell errors include an HResult code. In the event of a failed PowerShell script, you can use the HResult code to move the workflow through a specific condition.

For example, when resetting an Active Directory password to a password that does not meet policy requirements, such as minimum length or complexity, the PowerShell script returns the HResult code -2146022651. To use this code, create an activity condition with the **Condition** value of *`activity.hresult = -2146022651`*. If the PowerShell script returns this code when the activity runs, the workflow transitions through this new condition.

SSH activities

SSH activities allow workflows to perform operations on Linux and Unix computers.

Your ServiceNow instance must have access to a MID Server configured to use SSH to run these Orchestration activities.

Run Command activity

The *Run Command* activity runs a command (including shell scripts) on a Linux or UNIX computer.

Important:
The Run Command activity is deprecated in this release. If you have a workflow created in a previous version that uses this activity, your workflow will continue to work normally after upgrading to Helsinki. However, to use this functionality in a new workflow, you must create a custom activity using the SSH activity template in the ServiceNow® activity designer.

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Input variables

Run command input variables

Field	Description
Long running	Select this check box to disable the SSH connection timeout if you think the command will take longer to run than the default 60 seconds. Orchestration periodically checks the running process to determine its status until it is finished.
Hostname	Hostname or IP address of destination server for SSH activity.
Directory	Name of the working directory.
Command	The command to run from this activity.
Sudo	Select this check box to use sudo to run the command on the host machine.
Sensor script	The script to run using the results of the probe. The output from the probe is contained in a variable called *output*. Any error from the probe is contained in a variable called *error*.

Run SCP activity

The Run SCP activity uses Secure Copy Protocol (SCP) to copy a file from one computer to another, including the directory in which the file resides.

Note:
This activity is deprecated in the Geneva release and is not available for use in new workflows. If you have a workflow created in a previous version that uses this activity, your workflow will continue to work normally after upgrading. The custom Secure Copy activity replaces the Run SCP activity in the Geneva release.

Input variables

Run SCP input variables

Field	Description
From Host	Hostname or IP address of the source computer.
From File	Absolute path to the file to copy. This value can be a directory.
To Host	Hostname or IP address of the target computer.
To File	Path to the target file. This path can be absolute or relative to the logged in user's home directory. The specified directory must already exist on the target computer.
Copy Directory	Check box to copy a directory defined in the **From File** variable and all files contained in that directory.

Orchestration applications

Orchestration provides several applications with your subscription.

Orchestration ROI

The Orchestration ROI application allows you to estimate and compute cost savings for tasks in your system that could be automated with Orchestration.

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After you automate the tasks, you can track cost savings by associating Orchestration workflows with corresponding task areas. Configuration in the application allows you to select the hourly rate for performing the task manually, the rules the system uses to select tasks for evaluation, and the time period of the evaluation. Orchestration ROI estimates your savings by multiplying the cost of performing repetitive tasks manually by the estimated number of times the system performs those tasks automatically during a specific date/time range. The system also calculates the actual savings of your automations. Orchestration ROI is included with the base Orchestration subscription.

Orchestration ROI reports offer a number of views of the comparative data and allow you to access the associated records directly from the reports. The standard reports included with the Orchestration - ROI plugin provide summaries, estimated costs, and calculated costs for automated processes. The ROI premium dashboard uses Performance Analytics to provide detailed reports on calculated savings over time. Performance Analytics requires a different plugin and subscription.

Note:
When Orchestration ROI is activated as a dependent plugin of Orchestration, demo data is not installed. If you want to use demo data as a template for your own ROI evaluation, submit a request to ServiceNow® technical support for an Orchestration ROI plugin upgrade with demo data selected.

To set up Orchestration ROI, complete the configuration tasks in the order shown here.

Create Orchestration ROI labor rate cards

Before calculating your Orchestration ROI, you must create labor rate cards for the manual work that would be required to complete the tasks correlated to the ROI calculations.

Before you begin
Role required: orchestration_manager

About this task
The hourly rates defined in the rate cards are used to determine the savings from your orchestrated tasks.

Procedure

1. Navigate to **All** > **Orchestration** > **ROI** > **Labor Rate Cards**.
2. Complete the fields in the form using the descriptions in Manage a labor rate card.
3. Click **Submit**.
4. Create additional rate cards as needed.

Create an Orchestration ROI automation entry record

The ROI automation entry record couples the cost of performing a task with the specific workflow that automates the task, for the purpose of calculating the resulting savings.

Before you begin
Role required: orchestration_manager
Before starting this procedure, verify that the appropriate labor rate cards were created.

About this task
Use this record to apply a manual hourly rate to a task that is performed automatically by your instance. To determine the savings realized from orchestrating a task, the system can evaluate whether those savings were estimated or calculated.

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- **Estimated savings**: Uses the labor rate, the time estimates for completion of the task, and the number of automations that have been run to determine savings.
- **Calculated savings**: Uses the labor rate, the time calculated for completion of the task, based on the configured evaluation period, and the number of automations that have been run to determine savings.

Procedure

1. Navigate to **All** > **Orchestration** > **ROI** > **Automation Entry Form**.
2. Fill in the fields on the form, as appropriate.

Automation Entry Form

Field	Description
Category	Category of the selected workflow automation. The following categories are provided in the base Orchestration - ROI system: ○ **Access & Identity Management** ○ **Datacenter Automation** ○ **IT Service Management** ○ **Other** **Note:** To create a category, open the dictionary record for the Automation Entry Form [automation_entry_form] table and add an option to the choice list.
Item	Unique name for the specific task within the category. This value represents the work to which the labor rate card applies, such as **Password Reset**.
Resource	Labor rate card to apply to this automation entry. You must have IT Cost Management active on the instance for this field to appear.
Associated Workflows	Workflow automations created to automate this manual task. The system uses this field to identify the number of automations that have been run.
Estimated Duration (min) per Task	Estimated time to perform this task manually.
Estimated Volume per Month	Estimated number of times needed to perform this task manually per month.
Read-only fields	
Start time	Start time for the evaluation period. Configure this value in the Time Range for Calculated Averages module.
End time	End time of the evaluation period. Configure this value in the Time Range for Calculated Averages module.
Calculated average duration per task (min)	Actual time required to perform this task manually.

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Field	Description
Calculated average volume per month	Actual average number of times this task is performed manually per month.

3. Select one of these submission options:
   - **Submit**: Saves the record to the table without running any calculations.
   - **Submit and process now**: Saves the record and calculates the savings based on the hourly rate and the number of workflow contexts for this automation entry.

Create an Orchestration ROI correlated task rule

The correlated task rule applies configurable conditions to fields in a selected table that tell the instance which manual tasks correspond to an automation entry record.

Before you begin

Role required: orchestration_manager
Before starting this procedure, make sure you have created labor rate cards and the appropriate automation entry records for the automated tasks you want to evaluate.

About this task

Create conditions that the system can use to correlate manual tasks to the automation entry. For example, a rule on the Incident [incident] table uses these conditions to correlate the employee on-boarding task to values configured in the Employee OnBoarding automation entry record:

- **[Subcategory] [is] [Employee OnBoarding]**
- **[Sort description] [contains] [new employee]**

When a new employee opens an incident to request services or assets which are typically handled manually, Orchestration applies the usual labor rate for the manual work to the potential automated solution, and then computes the actual savings.

Procedure

1. Navigate to **All** > **Orchestration** > **ROI Task Correlation** > **Correlated Tasks Rules**.
2. Click **New**.
3. Fill in the fields on the form, as appropriate.

Automation entry form

Field	Description
Automation entry	Automation entry record that correlates to the manual task defined by these conditions. The entry record names the workflow used to automate the task and defines the labor rate used to calculate the cost of the task.
Table	Table to filter, using these conditions. The rule selects records from this table that match the conditions. Information from these records is used to calculate the actual time to perform a manual task and the actual volume for that manual task.
Condition	Condition builder to use to filter records for this table. Use these conditions to identify all manual tasks correlated to this automation entry.
Read-only fields	

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Field	Description
Processed on	Date and time that the system performs the matching records lookup. The system automatically searches for new manual tasks matching these conditions.

4. Select one of these submission options:
   - **Submit**: Saves the record to the table without running any calculations.
   - **Submit and process now**: Saves the record, looks up all matching tasks, and saves matching record information to the Correlated Tasks [manual_mapping_records] table.
5. To view a rule, select the link in the **Table** column of the **Correlated Tasks Rules** related list for the automation entry you want to see.
6. To view the list of tasks that match all correlated rules in the system, navigate to **Orchestration** > **ROI Task Correlation** > **Correlated Tasks**.
7. To view the list of tasks that match this rule in the system, click **Correlated Tasks** under **Related Links** in this form

Configure the time range for Orchestration ROI calculations

Select a date range to calculate the average number of tasks and the duration per month for the correlated tasks.

Before you begin
Role required: orchestration_manager

About this task
By default, the system creates a range ending at the current date and time and extending back over the previous month. You can change this range at any time and recalculate the ROI instantly.

Procedure
1. Navigate to **All** > **Orchestration** > **ROI Task Correlation** > **Time Range for Calculated Averages**.
2. Enter a new start or end date and time or click the icon to select a date using the calendar.
3. Click **Calculate** to recalculate the ROI based on the new time range and to save your settings.

Installed with Orchestration ROI

Several types of components are installed with the Orchestration - ROI plugin (com.snc.runbook_automation.roi).

Tables installed with Orchestration ROI

Tables are added with activation of Orchestration ROI.

Table	Description
Expense and Savings [run_rate_predicted_savings]	Contains the data for the reports in **Orchestration** > **ROI Reports** > **Predicted Savings**.
Savings Report [savings_report]	Contains the number of automations that have been run before the date specified in the **Processed On** column, based on:

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Table	Description
	• Each automation entry's associated workflows • Estimated savings based on the estimated duration per task. • Calculated savings based on calculated duration.
Detailed Savings Report [detailed_savings_report]	Contains a detailed list for the Savings Report [savings_report] table. This list contains each automation's run date and savings for that automation.
Automation Entries [automation_entry_form]	Contains automation entries that couple labor resources to specific manual tasks. You can specify the estimated duration to perform a task manually and the estimated number of times that a task is performed per month. If this automation entry already has workflow automations implemented, you can specify the associated workflows. The system calculates the savings, based on the labor rate card and the number of workflow automations that have been performed.
Roadmap Planning [roadmap_planning]	Contains roadmap planning for each automation entry to be implemented. You can provide estimated hours to implement a workflow automation, the automation percentage anticipated by the end of the year, and the starting month to implement the workflow.
Correlated Tasks [manual_mapping_records]	Contains all matching manual tasks for each automation entry. Each tasks's information is stored in this table for the system to use to calculate the actual duration and volume for each manual task.
Correlated Tasks Rules [manual_mapping_conditions]	Contains the correlated task rules the system uses to look up manual tasks corresponding to each automation entry.

Plugins installed with Orchestration ROI

Plugins are installed with activation of Orchestration ROI, if they are not already active.

Plugin	Description
Cost Management [com.snc.cost_management]	Provides the labor rate cards Orchestration ROI uses to determine the savings for each automated task. See Cost Management for more information.

Roles installed with Orchestration ROI

Roles are added with activation of Orchestration ROI.

Role title [name]	Description	Contains Roles
Orchestration manager [orchestration_manager]	Manages all activities in the Orchestration ROI module.	• pa_admin • report_admin

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UI actions installed with Orchestration ROI

UI actions are added with activation of Orchestration ROI.

UI actions for Orchestration - ROI

UI action	Table	Description
Savings Report	Automation Entry Form [automation_entry_form]	Displays the savings report specific to this automation entry, if the associated workflows are not empty.
Estimated and Projected Savings	Automation Entry Form [automation_entry_form]	Displays the estimated savings, based on the estimated duration of the task, and calculated savings, based on the calculated duration of the task.
Show Workflow Context	Detailed Savings Report [detailed_savings_report]	Shows the related workflow context.
Submit AND process now	Automation Entry Form [automation_entry_form]	Processes this new entry
Correlated Tasks	Correlated Tasks Rules [manual_mapping_conditions]	Displays all matching tasks from the Correlated Tasks [manual_mapping_records] table.
Detailed Savings Report	Automation Entry Form [automation_entry_form]	Displays the list of automations that have been run, based on associated workflows.
Task	Correlated Tasks [manual_mapping_records]	Displays the task record.
Submit AND process now	Correlated Tasks Rules [manual_mapping_conditions]	Processes a correlated task rule. This action performs matching on the specified table and the filter conditions.

Script includes installed with Orchestration ROI

Script includes are added with activation of Orchestration ROI.

Script include	Description
OrchestrationROIAjax	Script that calculates the actual duration and volume of a task.
OrchestrationROI	Script that calculates the number of workflow contexts, looks up all matching tasks, calculates savings, and other functions used in the UI actions.
ROIDemoDataUtil	Script that updates demo data timestamps.

Client scripts installed with Orchestration ROI

Client scripts are added with activation of Orchestration ROI.

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Client script	Table	Description
Display info for processing rules	Correlated Tasks Rules [manual_mapping_conditions]	Displays annotation on the Correlated Task Rule form advising that new task rules are not evaluated until the time specified in the ROI schedule.

Business rules installed with Orchestration ROI

Business rules are added with activation of Orchestration ROI.

Business rule	Table	Description
Delete corresponding records	Automation Entry Form [automation_entry_form]	When a record is deleted from the Automation Entry Form [automation_entry_form] table, this business rule deletes all records in other ROI tables that reference this entry.
Insert into Run Rate & Savings	Automation Entry Form [automation_entry_form]	When a new automation entry is provided, this business rule calculates the estimated savings, based on the estimated duration of a task and its associated labor rate card.
Insert into Savings Reports	Automation Entry Form [automation_entry_form]	When a new automation entry is provided, this business rule inserts a new record into the Savings Report [savings_report] table with the**automations_run** field set to **0**.

Orchestration ROI reports

Orchestration ROI provides a collection of standard and premium reports to help you calculate savings from automating services in your organization.

The ROI standard reports are included with Orchestration ROI. The premium reports provide enhanced views generated with Performance Analytics and require the Orchestration - ROI Premium plugin.

Orchestration ROI standard reports

The dashboard of standard ROI reports provides summaries, estimated costs, and calculated costs for automated processes. To access the ROI standard dashboard, navigate to **Orchestration** > **ROI Reports** > **Dashboard**.

Summary tab

The Summary tab contains four reports on automation categories.

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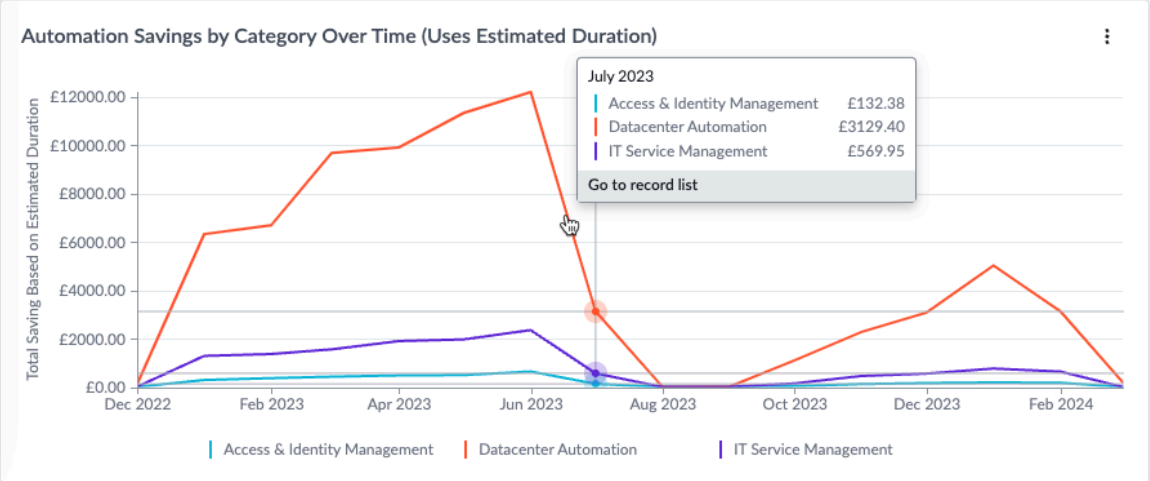
ROI summary report sample



Standard ROI summaries by category

Report	Description
Manual Tasks by Category Over Time	Trend of manual tasks by category over time. For example, if you use automations to perform a portion of the necessary tasks, the report shows the number of tasks still executed manually, decreasing over time. • **Type**: Line chart • **Table**: Detailed Savings Report [detailed_savings_report]
Automations by Category Over Time	Trend of automated tasks by category over time. For example, this chart can show the increase in the number of automated tasks as a workflow automation rolls out slowly over time. • **Type**: Line chart • **Table**: Detailed Savings Report [detailed_savings_report]
Automation Savings by Category Over Time (Uses Estimated Duration)	Amount of savings from automated tasks over time, based on the estimated duration of the task, the number of automations performed, and the cost from the labor rate card. • **Type**: Line chart • **Table**: Detailed Savings Report [detailed_savings_report]
Automation Savings by Category Over Time (Uses Calculated Duration)	Amount of savings from automated tasks over time, based on the calculated duration of the task, the number of automations performed, and the cost from the labor rate card. • **Type**: Line chart • **Table**: Detailed Savings Report [detailed_savings_report]

Estimated Costs tab

The Estimated Costs tab contains eight reports on estimated time and expense for automations.

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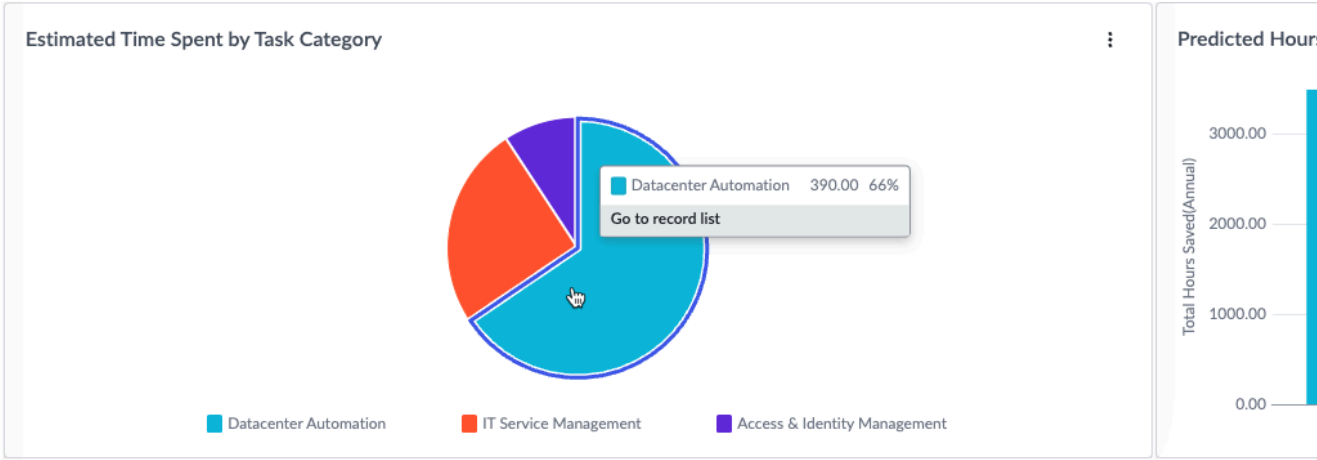
ROI estimated time and expense report samples



Standard ROI time and expense estimates

Report	Description
Estimated Time Spent by Task Category	Total estimated time spent, in minutes, on all tasks by task category. • **Type**: Pie chart • **Table**: Automation Entry Form [automation_entry_form]
Estimated Volume of Manual Tasks per Month by Category	Total estimated volume of all tasks per month by task category. • **Type**: Pie chart • **Table**: Automation Entry Form [automation_entry_form]
Predicted Hours Spent Monthly by Category (Uses Estimated Duration & Volume)	Total predicted hours spent monthly on all manual tasks by category, using the estimated duration of each task and the estimated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Predicted Monthly Expense by Category (Uses Estimated Duration & Volume)	Total predicted monthly expense for all manual tasks by category, using the estimated duration of each task, estimated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Predicted Hours Spent Quarterly by Category (Uses Estimated Duration & Volume)	Total predicted hours spent quarterly on all manual tasks by category, using the estimated duration of each task and the estimated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]

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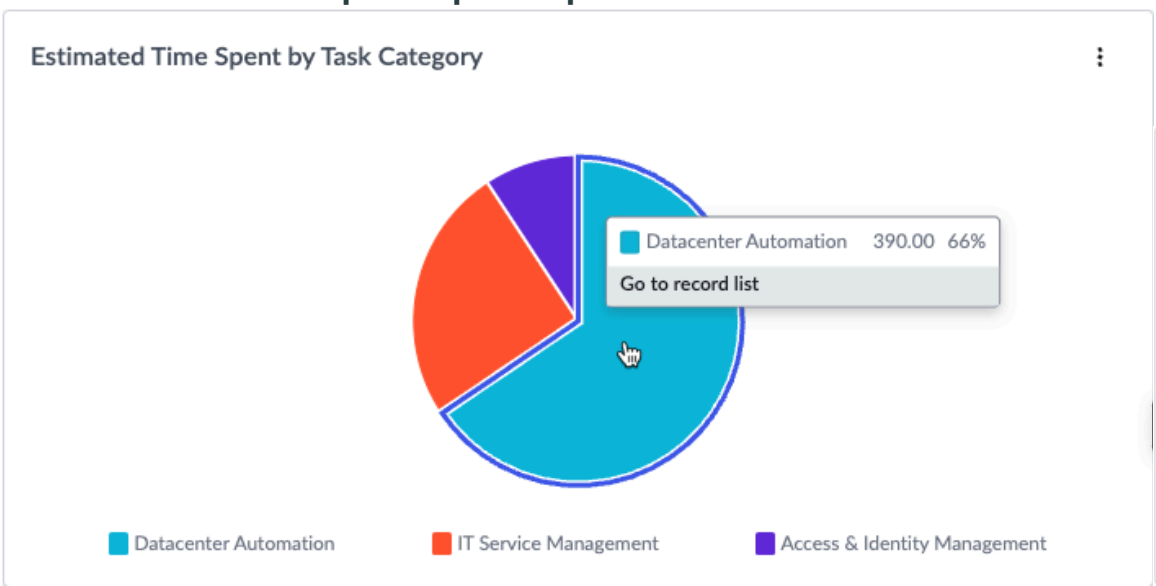
Standard ROI time and expense estimates (continued)

Report	Description
Predicted Quarterly Expense by Category (Uses Estimated Duration & Volume)	Total predicted quarterly expense for all manual tasks by category, using the estimated duration of each task, estimated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Predicted Hours Spent Annually by Category (Uses Estimated Duration & Volume)	Total predicted hours spent annually on all manual tasks by category, using the estimated duration of each task and the estimated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Predicted Annual Expense by Category (Uses Estimated Duration & Volume)	Total predicted annual expense for all manual tasks by category, using the estimated duration of each task, estimated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]

Costs from Correlated Tasks tab

The Costs from Correlated Tasks tab contains eight reports on time and expense for automations based on actual calculations.

ROI calculated time and expense report samples



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Standard ROI calculated time and expense of automations

Report	Description
Time Spent by Task Category	Total actual time spent, in minutes, on all tasks by task category. • **Type**: Pie chart • **Table**: Automation Entry Form [automation_entry_form]
Volume of Manual Tasks per Month by Category	Total actual volume of all tasks per month by task category. • **Type**: Pie chart • **Table**: Automation Entry Form [automation_entry_form]
Projected Hours Spent Monthly by Category (Uses Calculated Duration & Volume)	Total projected hours spent monthly on all manual tasks by category, using the calculated duration of each task and the calculated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Projected Monthly Expense by Category (Uses Calculated Duration & Volume)	Total projected monthly expense for all manual tasks by category using the calculated duration of each task, the calculated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Projected Hours Spent Quarterly by Category (Uses Calculated Duration & Volume)	Total projected hours spent quarterly on all manual tasks by category, using the calculated duration of each task and the calculated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Projected Quarterly Expense by Category (Uses Calculated Duration & Volume)	Total projected quarterly expense for all manual tasks by category using the calculated duration of each task, the calculated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Projected Hours Spent Annually by Category (Uses Calculated Duration & Volume)	Total projected hours spent annually on all manual tasks by category, using the calculated duration of each task and the calculated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]

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Standard ROI calculated time and expense of automations (continued)

Report	Description
Projected Annual Expense by Category (Uses Calculated Duration & Volume)	Total projected annual expense for all manual tasks by category using the calculated duration of each task, the calculated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]

Schedule Orchestration ROI calculations for standard reports

The scheduled job that calculates Orchestration ROI standard reports is active by default and controlled by system properties.

Before you begin

Role required: orchestration_manager, admin

About this task

The system provides a default scheduled job called Processing ROI Schedule that allows you to configure when Orchestration calculates the ROI for standard reports. This schedule allows scripting for advanced conditions. To modify the schedule or write a script to run, open Processing ROI Schedule from **System Scheduler** > **Scheduled Jobs** > **Scheduled Jobs** and click **Configure Job Definition**. To execute the schedule directly from the job definition, click **Execute Now**

To control the running of the schedule job with the Orchestration properties.

Procedure

1. Navigate to **Orchestration ROI** > **Properties**.
2. Configure the following properties:

ROI schedule properties

Property	Description
roi.processing.active	Activate scheduled job for ROI processing. This property activates the Processing ROI Schedule scheduled job. ○ **Type**: true | false ○ **Default**: true
roi.processing.interval	Scheduled ROI processing interval (hours). This property sets the repeat interval for the scheduled job that processes savings reports and correlated tasks. ○ **Type**: integer ○ **Default**: 24

3. Click **Save** to save your changes.

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Orchestration ROI premium reports

The premium dashboard provides detailed reports on calculated savings over time.

The ROI premium reports require the Orchestration - ROI Premium plugin and are built using Performance Analytics. The Orchestration - ROI Premium plugin is dependent on the Performance Analytics - Premium plugin which requires a separate subscription.

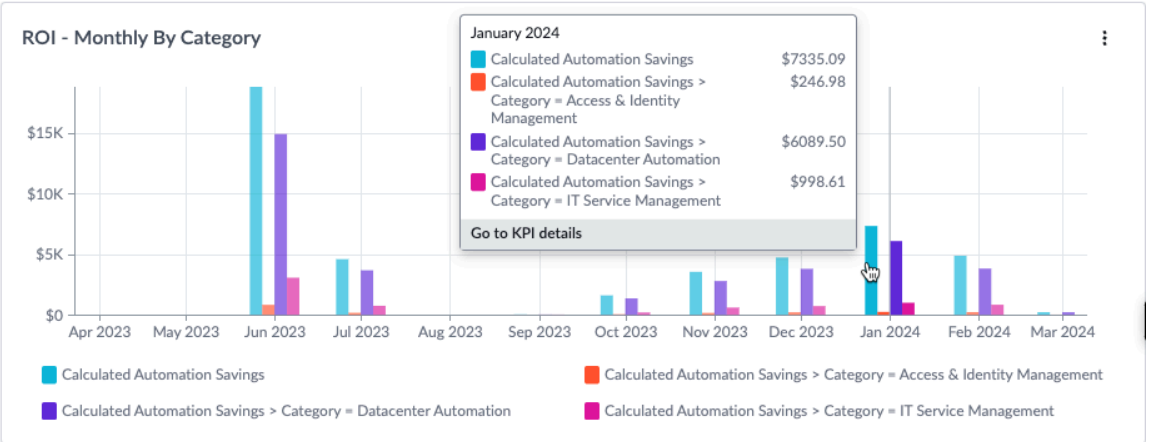
Important:
You must activate the Performance Analytics scheduled collection job before Orchestration ROI premium can display data.

To access the ROI premium dashboard, navigate to **Orchestration** > **ROI Reports** > **Premium Dashboard**.

ROI By Category tab

The ROI By Category tab contains three reports showing the calculated savings over time by category.

Calculated savings monthly by category



Premium reports for calculated savings over time by category

Report	Description
ROI - Monthly By Category	Shows the calculated savings each month by category. The chart displays the total calculated savings against the calculated savings for each category. • **Type**: Column chart • **Table**: Detailed Savings Report [detailed_savings_report]
ROI - By Category	Shows the trend of calculated savings by category. • **Type**: Spline chart • **Table**: Detailed Savings Report [detailed_savings_report]
ROI - Running Sum 12 month period	Shows the running sum of calculated savings for all categories in the last 12 months. • **Type**: Area chart • **Table**: Detailed Savings Report [detailed_savings_report]

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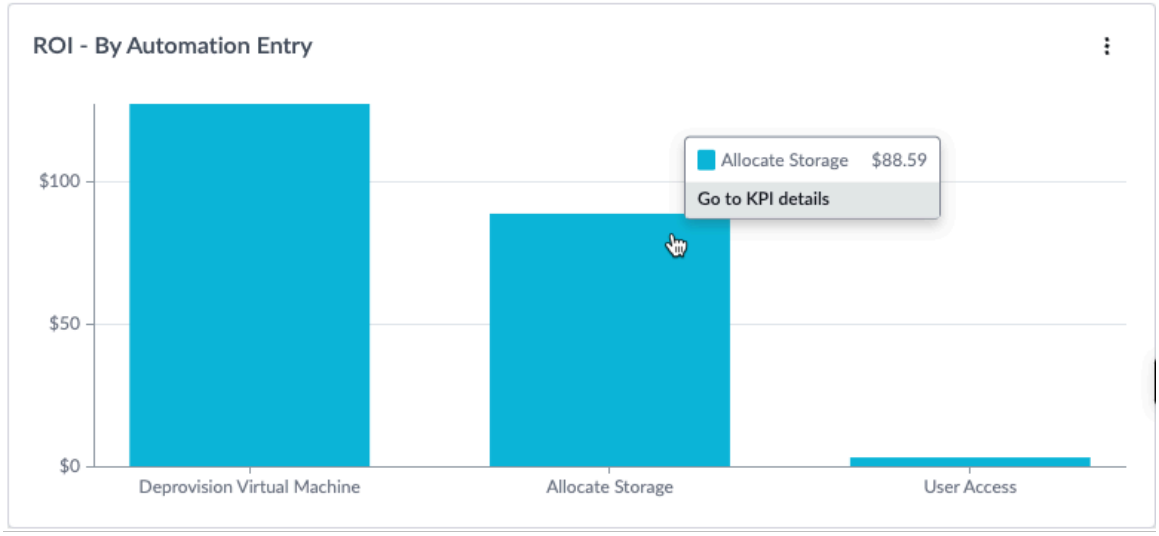
ROI By Automation Entry

The ROI By Automation Entry tab contains two reports showing the calculated savings over time by automation entry.

Calculated savings for the current month by automation entry



Calculated savings over time by automation entry

Report	Description
ROI By Automation Entry	Shows the current month's calculated savings for each automation entry. • **Type**: Column • **Table**: Detailed Savings Report [detailed_savings_report]
ROI - By Automation Entry Top 10 List	Shows the top 10 automation entries that have the most calculated savings in the current month. • **Type**: Scorecard • **Table**: Detailed Savings Report [detailed_savings_report]

Request Orchestration ROI premium reports

To view the Orchestration ROI premium reports, you must request activation of the Orchestration - ROI Premium (com.snc.runbook_automation.roi_premium) plugin. The Orchestration - ROI Premium plugin is included with an Orchestration subscription, but must be activated by request.

Before you begin

The Orchestration - ROI Premium plugin requires the Performance Analytics - Premium plugin, which must be purchased separately.

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

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Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

4. Select **Submit**.
   After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

Schedule Orchestration ROI calculations for premium reports

Orchestration ROI premium reports use a Performance Analytics job that must be activated before premium reports can be generated.

Before you begin

Role required: orchestration_manager, admin

About this task

The scheduled job required to calculate premium ROI reports is called [PA ROI] Historic Data Collection and is installed with the Orchestration - ROI Premium [com.snc.runbook_automation.roi_premium] plugin. This job is not active by default.

Procedure

1. Navigate to **All** > **Performance Analytics** > **Data Collector** > **Jobs**.
2. Search for the [PA ROI] Historic Data Collection job.
3. Select the **Active** check box.
4. The scheduling options appear for the value selected in the **Run** field.
   For instructions on creating a schedule, see Create or schedule a data collection job.
5. To execute the schedule directly from the job definition, click **Execute Now**.
6. Click **Update**.

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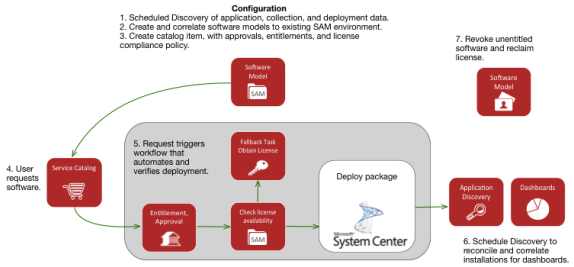
Client Software Distribution

The Client Software Distribution (CSD) application allows administrators to distribute software from the service catalog using third-party management systems.

CSD allows an administrator to create all the records necessary to deploy software from service catalog requests, including software models and catalog items. You can use the CSD application to automate the deployment and revocation of software from an SCCM host using the custom SCCM activity pack. You can define lease periods for software distributed from the Service Catalog and allow lease extensions in some cases, pending approvals. Deployment is accomplished using Orchestration activities and workflows.

CSD also integrates with Software Asset Management to manage license counts for deployed software.

CSD process flow using SCCM



Request client software distribution

Client software distribution requires the Orchestration - Client Software Distribution plugin (com.snc.orchestration.client_sf_distribution), which is available by request with a subscription to Orchestration.

Before you begin

Role required: admin

About this task

The Orchestration - Client Software Distribution plugin activates the Orchestration - System Center Configuration Manager plugin that contains the custom SCCM activities used to deploy or revoke software using an SCCM server. For additional plugin dependencies, see Plugins installed with client software distribution.

Note:
The Orchestration - Client Software Distribution plugin runs in its own application scope.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

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Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

4. Select **Submit**.
   After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

Installed with client software distribution

Several types of components are installed with client software distribution (CSD).

Tables installed with client software distribution

These tables are installed with the Orchestration - Client Software Distribution plugin (com.snc.orchestration.client_sf_distribution).

Client software distribution tables

Table	Description
Client Software Distribution Catalog Item [sn_client_sf_dist_cat_item]	Contains all catalog items created for client software distribution. This table extends the Catalog Item [sc_cat_item] table.
Client Software Distribution Software Request [sn_client_sf_dist_req_software]	Contains all requested software, and their statuses.
Client Software Distribution Application [sn_client_sf_dist_application]	Contains all discovered CSD applications.
Client Software Distribution Provider [sn_client_sf_dist_provider]	Contains all software distribution providers.

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Client software distribution tables (continued)

Table	Description
Client Software Distribution Extension Key [sn_client_sf_dist_extension_key]	Contains the predefined CSD extension keys.
Client Software Distribution Extension Point [sn_client_sf_dist_extension_point]	Contains the customization script for the extension keys.
Client Software Distribution Software Configuration [sn_client_sf_dist_software_config]	Base table for all software provider configurations.
SCCM Server Instance [sn_client_sf_dist_cmdb_ci_sccm_server]	Contains all SCCM server instances. This table extends the Configuration Item [cmdb_ci] table.
SCCM Application [sn_client_sf_dist_sccm_application]	Contains all discovered SCCM applications. This table extends the Client Software Distribution Application [sn_client_sf_dist_application] table.
SCCM Application Catalog Item [sn_client_sf_dist_sccm_app_cat_item]	Contains all catalog items created for SCCM applications. This table extends the Client Software Distribution Catalog Item [sn_client_sf_dist_cat_item] table.
SCCM Collection [sn_client_sf_dist_sccm_collection]	Contains all discovered SCCM collections. Contains all discovered SCCM collections.
SCCM Deployment [sn_client_sf_dist_sccm_deployment]	Contains all discovered SCCM deployments. Contains all discovered SCCM deployments.
SCCM Configuration [sn_client_sf_dist_sccm_sf_config]	Contains the SCCM application, install and uninstall collections, and Discovery model. This table extends the Client Software Distribution Software Configuration [sn_client_sf_dist_software_config]

Plugins installed with client software distribution

These plugins are installed with the Orchestration - Client Software Distribution plugin, if they are not already active.

For instructions on requesting activation of Client Software Distribution (CSD) see Request client software distribution.

Plugins for Orchestration - Client Software Distribution

Plugin	Description
Orchestration - System Center Configuration Manager [com.snc.orchestration.sccm_mgnt]	Installs the custom SCCM Orchestration activities that do work on the SCCM target host.
Orchestration - Asset Lease Management [com.snc.orchestration.asset_lease_management]	Installs the lease functionality for software distributed through the Service Catalog. This includes starting, stopping, and extending leases.
Service Catalog Scoped API	Installs the API to support application creation in the Service Catalog.

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Plugins for Orchestration - Client Software Distribution (continued)

Plugin	Description
[com.glideapp.servicecatalog.scoped.api]	
Software Asset Management [com.snc.software_asset_management]	Provides the ability to manage software assets, including the reconciliation of entitlements to licenses for named users, workstation, and enterprise software agreements.

Roles installed with client software distribution

These roles are installed with the Orchestration - Client Software Distribution plugin.

Roles for Orchestration - Client Software Distribution

Role title [name]	Description	Contains Roles
Client software distribution admin [sn_client_sf_dist.csd_admin]	Administrator role for managing client software distribution application.	• sam • agent_admin • report_admin • catalog_admin • itil • workflow_admin

Script includes installed with client software distribution

These script includes are installed with the Orchestration - Client Software Distribution plugin

Script includes for Orchestration - Client Software Distribution

Script include	Description
CSDExtensionPoint	Execute the CSD provider's specific code
CSDUtil	Utility functions for the CSD application.
RefQualsCSD	Reference qualifier filter. This script provides the filter functrions for the CSD providers, devices, SCCM application, install collections, and uninstall collections.
SCCMCatItemHandler	Sets the field values of specific SCCM catalog items. These values are the SCCM catalog item table name, catalog item name, SCCM provider, and SCCM software configuration.
SoftwareCatItemCreator	Creates software catalog items
CSDCatItemHandler	Base class for CSD catalog item creation. This script is used by the Create Catalog Item UI action to create and application catalog.
CSDDemoDataUtil	Populates demo data.
CSDDemoDataUtilAjax	Populates demo data.

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Properties installed with client software distribution

Properties for client software distribution (CSD) manage the installation status of requested software deployments and configure scheduled Discoveries.

To access CSD properties, navigate to **Client Software Distribution** > **Properties**. The following properties are available:

Client software distribution properties

Property	Name	Description
Status check expiration interval (days)	sn_client_sf_dist.softwareInstallExpDays	Controls how many days the system waits before ignoring the software installation status. The default time limit for installing software is 30 days before the system stops checking the installation status of a deployment. Installation statuses are: • **Not installed**: User has not installed requested software prior to the expiration of the configured time limit. • **Installed**: Software was installed within the configured time limit. • **Status check expired**: Time limit has expired for the user to install the requested software. The system no longer checks the status of this deployment. • **Revoked**: Software was revoked by the administrator. • **Type**: integer • **Default value**: 30
Reconcile software installation status interval (hours)	sn_client_sf_dist.softwareInstallIntervalHour	Determines when the scheduled job runs that determines the installation status. By default, the system checks the installation status every hour. • **Type**: integer • **Default value**: 24
Set scheduled application Discovery interval (days).	sn_client_sf_dist.discoveryExeDay	Sets the repeat interval for the scheduled job that runs application Discovery. By default, Discovery runs at midnight on the day set with this value. • **Type**: integer • **Default value**: 5

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Client software distribution properties (continued)

Property	Name	Description
Set lease execution schedule job interval (minutes)	sn_client_sf_dist.lease_execution_interval	Interval in which the CSD Lease Schedule scheduled job checks for requested software leases to start, stop, or extend. • **Type**: integer • **Default value**: 1
Set time prior to lease end to notify requester (days)	sn_client_sf_dist.lease_end_notification	Determines how many days prior to the end of a software lease to notify the requester. If lease extensions are allowed, ensure that this period provides enough time for the approval process to complete before the lease expires. • **Type**: integer • **Default value**: 5

Workflows installed with client software distribution

These workflows are installed with the Orchestration - Client Software Distribution plugin

Workflows installed with client software distribution

Workflow	Description
Discover SCCM	Retrieves lists of applications, collections, and deployments from SCCM servers using custom CSD orchestration activities. An administrator runs this workflow from a UI action in a SCCM Server Instance record.
Order Client Software	Runs automatically when a user orders software from the service catalog.
Deploy SCCM Application	Triggered by the Order Client Software workflow to deploy software through SCCM server. This workflow adds either the user or the device into the SCCM collection.
Revoke Client Software	Begins the software revocation process for software deployed by an external provider. Administrators run this workflow from a UI action on the Requested Software record and the Installed Software Not Entitled record. This workflow triggers the appropriate provider workflow that performs the actual recovation. For example, this workflow triggers the Revoke SCCM Application workflow for applications in SCCM uninstall collections.
Revoke SCCM Application	Revokes SCCM applications that are members of an uninstall collection. The Revoke Client Software workflow triggers this workflow to revoke software deployed by an SCCM server. This workflow moves either the user or the device from the SCCM collection into the appropriate uninstall collection.

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Related topics

- Using extension points to extend application functionality
- Using scripted extension points in server-side scripts
- Using UI extension points in server-side UI macros
- Using client extension points in client-side UI scripting

Create licenses and counters for distributed software

Licenses and software counters are associated with the software model and must be created if you want to track the license for software deployed by client software distribution (CSD).

Before you begin

Role required: sam or admin

You can create software licenses and counters in Software Asset Management for software items deployed from the service catalog by CSD. CSD depends on the software counter result to determine if the license is available for the requested software. If the license **Valuation** is greater than 0, and the license type is **Not allocated**, CSD assumes that the license is available for the software.

Procedure

1. Navigate to **All** > **Software Asset** > **Software Licenses**.
2. Add a new software license for the software model you used in CSD.
3. Navigate to **Software Asset** > **Reconciliation** > **Software Counters**.
4. Create a software counter for the software model you created.
5. Run the counter to retrieve the software license information.

Client software distribution ordering process

Software deployed by Client Software Distribution (CSD) can be ordered from the service catalog by individual users or by approved users on behalf of others.

Client Software Distribution catalog items have different options, depending on how ordering is configured.

Lease start and end dates

All software deployed by CSD requires users to specify the beginning date for the lease. This is enforced by the Orchestration - Asset Lease Management plugin that is activated automatically with CSD. The system prepopulates the **Lease start** field with the current date and time.

If the catalog item is configured for revocation (uninstall), the form displays the **Lease end** field, which allows the requester to define an end date and time for the lease. The system validates user input in these fields to ensure that the dates selected define a future window. The **Lease end** field is not mandatory and can be left blank to order software with no end date.

Note:
For systems deploying software from Microsoft System Center Configuration Management (SCCM), the **Lease end** field is only available if the SCCM configuration specifies an uninstall collection.

Software offered only to the logged in user

If the software catalog item is configured with the **Order on behalf of** check box cleared, the **User** field does not appear on the order form. The logged in user selects the device on which

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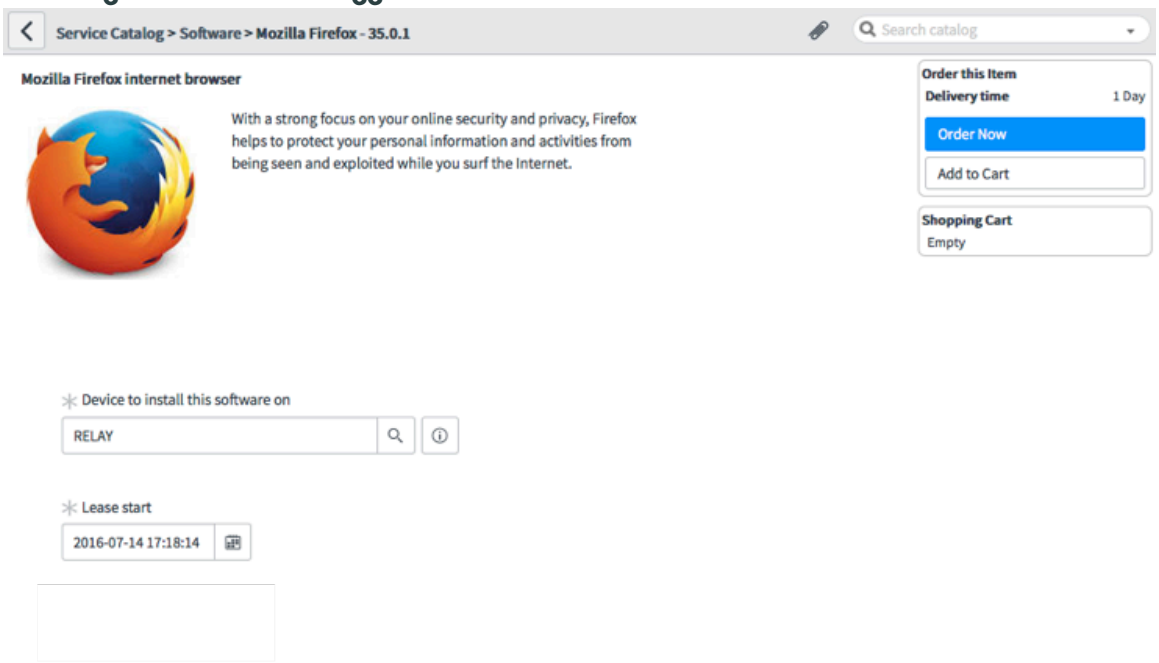
to deploy the software from the **Device to install this software on** field. Only those devices assigned to the logged in user appear in the list.

In this example, a user has logged into the service catalog to order Firefox for a computer that is assigned to the user. User selects the machine from a list of owned devices and selects the date and time the lease should begin. This software is deployed through Microsoft System Center Configuration Management (SCCM), but does not have an uninstall collection configured and cannot be revoked automatically by the system. As a result, the **Lease end** field is not available.

Ordering software as the logged in user



Software ordered on behalf of another user

If the software catalog item is configured with the **Order on behalf of** check box selected, the **User** field appears on the form. The logged in user can select any user from this field. The **Device to install this software on** field only lists the devices assigned to the user selected in the **User** field. If an approval is required for software ordered on behalf of another user, the system automatically sends an approval request to the manager of the user receiving the software. The approval is skipped if the requester is the named user's manager.

In this example, a manager is ordering Google Chrome for a contractor. The manager selects the contractor from the **User** field and then chooses a computer from the list of devices assigned to the contractor. This software has an SCCM uninstall collection configured, which allows the manager to select an end date for the lease that coincides with the end of the user's contract. When the lease expires, SCCM automatically uninstalls the software from the device.

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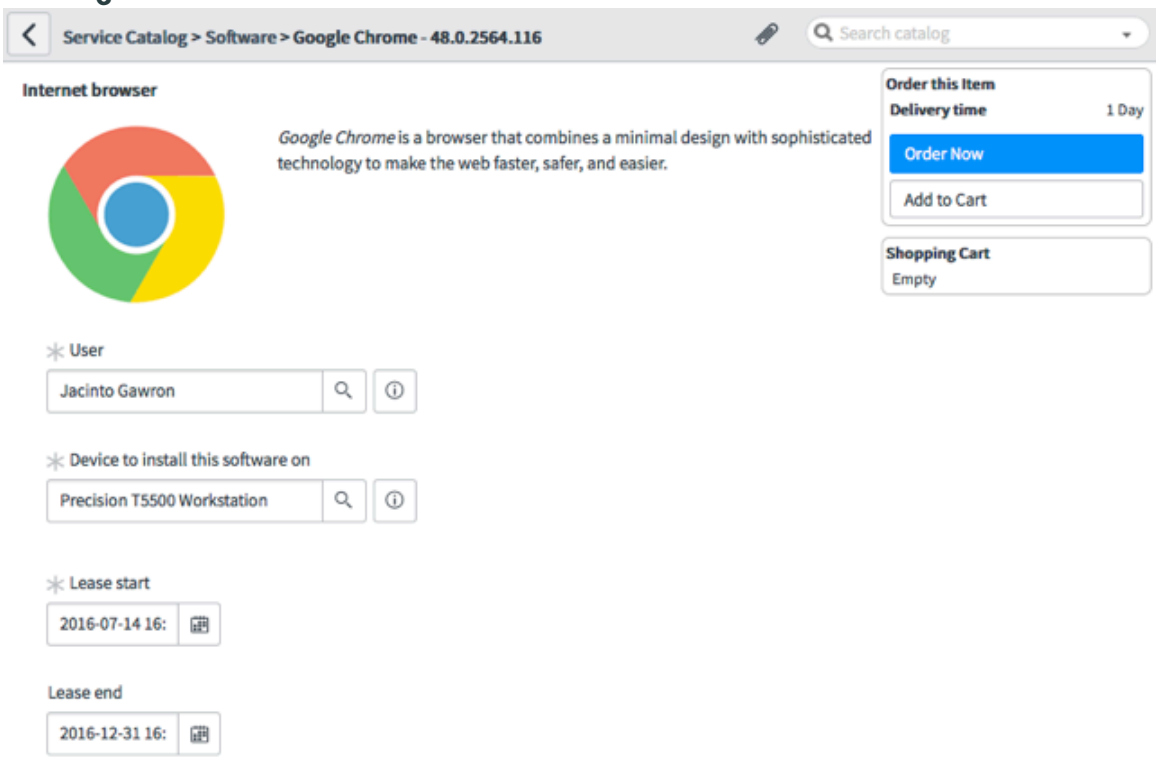
Defining software lease window



Extend a software lease

Users of software deployed by Client Software Distribution (CSD) can request the extension of a lease window, if the software is revocable by a software distribution system.

Before you begin

Role required: Any system user

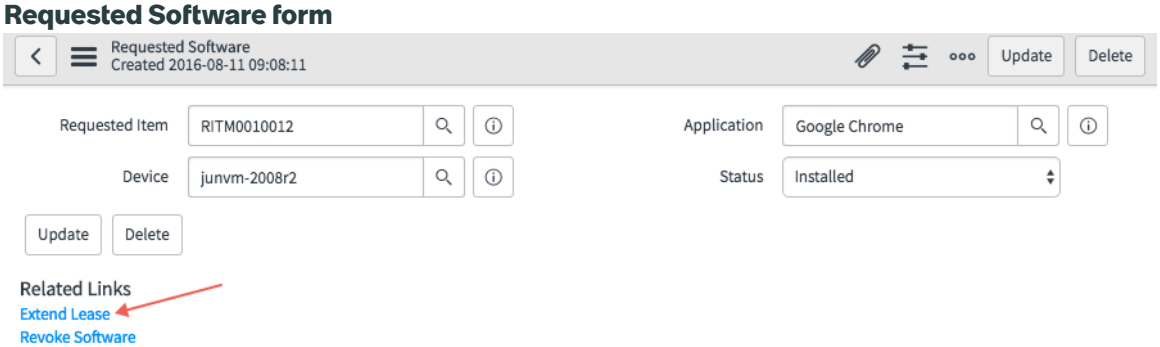
About this task

If your software has a lease end date defined, and the software status is **Installed**, you can request an extension of the lease, pending any approvals your organization requires.

Procedure

1. Navigate to **All** > **Service Catalog** > **My Requested Software**.
   The list shows only the software you have requested from the service catalog.
2. Select the record for the installed software whose lease you want to extend.
3. Under **Related Links** click **Extend Lease**.

Requested Software form



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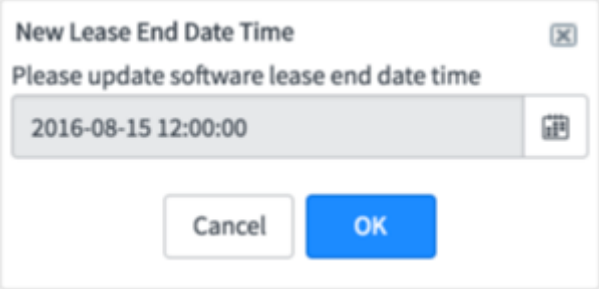
4. In the dialog box that appears, select a new lease end date in the calendar and click **OK**. You must select a date later than the current date.



If the lease extension is subject to manager approval, you are notified of the decision. If the request is approved, a notification shows the new lease end date. If the new end date is within 5 days (the default notification period) of the date when you made the request, CSD sends an immediate end-of-lease notification.

Important:
If lease extensions in your organization require approval, make sure the approver is available and has enough time to process your extension request. If the extension cannot be approved before the original end date expires, the software is revoked.

Client software distribution from SCCM

You can use Client Software Distribution (CSD) to deploy and revoke software deployments from Microsoft System Center Configuration Management (SCCM) and manage distributions on SCCM hosts.

The SCCM activity pack contains Orchestration activities that CSD uses to deploy software from a service catalog request and manage user and device collections on SCCM servers. In addition, CSD can manage license counts for deployed software using ServiceNow Software Asset Management, revoke software deployed by SCCM without user interaction, and manage lease periods.

Configuring SCCM

Follow the SCCM configuration procedures in the order shown.

Configure the Application Administrator role on the SCCM server

To deploy software using ServiceNow® Client Software Distribution (CSD), ensure that an SCCM administrative user has the correct permissions to deploy software and that PowerShell is properly configured.

Before you begin
SCCM role required: Application Administrator

About this task
These instructions are for Microsoft 2012 R2 Server.

Procedure

1. In the System Center Configuration Manager console, navigate to **Administration** > **Security** > **Administrative Users**.
2. Right-click the user to whom you want to grant the Application Administrator role.
3. Select **Properties** from the drop-down menu.
4. In the Properties dialog box, select the **Security Roles** tab.

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5. Ensure that the user has the Application Administrator role.
6. If the user does not already have this role, click **Add**, select this role from the list, and click **OK**.
7. Log into SCCM as the user with the Application Administrator role.
8. Open the menu from the upper left corner of the console and select **Connect via Windows PowerShell**.
9. Ensure that the user can access the CM console.
   This action establishes the environment path to PowerShell for the logged in Application Administrator user.

Update the SCCM cmdlet libraries

Ensure that the System Center Configuration Manager SCCM Cmdlet Library is up-to-date.

Before you begin

Role required: Either current user or system administrator, depending on settings.

About this task

The System Center Configuration Manager SCCM Cmdlet Library installs and updates the Windows PowerShell module for SCCM. SCCM checks for library updates on a daily basis. Out-of-date libraries can cause Discovery of the SCCM server to fail, because the system cannot parse the SCCM activity output. This warning message appears in the ECC queue input records for the SCCM GET activities:

```
WARNING: An update to the System Center 2012 Configuration
 Manager Cmdlet
Library is available. Please go to
'http://go.microsoft.com/fwlink/?LinkId=528947' to download the
 latest version.
Running cmdlet version: 5.0.8231.1004 Latest cmdlet version:
 5.0.8328.1155
```

Download the latest version of the cmdlet library from Microsoft. For installation instructions, see https://learn.microsoft.com/en-us/fabric/enterprise/powerbi/service-admin-reference.

If you elect to use an earlier version library, use this procedure to disable the CM update check, which allows Discovery to prodeed without issues.

Procedure

1. Log into the SCCM console as an adminstrator.
2. Open the menu from the upper left corner of the console.
3. Select **Connect via Windows PowerShell**.
4. Run one of these commands to disable the update check:
   - **Per-user**: *`Set-CMCmdletUpdateCheck -CurrentUser -IsUpdateCheckEnabled 0`*
   - **Per-system**: *`Set-CMCmdletUpdateCheck -System -IsUpdateCheckEnabled 0`*

   Important:
   The per-system cmdlet must run in an elevated Windows PowerShell session.

5. Run the *`Get-CMCmdletUpdateCheck`* command to refresh the console and check the settings.

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6. Ensure that the value of the *IsEnabled* configuration variable has changed to **False**. This indicates that the warning for an out of date cmdlet library is disabled for the users specified.
7. To re-enable the update check, run the *-IsUpdateCheckEnabled 1* command for either the current user or for the system.

Configure the MID Server for SCCM activities

To use a MID Server with Microsoft System Center Configuration Management (SCCM) activities, configure it to communicate with the SCCM server.

Before you begin
Role required: admin

Procedure
1. In the navigation filter, enter **cmdb_ci_dns_name.list**.
2. Click **New**.
3. Enter the fully-qualified domain name (FQDN) of the SCCM server in the **Name** field.
4. Right-click in the form header and select **Save**.
5. In the **IP Address** related list, click **New**.
6. In the **IP Address** field, enter the IP address of the SCCM server.
7. In the **Nic** field, select **eth0** or your preferred network interface controller.
8. Leave the **Netmask** field blank.
9. Click **Submit**.

Create Windows credentials for SCCM deployments

Microsoft System Center Configuration Manager (SCCM) requires the appropriate credentials to deploy applications using the Client Software Distribution application.

Before you begin
Role required: sn_client_sf_dist.csd_admin or admin

About this task
Client software distribution requires Windows credentials that have administrative rights on the SCCM server.

Procedure
1. Navigate to **All** > **Orchestration** > **Credentials**.
2. Click **New**.
3. In the list of credential types, select **Windows Credentials**.
4. Provide a user name and password with administrative rights on the SCCM server.

> **Important:**
> Ensure the following:
> - This user must have the Application Administrator role on the SCCM server.
> - Use the credentials to log into the SCCM Server and connect via Windows PowerShell from the System Center Configuration Manager console at least once to set the path variable for that credential.

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5. Fill in the other fields on the form, as appropriate.

   For details, see Windows credentials.

6. Click **Submit**.

Retrieve SCCM data for client software distribution

Retrieve the collections and the list of applications available for deployment from your SCCM servers.

Before you begin

Role required: sn_client_sf_dist.csd_admin or admin

Before starting this procedure:

- Set up your Microsoft System Center Configuration Manager (SCCM) server, create the applications and collections, and configure the deployments you need. For information, see your SCCM documentation.
- Configure a user with the Application Deployment Manager role on the SCCM server.
- Set up the MID Server to communicate with the SCCM server.
- Add Powershell credentials to the ServiceNow Credentials [discovery_credentials] table for the SCCM user who has the Application Deployment Manager role.

About this task

To populate the Client Software Distribution application with SCCM data:

Procedure

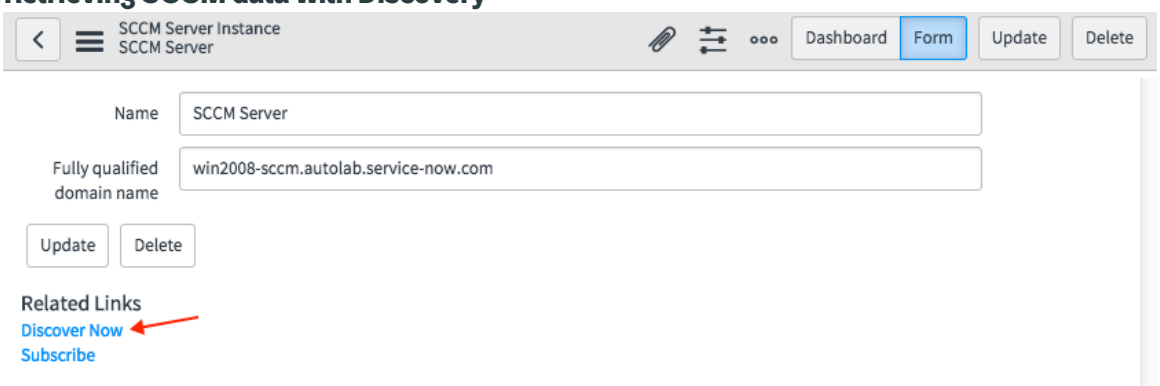
1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Server Instance**.
2. Click **New**.
3. In the SCCM Server Instance form, identify the server by name and provide the fully qualified domain name.
4. Click **Submit**.

   The new SCCM server appears in the list.

5. Open the new SCCM record and click **Discover now** under **Related links**.

   The system runs the Discover SCCM workflow that retrieves the application, collection, and deployment data from the SCCM server.

Retrieving SCCM data with Discovery



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SCCM server Discovery for client software distribution

A Discovery workflow populates ServiceNow tables with collection, application, and deployment data retrieved from SCCM servers.

Users run the **Discover SCCM** workflow from an SCCM Server Instance record to populate the following ServiceNow tables:

SCCM data populated in ServiceNow tables

Table	Fields
SCCM Application [sn_client_sf_dist_sccm_application]	• name • publisher • version • model • sccm_server
SCCM Collection [sn_client_sf_dist_sccm_collection]	• name • type • sccm_server
SCCM Deployment [sn_client_sf_dist_sccm_deployment]	• application • collection • type

Note:
For details about the custom activities used in this workflow to extract data from an SCCM server, see Orchestration SCCM activity pack.

Set up a software model for an SCCM application

Using the applications discovered on the SCCM server, set up a software model used by the Software Asset Management application to manage licenses.

Before you begin

Role required: sn_client_sf_dist.csd_admin or admin
Before creating software models, you must discover the applications available for deployment on the SCCM server. See Retrieve SCCM data for client software distribution for details.

About this task

You can link an SCCM application to an existing software model or create a new model.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Applications**.
   A list of applications discovered on the SCCM server appears.
2. Open an SCCM application record.
3. To link to an existing model, click the magnifying glass icon in the **Model** field and select a model from the list.

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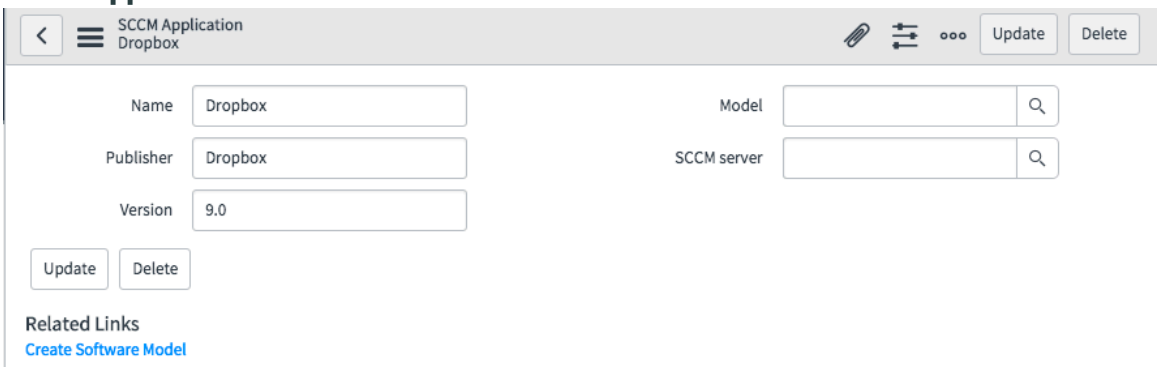
SCCM application record



4. To create a model, click **Create Software Model** under **Related Links**.

   a. Complete the software model fields.
   See for details.

   b. Click **Submit**.
   The view returns to the SCCM Applications form.

Define an SCCM configuration

To create catalog items for SCCM software deployment or to configure your instance to revoke software through SCCM, you must first associate that software with a collection through an SCCM configuration.

Before you begin

Before you create an SCCM configuration record, make sure you have discovered the SCCM applications, collections, and deployments and set up the necessary software models.

Role required: sn_client_sf_dist.csd_admin or admin

About this task

The SCCM configuration process associates software with SCCM collections. To deploy software from an SCCM server, the user or device must be a member of an SCCM collection associated with an **install** deployment. Client Software Distribution (CSD) allows you to revoke unentitled software using an SCCM server when that software can be removed using an **uninstall** collection. Users requesting revokable software from the Service Catalog also have the ability to define lease start and stop dates and request lease extensions.

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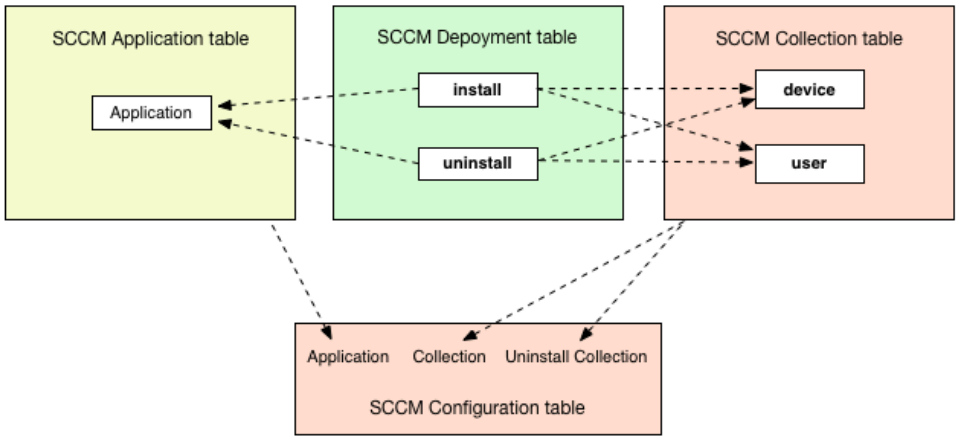
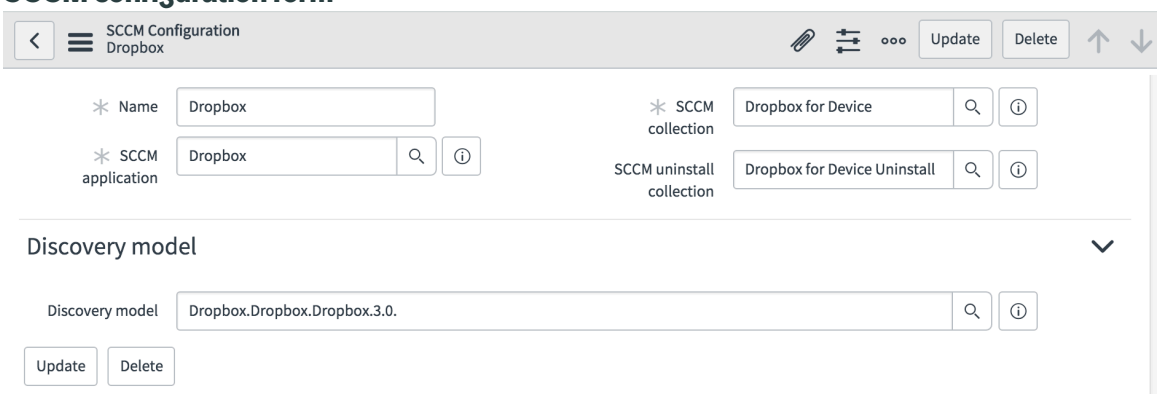
SCCM table references



Procedure

1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Applications**.
2. Open an application that has a configured software model.
3. Under **Related Links**, click **Create Software Configuration**.
4. Complete the form, using the fields in the table.

SCCM configuration form



SCCM configuration fields

Field	Description
Name	Recognizable name for this SCCM software configuration.

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Field	Description
SCCM application	Name of an application hosted on the SCCM server.
SCCM collection	Name of the collection associated with the **install** deployment for the selected application on the SCCM server. Only those collections associated with the application are available for selection.
SCCM uninstall collection	Name of the collection associated with the **uninstall** deployment for the selected application on the SCCM server. You must specify an uninstall collection to: ○ Define a lease end date for deployed software. ○ Allow lease extensions. ○ Revoke software from a user's machine.
Discovery model	Discovery model that links the unentitled software installation with the SCCM configuration. From the SCCM configuration record, Client Software Distribution can determine which collection to use to revoke the software. Unentitled software is software found on the user's machine that the user is not entitled to use.

Create a catalog item for an SCCM application

Using the applications discovered on the SCCM server, create a catalog item for an application you want to offer for distribution from the service catalog.

Before you begin

Role required: sn_client_sf_dist.csd_admin or admin
Before creating a catalog item, you must link the application to a software model and create at least one software configuration.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Applications**.
   A list of applications discovered on the SCCM server appears.
2. Open a record for an SCCM application.
3. Under **Related Links**, click **Create Catalog Item**.
   A new SCCM Application Catalog Item record appears with preconfigured information. .

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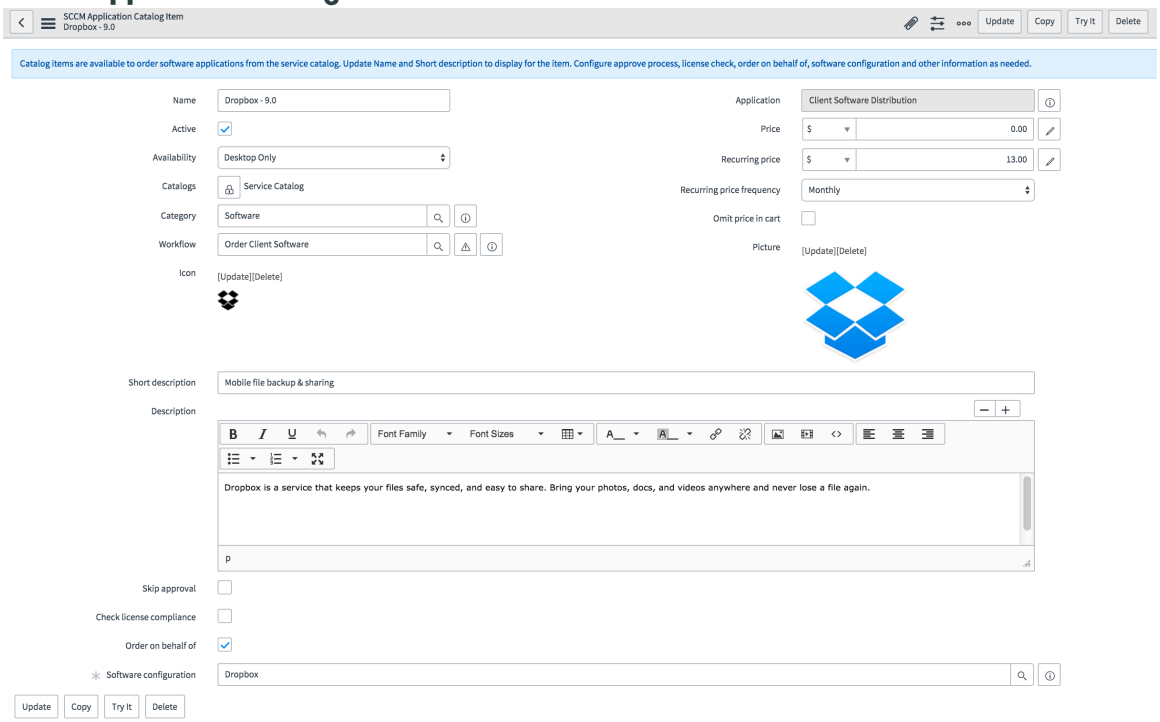
SCCM application catalog item



4. Add price information and complete the following fields added to the Client Software Distribution Catalog Item [sn_client_sf_dist_cat_item] table by the Orchestration - Client Software Distribution plugin:

SCCM fields in the catalog item form

Field	Description
Skip approval (skip_approval)	Check box that allows skipping approval for this item by the requester's manager when a user orders it from the service catalog. Use this field in conjunction with the **Order on behalf of** field to ensure that software ordered by a logged in user on behalf of another user is subject to approval. By default, this check box is cleared, requiring manager approval for all new catalog items. **Note:** There are two levels of approval possible. By default, all category items require group approval for items in excess of $1000. If that approval is given or skipped, the system evaluates the **Skip approval** check box to determine if the software item requires approval by the requester's manager.
Check license compliance (check_license_compliance)	Check box that forces the system to determine if deploying this item is allowed under the current license.
Order on behalf of	Check box that allows the logged-in user to order this software from the service catalog for another user. This permits service desk personnel to order SCCM deployments for other users in the system. By default, this feature is enabled. To prevent unauthorized users from ordering software, ensure that

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Field	Description
	approvals are required for this type of deployment by clearing the **Skip approval** check box. If an approval is required for software ordered on behalf of a user, the system automatically sends an approval request to the manager of the user receiving the software. The approval is skipped if the requestor is the named user's manager. Software items requested from the service catalog on behalf of a different user require the following information: ○ **User**: User selected for deployment. This field is automatically populated with the name of the logged in user. You can select another user from the list. ○ **Device to install this sofware on**: Device belonging to the selected user on which to deploy the software. Only devices belonging to that user appear in the choice list. ○ **Lease start**: Date and time to deploy the software. This is the start time for the lease. A lease can be open-ended or have a lease end time.
SCCM configuration	Name of the SCCM configuration record for this application. This record defines the collection and uninstall collection for this application. This configuration is required for all deployments, revocations, and leases performed by the SCCM server.

5. If the catalog item requires approval because of cost, be sure to configure an approval group in the**Approved By Group** related list.
   By default, the Service Catalog Request workflow runs when an item costing more than $1000 is ordered and looks for an appropriate approval group. If no approval group is configured for the item, this workflow skips approval altogether and ends. The system then runs the Order Client Software workflow, which evaluates the **Skip approval** check box to determine if approval by the requester's manager is required.
6. Click **Update**.
   The view returns to the SCCM Applications list.
7. To see all client software distribution (CSD) catalog items, navigate to **Client Software Distribution** > **Maintain Items** > **Software Items**.

SCCM deployment

Ordering an SCCM application from a client software distribution (CSD) catalog item in the service catalog triggers the Order Client Software workflow.

This process deploys an SCCM application to a user or device through a service catalog order:

1. If the **Skip approval** check box is cleared in the software catalog item, the Order Client Software workflow sends the catalog request to the requesting user's manager for approval.
2. If the **Check license compliance** check box is selected in the software catalog item, the workflow performs a software license check. If there is no license available, the workflow creates a catalog task to procure more licenses and assigns the task to the Client Software Distribution Administrators group.

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3. The Order Client Software workflow triggers the Deploy SCCM Application workflow as a subflow. This workflow adds either the user or the device to the SCCM collection using the Add to User Collection or Add to Device Collection SCCM activity.
4. If the software configuration specifies SCCM uninstall collection in the software catalog item, the Deploy SCCM Application workflow checks if the user or device exists in the uninstall collection. The workflow uses the Is Device in Collection or Is User in Collection SCCM activity. If the user or device exists in the uninstall collection, the workflow removes the device or user. The workflow uses the Remove from Device Collection or Remove from User Collection SCCM activity before adding it to the SCCM install collection.

Client software distribution validation process

After SCCM deploys software to a target computer, client software distribution (CSD) detects the installation and validates its status.

Client software distribution uses the following methods for detecting software installed on the target machine:

- **Discovery**: CSD is configured to leverage Discovery to detect software installations. You can run Discovery manually at any time, or by a scheduled job.
- **Microsoft SCCM Integration**: You can import SCCM data into the CMDB using the features in the Integration - Microsoft SCCM plugin if Discovery is not active on the instance.

The instance uses the data gathered by Discovery or the SCCM integration plugin to populate the Software Installation [cmdb_sam_sw_install] table. To validate installations using this data, CSD runs a scheduled job called Reconcile Requested Software that uses Properties installed settings. This process reconciles the software installation data accumulated in the CMDB and makes these status updates:

- **Not installed** to **Installed**: The user has installed the requested software within the time limit configured in the *sn_client_sf_dist.softwareInstallExpDays* property.
- **Not installed** to **Status check expired**: The time limit has expired for the user to install the requested software. The system stops checking for installation when the time limit expires.

SCCM software revocation

An administrator can revoke software without any user interaction using Microsoft System Center Configuration Manager (SCCM) if the software configuration specifies an SCCM uninstall collection, even if the software was installed by some other process or user.

Revoke software deployed through the service catalog

Software deployed by SCCM can be revoked, but only when the software's status is **Installed** and the application associated with the software configuration has an uninstall collection configured.

Before you begin

- Create an SCCM configuration record for the application that names an appropriate uninstall collection.
- Associate the CSD catalog item for the application with the SCCM configuration that specifies the uninstall collection.

Role required: sn_client_sf_dist.csd_admin or admin

A workflow called Revoke SCCM Application moves either the user or the device from its respective collection and adds it to the appropriate uninstall collection. When SCCM performs

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an internal policy check and finds the user or device in the uninstall collection, SCCM removes the related software package from the client computer.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **Reports** > **Requested Software**.
2. Open the record for the SCCM software package you want to revoke.
   The package must have a **Status** of **Installed** to be revocable.
3. Under **Related Links**, click **Revoke software**.

   This action runs the Revoke Client Software workflow, which triggers the Revoke SCCM Application subflow that moves the user or device from the install collection to the uninstall collection. When SCCM performs an internal policy check and finds the user or device in the uninstall collection, SCCM removes the related software package from the client computer.

Revoke unentitled software

An administrator can revoke software using Microsoft System Center Configuration Manager (SCCM) that a user is not entitled to use even if the software was installed by some other process or user.

Before you begin

To revoke software using SCCM, you must create an SCCM configuration record for the application, in which the appropriate software Discovery model is defined. See Software discovery models.

Role required: sn_client_sf_dist.csd_admin or admin

Client Software Distribution (CSD) uses Software Asset Management to identify unentitled software installations. Discovery detects the software on the user's machine, and SAM determines if the user or device is entitled to use that software. This might include software that was not installed through a catalog request or software that the user installed without approval. If the software installation's Discovery model is associated with an SCCM software configuration that has an uninstall collection defined, then an administrator can use CSD to revoke that software from the user's machine without involving the user.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **Reports** > **Installed Software Not Entitled**.
2. Select the record for the installation that has unentitled users.
3. Under **Related Links**, click **Revoke software**.

   This action runs the Revoke Client Software workflow, which triggers the Revoke SCCM Application subflow that moves the user or device from the install collection to the uninstall

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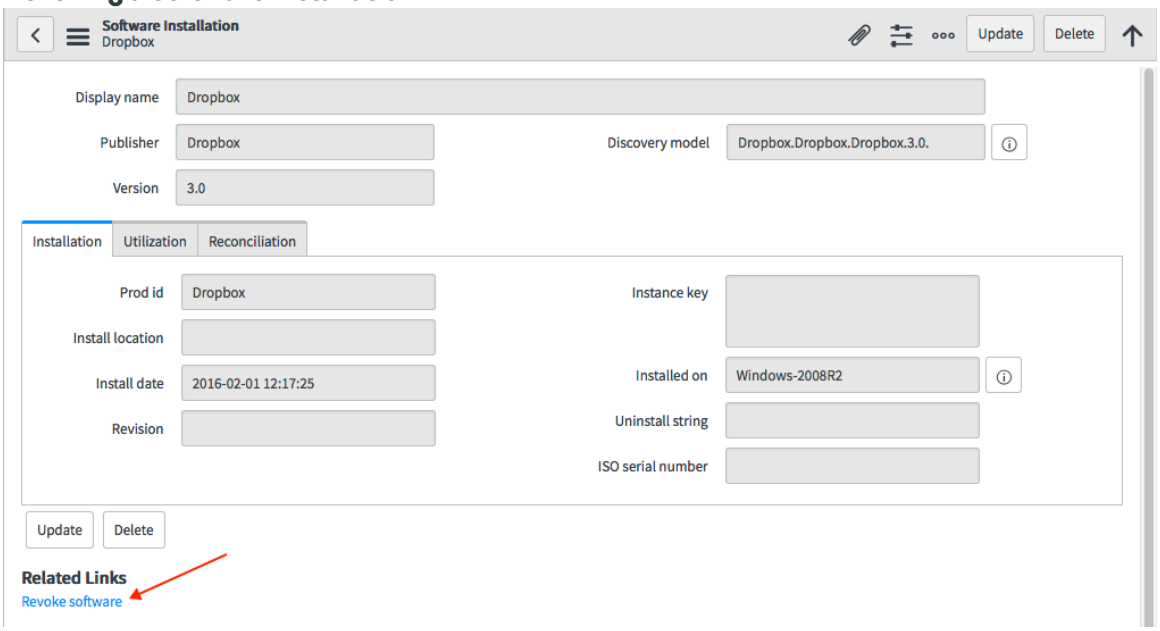
collection. When SCCM performs an internal policy check and finds the user or device in the uninstall collection, SCCM removes the related software package from the client computer.

Revoking a software installation



SCCM software revocation workflow

The Revoke SCCM Application workflow moves a user or device from an install collection to an uninstall collection to revoke software installed from Microsoft System Center Configuration Manager (SCCM).

For the revocation workflow to run, the software package must have a status of **Installed** and must be pre-configured for an appropriate uninstall collection. See Revoke software deployed through the service catalog for configuration instructions. When an administrator initiates the revocation process, the system launches the Revoke SCCM Application workflow to move the user or device collection associated with installation to the appropriate SCCM uninstall collection. When the SCCM server performs a policy check, it finds the additions to the user or device uninstall collection and revokes the software package associated with that collection.

The workflow employs two custom activities, Remove from User Collection and Remove from Device Collection, to remove either the user or the device from its original collection. The workflow then adds the user or device to the appropriate uninstall collection on the SCCM server with the Add to User Collection or Add to Device Collection activity.

Note:
This workflow is triggered by the Revoke Client Software workflow as a subflow.

Client software distribution dashboard

The CSD dashboard provides a collection of visual reports for the Client Software Distribution application.

CSD dashboard

To access the CSD dashboard, navigate to **Client Software Distribution** > **Requested Software** > **Dashboard**.

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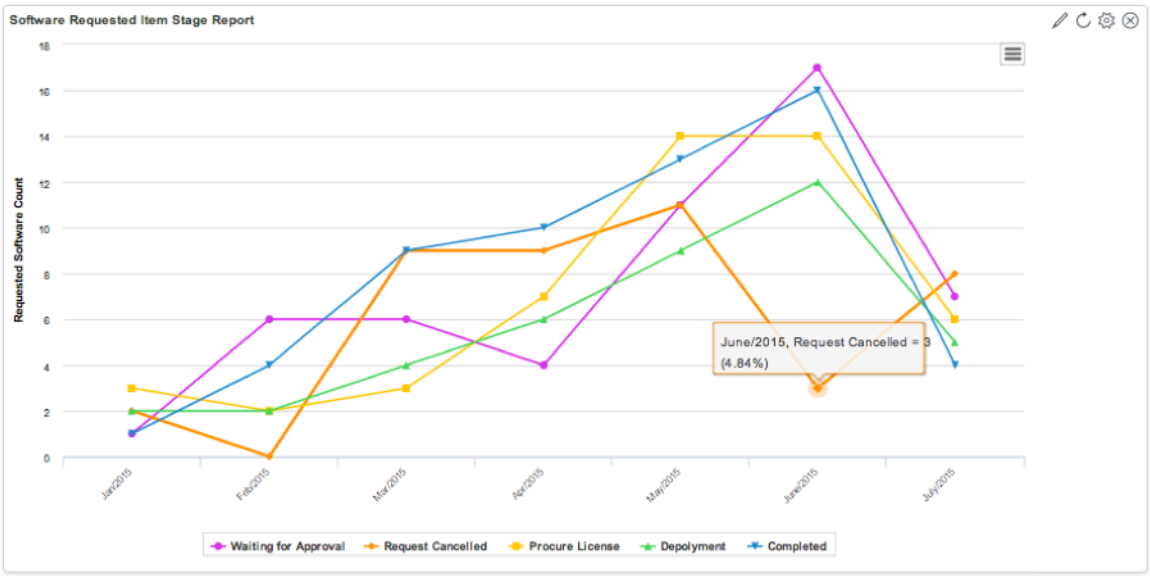
Sample report from CSD dashboard



Client software distribution reports

Report	Description
Open Tasks	Displays all open tasks grouped by the requested item's stage value. • *Type*: Create a basic list report • *Table:* Catalog Task [sc_task]
Top 10 Applications Installed	Displays the top 10 applications installed by request count. • **Type**: Create a bar report • **Table**: Requested Software [sn_client_sf_dist_req_software]
Total Software Request Item Over Time	Displays the total software items requested each month. • **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
Requests Completed Report	Displays the total of software requests completed each month. • **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
Installed Software Not Entitled	Displays installed software that users or devices are not entitled to use. This can be software deployed through CSD or by another process that does not comply with licensing. This report is on a Software Asset Management table. • **Type**: Create a basic list report • **Table**: Software Installation [cmdb_sam_sw_install]
Software Installation Status	Displays the count of requested software, grouped by installation status, for each month.

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Client software distribution reports (continued)

Report	Description
	• **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
Software Requested Item Stage Report	Displays the sum of all requested items, grouped by the requested item's stage, for each month. • **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
License Counts Available	Displays the license counts for all available applications. • **Type**: Create a basic list report • **Table**: SCCM Application Catalog Item [sn_client_sf_dist_sccm_app_cat_item]

Usage Overview dashboard

Navigate to **Client Software Distribution** > **Usage Overview** to view the current transaction count for your instance.

Client software distribution extension framework

Client software distribution (CSD) provides built-in extension points for integrating a ServiceNow instance with client software distribution providers, such as Casper, Altiris, or LANDesk.

Important:
The use of CSD extension points is an advanced procedure intended for use by experienced ServiceNow AI Platform developers only. Instructions for customizing your instance to deploy and revoke software from a software distribution provider can be found in the CSD Extension Implementation Guide.

Configure client software distribution providers

Identify the provider and specify the workflows and extension points for a customized software distribution process.

Before you begin

Perform the development tasks described in the CSD Extension Implementation Guide before attempting this procedure.

Role required: sn_client_sf_dist.csd_admin, admin

Procedure

1. Navigate to **All** > **Client Software Distribution** > **Extensions** > **Providers**.
2. Click **New**.
3. Complete the form using the fields in the table.

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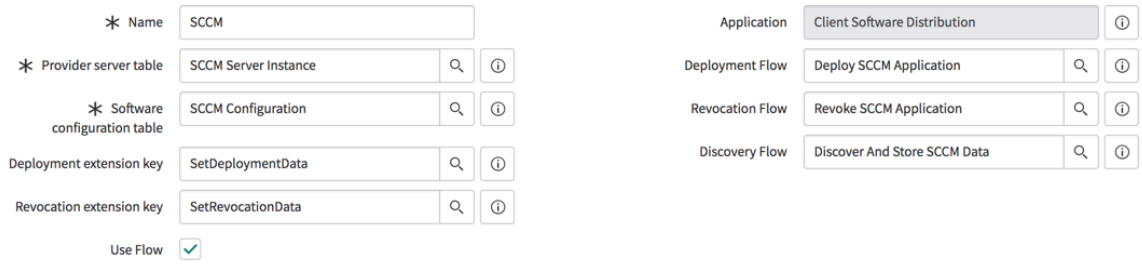

Client software distribution provider fields

Field	Description
Name	Descriptive name of the provider.
Provider server table	Table name of the provider server. You must create this table as an extension of the Configuration Item [cmdb_ci] table. For example, you might call your table Casper Server Instance [cmdb_ci_casper_server_instance].
Discovery flow	Flow that discovers the provider server and returns the data from that server back to the instance. This is the flow you create with custom activities that query the provider server.
Software configuration table	Table name of the software configuration for this provider. You create this table as an extension of the Client Software Distribution Software Configuration [sn_client_sf_dist_software_config] table. For example, you might create a table called Casper Software Configuration [sn_client_sf_dist_casper_sf_config].
Deployment extension key	The **SetDeploymentData** key provided with CSD. This key sets up the data for the software ordering and deployment workflow.
Deployment flow	Flow that deploys software from the provider server. This is the flow you created with custom activities that tells the provider where to deploy an application requested from the service catalog.
Revocation extension key	The **SetRevocationData** key provided with CSD. This key sets up the data for installation revocation.
Revocation flow	Flow that revokes an installation from a provider server. This is the flow you created with custom activities that tells the provider which application to remove from a device.
Use Flow	Option to use Integration Hub flows for client software distribution. When this option isn't

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Field	Description
	selected, Orchestration workflows are used for client software distribution. **Note:**

Client software distribution extension keys

Client software distribution (CSD) extension keys allow you to customize the deployment and revocation of software from distribution providers.

These pre-defined keys allow you to generate input variables for workflows that deploy and revoke software from external distribution providers:

- **SetDeploymentData**: Sets the software order information and generates the input variables for the deployment workflow.
- **SetRevocationData**: Generates the input variables for the revocation workflow.
- **CheckRevocable**: Specifies the conditions that determine if an installation can be revoked. If the software configuration associated with the installed software allows uninstallation, the installed software can be revoked.

Client software distribution extension points

The client software distribution (CSD) extension points create the customization code for the specific provider and the extension keys.

The purpose of the extension points is to associate extension keys with a specific provider, and then create a script that sets input variables for your custom deployment and revocation workflows. Another extension point script tells CSD if the provider has the capability to revoke software. If this is the case, CSD enables the UI action that triggers revocation from the provider.

SetDeploymentData

The script associated with this extension key must set the *`csdExtensionResult`* object with these attributes:

- *`deploymentWorkflowInputs`*: Object that specifies the deployment workflow input variables.
- *`softwareModel`*: Software model sys_id.
- *`deploymentType`*: An integer. Use **1** for deployment to a user and **2** for deployment to a device.
- *`softwareApplication`*: Software application sys_id.

CheckRevocable

The script associated with this extension key gets the input parameter *`csdExtensionInputs.softwareConfiguration`*, which is a Client Software Distribution record in the Software Configuration [sn_client_sf_dist_software_config] table. All providers' software configurations are extended from this table, but may have different attributes.

This script must set the *`csdExtensionResult`* object to **true** or **false**, depending on whether the software configuration specifies uninstallation.

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SetRevocationData

The script associated with this extension key gets the input parameter *csdExtensionInputs.softwareConfiguration*, which is a Client Software Distribution record in the Software Configuration [sn_client_sf_dist_software_config] table. All providers' software configurations are extended from this table, but may have different attributes.

The script must set the *csdExtensionResult* object with these attributes:

- *revocationWorkflowInput*: Object that specifies the revocation workflow input variables.
- *softwareModel*: Software model sys_id.
- *deploymentType*: An integer. Use **1** for deployment to a user and **2** for deployment to a device.

Related topics

Using extension points to extend application functionality

Using scripted extension points in server-side scripts

Using UI extension points in server-side UI macros

Using client extension points in client-side UI scripting

Orchestration examples

These examples demonstrate how Orchestration can be used to automate common tasks.

Active Directory automation example

A set of six Orchestration Active Directory activities enables organizations to automate their on-boarding/off-boarding processes with auditable, self-documenting workflows that save time and eliminate mistakes.

The activities in the Active Directory activity pack are designed to manage user accounts and reset user passwords. The following activities cover the most common use cases administrators encounter when managing Active Directory user accounts:

- Create AD User Account
- Update AD User Account
- Remove AD User Account
- Disable AD User Account
- Query AD
- Reset AD User Password.

These activities share a common design, have complementary functionality, and share a common set of parameters. They can be used singly or together to create consistent workflows for provisioning and de-provisioning user accounts.

Update Active Directory with Orchestration

An organization plans to make their ServiceNow instance the single system of record for user account data and wants to update Active Directory with the latest changes.

About this task

The solution is to create an Orchestration workflow that pushes changes from the ServiceNow user record down to the Active Directory to create a new user record or update an existing

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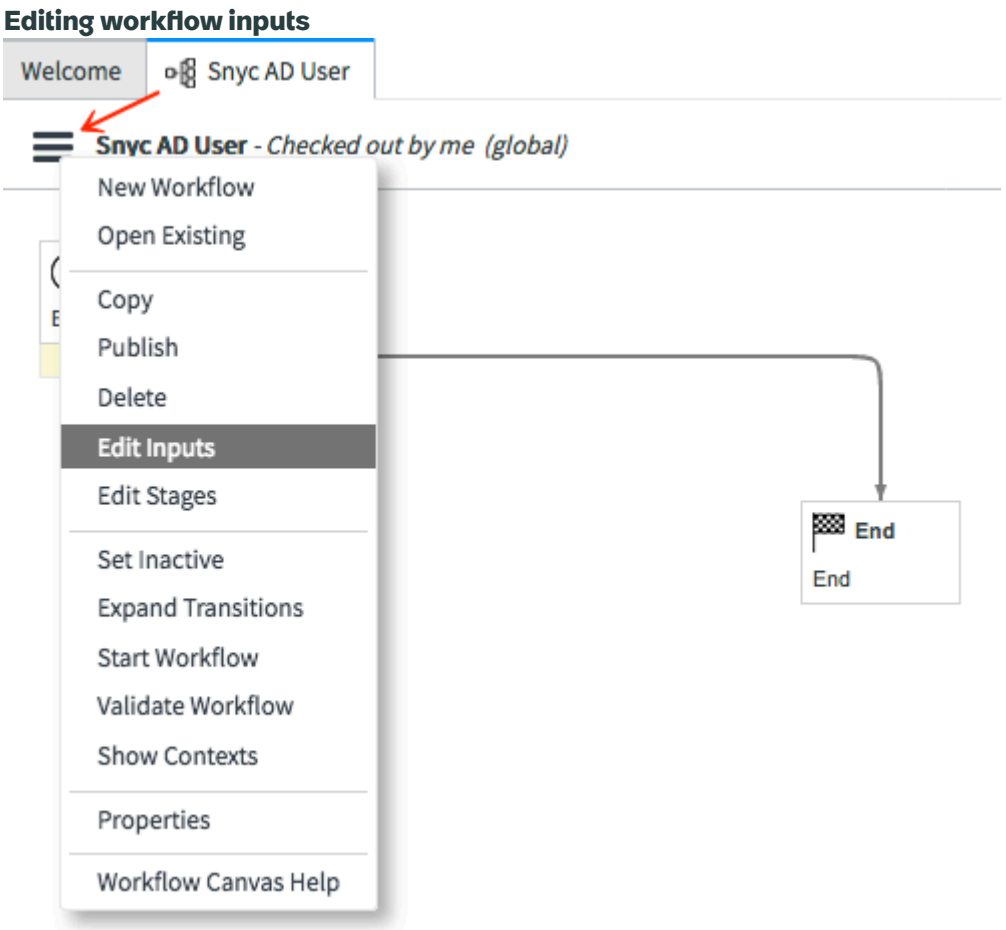
record. This is accomplished by creating an Orchestration workflow that can create and update records in Active Directory based on the data in the ServiceNow User [sys_user] table.

Note:
This example workflow assumes that ServiceNow is configured for LDAP and an LDAP server is configured to accept the new user accounts. The Active Directory user management activities are not dependent on LDAP, but the presence of LDAP makes this example workflow much easier. You must provide the domain controller's IP address to the workflow, either by hardcoding it, adding another workflow input, or using a script to look it up from the CMDB.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. In the **Workflow** tab, click the **+** icon to create a new workflow using these variables:
   - *Name*: Sync AD User
   - *Table*: Global [global]
3. Click **Submit**.
   A basic workflow with a Begin and End point appears on the canvas.
4. Click the menu icon in the upper left corner of the canvas and select **Edit Inputs** from the context menu.



5. In the Workflow Inputs form, click **New** in the **Variables** record list, and create a new variable, using the fields in the table.

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Field	Value
Type	Reference
Label	User
Column name	u_user
Reference Specification > Reference	User (sys_user)

6. Click **Submit**.
7. In the **Custom** tab, expand **Custom Activities** > **Active Directory**.
8. Drag and drop the Update AD Object activity onto the transition line between the Begin and End points of the new workflow.
   This action automatically links the activity with the end point and opens the Workflow Activity property form.
9. Complete the form using the fields in the table.

Field	Value
Name	Enter a logical name such as **Update user data**.
Domain controller	The ServiceNow LDAP integration adds a reference to the LDAP server to which the user's account is linked. To identify the LDAP server, enter the following statement: `${workflow.inputs.u_user.ldap_server.server_url}`
Type	Type of AD object. In this case, the type is **User**, which is the default.
Object name	This example assumes that the ServiceNow user name matches the Active Directory sAMAccountName. Enter the following: `${workflow.inputs.u_user.user_name}`
Object data	Updates the user's account in Active Directory, if the user exists. In this example, the user's title is updated: `{"title" : "QA"}`

10. Click **Submit**.
    The workflow looks like this:

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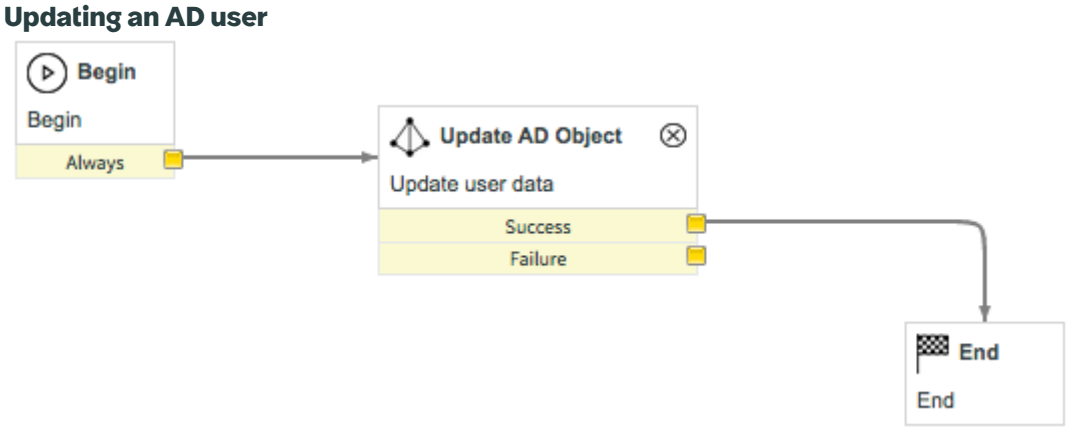

11. Attach both activity outcomes (Success and Failure) to the end point.
At this point, the workflow takes a ServiceNow user record as input and updates the First Name, Last Name, and Title of the corresponding Active Directory account. If the account does not exist in Active Directory, the workflow fails.

> **Note:**
> In a normal workflow, some type of alternate action is desirable upon failure. For example, you might send an Email and SMS notifications if the workflow failed to update the record.

12. To prevent the workflow from failing, add a Create AD Object activity to the transition lines between Begin and the Update AD Object activity.
13. Complete the Workflow Activity property form using the fields in the table.

Field	Value
Name	Enter a logical name such as **Create user data**.
Domain controller	Same as for the update activity. `${workflow.inputs.u_user.ldap_server.server_url}`
Ou	The organizational unit to which this object belongs. For the purpose of this example, you can enter **OU=HQ,OU=Managed Objects**
Object name	Same as for the update activity. `${workflow.inputs.u_user.user_name}`
Object data	Creates an account with only the user name in it. For the purpose of this example, you can enter `{"givenName" : "${workflow.inputs.u_user.first_name}", "SN" : "${workflow.inputs.u_user.last_name}" }`

14. Click **Submit**.
15. Connect the Failure outcome of the Create AD Object activity to End.
For this example, we are ignoring errors. The workflow now looks like this:

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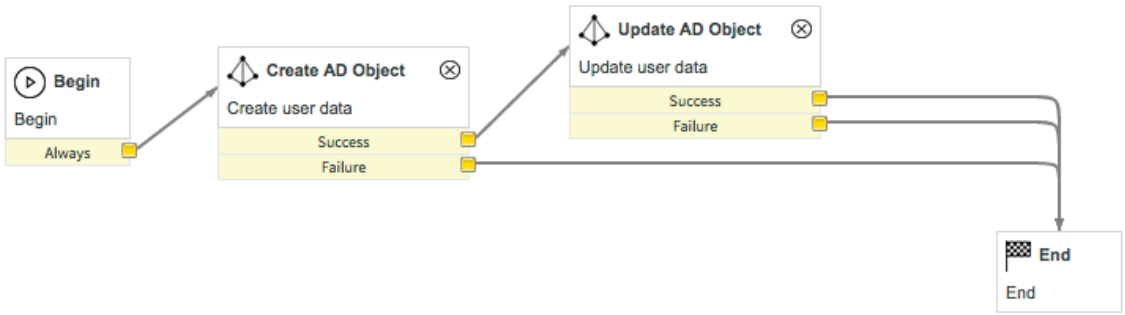
Creating an AD user



This procedure builds a simple workflow that creates a bare-bones Active Directory account consisting of a user name only. The workflow then updates that account with additional information provided by the ServiceNow User [sys_user] table. However, we do not want to execute the Create AD Object activity if the user account already exists. The workflow needs to query Active Directory for matching user records and then branch the workflow based on the results of the query. If an account already exists, then the workflow should update the account. If the account does not exist, then the workflow should create the account in Active Directory.

16. Drag and drop the Query AD activity onto the transition between Begin and Create AD Object.
17. Complete the Workflow Activity property form using the fields in the table.

Field	Definition
Name	Enter a logical name such as **Search for existing account**.
Domain controller	`${workflow.inputs.u_user.ldap_server.server_url}`
Properties	A comma-separated list of Active Directory properties to return. For example, givenName, SN, title. If the parameter field is blank, then all properties are returned. In this workflow, we leave the field blank.
Search filter	An LDAP filter string that defines the search parameters. Use any valid LDAP filtering criteria. To find user accounts matching the input record, we use: `(samaccountname=${workflow.inputs.u_user.user_name})`

18. Click **Submit**.
19. Connect the Failure outcome for the query activity to the End point.
Remember that we are ignoring errors in this workflow.
20. Connect the Success outcome of the query activity to the Update AD Object activity.
The workflow now looks like this:

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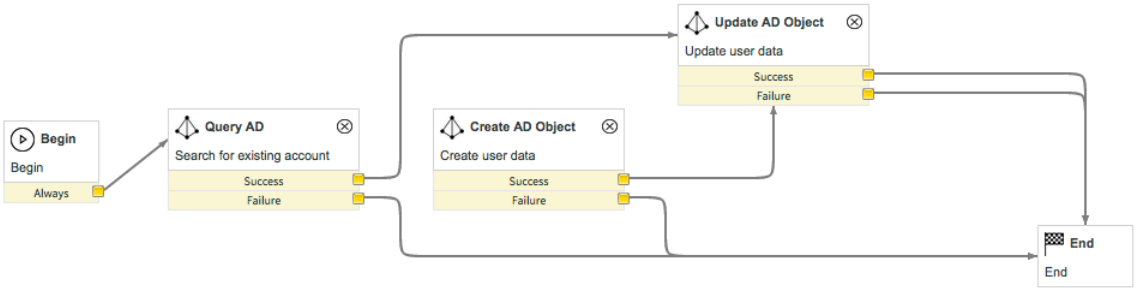
Querying AD for user accounts



The Query AD activity returns its results as a JSON string in the workflow data bus. This JSON string is always an array of objects. Each object corresponds to an Active Directory entry that matched the query. Our workflow should branch, whether that array is empty or not.

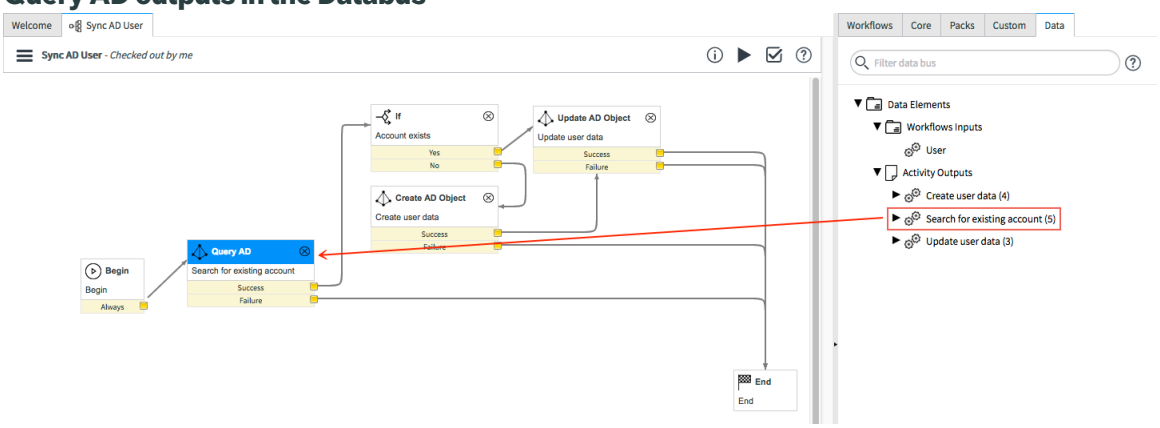
21. Drag a standard *If* activity from the *Conditions* folder in the **Core** tab and drop it onto the transition between Query AD and Update AD Object.
22. Complete the Workflow Activity properties form using the fields in the table.

Field	Value
Name	Enter a logical name such as **Account exists**.
Advanced	Select this check box to open the *Script* field.

Script	For the If activity to work correctly, we must return a **yes** or **no** in the answer variable (var) which corresponds to the Yes and No outcomes of the query activity. Line 1 converts the Query AD results from a JSON string into a Javascript array called queryResults. Line 2 checks the length of that array. If the array is more than 0, a match to the account was found, and we set our answer to yes. Otherwise, the answer is no.
	`var queryResults=new JSON().decode(data.get(5).output);`
	`answer = ( queryResults.length>0 ? 'yes' : 'no' );`

Note:
The expression `data.get(5)` in this script identifies the Query AD output in the Databus by order number, since it was the fifth activity added to the workflow.

Query AD outputs in the Databus



23. Click **Submit**.

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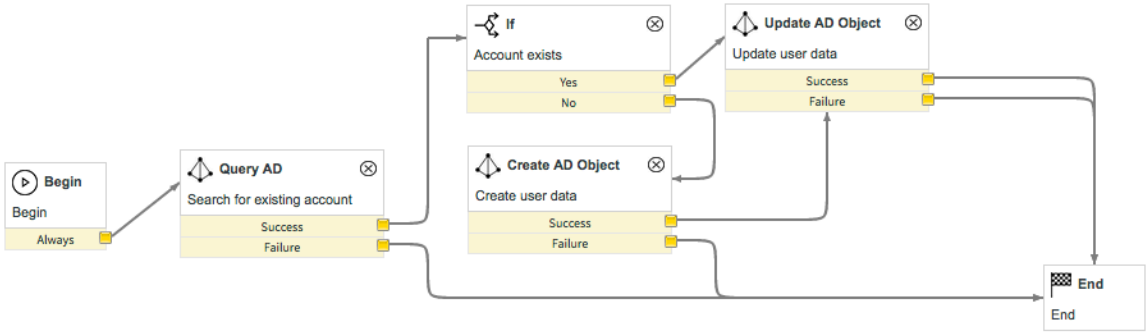
24. In the canvas, create a transition from the Yes outcome of the If activity to the Update AD Object activity.
25. Create a transition from the No outcome of the If activity to the Create AD Object activity. This is the final step. This workflow will query Active Directory to determine if an account already exists. If an account exists, the workflow updates that account. If an account does not exist, the workflow creates the account and then updates the Active Directory with the configured user data set.

Creating the conditional paths



Orchestration activity packs

The base Orchestration system includes packs of custom activities you can use to automate typical IT and business processes in your network.

Activity packs allow you to automate several common business processes, such as managing Active Directory accounts and Exchange server mailboxes. Activity packs can also automate IT functions such as starting and stopping Windows servers, joining domains, assigning IP addresses, and configuring load balancers.

Use an activity pack

The **Packs** tab of the Workflow Editor contains any activity packs downloaded from the ServiceNow Store and any activity packs that you create.

Before you begin

Roles required: admin, activity_admin, activity_creator

About this task

You can organize custom activities into packs and upload them to the ServiceNow Store. Your custom packs do not appear in the tree until at least one activity in the pack is published. Activities added to an existing pack are not displayed until they are published. Activity packs from any Application scope can appear in the **Packs** tab, regardless of the current scope setting for the instance.

Procedure

1. In the Workflow Editor palette, select the **Packs** tab.
2. Click the download icon.

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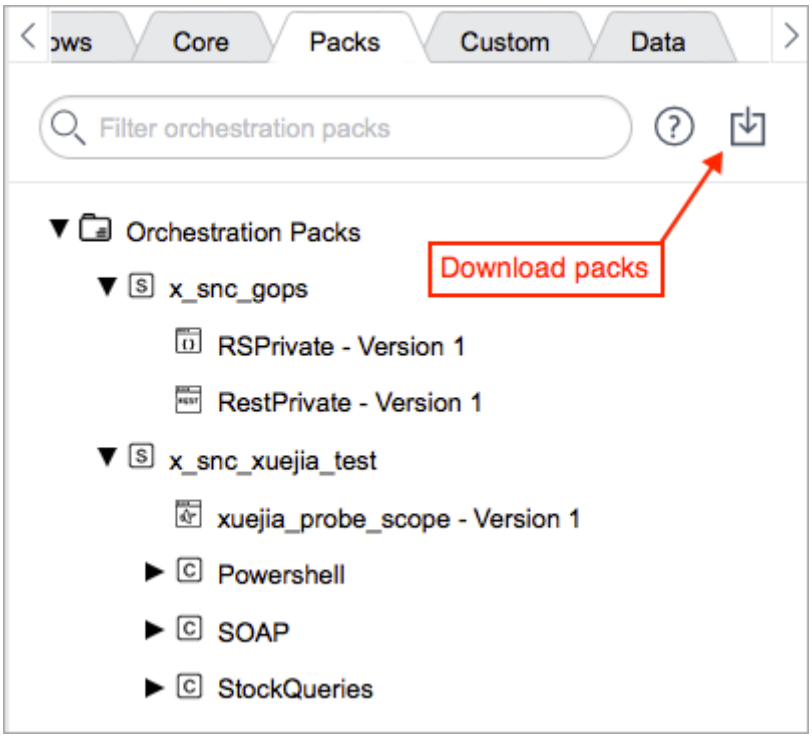
The hierarchy in the tab organizes packs by vendor, scope, category, and activity.



Active Directory activity pack

The Active Directory (AD) activity pack enables an administrator to create, delete, and manage objects in Windows Active Directory, such as users, groups, and computers, using a ServiceNow Orchestration workflow.

Activities in this pack can reset a password automatically from a user request or manage any user account in Active Directory, whether or not it was created by a Orchestration workflow.

Domain controllers are identified by the IP address of the host machine. To use the hostname of the domain controller, add the Resolve DNS Name activity to resolve the hostname into an IP, and then pass the IP into the Active Directory activity.

Your instance must have access to a MID Server configured to use PowerShell to run these activities.

Note:
All Active Directory activities pass through error messages returned from Active Directory. To view these error messages, point to the failed activity in the workflow canvas or select the **Workflow Log** tab in a Workflow Context record.

Custom Active Directory activities

Orchestration provides custom Active Directory activities that were created with the Orchestration Create a PowerShell activity, starting with the Geneva release. These activities perform the same functions as AD activities by the same name from previous releases and replace those activities for all new workflows. Existing workflows from earlier versions that were created with legacy AD activities continue to function normally after an upgrade to Istanbul. However, all new workflows must use these custom AD activities. The Powershell activity template gives workflow administrators the ability to store input and output variables from the Query AD activity in the Databus.

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Note:
To use the Active Directory custom activities, you must request activation of the Orchestration - Active Directory plugin.

Active Directory credentials with LDAP

If you are using an LDAP Server with MID Servers, note that Orchestration and Active Directory activities do not use the user name and password configured on LDAP Servers. You must create a Windows type orchestration credential record Windows credentials. The username and password in the credentials record is used for LDAP queries that Orchestration and workflow activities perform.

Connection port used by AD Orchestration activities

All Active Directory activities use port 389 for LDAP access. If you are using AD activities with Oracle Virtual Directory (OVD) as a proxy, set up pass-through on port 389 only.

Add User to Group AD activity

The Add User to Group activity adds a user to a group in Windows Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Input variables

Add User to Group input variables

Variable	Description
DomainController	IP address of the domain controller machine.
UserName	Name of the user to add to the group.
GroupName	Name of the group to which this user is added.

Output variables

Add User to Group output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The `executionResult.errorMessages` from the Activity designer parsing sources.

Conditions

Add User to Group conditions

Condition	Description
Success	User was successfully added to group.

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Add User to Group conditions (continued)

Condition	Description
Failure	An error occurred while attempting to add the user to the group. Additional details may be available in the workflow log.

Change AD User Password activity

The Change AD User Password activity changes the password for an Active Directory user account.

This activity requires the user's current password to run, unlike the **Reset AD User Password** activity. If the new password violates any Active Directory password requirements, such as length or character combinations, the activity fails and returns the appropriate error message. This error message appears in the ECC queue and in hint text when a user points to the activity in the Workflow Editor.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Change AD User Password input variables

Variable	Description
DomainController	IP address of the domain controller machine.
User	The sAMAccountName of the Active Directory user account.
New_password	The new password to assign this user.
Old_password	The user's current password.

Output variables

Change AD User Password output variables

Variable	Description
result	One of the following outcomes: • **failure** • **success** • **Policy Failure** • **Incorrect old password**
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

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Change AD User Password output variables (continued)

Variable	Description
hresult	Powershell command result.

Conditions

The activity provides the following conditions:

Change AD User Password conditions

Condition	Description
Success	Password successfully reset.
Policy Failure	Password does not comply with the organization's Active Directory requirements.
Incorrect old password	Password being changed was not entered correctly.
Failure	An error occurred while attempting to change the password. Additional details may be available in the workflow log.

Active Directory credentials with LDAP

If you are using an LDAP Server with MID Servers, note that Orchestration and Active Directory activities do not use the user name and password configured on LDAP Servers. You must create a Windows type orchestration credential record Windows credentials. The username and password in the credentials record is used for LDAP queries that Orchestration and workflow activities perform.

Create AD Object activity

The Create AD Object activity creates an object in Windows Active Directory.

This activity fails if it finds an existing object with matching input variables.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Create AD Object input variables

Variable	Description
DomainController	IP address of the domain controller machine.
Type	The object type to create: user, group, or computer.
OU	The organizational unit to which this object belongs.

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Create AD Object input variables (continued)

Variable	Description
ObjectName	The sAMAccountName of the Active Directory object. **Object name** is also used for the **name** attribute in Active Directory. This behavior is available in **ActiveDirectory.psm1**. Whatever is passed as the **Object name** becomes both the **samAccountName** and the **name** of the new user in Active Directory.
ObjectData	A JSON object containing Active Directory property names and their corresponding values. For example: `{ "givenName" : "John", "SN" : "Doe", "title" : "Sr. Account Specialist", "allowLogin" : true }` This example sets the first name (givenName), last name (SN), and title on the Active Directory user account and allows that user to log in (allowLogin). This field allows expression evaluation via the ${} variable substitution syntax.

Output variables

Create AD Object output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Create AD Object conditions

Condition	Description
Success	A Windows Active Directory object was created successfully.
Failure	An error occurred while attempting to create the AD object. Additional details may be available in the workflow log.

Disable AD User Account activity

The Disable AD User Account activity disables a Windows Active Directory user account, making it inactive.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

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Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Disable AD User Account input variables

Variable	Description
DomainController	IP address of the domain controller machine.
User	The sAMAccountName of the Active Directory user account.

Output variables

Disable AD User Account output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *`executionResult.errorMessages`* from the Activity designer parsing sources.

Conditions

Disable AD User Account conditions

Condition	Description
Success	AD user account was successfully disabled.
Failure	An error occurred while attempting to disable the account. Additional details may be available in the workflow log.

Enable AD User Account activity

The Enable AD User Account activity enables a Windows Active Directory user account, making it active.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

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Input variables

Enable AD User Account input variables

Variable	Description
User	The sAMAccountName of the Active Directory user account.
DomainController	IP address of the domain controller machine.

Output variables

Enable AD User Account output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Enable AD User Account conditions

Condition	Description
Success	AD user account was successfully enabled.
Failure	An error occurred while attempting to enable the AD user account. Additional details may be available in the workflow log.

Is AD Account Locked activity

The Is AD Account Locked activity determines whether an Active Directory user account is locked.

An account may be locked automatically if a user enters an incorrect password more times than allowed by the Active Directory security policy. You can unlock an account using the Unlock AD User Account activity.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Is AD Account Locked input variables

Variable	Description
DomainController	IP address of the domain controller machine.

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Is AD Account Locked input variables (continued)

Variable	Description
User	The sAMAccountName of the Active Directory user account.

Output variables

Is AD Account Locked output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.
output	The query result.

Conditions

Is AD Account Locked conditions

Condition	Description
Locked	The AD account is locked.
Unlocked	The AD account is unlocked.
Failure	An error occurred while processing the query. Additional details may be available in the workflow log.

Query AD activity

The Query AD activity retrieves entries from the Windows Active Directory based on an LDAP search filter and stores the results as a JSON string that can be used in the data bus.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory** > **.**

Note:
This activity replaces an AD activity by the same name available in releases prior to Geneva. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul and will continue to save query results to the scratchpad. However, all new workflows must use the custom version of this activity. This activity was built with the Create a PowerShell activity, which stores input and output variables in the databus instead of the scratchpad.

Input variables

Query AD input variables

Variable	Description
DomainController	IP address of the domain controller machine.

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Query AD input variables (continued)

Variable	Description
Properties	A comma-separated list of Active Directory properties to return. For example, *`givenName,SN,title`*. If this field is blank, then all properties are returned.
SearchFilter	An LDAP filter string that defines the search parameters. Use any valid LDAP filtering criteria. For example, to find user accounts matching the ServiceNow input record, use: `(samaccountname=${workflow.inputs.u_user.user_name})`

Output variables

Query AD output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *`executionResult.errorMessages`* from the Activity designer parsing sources.
output	The query result.

Conditions

Query AD conditions

Condition	Description
Success	The query completed as expected.
Failure	An error occurred while processing the query. Additional details may be available in the workflow log.

Remove AD Object activity

The Remove AD Object activity deletes an object from Windows Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

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Input variables

Remove AD Object input variables

Variable	Description
DomainController	IP address of the domain controller machine.
ObjectName	The sAMAccountName of the Active Directory object.
Type	The object type to remove: • **user** • **group** • **computer**

Output variables

Remove AD Object output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Remove AD Object conditions

Condition	Description
Success	AD object was successfully removed.
Failure	An error occurred while attempting to remove the AD object. Additional details may be available in the workflow log.

Remove User from Group AD activity

The Remove User from Group activity removes a user from a group in Windows Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Input variables

Remove User from Group input variables

Variable	Description
DomainController	IP address of the domain controller machine.
UserName	Name of the user to remove from the group.
GroupName	Name of the group from which this user is removed.

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Output variables

Remove User from Group output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Remove User from Group conditions

Condition	Description
Success	User was successfully removed from the group.
Failure	An error occurred while attempting to remove the user from the group. Additional details may be available in the workflow log.

Reset AD User Password activity

The Reset AD User Password activity resets the password of a user account in Windows Active Directory.

If the new password violates any Active Directory password requirements, such as length or character combinations, the reset activity fails and returns the appropriate error message. This error appears in the ECC Queue and when you point to the activity in the Workflow Editor.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Reset AD User Password input variables

Variable	Description
DomainController	IP address of the domain controller machine.
User	The sAMAccountName of the Active Directory user account.
Password	The new password for the user. This password must comply with the organization's Active Directory requirements.
ForceChange	Makes this password temporary by forcing the user to change it at the next login.

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Reset AD User Password input variables (continued)

Variable	Description
Unlock	Unlock the account if the account is locked.

Output variables

Reset AD User Password output variables

Variable	Description
result	One of the following outcomes: • **failure** • **success** • **Policy Failure**
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.
hresult	Powershell command result.

Conditions

Reset AD User Password conditions

Condition	Description
Success	Password was successfully reset.
Policy Failure	New password does not comply with the organization's Active Directory requirements.
Failure	An error occurred while attempting to reset the password. Additional details may be available in the workflow log.

Unlock AD Account activity

The Unlock AD Account activity unlocks a locked Active Directory user account.

You can use the Is AD Account Locked activity activity to determine if an account is locked.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

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Input variables

Unlock AD Account input variables

Variable	Description
DomainController	IP address of the domain controller machine.
User	The sAMAccountName of the Active Directory user account.

Output variables

Unlock AD Account output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Unlock AD Account conditions

Condition	Description
Success	The account was successfully unlocked.
Failure	An error occurred while attempting to unlock the account. Additional details may be available in the workflow log.

Update AD Object activity

The Update AD Object activity updates an object in Windows Active Directory.

This activity only replaces existing values with new values. It cannot add new values to AD records such as adding a new group member to an AD group. For complex AD operations, use the Run PowerShell activity instead. The activity fails if it cannot find an existing account with matching object name and data.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note:
This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Update AD Object input variables

Variable	Description
DomainController	IP address of the domain controller machine.

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Update AD Object input variables (continued)

Variable	Description
ObjectName	The sAMAccountName of the Active Directory object.
ObjectData	A JSON object containing Active Directory properties and their values. For example, to set the first name, last name, and title of a user, clear the user's manager, and set the VIP flag to true, the Object Data specifies: `{ "givenName" : "John", "SN" : "Doe", "title" : "Sr. Account Specialist", "manager" : null, "msTSAllowLogon" : false }`
Type	The object type to update: user, group, or computer.

Output variables

Update AD Object output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Update AD Object conditions

Condition	Description
Success	AD object was successfully updated.
Failure	An error occurred while attempting to update an AD object. Additional details may be available in the workflow log.

Azure AD activity pack

The Azure AD activity pack enables an administrator to automate employee onboarding and offboarding functions on Azure AD and manage Office 365 licensing.

Use the Azure AD activities to add and remove users to Azure Active Directory, manage security group membership, and assign or remove Office 365 licenses for individual users.

The Azure AD activities were created with the Orchestration REST Web Service activity template.

Add User to Group Azure AD activity

The Add User to Group activity adds a user to an existing security group in Azure Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important:
The REST message used for this activity must be configured to use OAuth 2.0.

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Input variables

Add User to Group input variables

Variable	Description
user_id	Object ID (GUID) of the member to be added.
group_id	Object ID (GUID) of the target group.

Output variables

Add User to Group output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

Conditions

Add User to Group conditions

Condition	Description
Success	Activity successfully added the object ID to the security group.
Failure	Activity failed to update the group's membership, or the activity failed to connect to Azure AD.

Assign User License Azure AD activity

The Assign User License activity assigns an additional Office 365 software license to the named user.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important:
The REST message used for this activity must be configured to use OAuth 2.0.

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Input variables

Assign User License input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com**.
sku_id	Subscription SKU ID associated with the tenant's enterprise agreement.

Output variables

Assign User License output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

Conditions

Assign User License conditions

Condition	Description
Success	Activity successfully assigned an Office 365 license to a user.
Failure	Activity failed to assigned an Office 365 license to a user, or the activity failed to connect to Azure AD.

Create User Azure AD activity

The Create User activity creates a user for the Azure Active Directory tenant.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important:
The REST message used for this activity must be configured to use OAuth 2.0.

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Input variables

Create User input variables

Variable	Description
display_name	Name of the Azure AD user in the accepted display format, such as **jacinto.gawron**.
user_principal_name	User principal name (UPN) in an email format. For example, you might enter **jacinto.gawron@khitomer.com**.
mail_nickname	User's email alias that redirects to the user's full address.
password	User's Azure AD password. This password must be passed as a workflow input with a type of **Password (2 Way Encrypted)** and must meet the password policy set in Azure AD.
change_password	Control that requires the user to change their password at the next login, if set to true.
account_enabled	Control that sets the user's account is enabled, if set to true.
given_name	First name of the user.
surname	Last name of the user.
other_mails	List of additional email addresses for the user. For example, you might enter `["jac@home.com", "jgawron@fabrikam.com"]`.
country	The country or region in which the user is located. For example, you might enter **US** or **UK**. The default value is set to**US**.
city	City in which the user is located.
department	Name of the department in which the user works.
mobile	User's primary cell phone number.
job_title	User's job title.
physical_delivery_office_name	Office location in the user place of business.
postal_code	Postal code of the user's address.
preferred_language	Language in which the user prefers to communicate. This value must follow the ISO 639-1 Code. For example, you might enter **en-US**. The default value is set to **en-US**.
state	State or province for the user's address.
street_address	Street address of the user's place of business.
telephone_number	Primary telephone number of the user's place of business.

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Create User input variables (continued)

Variable	Description
usage_location	Two letter country code that is required for users who are assigned Office 365 licenses. The default value is **US**.

Output variables

Create User output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
status_code	Contains the status code returned from the Web service.
user_exists	Output variable mapped to the JSON message that contains the `User already exists` error.
user_info	The *`user_info`* array contains attributes that can be leveraged by other activities as inputs. For example, the user *`objectid`* output (GUID) can be passed to the Add User to Group activity as the *`user_id`* input. • *`objectid`*: User's Azure AD identifier. • *`accountEnabled`*: Boolean variable indicating whether the user's account is active or inactive. • *`displayName`*: Users display name, such as **jacinto.gawron**. • *`userPrincipalName`*: User's name in email format, such as **jacinto.gawron@wammo.com**. • *`mailNickname`*: User's email alias.

Conditions

Create User conditions

Conditions	Description
Created user	Activity successfully created the user.
User already exists	User already exists in the tenant domain.
Failure	Activity failed to connect to Azure AD, or an input value was invalid.

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Delete User Azure AD activity

The Delete User activity deletes the named user's account from the Azure Active Directory tenant.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important:
The REST message used for this activity must be configured to use OAuth 2.0.

Input variables

Delete User input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com**.

Output variables

Delete User output variables

Variables	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

Conditions

Delete User conditions

Condition	Description
Deleted user	Activity deleted the specified user.
User does not exist	Specified user does not have an account in the tenant domain.
Failure	Activity failed to connect to Azure AD.

Get User Info Azure AD activity

The Get User Info activity returns the named user's information from the Azure Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

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Important:
The REST message used for this activity must be configured to use OAuth 2.0.

Input variables

Check If User Exists input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com** **Note:** Version 2 of this activity enforces input validation. If empty, the following message appears: "Mandatory input 'user_id' is empty" .

Output variables

Check If User Exists output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.
user_info	The *user_info* array contains attributes that can be leveraged by other activities as inputs. For example, the user *objectid* output (GUID) can be passed to the Add User to Group activity as the *user_id* input. • *objectid*: User's Azure AD identifier. • *accountEnabled*: Boolean variable indicating whether the user's account is active or inactive. • *displayName*: Users display name, such as **jacinto.gawron**. • *userPrincipalName*: User's name in email format, such as **jacinto.gawron@wammo.com**. • *mailNickname*: User's email alias.

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Conditions

Check If User Exists conditions

Condition	Description
User exists	Activity found the named user.
User does not exist	Activity was unable to find the named user in the customer tenant domain.
Failure	Activity failed to connect to Azure AD.

Remove User from Group Azure AD activity

The Remove User from Group activity removes an existing user from a security group in Azure Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important:
The REST message used for this activity must be configured to use OAuth 2.0.

Input variables

Remove User from Group input variables

Variable	Description
user_id	Object ID (GUID) of the user to be removed.
group_id	Object ID (GUID) of the target group.

Output variables

Remove User from Group output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

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Conditions

Remove User from Group conditions

Variable	Description
Success	Activity removed the object ID from the security group.
Failure	Activity failed to update the group's membership, or the activity failed to connect to Azure AD.

Remove User License Azure AD activity

The Remove User License activity revokes the specified Office 365 software license for the named user.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important:
The REST message used for this activity must be configured to use OAuth 2.0.

Input variables

Remove User License input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com**.
sku_id	Subscription SKU ID associated with the tenant's enterprise agreement.

Output variables

Remove User License output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

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Conditions

Remove User License conditions

Condition	Description
Success	Activity removed an Office 365 license from the named user.
Failure	Activity failed to remove an Office 365 from a user, or the activity failed to connect to Azure AD.

Reset User Password Azure AD activity

The Reset User Password activity changes the named user's Azure Active Directory password.

The Azure password policy imposes constraints on the complexity, length, and re-use of a password.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important:
The REST message used for this activity must be configured to use OAuth 2.0.

Input variables

Reset User Password input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com**.
password	User's Azure AD password. This password must be passed as a workflow input with a type of **Password (2 Way Encrypted)** and must meet the password policy set in Azure AD.
change_password	Control that requires the user to change their password at the next login, if set to true.

Output variables

Reset User Password output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.

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Reset User Password output variables (continued)

Variable	Description
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

Conditions

Reset User Password conditions

Condition	Description
Success	Activity reset the named user's password.
Failure	Activity failed to reset the named user's password, or the activity failed to connect to Azure AD.

Exchange activity pack

The Exchange activity pack allows workflows to manage Microsoft Exchange mail systems.

The use of Orchestration Exchange activities requires the following:

- Microsoft Exchange 2010, 2013, or 2016.
- A MID Server configured to run Powershell 2.0
- A target Exchange server in the same Active Directory domain as the instance.
- Powershell Remoting enabled on the target Exchange server.

Note:
These activities cannot be used to interact with Microsoft Exchange Online.

Orchestration provides custom Exchange activities that were created with the Orchestration activity designer template. These activities perform the same functions as Exchange activities by the same name from previous releases and replace those activities for all new workflows. The custom Exchange activities were built with a Powershell activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Note:
Existing workflows from earlier versions that were created with legacy Exchange activities continue to function normally after an upgrade to Geneva. However, all new workflows must use these custom Exchange activities.

To use the Microsoft Exchange custom activities, you must request activation of the Orchestration - Exchange plugin. The custom Exchange activities are available in the Workflow Editor on the **Custom** tab. Expand the **Custom Activities** tree and select the **Exchange** category for the activity you want to use.

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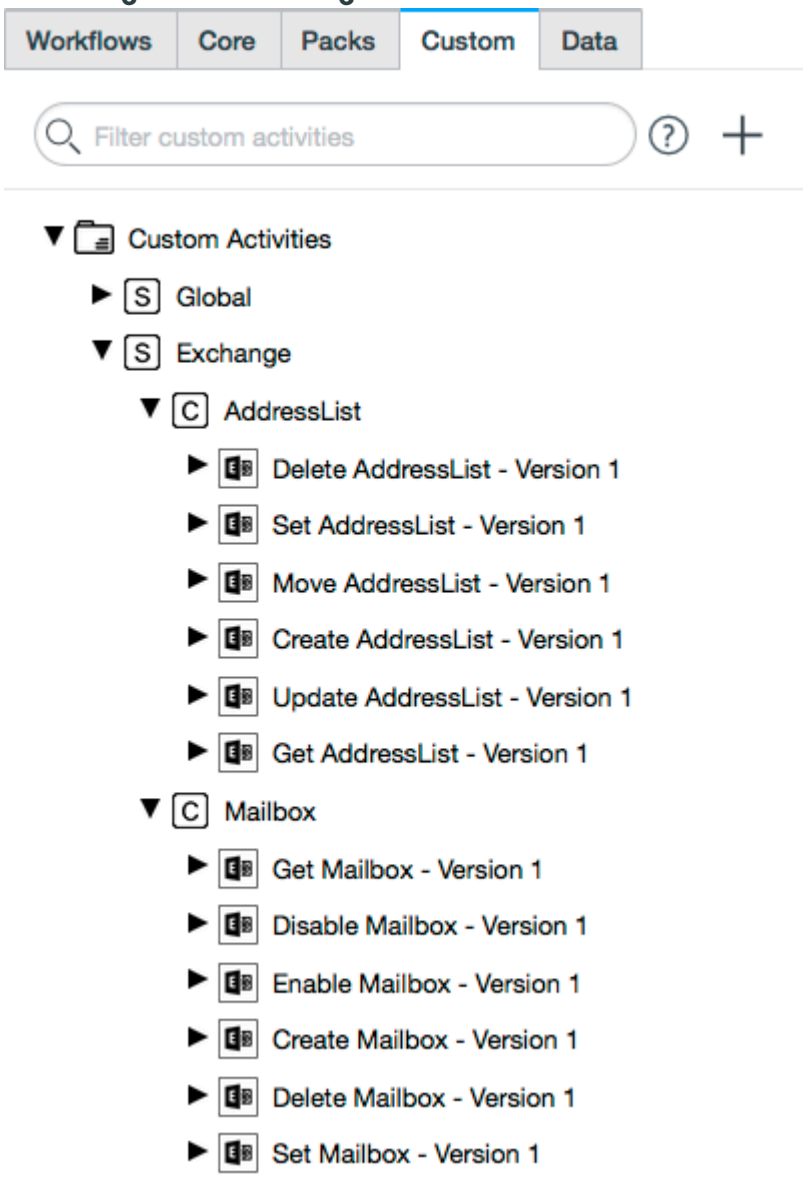
Accessing custom Exchange activities



Configure MID Server for Exchange

Configure a MID Server with defined IP ranges to use Exchange.

Before you begin

Role required: admin

About this task

If the MID Server manages resources within defined IP ranges, instead of all computers on your network, you must perform additional configuration steps to run Exchange activities. You do not need to perform these steps if your MID Server uses the default configuration.

Procedure

1. In the navigation filter, enter `cmdb_ci_dns_name.list`.
2. Click **New**.
3. Enter the fully-qualified domain name (FQDN) of your Exchange server in the **Name** field.
4. Right-click the form header and select **Save**.

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5. In the **IP Address** related list, click **New**.
6. In the **IP Address** field, enter the IP address of your Exchange server.
7. In the **Nic** field, select **eth0** or your preferred network interface controller.
8. Leave the **Netmask** field blank.
9. Click **Submit**.

Pass multivalued properties with an Exchange activity

To set a multivalued property using an Exchange activity, you must use a specific parameter format.

About this task

The Optional parameters shared input variable allows you to set multivalued properties.

Procedure

- To set a multivalued property, replacing any existing values, use this format: "`PropertyName`":"(`value1`, `value2`, `value3`)"
- To add values, use this format: "PropertyName":"+(`value1`, `value2`, `value3`);"
- To remove values, use this format: "PropertyName":"-(`value1`, `value2`, `value3`);"
- To both add and remove values, use this format: "PropertyName":"-(`value1`, `value2`, `value3`);+(`value1`, `value2`, `value3`);"

Create Address List activity

The Create Address List activity creates a new address list that acts as an alias for emailing all users in the group.

This alias cannot be used to manage user permissions. This activity implements the Microsoft Exchange New-AddressList command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Create Address List input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
name	Name of the new address list to create.

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Create Address List input variables (continued)

Variable	Description
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format *`"parameter":"true"`*.

Output variables

Create Address List output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.
output	Raw XML payload from the Exchange server. This data includes all Exchange attributes.

Conditions

Create Address List conditions

Condition	Description
Success	The activity succeeded in creating a new address list.
Failure	The activity failed to create a new address list.

Delete Address List activity

The Delete Address List activity removes an existing address list from an Exchange server.

This activity implements the Microsoft Exchange Remove-AddressList command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

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Input variables

Delete Address List input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
identity	Name of the address list to remove.
domainController	Fully-qualified domain name (FQDN) of the domain controller that writes to Active Directory.
recursive	Check box that indicates if the activity should delete Active Directory elements that are children of the specified address list.
whatif	Check box that indicates if the activity should stage the changes without applying them. Use this variable to test your activity settings before using the activity in a live workflow. When this variable is selected, the Exchange server does not make any changes but indicates if the command would succeed or fail. You can review any messages from the Exchange server using the ECC queue.

Output variables

Delete Address List output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Delete Address List conditions

Condition	Description
Success	The activity succeeded in removing the address list from the Exchange server.
Failure	The activity failed to remove the address list from the Exchange server.

Get Address List activity

The Get AddressList activity retrieves all attributes from the specified Exchange address list.

This activity implements the Microsoft Exchange Get-AddressList command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

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Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Get Address List input variables

Variables	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
domainController	Fully-qualified domain name (FQDN) of the domain controller that writes to Active Directory.
identity	Name of the address list to get attributes from. If you enter a value in this variable, leave the **container** and **searchText** variables blank.
organization	Organization to which the specified address list belongs.
searchText	Filter text that causes the activity to return only results that contain this text. This variable can only be used with Exchange 2013 servers. If you enter a value in this variable, leave the **container** and **identity** variables blank.
container	Parent address list of the address list from which you want to retrieve attributes. If you enter a value in this variable, leave the **identity** and **searchText** variables blank

Output variables

Get Address List output variables

Variables	Descriptions
result	Either **success** or **failure**.
error	Error message if the operation fails.
output	Raw XML payload from the Exchange server. This data includes all Exchange attributes.

Conditions

Get Address List conditions

Condition	Description
Success	The activity succeeded in retrieving the attributes from the address list.
Failure	The activity failed to retrieve the attributes from the address list.

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Move Address List activity

The Move Address List activity moves a Microsoft Exchange address list to another location in the address hierarchy.

This activity implements the Microsoft Exchange Move-AddressList command.

The Exchange server caches the changes from this activity but does not immediately apply them. Use the Update Address List activity after this activity to apply the changes or wait for the Exchange server to automatically apply cached changes.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Move Address List input variables

Variables	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
identity	Name of the address list to move.
target	Path to the address list's new location.
domainController	Fully-qualified domain name (FQDN) of the domain controller that writes to Active Directory.
whatif	Check box that indicates if the activity should stage the changes without applying them. Use this variable to test your activity settings before using the activity in a live workflow. When this variable is selected, the Exchange server does not make any changes but indicates if the command would succeed or fail. You can review any messages from the Exchange server using the ECC queue.

Output variables

Move Address List output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

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Conditions

Move Address List conditions

Condition	Description
Success	The activity succeeded in moving the address list to another location.
Failure	The activity failed to move the address list to another location.

Set Address List activity

The Set Address List activity modifies a Microsoft Exchange address list.

Use the Optional parameters variable to pass specific values to the Microsoft Exchange server. This activity implements the Microsoft Exchange Set-AddressList command.

The Exchange server caches the changes from this activity but does not immediately apply them. Use the Update Address List after this activity to apply the changes or wait for the Exchange server to automatically apply cached changes.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Set Address List input variables

Variables	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
identity	Name of the address list to modify.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format `"parameter":"true"`.

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Output variables

Set Address List output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Set Address List conditions

Variable	Description
Success	The activity succeeded in modifying the specified address list.
Failure	The activity failed to modify the specified address list.

Update Address List activity

The Update Address List activity adds or removes users from the specified address list and immediately applies any cached address list changes to the server.

Use the optional parameters variable to specify which users to add or remove. This activity implements the Microsoft Exchange Update-AddressList command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Update Address List input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
identity	Name of the address list to update.
domainController	Fully-qualified domain name (FQDN) of the domain controller that writes to Active Directory.
whatif	A check box that indicates if the activity should stage the changes without applying them. Use this variable to test your activity settings before using the activity in a live workflow. When this variable is selected, the Exchange server does not make any changes but indicates if the command would

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Update Address List input variables (continued)

Variable	Description
	succeed or fail. You can review any messages from the Exchange server using the ECC queue.

Output variables

Update Address List output variables

Variable	Description
result	Either **Success** or **Failure**.
error	Error message if the operation fails.

Conditions

Update Address List conditions

Condition	Description
Success	The activity succeeded in adding or removing users from the specified address list.
Failure	The activity failed to add or remove users from the specified address list.

Create Mailbox activity

The Create Mailbox activity creates a new Active Directory user, if that user does not already exist, and a Microsoft Exchange mailbox for that user.

This activity implements the Microsoft Exchange New-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Create Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.

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Create Mailbox input variables (continued)

Variable	Description
	Important: The MID Server must be in the same domain as the Exchange server.
first_name	First name of the user.
middle_initial	Middle initial of the user.
last_name	Last name of the user.
alias	The display name for the mailbox address, the part of the email address to the left of the @ symbol. If no alias is specified, the activity uses First name.Last name as the alias. The alias is also used as the user's principal name (UPN) if none is specified in the optional parameters.
password	Password to use for the new mailbox. The password is encrypted when it is sent to the target host.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format *`"parameter":"true"`*.

Output variables

Create Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.
output	Raw XML payload from the Exchange server. This data includes all Exchange attributes.

Conditions

Create Mailbox conditions

Condition	Description
Success	The activity succeeded in creating a new mailbox for the specified user. If no Active Diectory account existed for that user, this activity succeeded in creating a new account.

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Create Mailbox conditions (continued)

Condition	Description
Failure	The activity failed to create a new mailbox or an Active Directory account for the specified user.

Delete Mailbox activity

The Delete Mailbox activity deletes the Microsoft Exchange mailbox of an Active Directory user.

Optional parameters determine how the Exchange server handles the mailbox after deleting the user. This activity implements the Microsoft Exchange Remove-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Delete Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
user	Active Directory user to delete. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format `"parameter":"true"`.

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Output variables

Delete Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Delete Mailbox conditions

Condition	Description
Success	The activity succeeded in deleting the specified user's mailbox.
Failure	The activity failed to delete the specified user's mailbox.

Disable Mailbox activity

The Disable Mailbox activity disables the mailbox associated with a specified Active Directory account.

This activity implements the Microsoft Exchange Disable-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Disable Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
user	Active Directory user who's mailbox should be disabled. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type.

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Disable Mailbox input variables (continued)

Variable	Description
	Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format *`"parameter":"true"`*.

Output variables

Disable Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Disable Mailbox conditions

Condition	Description
Success	The activity succeeded in disabling the specified mailbox.
Failure	The activity failed to disable the specified mailbox.

Enable Mailbox activity

The Enable Mailbox activity creates a new mailbox for an existing Active Directory user.

This activity implements the Microsoft Exchange Enable-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Enable Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.

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Enable Mailbox input variables (continued)

Variable	Description
domain	The name of the Exchange server's assigned domain.
user	Active Directory user who's mailbox should be enabled. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format `"parameter":"true"`.

Output variables

Enable Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Enable Mailbox conditions

Condition	Description
Success	The activity succeeded in creating a new mailbox for the specified user.
Failure	The activity failed to create a new mailbox for the specified user.

Get Mailbox activity

The Get Mailbox activity gets the mailbox for the specified user or all mailboxes on a Microsoft Exchange server.

This activity implements the Microsoft Exchange Get-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

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Input variables

Get Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
user	User whose mailbox this activity should retrieve. If no user is specified, the activity gets all mailboxes on the Exchange server. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format `"parameter":"true"`.

Output variables

Get Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.
output	Raw XML payload from the Exchange server. This data includes all Exchange attributes.

Conditions

Get Mailbox conditions

Condition	Description
Success	The activity succeeded in retrieving the attributes of the specified mailbox.
Failure	The activity failed to retrieve the attributes of the specified mailbox.

Set Mailbox activity

The Set Mailbox activity modifies the settings of an existing Microsoft Exchange mailbox.

Use the optional parameters variable to pass specific values to the Exchange server. This activity implements the Microsoft Exchange Set-Mailbox command.

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To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note:
This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Set Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
user	Active Directory user whose mailbox you want to modify. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format *`"parameter":"true"`*.

Output variables

Set Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Set Mailbox conditions

Conditions	Description
Success	The activity succeeded in modifying the settings of the specified mailbox.
Failure	The activity failed to modify the settings of the specified mailbox.

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F5 Network Management activity pack

Orchestration provides custom activities for configuring elements of an F5 load balancer, including pools, pool members, and the virtual servers contained in the pool.

All F5 custom activities are in the F5 Network Management Application Application scope and are activated by the Orchestration - F5 network management plugin, which must be activated by request.

ServiceNow provides custom F5 activities, built from the REST web service activity template, that you can use to perform the following tasks:

- Add, delete, or verify pools.
- Add, delete, or identify pool members.
- Add or delete virtual servers.
- Add a profile to a virtual server.
- Configure the virtual server for vlans, irules, pool, and persistence.

Add F5 Pool Member activity

The Add F5 Pool Member activity adds a member to an F5 load balancer pool.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Membership Management
- **REST function**: post

Input variables

Add F5 Pool Member input variables

Variable	Description
PoolName	Name of this pool, such as `testPool`.
F5IPAddress	IP address of the F5 console.
MemberName	Pool member IP address and port, such as 192.168.2.19:80.

Output variables

Add F5 Pool Member output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.
output	The REST output.

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Conditions

Add F5 Pool Member conditions

Condition	Description
Success	Activity successfully added an F5 load balancer pool member.
Failure	Activity failed to add an F5 load balancer pool member.

Get F5 Pool Member activity

The Get F5 Pool Member activity returns the pool members and verifies the pool's status.

Use this activity to verify that a pool member was created properly.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Membership Management
- **REST function**: get

Input variables

Get F5 Pool Member input variables

Variable	Description
PoolName	Name of this pool, such as `testPool`.
F5IPAddress	IP address of the F5 console.

Output variables

Get F5 Pool Member output variables

Variable	Description
MembersArray	Array for the returned pool member IP address and port, such as 192.168.2.19:80.
status_code	The HTTP status code.
error	The REST error.
result	Success or failure.
output	The REST output.

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Conditions

Get F5 Pool Member conditions

Condition	Description
Success	Activity successfully returned the F5 load balancer pool members.
Failure	Activity failed to return the F5 load balancer pool members

Delete F5 Virtual Server activity

The Delete F5 Virtual Server activity deletes a virtual server from an F5 load balancer pool.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 VIP Management
- **REST function**: delete

Input variables

Delete F5 Virtual Server input variables

Variable	Description
F5IPAddress	IP address of the F5 console.
name	The virtual server's name, such as `testVIP`.

Output variables

Delete F5 Virtual Server output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.

Conditions

Delete F5 Virtual Server conditions

Condition	Description
Success	Activity successfully deleted the virtual server from the F5 load balancer pool.
Failure	Activity failed to delete the virtual server from the F5 load balancer pool.

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Check F5 Pool activity

The Check F5 Pool activity checks the status of a pool to determine if it is available to accept traffic.

Use this activity to determine if a pool you just created is up and running with the proper configuration.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Management
- **REST function**: get

Input variables

Check F5 Pool input variables

Variable	Description
F5IPAddress	IP address of the F5 console.
PoolName	Name of this pool, such as `testPool`.

Output variables

Check F5 Pool output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.

Conditions

Check F5 Pool conditions

Condition	Description
Success	Activity successfully returned the status of the F5 load balancer pool.
Failure	Activity failed to return the status of the F5 load balancer pool.

Add F5 Profile to Virtual Server activity

The Add F5 Profile to Virtual Server activity adds a profile to a virtual server assigned to an F5 load balancer pool.

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This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 VIP Profile Management
- **REST function**: post

Input variables

Add F5 Profile to Virtual Server input variables

Variable	Description
name	The virtual server's name, such as `testVIP`
F5IPAddress	IP address of the F5 console.
VirtualServerName	Name of the virtual server, such as `testVIP`.

Output variables

Add F5 Profile to Virtual Server output variables

Variable	Description
result	Success or failure.
output	The REST output.
status_code	The HTTP status code.

Condtions

Add F5 Profile to Virtual Server conditions

Condition	Description
Success	Activity successfully added the F5 load balancer profile to the virtual server.
Failure	Activity failed to add the F5 load balancer profile to the virtual server.

Modify F5 Virtual Server activity

The Modify F5 Virtual Server activity configures a virtual server assigned to an F5 load balancer pool with irules and a vlan.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

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REST settings

- **REST message**: F5 VIP Management
- **REST function**: put

Input variables

Modify F5 Virtual Server input variables

Variable	Description
name	The virtual server's name, such as `testVIP`.
F5IPAddress	IP address of the F5 console.
irules	The irules for the virtual server, such as `_sys_https_redirect`. • **pool**: Name of the pool for the virtual server, such as `testPool`. • **persistent**: Persistent profile for the virtual server, such as `cookie`.
vlans	Vlans for the virtual server, such as `internal`.

Output variables

Modify F5 Virtual Server output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
output	The REST output.

Conditions

Modify F5 Virtual Server conditions

Condition	Description
Success	Activity successfully configured a virtual server assigned to an F5 load balancer pool.
Failure	Activity failed to configure a virtual server assigned to an F5 load balancer pool.

Add F5 Virtual Server activity

The Add F5 Virtual Server activity adds a virtual server.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

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REST settings

- **REST message**: F5 POOL Membership Management
- **REST function**: post

Input variables

Add F5 Virtual Server input variables

Variable	Description
name	The virtual server's name, such as `testVIP`.
description	Description of this virtual server.
ipProtocol	Protocol used for this virtual server, such as `tcp`.
destination	Virtual server IP address and port number, such as 192.168.4.20:80.
mask	Subnet mask for this virtual server, such as 255.255.255.255.
F5IPAddress	IP address of the F5 console.
sourceAddressTranslation	Source address translation mode.

Output variables

Add F5 Virtual Server output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.
output	The REST output.

Conditions

Add F5 Virtual Server conditions

Condition	Decription
Success	Acitivty successfully added a virtual server.
Failure	Activity failed to add a virtual server.

Delete F5 Pool Member activity

The Delete F5 Pool Member activity deletes an F5 load balancer pool member.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

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REST settings

- **REST message**: F5 POOL Membership Management
- **REST function**: delete

Input variables

Delete F5 Pool Member input variables

Variable	Description
PoolName	Name of this pool, such as `testPool`.
F5IPAddress	IP address of the F5 console.
MemberName	Pool member IP address and port, such as 192.168.2.19:80.

Output variables

Delete F5 Pool Member output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.

Conditions

Delete F5 Pool Member output variables

Condition	Description
Success	Acivity succeeded in deleting an F5 load balancer pool member.
Failure	Acivity failed to delete an F5 load balancer pool member.

Delete F5 Pool activity

The Delete F5 Pool activity deletes an F5 load balancer pool.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Management
- **REST function**: delete

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Input variables

Delete F5 Pool input variables

Variable	Description
F5IPAddress	IP address of the F5 console.
PoolName	Name of this pool, such as `testPool`.

Output variables

Delete F5 Pool output variables

Variable	Description
result	Success or failure.
error	The REST error.
status_code	The HTTP status code.

Conditions

Delete F5 Pool conditions

Condition	Description
Success	Activity successfully deleted the F5 load balancer pool.
Failure	Activity failed to delete the F5 load balancer pool.

Add F5 Pool activity

The Add F5 Pool activity creates the F5 load balancer pool.

Use this activity to verify that a pool member was created properly.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Management
- **REST function**: post

Input variables

Add F5 Pool input variables

Variable	Description
PoolName	Name of this pool, such as `testPool`.

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Add F5 Pool input variables (continued)

Variable	Description
F5IPAddress	IP address of the F5 console.
MemberName	Pool member IP address and port, such as 192.168.2.19:80.

Output variables

Add F5 Pool output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.
output	The REST output.

Conditions

Add F5 Pool conditions

Condition	Description
Success	Activity succeeded in creating the F5 load balancer pool.
Failure	Activity failed to create the F5 load balancer pool.

Infoblox DDI activity pack

This activity pack supports Infoblox DDI management through ServiceNow Orchestration.

The Infoblox DDI activity pack manages the IP addresses used in a network by integrating DNS and DHCP. Custom Orchestration activities use Infoblox Web API (WAPI) REST web services to access the Infoblox GRID server.

Important:
Managing IP addresses through the Infoblox server requires a fully functional MID Server.

Starting with the Jakarta release, the Infoblox activity pack updates to version 2. This update supports Infoblox network views, which can restrict the visibility of network data. The view parameter can be passed as a query parameter or payload content, to do operations in a specific view. Version 2 also supports specifying the version of WAPI to use in integration endpoints.

Supported for Infoblox:

- WAPI version 2.0 for REST messages
- NIOS appliance version 7.0

Note:
To use the Infoblox DDI activities and workflow, you must request activation of the Orchestration - Infoblox DDI Activty Pack plugin.

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Create a REST credential for Infoblox activities

All Infoblox activities require a REST credential to manage IP addresses from the Infoblox DDI server.

Before you begin

Before starting this procedure, make sure you have the following:

- A properly configured and running Infoblox DDI Grid Server.
- REST credentials defined on the Infoblox DDI server.

Role required: admin

About this task

You must create a REST credential record on the ServiceNow instance that each Infoblox activity can use to access management features on the Infoblox server.

Procedure

1. Navigate to **All** > **Orchestration** > **Credentials** and click **New**.
2. In the list of credential types, select **Basic Auth Credentials**.
3. Create the credential record with a logical name, such as **InfobloxCred**.
4. Right-click in the header bar of your new credential record and select **Copy sys_id** from the context menu.
   Follow browser instructions to copy the sys_id if browser security measures restrict this function.
5. Paste the sys_id into the **restCredentials** input field of each activity you use.

Infoblox workflows

The Infobox DDI activity pack includes two default workflows, one that reserves and registers IP addresses and another that releases IP addresses.

To access these workflows, navigate to **Workflow** > **Workflow Editor** and select the **Workflows** tab. Click on a workflow to open it, and then click the information icon in the workflow header to display the properties dialog box.

Infoblox Reserve/Register IP in IPAM

Use this workflow to register IPv4 addresses or request the next available IP address on IPAM. Optionally, you can use it to register IP addresses on DNS. The custom Infoblox activities used in this workflow are:

- IPAM Register IP Address
- IPAM Reserve IP Address
- Register DNS A-Record
- Get Network Details

Infoblox Reserve/Register IP input variables

Field	Description
Infoblox Server	IP address of the Infoblox DDI server.
Network	Network containing the target IP address.

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Infoblox Reserve/Register IP input variables (continued)

Field	Description
Zone	The DNS zone for the IP address being registered.
Rest Credentials	The sys_id of the REST credentials from the ServiceNow instance.
DNS Host Name	Name of the DNS server machine on which the IP address is being registered.
IPv4 Address	IP address being reserved or registered.

Infoblox Release IPAM Reservations

Use this workflow to release (delete) all the IPAM reservations associated with an IPv4 address. The custom Infoblox activities used in this workflow are:

- IPAM List IP Reservations
- List DNS Record
- DNS Delete
- IPAM Delete

Infoblox Release IPAM Reservations input variables

Field	Description
Rest Credentials	The sys_id of the REST credentials from the ServiceNowinstance.
IP to Delete	IP address to release.
Infoblox Server	IP address of the Infoblox DDI server.

Infoblox roles and permissions

Define the roles and permissions that the Infoblox activities need to access the various resources on the Infoblox server.

Admin groups

There are three types of admin groups on an Infoblox server:

- Superuser
- Default
- Limited Access

To perform specific operations on the Infoblox server, the Limited Access user must have a minimum set of privileges for the desired resources, using either the user interface or an API. These privileges are based on read and read/write access. For more information, refer to the "About Admin Groups" section in the Infoblox NIOS Administrator Guide.

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Permission hierarchy

1. **User**: A user can be part of multiple groups.
2. **Group**: A group can have many roles.
3. **Role**: Each role consistes of specific resource permissions.

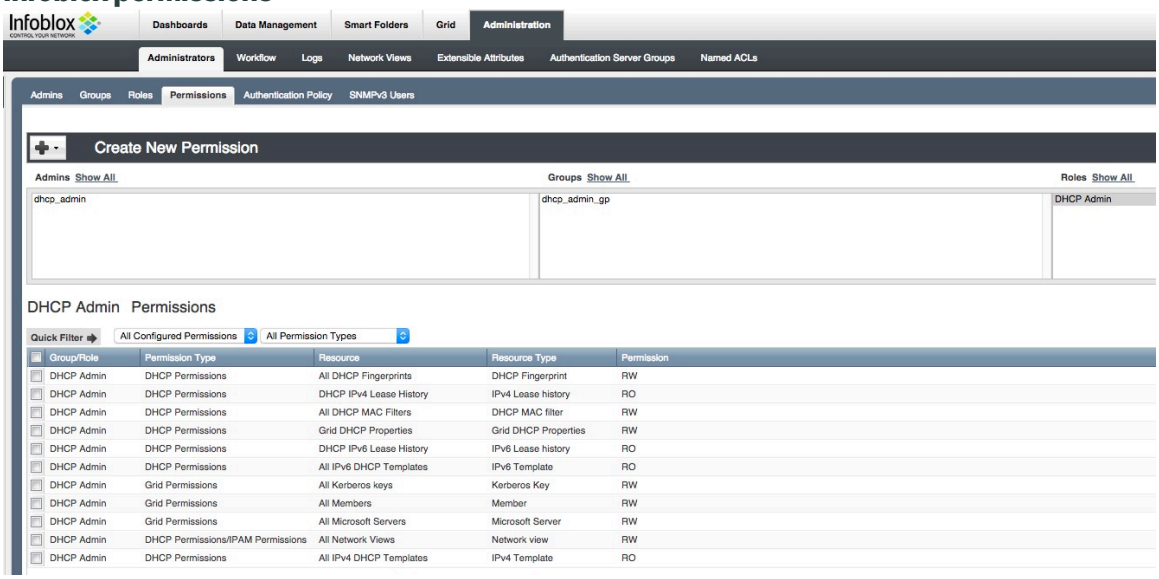
Required permissions

The ServiceNow Infoblox activity pack requires appropriate read and read/write privileges for these resources:

- Network
- DHCP
- DNS
- IPAM

This example shows a default DHCP admin role, its resources, and the related permissions for each.

Infoblox permissions



Infoblox DHCP activities

The Infoblox DHCP activities manage the IP addresses reserved for DHCP in your network.

Use these activities to reserve, list, or delete IP addresses that are used for DHCP assignment in your network.

DHCP Reserve IP v4 Address Range activity

The DHCP Reserve IP v4 Address Range activity reserves an IP address range for DHCP use.

The DHCP activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DHCP**.

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Input variables

DHCP Reserve IP v4 Address Range input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
startIpAddress	Beginning IPv4 address of the range to reserve.
endIpAddress	Ending IPv4 address of the range to reserve.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

DHCP Reserve IP v4 Address Range output variables

Variable	Description
DHCPIpAddressRange	Range of reserved IPv4 addresses.
error	Displays the message for any REST error encountered.

Conditions

DHCP Reserve IP v4 Address Range conditions

Variable	Description
Success	Activity successfully reserved the specified IPv4 address range.
Failure	Activity failed to reserve the specified IPv4 address range.

DHCP Delete IP Reservation activity

The DHCP Delete IP Reservation activity deletes IP reservations in DHCP using either an IPv4 or IPv6 address range.

An automation can obtain an Infoblox DHCP object to delete from either of these activities:

- DHCP List IP Reservations
- DHCP Reserve IPv4 Address Range

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The DHCP activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DHCP**.

Input variables

DHCP Delete IP Reservation input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
ipToDelete	IP address range to delete, in the form: `range/<encrypted code>:<start range>/<end range>/default`
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.

Output variables

DHCP Delete IP Reservation output variables

Variable	Description
DHCPDeletedIpRange	Range of deleted IP addresses.
error	Displays the message for any REST error encountered.

Conditions

DHCP Delete IP Reservation conditions

Variable	Description
Success	Activity successfully deleted the specified IP address range.
Failure	Activity failed to delete the specified IP address range.

DHCP List IP Reservations activity

The DHCP List IP Reservations activity generates a list of all the DHCP range reservations on a specific InfoBlox server.

The DHCP activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

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To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DHCP**.

Input variables

DHCP List IP Reservations input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

DHCP List IP Reservations output variables

Variable	Description
reference	Reference value for an array of DHCP address ranges in this format: `range/<encrypted code>:<start range>/<end range>/default`
network	Address of the network containing the IP address range.
network_view	Routing doman associated with the network returned.

Conditions

DHCP List IP Reservations conditions

Variables	Description
Success	Activity successfully returned an array of DHCP IP address ranges.
Failure	Activity failed to return an array of DHCP IP address ranges.

Infoblox DNS activities

The Infoblox DNS activities manage DNS records in your network using an Infoblox DDI Grid Server.

Use these activities to register, list, or delete DNS records managed on an Infoblox server.

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List DNS C-records activity

The List DNS C-records activity retrieves all canonical (CNAME) records from a specified Infoblox server.

The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Input variables

List DNS C-records input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

List DNS C-records output variables

Variable	Description
error	Displays the message for any REST error encountered.
reference	Reference value for a DNS CNAME record, such as: `record:cname/ZG5zLmJpbmRfY25hbWUkL19kZWZhdWx0LmNvbS50ZXN0LmNuYW1l:cname.test default`
cannonicalName	CNAME record.
name	Name of the network option returned, such as *`domain-name-server`*.
view	The assigned view of the DNS data. A given zone can have multiple views, which are accesse depending on the IP address of the source of the query. The **default** view of DNS data for this activity is the network view.

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Conditions

List DNS C-records conditions

Variable	Description
Success	Activity successfully listed the DNS C records.
Failure	Activity failed to list the DNS C records.

Register DNS A-record activity

The Register DNS A-record activity creates a DNS A record on a specified Infoblox server.

The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Input variables

Register DNS A-record input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
network	Address of the network containing the IP address to register in the record.
hostName	Name of the actual server machine associate with the IP address in this record.
zone	The DNS zone associated with the record being created.
ipAddress	Specific IP address registered in this record.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

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Output variables

Register DNS A-record output variables

Variable	Description
error	Displays the message for any REST error encountered.
DNSARecord	Name of the record registered, expressed in the format: *record:host/<encrypted code>:<network name>/default*.

Conditions

Register DNS A-record conditions

Variable	Description
Success	Activity successfully created the DNS A record.
Failure	Activity failed to create the DNS A record.

Register DNS C-Record activity

The Register DNS C-Record activity creates a DNS canonical (CNAME) record on a specified Infoblox server.

The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Input variables

Register DNS C-Record input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
cname	The DNS cannonical record to create, as expressed by the *c_name* value.
recordName	Name of the record to create.
zone	The DNS zone containing the cannonical record to create.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**.

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Register DNS C-Record input variables (continued)

Variable	Description
	Note: If the field is empty, the operation is treated as happening in the default view.

Output variables

Register DNS C-Record output variables

Variable	Desctiption
error	Displays the message for any REST error encountered.
DNSCRecord	Name of the CNAME record registered, expressed in the format: *record:cname/<encrypted code>:<network name>/default*.

Conditions

Register DNS C-Record conditions

Variable	Description
Success	Activity successfully created the cannonical DNS record.
Failure	Activity failed to create the cannonical DNS record.

List DNS Record activity

The List DNS Record activity generates a list of all the DNS entries on a specific InfoBlox server.

The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Input variables

List DNS Record input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**.

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List DNS Record input variables (continued)

Variable	Description
	Note: If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

List DNS Record output variables

Variable	Description
reference	Reference value for a DNS record, such as: `record:cname/ZG5zLmJpbmRfY25hbWUkL19kZWZhdWx0LmNvbS50ZXN0LmNuYW1l:cname.tes default`
configure_for_dhcp	Returns the status of a DHCP fixed address object.
host	Host machine with which the DNS record is associated.
ipv4addr	The reserved IPv4 address associated with a DNS record.
name	Name of the network option returned. For example, the name of the DNS record object from **reference** example is *cname.test.com*.
view	The assigned view of the DNS data. A given zone can have multiple views, which are acces depending on the IP address of the source of the query. The **default** view of DNS data for th activity is the network view.
error	Displays the message for any REST error encountered.

Conditions

List DNS Record conditions

Variable	Description
Success	Activity successfully listed all the available DNS record.
Failure	Activity failed to list the available DNS record.

DNS Delete activity

The DNS Delete activity deletes DNS records of any type from in Infoblox server, such as C and A records.

The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Note:
It is faster to create a new record than recover one that has been deleted.

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Input variables

DNS Delete input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
RecordToDelete	Name of the DNS record to delete. The record is expressed in this format: *record:cname/ZG5zLmJpbmRfY25hbWUkL19kZWZhdWx0LmNvbS50ZXN0LmNuYW11:cname.test.default*
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.

Output variables

DNS Delete output variables

Variable	Description
DeletedRecord	Name of the deleted DNS record.
error	Displays the message for any REST error encountered.

Conditions

DNS Delete conditions

Variable	Description
Success	Activity successfully deleted the specified DNS record.
Failure	Activity failed to delete the specified DNS record.

Infoblox IPAM activities

The Infoblox IPAM activities manage IP addresses in your network using an Infoblox DDI Grid Server.

Use these activities to register, reserve, list, or delete IP addresses.

IPAM Register IP Address activity

The IPAM Register IP Address activity registers an IP address in a network using Infoblox IPAM.

The output of this activity produces an InfoBlox IP address record that can be used for other IPAM functions in the format `fixedaddress/<encrypted key>:<reserved ip address>/<view>`.

The IPAM activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

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To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **IPAM**.

Input variables

IPAM Register IP Address input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
macAddress	Mac address of the computer for which this IP address is registered.
ipAddress	Specific IP address to register.
network	Address of the network containing the registered IP address.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

IPAM Register IP Address output variables

Variable	Description
error	Displays the message for any REST error encountered.
IPAddressRecord	IPAM record of the registered IP address.

Conditions

IPAM Register IP Address conditions

Variable	Description
Success	Activity successfully registered the specified IP address.
Failure	Activity failed to register the specified IP address.

IPAM Reserve IP Address activity

The IPAM Reserve IP Address activity reserves an IP address in a network using Infoblox IPAM.

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The output of this activity produces an InfoBlox IP address record that can be used for other IPAM functions in the format `fixedaddress/<encrypted key>:<reserved ip address>/<view>`.

The IPAM activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **IPAM**.

Input variables

IPAM Reserve IP Address input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
macAddress	Mac address of the computer for which this IP address is reserved.
network	Address of the network containing the reserved IP address. The Infoblox server reserves the next available IP address from this network.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

IPAM Reserve IP Address output variables

Variable	Description
error	Displays the message for any REST error encountered.
IPAddressRecord	IPAM record of the reserved IP address.
IPAddress	Selected IP address to reserve.

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Conditions

IPAM Reserve IP Address conditions

Variable	Description
Success	Activity successfully reserved the specified IP address.
Failure	Activity failed to reserve the specified IP address.

IPAM List IP Reservations activity

The IPAM List IP Reservations activity returns an array of all IP Address within the named InfoBlox Server.

The IPAM activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **IPAM**.

Input variables

IPAM List IP Reservations input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

The output of this activity produces an array of reserved IP addresses in the format `fixedaddress/<encrypted key>:<reserved ip address>/<view>`.

IPAM List IP Reservations output variables

Variable	Description
reference	Reference value of a reserved IP address contained in an array of addresses, such as `fixedaddress/ZG5zLmZpeGVkX2FkZHJlc3MkMTAuMC4xMDMuMTEuMC4u:0.0.0.11/default" ipv4addr: "0.0.0.11"`

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IPAM List IP Reservations output variables (continued)

Variable	Description
ipv4addr	The reserved IPv4 address.
network_view	Routing domain associated with the network returned.
error	Displays the message for any REST error encountered.

Conditions

IPAM List IP Reservations conditions

Variable	Description
Success	Activity successfully retrieved the list of reserved IP addresses from the Infoblox server.
Failure	Activity failed to retrieve the list of reserved IP addresses from the Infoblox server.

IPAM Delete activity

The IPAM Delete activity deletes an IP Address within a named InfoBlox server.

The IPAM activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **IPAM**.

Input variables

IPAM Delete input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
itemToDelete	The IP address to delete, in the format `fixedaddress/<encrypted key>:<reserved ip address>/<view>`.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.

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Output variables

IPAM Delete output variables

Variable	Description
DeletedRecord	IPAM record of the deleted IP address.
error	Displays the message for any REST error encountered.

Conditions

IPAM Delete conditions

Variable	Description
Success	Activity successfully deleted the specified IP address.
Failure	Activity failed to delete the specified IP address.

Infoblox network activities

The Infoblox network activities manage networks using an Infoblox DDI Grid Server.

Use these activities to create, list, or delete networks on an Infoblox server.

Create Network activity

The Create Network activity creates new networks on a specified Infoblox server.

The network activities use the REST web service activity template to manage network addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **Network**.

Input variables

Create Network input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
network	Address of the network to create.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**.

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Create Network input variables (continued)

Variable	Description
	Note: If the field is empty, the operation is treated as happening in the default view.

Output variables

Create Network output variables

Variable	Description
NetworkCreated	Address of the network created.
error	Displays the message for any REST error encountered.

Conditions

Create Network conditions

Variable	Description
Success	Activity successfully created the network.
Failure	Activity failed to create the network.

Get Network Details activity

The Get Network Details activity retrieves the information about a specific network on an Infoblox server.

The network activities use the REST web service activity template to manage network addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **Network**.

Input variables

Get Network Details input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
network	Address of the network whose details you want to see.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**.

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Get Network Details input variables (continued)

Variable	Description
	Note: This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

The output variables from this activity are objects on the Infoblox server used to identify network details. For more information, refer to the Infoblox documentation.

Get Network Details output variables

Variable	Description
error	Displays the message for any REST error encountered.
NetworkOptions	The *NetworkOptions* array contains these attributes: • *reference*: Reference value for the network requested. This value is in the form of `network/ZG5zLm5ldHdvcmskMTAuMS4wLjAvMTYvMA:10.1.0.0%2F1` • *options*: The *options* array contains these attributes: ◦ *name*: Name of the network option returned, such as *domain-name-server*. ◦ *num*: Index number of the option. For example, the index for *domain-name-server* is *6*. ◦ *use_option*: Indicates whether a DHCP option is used at that level in the network heirarchy. Set this value to **True** to override the Grid Level DHCP option with this option at the network level. ◦ *value*: Value to use for this option. For example, the value for the *domain-name-server* option is the IP address of the server machine. ◦ *vendor_class*: The class of the network object. The options are **DHCP**, **DNS**, or **IPAM**.

Conditions

Get Network Details conditions

Variable	Description
Success	Activity successfully retrieved network details from the Infoblox server.

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Get Network Details conditions (continued)

Variable	Description
Failure	Activity failed to retrieve network details from the Infoblox server.

Delete Network activity

The Delete Network activity deletes a network from an Infoblox server.

The network activities use the REST web service activity template to manage network addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **Network**.

Input variables

Delete Network input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
networkToDelete	Reference number of the network to delete from the Infoblox server. You can obtain this value either by using the List Registered Networks activity or when creating a network with the Create Network activity. An example of the network reference value is: *`network/ZG5zLm51dHdvcmskMTUuMC40NS4wLzI0LzA:15.0.45.0/24/default`*.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.

Output variables

Delete Network output variables

Variable	Description
DeletedNetwork	Reference number of the deleted network from the Infoblox server.
error	Displays the message for any REST error encountered.

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Conditions

Delete Network conditions

Variable	Description
Success	Activity successfully deleted the network.
Failure	Activity failed to delete the network.

List Registered Networks activity

The List Registered Networks activity retrieves all the networks associated with an Infoblox server.

The network activities use the REST web service activity template to manage network addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **Network**.

Input variables

Activity input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

Activity output variables

Variable	Description
reference	Reference value of a registered network.
network	Network address.
network_view	Routing doman associated with the network returned.
error	Displays the message for any REST error encountered.

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Conditions

Activity conditions

Variable	Description
Success	Activity successfully retrieved the list of registered networks available on the Infoblox server.
Failure	Activity failed to retrieve the list of registered networks available on the Infoblox server.

PowerShell activity pack

PowerShell is built on the Windows .NET Framework and is designed to control and automate the administration of Windows machines and applications.

Orchestration provides custom PowerShell activities that were created with the PowerShell activity designer template. These activities perform the same functions as PowerShell activities by the same name from previous releases and replace those activities for all new workflows. These custom activities give workflow administrators the ability to store input and output variables in the databus.

Note:
Existing workflows from earlier versions that were created with legacy PowerShell activities continue to function normally after an upgrade to Geneva. However, all new workflows must use these custom PowerShell activities.

Starting with the Zurich release, there are the following updates to the PowerShell activity pack:

- A new PowerShell probe (V2), which takes advantage of Integration Hub functionality
- The ability to insert debug statements in the PowerShell scripts and produce the resulting messages at runtime

To use the PowerShell custom activities, you must request activation of the Orchestration - PowerShell plugin. These activities are available in the Workflow Editor on the **Custom** tab. Expand the **Custom Activities** tree and select the PowerShell category for the activity you want to use.

ServiceNow supports PowerShell 3.0 to 5.1.

PowerShell activity designer

PowerShell activities are configured to return data to a workflow from a host using Microsoft PowerShell.

You must purchase Classic Orchestration to use this template. For specific information about using the tools in the activity designer, refer to these resources:

- Orchestration activity designer
- Create input variables
- Create a parsing rule

ServiceNow supports PowerShell 3.0 to 5.1.

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PowerShell protocols and troubleshooting

PowerShell uses the Windows Management Instrumentation (WMI) and Windows Remote Management (WinRM) protocols to enable Orchestration activities to run commands on remote Windows hosts.

Windows Management Instrumentation (WMI)

WMI provides a uniform interface for any local or remote applications or scripts that obtain management data from a computer system, a network, or an enterprise. WMI contains these components:

- **Managed objects and WMI providers**: A WMI provider is a COM object that monitors one or more managed objects for WMI. A managed object is a logical or physical enterprise component, such as a hard disk drive, network adapter, database system, operating system, process, or service.
- **WMI infrastructure**: The WMI infrastructure is a Microsoft Windows operating system component know as the WMI service (winmgmt). The WMI infrastructure is composed of the WMI Core and the WMI repository. The WMI repository is organized by WMI namespaces. The WMI service creates namespaces, such as `root\default`, `root\cimv2`, and `root\subscription`, at system startup and preinstalls a default set of class definitions, including the Win32 Classes, the WMI System Classes, and others. The remaining namespaces found on your system are created by providers for other parts of the operating system or products.
- **WMI consumers**: A WMI consumer is a management application or script that interacts with the WMI infrastructure. A management application can query, enumerate data, run provider methods, or subscribe to events by calling either the COM API or the Scripting API for WMI.

WMI installation and configuration

For the MID Server to successfully make a remote connection to the target host, TCP port 135 must be open. The Windows firewall automatically creates an inbound rule for WMI connectivity called Windows Management Instrumentation (DCOM-In).

Windows Remote Management (WinRM)

WinRM is the Microsoft implementation of WS-Management Protocol, a standard Simple Object Access Protocol (SOAP) protocol that allows hardware and operating systems from different vendors to interoperate.

WinRM contains these components:

- **WinRM Scripting API**: This scripting API enables Orchestration to obtain data from remote computers, using scripts that perform WS-Management protocol operations.
- **WMI Service**: The WMI service continues to run side-by-side with WinRM and provides requested data or control through the WMI plug-in. You can continue to obtain data from standard WMI classes, such as as Win32_Process.

WinRM configuration

WinRM is automatically installed on Windows 2008 R2 and above operating systems, but must be configured before use.

1. In a command prompt, enter **winrm quickconfig**. This command is not case sensitive.
2. When the console displays **Make these changes [y/n]?**, enter **y**.

   The `winrm quickconfig` command performs the following operations:

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- Starts the WinRM service, and sets the service startup type to **auto start**.
- Configures a listener for the ports that send and receive WS-Management protocol, using either HTTP or HTTPS on any IP address.
- Creates a firewall exception for the current user profile.

MID Server PowerShell files

PowerShell functions are stored in script files (*.ps1) that use a PowerShell Script module (*.psm1) file name extension.

The PowerShell functions are used by the PowerShell MID Server script files included in these activity packs:

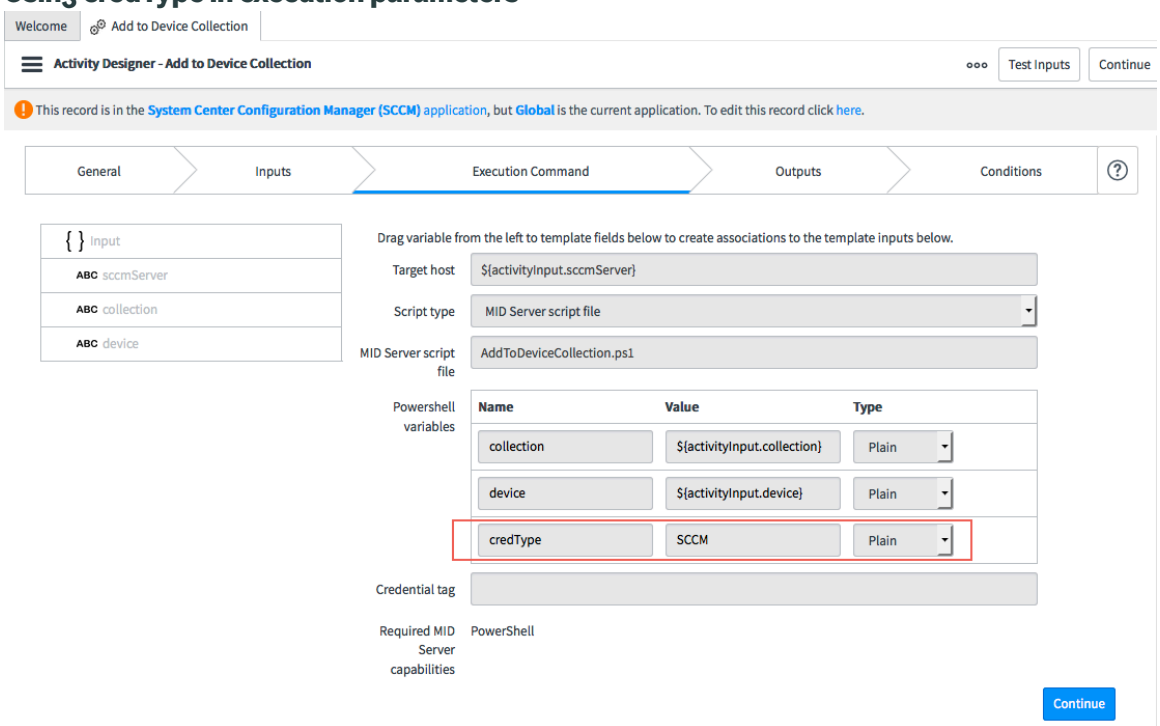
- Active Directory
- Exchange
- SCCM
- PowerShell

PSScript.ps1

This script performs a few tasks, such as credential testing, password encryption, and the execution of scripts configured in the Orchestration Activity Designer or in MID Script Files. However, this document focuses on how PSScript.ps1 uses the `credential.psm1` module for testing access to remote hosts.

The PowerShell variables are generally used directly in the PowerShell execution command or as arguments in the MID Server script file you specify. There are special variables that are passed to PSScript.ps1, such as *`credType`*.

Using credType in execution parameters



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PowerShell credTypes

The PowerShell credential types:

Type	Description
WMI	testCredentialWMI
Exchange	testCredentilExchange
AD	testCredentilAD
SCCM	testCredentilSCCM

If no credential type is passed to the PSScrip.ps1 script, the MID Server defaults to the WMI test function to test access to the target host. If there is a credential type used, the MID Server runs the corresponding test function for that credential type.

Exit codes

These exit codes are returned from the PSScript.ps1 script and logged in the MID Server log file.

PSScript.ps1 exit codes

Type	Test function
0	PowerShell command/script ran successfully.
1	Test finished successfully, but the command/script failed to execute.
2	Incorrect syntax passed to script.
3	All credentials including MID Server service account failed to execute the command/script.
4	Passed test and executed the activity, but an error was returned. Example user cannot be found.

DiagnosticsUtil.psm1

The MID Server uses this module file to perform PowerShell logging that assists debugging any Orchestration activity using PowerShell scripting. You can also add debugging statements directly to custom scripts.

PowerShell diagnostic utilities

Utility	Description
SNCLog-DebugInfo	Log a debug message for a PowerShell script or PowerShell Orchestration activity. Examples: • `SNCLog-DebugInfo -message "My debug message..."` • `SNCLog-DebugInfo "My debug message"`

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PowerShell diagnostic utilities (continued)

Utility	Description
SNCLog-ParameterInfo	Log a function parameter value. For `"function getHostName{ param( [String] $target )"`, the first value to the PowerShell hashtable is a string to indicate which function executes, and the values for each of the function parameters. Examples: • Function with single parameter: `SNCLog-ParameterInfo @("Running getHostName", $target)` **Note:** The debug message shows, 'Running `getHostName $target: [actual value of $target]`'. • Function with multiple parameters: `SNCLog-ParameterInfo @("Running functionName", $param1, $param2, $param3)`
SNCObfuscate-Value	Use this utility to encrypt values for security purposes. The function displays `"$variableName":***`, where *** is the obfuscated value. Example: `SNCObfuscate-Value $password` **Note:** The debug message reads: `"$password : ***"`.

Credentials.psm1

The MID Server uses this module file to test access to a target host. The MID Server loops through all Windows credentials stored in its credentials table using the following access type functions, unless the PowerShell activity has a credential type (**credType**) defined. All ServiceNow® authored PowerShell activities are hard-coded to use a specific credential type. As a result, the MID Server only tests credential access against the designated function.

PowerShell test functions

Function	Description
testCredentialWMI	Tests the given user and password on the target host using the *`Get-WMI`* object.
testCredentilAD	Tests the given user and password on the target host using the built-in *`DirectoryEntry`* object.

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PowerShell test functions (continued)

Function	Description
testCredentialExchange	Tests the given user and password to create a session on an Exchange host. This test uses the built-in PowerShell remoting feature on a remote host. WinRM is configured on Exchange servers by default.
testCredentialSCCM	Tests the given user and password to create a session on an SCCM server. This test uses the built-in PowerShell remoting feature on a remote host. This test requires WinRM to be configured.
testNoCredentialAccessWMI	Tests the given user and password on the target host, using the *Get-WMI* object. This test is used when no **credType** is used.

Note:
If the test passes using one of these functions, that credential is used to run the PowerShell script/command. If the tests fail to access the target host using these functions, the MID Server runs the PowerShell script/command under the account of the MID Server service.

This diagram illustrates the dependency of the credential selection behavior on the host being targeted by the PowerShell activity. If the target host is the IP address or host name of the MID Server, the MID Server bypasses all credentials in the Credentials table and uses the account of the MID Server service. If the target host is not the MID Server, then all Windows credentials are used first. If all credentials in the Credentials table are unsuccessful in running the PowerShell activity, then the MID Server uses the MID Server service account.

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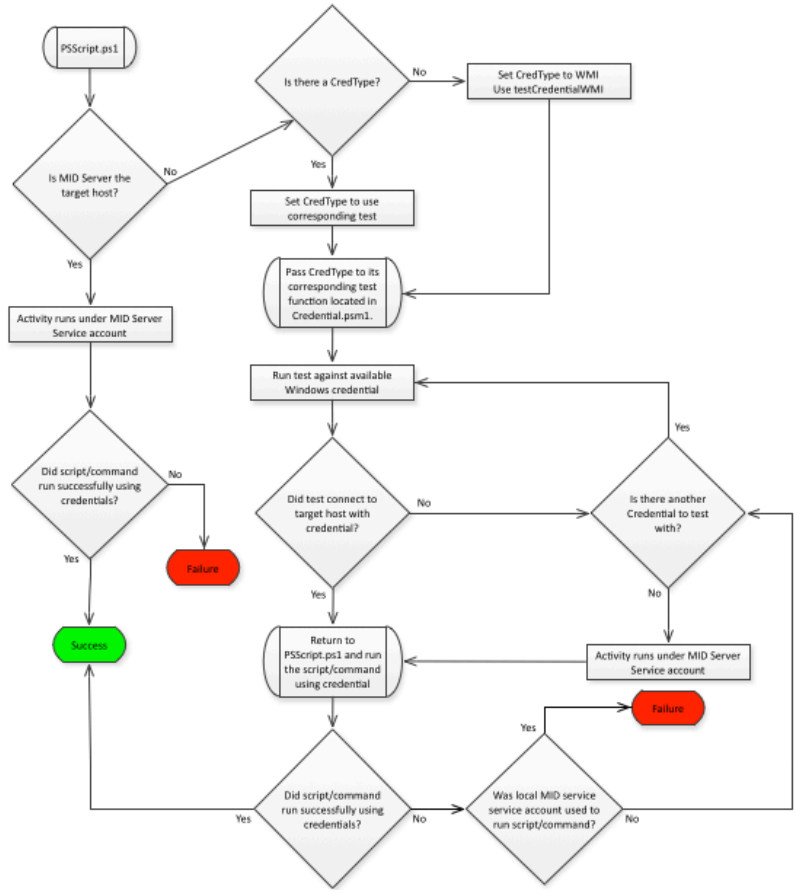
PowerShell credential selection criteria



ActiveDirectory.psm1

This module file stores the functions used by the PowerShell scripts shipped with the Active Directory activity pack.

Exchange.psm1

This module file stores the functions used by the PowerShell scripts shipped with the Exchange activity pack.

SCCM.psm1

This module file stores the functions used by the PowerShell scripts shipped with the SCCM activity pack.

PowerShell troubleshooting

Authentication and access denied errors can prevent PowerShell activities from running a command on a target host.

Use these procedures for troubleshooting authentication failures with Orchestration PowerShell activities and when the Remote Procedure Call (RPC) server is unavailable or when access is denied. The authentication failure error displays when all credentials, including those of the local MID Server service account, do not have the correct permissions to run the Powershell script/command. The same error displays when the target host is unreachable.

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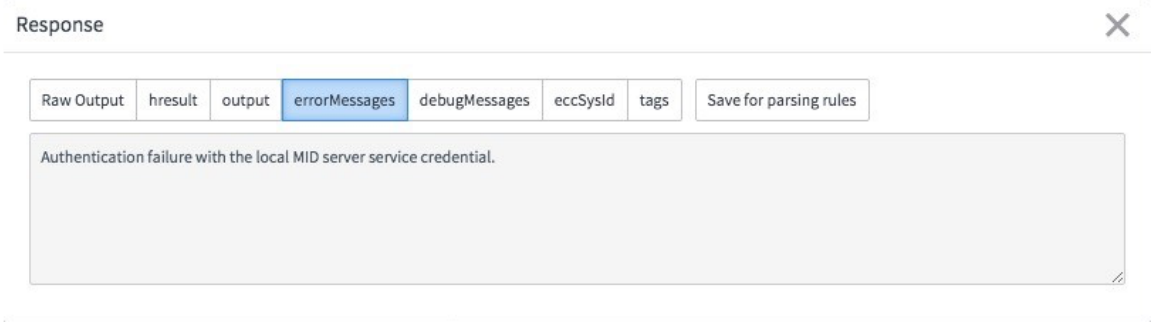
Authentication error message



Authentication failure in an Active Directory activity

This example uses the Create AD Object activity to illustrate troubleshooting authentication failure in PowerShell.

Before you begin

Role required: Permissions to access and create accounts on Active Directory

About this task

Validate that the account you are using has the proper permissions to run the activity.

Procedure

1. Log on to the target machine using the account under which you want to run the activity. Active Directory tools must be installed on this machine.
2. Launch the Active Directory Users and Computers application.
3. Navigate to the OU under which you want to create the Active Directory object.
4. Attempt to create the object.

   If this procedure is successful under the specified user, the following might be the cause of the authentication failure:

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- User name is invalid.
- Password entered incorrectly.
- Domain controller is unreachable.

Note:
The majority of the return codes listed in the MID Server log for this error are **1**s and **3**s. This is because the Active Directory activities use the ADSI provider and not WMI or WinRM. An error code of **1** means the account was able to connect with the test account, but running the script failed.

```
Attempting to use credential with username 'service-now\joel.zamallo
Running command:-> C:\Windows\System32\WindowsPowerShell\v1.0\powers
rShell\PSScript.ps1' -computer '10.11.144.230'   -script 'C:\Users\j
useCred $true -isDiscovery $false -debug $true; exit $LASTEXITCODE}"
Thread name is Powershell is executing...
The exit value from waitFor() is 1
The status code returned from running the command is 1
```

An error code of **3** means that the MID Server attempted to run the PowerShell activity under the MID Server service account but failed.

```
worker-Standard:PowershellProbe DEBUG: Thread name is Powershell is executing...
Gobbling stdout: Powershell is executing... Gobbled: <powershell>
Gobbling stdout: Powershell is executing... Gobbled: <output>
Gobbling stdout: Powershell is executing... Gobbled: </output>
Gobbling stdout: Powershell is executing... Gobbled: </powershell>
worker-Standard:PowershellProbe DEBUG: The exit value from waitFor() is 3
worker-Standard:PowershellProbe DEBUG: The status code returned from running the command is 3
worker-Standard:PowershellProbe DEBUG: Queuing Powershell Windows - Powershell (nodes: 3)
worker-Standard:PowershellProbe Sending to queue: Powershell,Windows - Powershell (nodes: 3),1
worker-Standard:PowershellProbe Document: <?xml version="1.0" encoding="UTF-8"?><results probe
<error>Authentication failure with the local MID server service credential.</error>
```

Authentication failure in an Exchange activity

This example uses the Create Mailbox activity to illustrate troubleshooting authentication failure in PowerShell.

Before you begin

Role required: Permissions to access and create mailboxes on the Exchange server

Procedure

1. Validate that the account you are using has the proper permissions to run the PowerShell activity.
2. Log on to a machine that has the Exchange Management Shell (EMS) installed.
3. Create a user using the `New-mailbox` Exchange commandlet.

Creating a new user in Exchange

```
[PS] C:\Windows\system32>
[PS] C:\Windows\system32>
[PS] C:\Windows\system32>
[PS] C:\Windows\system32>
[PS] C:\Windows\system32>New-Mailbox -Name 'Test P. Smith' -Alias 'test.smith' -OrganizationalUnit 'discolab2.service-no
w.com/Managed Objects/Users/San Diego' -UserPrincipalName 'test.smith@discolab2.service-now.com' -SamAccountName 'test.s
mith' -FirstName 'Test' -Initials 'P' -LastName 'Smith' -Password 'System.Security.SecureString' -ResetPasswordOnNextLog
on $false_
```

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If this procedure is successful under the specified credential, the following is the likely cause of the failure:

- User name is invalid.
- Password entered incorrectly.
- Exchange server is unreachable.

4. If the Exchange server is unreachable, examine the MID Server logs.
   Because the Exchange activities use WinRM to access the Exchange server, the logs can provide more troubleshooting information.

> **Note:**
> Ensure that the error is NOT **WinRM cannot process the request**.

Remote Procedure Call (RPC) server unavailable or access denied

Typically, this error is logged when running a PowerShell script/command that uses WinRM or WMI.

Possible causes of error

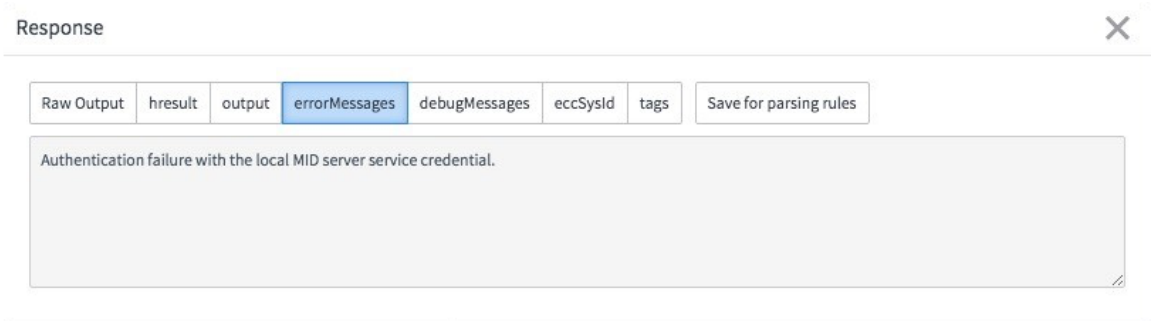
The target host might have one of these issues:

- WinRM isn't configured.
- Firewall is blocking access to the host over TCP port 135 (WMI) or HTTP/HTTPs and TCP port 5985 (WinRM).
- Kerberos issue, caused by hopping to multiple hosts using WMI.

Example WinRM error

The Create Mailbox activity from the Exchange activity pack has generated an error in the ECC queue involving authentication using the MID Server service credential. This occurred because the MID Server credential is the last to be used if the targeted host is not the MID Server.

Authentication failure error message



The MID Server log shows that the MID Server tried to run the activity under specific credentials, but wasn't successful and received an exit code of 1.

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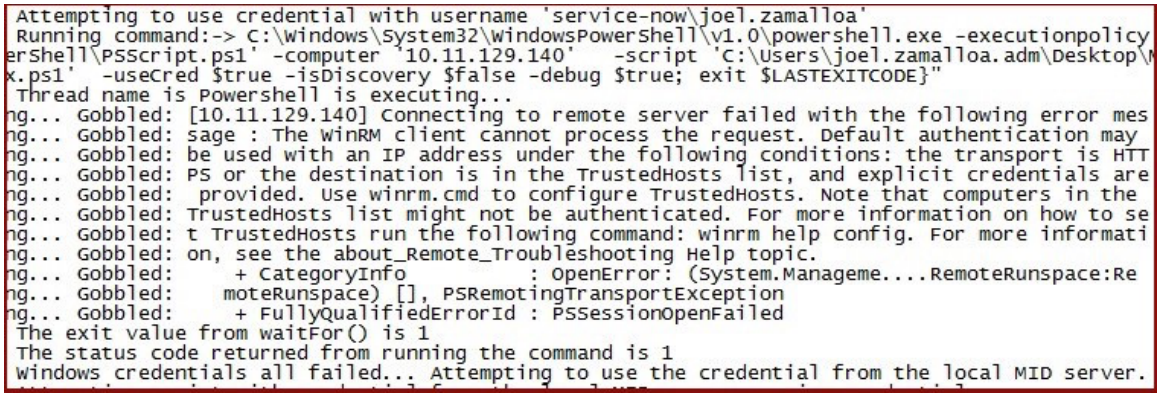
MID Server error code



Join Domain activity

The Join Domain activity joins a Windows computer to a domain.

If the computer is already a member of a domain, this activity completes without modifying the computer. Joining a domain requires a username and password. This user must have domain administration privileges or privileges to join a computer to the domain.

Note:
This activity replaces a Powershell activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Join Domain input variables

Variables	Description
Hostname	Hostname or IP address of the Windows server that is joining the domain.
Domain	Name of the domain to join.
Domain_user	The name of a user who has domain administration privileges or privileges to join a computer to the domain.
Domain_user_password	The password for the user who has domain administration privileges or privileges to join a computer to the domain.

Output variables

Join Domain output variables

Variables	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.

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Conditions

Join Domain conditions

Condition	Description
Success	The activity succeeded in joining the computer to the domain.
Failure	The activity failed to join the computer to the domain.

Install Windows App activity

The Install Windows App activity installs an application from an MSI package on a Windows target machine.

Note:
This activity replaces a Powershell activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Install Windows App input variables

Variable	Description
hostname	Hostname or IP address of the target Windows machine on which the service is installed. Use the Resolve DNS MID Server capabilities to resolve hostnames into IP addresses.
installerpath	Path to the installer. The installer can be on any machine that is visible to both the MID Server and the target machine (local drive, UNC path, mapped drive, etc.).
installer	Name of the installer file, such as `winzip150.msi`. The installer must be an MSI package.
arguments	The parameter that contains the command line arguments to the MSI package. These are name=value pairs, separated by a space. For example, the argument might appear as: `INSTALLDIR=c:\myinstallfolder` ADDDESKTOPICON=0. These arguments are dependent on the what the actual MSI being installed defines. If there are no arguments, leave the field empty.

Output variables

Install Windows App output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *`executionResult.errorMessages`* from the Activity designer parsing sources.

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Conditions

The activity state tells the workflow engine what to do with the activity.

Install Windows App conditions

Name	Description
Success	The Windows application was successfully installed on the target machine.
Failure	The Windows application failed to install on the target machine

Enable WMI Windows Installer provider

To install software on Windows machines using the Install Windows App activity, enable WMI Windows Installer provider on all target machines.

Before you begin

- It is recommended that the MID Server, the target machine, and the installer source machine be on the same Active Directory domain. However, if these computers are on separate domains, those domains must have a trust relationship established between them.
- If the installer path is a UNC file sharing machine, the Active Directory account of the target computer must be trusted for delegation. For instructions on this configuration, see the posting on the community for installing and uninstalling Windows applications.

About this task

Note:
See WMI Providers for a list of Windows operating systems that provide this tool by default.

Procedure

1. Open the Control Panel.
2. Go to **Add or Remove Programs**.
3. Select **Add/Remove Windows Components**.
4. Double-click **Management and Monitoring Tools**.

   This action opens a secondary window displaying additional selections.
5. Select **WMI Windows Installer Provider** check box.
6. Click **OK** to return to the Windows Components Wizard window.
7. Click **Next**.
   You might be asked for the Windows installation CD to complete this process.

Change Service State activity

The Change Service State activity starts or stops a Windows service on a remote system.

This activity replaces a Powershell activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the Powershell activity template, which gives workflow administrators the ability to store input and output variables in the databus.

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Input Variables

Change Service State input variables

Variable	Description
hostname	Hostname or IP address of the target Windows machine on which the service is installed. Use the Resolve DNS activity to resolve hostnames into IP addresses.
service	Name of the Windows service to start or stop. The *service* parameter is the service name, not the display name of the service affected.
state	There are two actions to select for a service state change: **StartService** or **StopService**.

Output variables

Change Service State output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If there is no error, this value is null.

Conditions

Change Service State conditions

Condition	Description
Success	The target service was successfully started or stopped.
Failure	The update to the target service was unsuccessful, or the service was not found on the target system.

Restart Windows Server activity

The Restart Windows Server activity stops and then restarts a Windows server using Powershell.

Note:
This activity replaces a Powershell activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the Powershell activity template, which gives workflow administrators the ability to store input and output variables in the databus.

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Input variables

Restart Windows Server input variables

Variable	Description
Hostname	Hostname or IP address of the Windows server to restart.

Output variables

Restart Windows Server output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.

Conditions

Restart Windows Server conditions

Condition	Description
Success	The activity succeeded in restarting the Windows server.
Failure	The activity failed to restart the Windows server.

Uninstall Windows App activity

The Uninstall Windows App activity uninstalls an application from a Windows target machine.

The only applications that can be uninstalled using this activity are those that were installed by a Windows Installer.

Note:
This activity replaces a Powershell activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the Powershell activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Uninstall Windows App input variables

Variable	Description
hostname	Hostname or IP address of the Windows target machine on which to uninstall an application.
product	The name of the application to uninstall exactly as it appears in the Windows Add/Remove Programs list.

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Output variables

Uninstall Windows App output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.

Conditions

Uninstall Windows App conditions

Condition	Description
Success	The activity succeeded in unistalling the application from the Windows server.
Failure	The activity failed to uninstall the application from the Windows server.

Probe activity pack

Orchestration provides an activity pack customized using the ServiceNow activity designer that runs probes on target hosts to return specific information.

These custom activities were built with the Create a probe activity, which gives workflow administrators the ability to store input and output variables in the databus.

To use the custom probe activities, you must request activation of the Orchestration - Probe plugin.

Resolve DNS Name activity

The Resolve DNS Name activity takes an IP address or a fully qualified domain name (FQDN), which it resolves into one or more IP addresses.

The domain name is sent through the MID Server to the domain name system (DNS) to resolve the name. If a single IP address is returned, it is stored in two variables: *resolved_ip* and *resolved_ips*. If multiple IP addresses are returned, the first IP address is stored in the *resolved_ip* variable, and all the addresses are stored in the *resolved_ips* variable. If an IP address is provided instead of an FQDN, this address is output directly to both variables. Your ServiceNow instance must have access to a MID Server configured to use Resolve DNS to run this activity.

This activity replaces an activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the Probe activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Resolve DNS Name input variables

Variable	Description
FQDN	The fully qualified domain name to resolve or an IP address.

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Output variables

Resolve DNS Name output variables

Variable	Desctiption
ip	The first IP address of the resolved DNS name.
ips	Comma separated list of resolved IP addresses.
result	One of the following: • **resolved**: Able to resolve the sprcified DNS name. • **unresolved**: Unable to resolve the specified DNS name.

Conditions

Resolve DNS Name conditions

Condition	Description
Success	Activity successfully resolved the DNS name.
Failure	Activity failed to resolve the DNS name.

SNMP Query activity

The SNMP Query activity queries an SNMP device.

Your ServiceNow instance must have access to a MID Server configured to use SNMP to run this activity.

This activity replaces an activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the Probe activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

SNMP Query input variables

Variable	Description
hostname	Hostname or IP address of the SNMP device being queried.
oids	A list of unique object identifiers used to identify SNMP devices.

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Output variables

SNMP Query output variables

Variable	Description
description	Description of the SNMP object.
timeout	Boolean value indicating whether or not the query timed out.
error	Indicates any error that occurred. If no error occurred, this value is null.
oid_data	An array of data objects for all unique object identifiers.

Conditions

SNMP Query conditions

Condition	Description
Success	Activity successfully ran the query on the target device.
Failure	Activity failed to run the query on the target device. Failure could be caused by invalid credentials or a device that is not accessible.

SCCM activity pack

The Microsoft System Center Configuration Management (SCCM) activity pack provides Orchestration activities you can use to manage software deployments and collections on an SCCM server.

You can use SCCM Orchestration activities to deploy and revoke software from an SCCM server or manage user and device collections. The system manages software on an SCCM server using Orchestration activities and workflows.

Client software distribution requires:

- SCCM 2012 R2 and later.
- Powershell 3.x.
- Powershell Remoting enabled.
- The Windows PowerShell x86 execution policy must be set to unrestricted mode.
- Latest version of the SCCM *cmdlet* library installed on the SCCM server.
- Use the credentials to log onto the SCCM Server and connect via Windows PowerShell from the System Center Configuration Manager console at least once to set the path variable for that credential.

Request SCCM activities

The Orchestration - System Center Configuration Manager plugin installs the SCCM activity pack that deploys software from an SCCM host and manages user and device collections.

Before you begin

Role required: admin

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About this task

The SCCM plugin is activated automatically when the Orchestration - Client Software Distribution [com.snc.orchestration.sccm_mgnt] plugin is activated, but can be activated separately.

Note:
The activities in the SCCM plugin run in the System Center Configuration Manager scope.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

4. Select **Submit**.
   After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

Configure the MID Server for SCCM activities

To use a MID Server with Microsoft System Center Configuration Management (SCCM) activities, configure it to communicate with the SCCM server.

Before you begin

Role required: admin

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Procedure

1. In the navigation filter, enter **cmdb_ci_dns_name.list**.
2. Click **New**.
3. Enter the fully-qualified domain name (FQDN) of the SCCM server in the **Name** field.
4. Right-click in the form header and select **Save**.
5. In the **IP Address** related list, click **New**.
6. In the **IP Address** field, enter the IP address of the SCCM server.
7. In the **Nic** field, select **eth0** or your preferred network interface controller.
8. Leave the **Netmask** field blank.
9. Click **Submit**.

Add to Device Collection activity

The Add to Device Collection activity adds the specified device into a Microsoft System Center Configuration Manager (SCCM) device collection.

The Add to Device Collection activity uses the Powershell activity template to add a specified device to an SCCM device collection. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called `AddToDeviceCollection.ps1` to edit the collection.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note:
The Add to Device Collection activity does not use pre-processing or post-processing scripts.

Input variables

Add to Device Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the device collection.
device	Name of the device to add to the collection.

Output variables

Add to Device Collection output variables

Variable	Description
output	Variable that contains a value that is passed to other activities in the workflow.
error	Variable that contains the activity output error message.

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Conditions

Add to Device Collection conditions

Condition	Description
Success	Activity successfully added the device to the SCCM device collection.
Failure	Activity failed to add the device to the SCCM device collection.

Add to User Collection activity

The Add to User Collection activity adds a user to a Microsoft System Center Configuration Manager (SCCM) user collection.

The Add to User Collection activity uses the Powershell activity template to access the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called `AddToUserCollection.ps1` to edit the collection.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note:
The Add to User Collection activity does not use pre-processing or post processing scripts.

Input variables

Add to User Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the user collection.
user	Name of the user to add to the collection.

Output variable

Add to User Collection output variables

Variable	Description
output	Variable that contains a value that is passed to other activities in the workflow.
error	Variable that contains the activity output error message.

Conditions

Add to User Collection conditions

Success	Activity successfully added a user to the SCCM user collection.
Failure	Activity failed to add a user to the SCCM user collection.

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Get Applications activity

The Get Applications activity returns a list of all the applications available on a Microsoft System Center Configuration Manager (SCCM) server.

The Get Applications activity uses the Powershell activity template to access the applications on the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called `GetApplications.ps1`. This script filters the results of the GET, so that only specific attributes are returned for the applications on the SCCM server. Filtering the results in this manner controls the size of the payload, while providing the most desirable application data. The list of available applications is returned as an array in a JSON object.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note:
The Get Applications activity does not use a pre-processing script.

Input variables

Get Applications input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.

Output variables

The output variables for the Get Applications activity contain an array of objects called `applications` and an error message. Each object in the array contains the attributes in this table.

Get Applications output variables

Variables	Description
applications	The `applications` array contains these attributes: • `id`: Primary key of the SCCM application. • `ciUniqueId`: Unique ID of the SCCM application. • `name`: Name of the application. • `manufacturer`: Manufacturer of the application. • `version`: Version of the application. • `isDeployable`: True/false value indicating if this application is deployable. • `isDeployed`: True/false value indicating if this application is already deployed. • `numberOfUsersWithApp`: Count of users with this application installed.

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Get Applications output variables (continued)

Variables	Description
	• *numberOfDevicesWithApp*: Count of devices on which this application is installed. • *application*: Object containing the data set listed above for this application. Use the script to parse additional data from this set that you might need.
error	Variable that contains the activity output error message.

Conditions

Get Applications conditions

Variables	Description
Success	Activity successfully retrieved the list of applications available on the SCCM host.
Failure	Activity failed to retrieve the list of applications available on the SCCM host.

Get Deployments activity

The Get Deployments activity returns the list of deployments performed by Orchestration using a Microsoft System Center Configuration Manager (SCCM) server.

The Get Deployments activity uses the Powershell activity template to access the deployments on the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called *GetDeployments.ps1* that returns the deployments on the host. This script filters the results of the GET, so that only specific attributes are returned for the deployments on the SCCM server. Filtering the results in this manner controls the size of the payload, while providing the most desirable deployment data. The list of available deployments is returned as an array in a JSON object.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note:
The Get Deployments activity does not use pre-processing scripts.

Input variables

Get Deployments input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.

Output variables

Get Deployments output variables

Variable	Description
deployments	The *deployments* array contains these attributes:

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Get Deployments output variables (continued)

Variable	Description
	• *id*: Primary key of the SCCM application. • *applicationId*: Primary key of the SCCM application. • *softwareName*: Name of the software that will be deployed. • *collectionId*: Primary key of the SCCM collection. • *collectionName*: Name of the SCCM collection. • *desiredConfigType*: Possible values are: *Install* (1) and *Uninstall* (2). • *deploymentIntent*: Intended purpose of the deployment. Possible values are: **Available** (1) and **Required** (2) . • *numberSuccess*: Number of clients that successfully installed the deployment. • *numberErrors*: Number of clients with an error when installing the deployment. • *deployment*: Object containing the data set of attributes listed here for this deployment. Use the post-processing script to parse additional data from this set that you might need..
error	Variable that contains the activity output error message.

Conditions

Get Deployments conditions

Condition	Description
Success	Activity successfully retrieved the list of deployments performed by Orchestration using an SCCM host.
Failure	Activity failed to retrieve the list of deployments performed by Orchestration using an SCCM host.

Get Device Collections activity

The Get Device Collections activity returns the list of available device collections on a Microsoft System Center Configuration Manager (SCCM) host.

The Get Device Collections activity uses the Powershell activity template to access the collections on the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called *GetDeviceCollections.ps1* that returns the device collections on the server. This script filters the results of the GET, so that only specific attributes are returned for the device collections on the SCCM server. Filtering the results in this manner controls the size of the payload, while providing the most desirable device collection data. The list of available collections is returned as an array in a JSON object.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

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Note:
The Get Device Collections activity does not use pre-processing scripts.

Input variables

Get Device Collections input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server..

Output variables

Get Device Collections output variables

Variable	Description
deviceCollections	The *deviceCollections* array contains these attributes: • *id*: Primary key of the SCCM device collection. • *name*: Name of the SCCM device collection. • *collectionType*: Type of SCCM collection. In this case, the value is **device**. • *localMemberCount*: Count of device collection members visible at the local SCCM site. • *memberCount*: Count of all device collection members. • *deviceCollection*: Object containing the data set of attributes listed here for this device collection. Use the post-processing script to parse additional data from this set to use.
error	Variable that contains the activity output error message.

Conditions

Get Device Collections conditions

Condition	Description
Success	Activity successfully retrieved a list of device collections available on the SCCM host.
Failure	Activity failed to retrieve a list of device collections available on the SCCM host.

Get User Collections activity

The Get User Collections activity returns the list of available user collections on a Microsoft System Center Configuration Manager (SCCM) server.

The Get User Collections activity uses the Powershell activity template to access the user collections on the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called *GetUserCollections.ps1* that returns the user collections on the host. This script filters the results of the GET, so that only specific attributes are returned for the user collections on the SCCM server. Filtering the results in this

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manner controls the size of the payload, while providing the most desirable user collection data. The list of available collections is returned as an array in a JSON object.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note:
The Get User Collections activity does not use pre-processing scripts.

Input variables

Get User Collections input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.

Output variables

Get User Collections output variables

Variable	Description
userCollections	The *`userCollections`* array contains these attributes: • *`id`*: Primary key of the SCCM user collection. • *`name`*: Name of the SCCM user collection. • *`collectionType`*: Type of SCCM collection. In this case, the value is **user**. • *`localMemberCount`*: Count of user collection members visible at the local SCCM site. • *`memberCount`*: Count of all user collection members. • *`userCollection`*: Object containing the data set of attributes listed here for this user collection. Use the post-processing script to parse additional data from this set to use.
error	Variable that contains the activity output error message.

Conditions

Get User Collections conditions

Condition	Description
Success	Activity successfully retrieved the list of available user collections on an SCCM host.
Failure	Activity failed to retrieve the list of available user collections on an SCCM host.

Is Device in Collection activity

This activity verifies if a device exists in an SCCM device collection.

The Is Device in Collection activity uses the PowerShell activity template to verify if a specific device exists in an SCCM device collection. The activity is configured to use a MID Server with

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PowerShell capabilities and to run a MID Server script called `IsDeviceInCollection.ps1` to perform the test.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Input variables

Is Device in Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the device collection.
device	Name of the device to verify is in the collection.

Output variables

Is Device in Collection output variables

Variable	Description
output	Variable that contains the test result: True/False
errorMessage	Variable that contains the activity output error message.

Conditions

Is Device in Collection conditions

Condition	Description
Exist	The device exists in the collection.
Not exist	The device does not exist in the collection.
Failure	Activity failed.

Is User in Collection activity

This activity verifies if a user exists in an SCCM user collection.

The Is User in Collection activity uses the PowerShell activity template to verify if a specific user exists in an SCCM user collection. The activity is configured to use a MID Server with PowerShell capabilities and to run a MID Server script called `IsUserInCollection.ps1` to perform the test.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Input variables

Is User in Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.

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Is User in Collection input variables (continued)

Variable	Description
collection	Name of the user collection.
user	Name of the user to verify is in the collection.

Output variables

Is User in Collection output variables

Variable	Description
output	Variable that contains the test result: True/False
errorMessage	Variable that contains the activity output error message.

Conditions

Is User in Collection conditions

Condition	Description
Exist	The user exists in the collection.
Not exist	The user does not exist in the collection.
Failure	Activity failed.

Remove from Device Collection activity

The Remove from Device Collection activity removes a device from a Microsoft System Center Configuration Manager (SCCM) device collection.

The Remove from Device Collection activity uses the Powershell activity template to remove a device from a device collection on a Microsoft SCCM server. The activity is configured to use a MID Server with Powershell capabilites and to run a MID Server script called `RemoveFromUserCollection.ps1` to edit the collection.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Input variables

Remove from Device Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the device collection.
device	Name of the device to add to the collection.

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Output variables

Remove from Device Collection output variables

Variable	Description
output	Variable that contains a value that is passed to other activities in the workflow
error	Variable that contains the activity output error message.

Conditions

Remove from Device Collection conditions

Condition	Description
Success	Activity successfully removed the device from the SCCM device collection.
Failure	Activity failed to remove the device from the SCCM device collection.

Remove from User Collection activity

The Remove from User Collection activity removes a user from a Microsoft System Center Configuration Manager (SCCM) user collection.

The Remove from User Collection activity uses the Powershell activity designer template to access a user collection on a Microsoft SCCM target host. The activity is configured to use a MID Server with Powershell capabilites and to run a MID Server script called `RemoveFromUserCollection.ps1` to edit the collection.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Input variables

Remove from User Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the user collection.
user	Name of the user to add to the collection.

Output variables

Remove from User Collection output variables

Variable	Description
output	Variable that contains a value that is passed to other activities in the workflow.
error	Variable that contains the activity output error message.

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Conditions

Remove from User Collection conditions

Condition	Description
Success	Activity successfully removed the user from the SCCM user collection.
Failure	Activity failed to remove the user from the SCCM user collection.

SFTP File Transfer activity pack

Use the SFTP File Transfer activities to manage files and directories on an SFTP server and to move files from one SFTP server to another.

The SFTP activity pack includes scoped activities for common file transfer tasks and a ready-to-use workflow that includes these activities. Use the SFTP workflow to control which files are going to be moved, what conditions the files need to meet, the order in which the files are moved, and which overwrite options are executed.

Note:
To use the SFTP File Transfer activities and workflow, you must request activation of the Orchestration - SFTP plugin.

SFTP File Transfer workflow

The SFTP File Transfer activity pack includes a scoped workflow that uses multiple activities to manage files on SFTP servers.

The maximum activity count for the SFTP File Transfer workflow is set to 10,000. This allows the workflow to move up to 1000 files from one server to another.

Accessing the workflow

- Navigate to **Workflow** > **Workflow Editor** and select the **Workflows** tab.
- Click on the SFTP File Transfer workflow to open it.
- Click the information icon in the workflow header to display the properties dialog box.

Input variables

SFTP File Transfer workflow input variables

Variable	Description	Default value
Source host	Name or IP address of the server containing the files you want to move.	
Source port	Port number to use to communicate with the source server.	22
Source directory	Full path to the directory where the source files are located.	
Source files	Names of specific source files to move. Separate the file names in this list with semi-colons. This field supports the use of wild cards. For information about how the values in this field are affected by options in other fields, see the section below the table.	

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SFTP File Transfer workflow input variables (continued)

Variable	Description	Default value
Excluded files	Names of specific source files to exclude from the move. The system moves all other files found in the source directory or subfolders. Separate the file names in this list with semi-colons. This field supports the use of wild cards. For information about how the values in this field are affected by options in other fields, see the section below the table.	
Target host	Name or IP address of the server to which the files are being moved.	
Target port	Port number to use to communicate with the target host.	22
Datetime format	Timestamp format to apply when the `$[DateTime]` variable is used in the **Target directory** or **Target files** field. The system uses the current time from the instance to create timestamp values.	yyyy-MM-dd
Target directory	Path to the directory in the target host where the files are being moved. You can specify a target directory whose name includes the timestamp by adding the `$[DateTime]` variable to the directory name. For example, you might enter this path to a target directory: `/user/jacinto.gawron/documents/projects_$[DateTime]`. This produces the `projects_20150505` directory. When the timestamp variable is used, the system uses the format specified in the **Datetime format** field.	
Target file	Format to use for target file names when a timestamp is added. You can configure the system to add the timestamp as a prefix to the file name or insert the timestamp into the name, using these variables: • `$[DateTime]`: Current timestamp, using the format defined in the **Datetime format** field. • `$[SourceFile]`: Complete file name. • `$[SourceFile:Base]`: Base file name without the extension. • `$[SourceFile:Ext]`: File extension only. A target file name with the timestamp added as a prefix is expressed as: `$[DateTime]_$[SourceFile]`. This produces a file name that looks like this: `20150505_file1.txt` A target file name with the timestamp inserted into the name is expressed as: `$[SourceFile:Base]_$[DateTime]$[SourceFile:Ext]`. This produces a file name that looks like this: `file1_20150505.txt`	
Apply move conditions	Check box to apply conditions to the file transfer. If this check box is selected, additional fields appear for setting conditions.	false
Minimum file size, in bytes	Condition that defines a target file's minimum size requirement. This setting can help determine if the file is valid. This field appears when the **Apply move conditions** check box is selected.	0

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SFTP File Transfer workflow input variables (continued)

Variable	Description	Default value
Maximum file size, in bytes	Condition that defines a target file's maximum size requirement. This field appears when the **Apply move conditions** check box is selected.	-1
File is not older than	Condition that sets the earliest acceptable date for this file's age range. The range starts at 00:00 (midnight) on the date specified. This field appears when the **Apply move conditions** check box is selected.	
File is not newer than	Condition that sets the latest acceptable date for this file's age range. The range ends at 23:59 on the date specified. This field appears when the **Apply move conditions** check box is selected.	
Include subfolders	Check box to move the files from subfolders in the source directory. For information about how your selection affects other fields in the form, see the section below the table.	
Move order	Order in which the files are moved from the source to the target. The possible options are: • **None** (same order as files in the source directory) • **By timestamp** • **By file name** • **By file size**	
Sort order	Order in which the files are sorted in the target directory, using the option selected in the **Move order** field. Sorting options are **Ascending** and **Descending**.	desc
Maximum number of retries	Number of attempts the activity can make to connect to the target host or to move a file before timing out. When the retry limit to move a file or to connect to the host is exceeded, the system logs a failure. If the maximum number of failures is not exceeded, the system attempts to connect again or to move the next file named.	2
Time between retries, in seconds	Time, in seconds, between repeat attempts to connect to the target or to begin moving a file.	10
Maximum number of failures	Acceptable number of times the system can fail to connect to the target host or to move a file before it quits trying. A failure occurs when the number of configured retries is exceeded. Using the default settings, failure occurs when the system cannot connect to the target or move a file after two retries.	0
Duplicate file action	Action to take if a file being moved already exists in the target directory. The choices are: • **Overwrite if file exists** (default) • **Rename with index** • **Do not move**	overwrite

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SFTP File Transfer workflow input variables (continued)

Variable	Description	Default value
Preserve file attributes	Check box to use the time stamp and mode information from the source files for the copied files. If this check box is cleared, the copied files have a current time stamp and mode. **Note:** This timestamp is a file attribute and is not appended to the file name.	false
Upon success, remove files from source	Check box to delete original files from the source directory when they are copied to the new location. Clear this check box to keep the source files in their current location in the source host.	false
Upon failure, keep moved files on target	Check box to keep any files on the target that were moved successfully, even if the entire file transfer operation ended in failure. If this check box is cleared, the system removes all successfully transfered files from the target when general failure occurs.	true
Credential tag for source	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the source host.	
Credential tag for target	Specific credential tag this activity must use to run SSH commands on the target host.	

File selection logic

When selecting the files to move from the source host, the system uses this logic:

- If the **Source files** and **Excluded files** fields are empty, the system moves all the files in the source directory.
- When the **Include subfolders** check box is selected, the following dependencies exist:
  - If no files are specified in the **Source files** and **Exclude files** fields, the system moves all files in the source directory and all files in all subfolders of the source directory.
  - If the **Source files** field contains file names, the system moves those files from their location on either the source directory or any of its subfolders.
  - If the **Exclude files** field contains file names, the system moves all the files from the source directory and its subfolders except those excluded files.
- When the **Include subfolders** check box is cleared, the system looks only in the source directory for files to move or exclude.

Copy File activity

The Copy File activity copies a file from an SFTP server (source host) to another SFTP server (target host).

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Input variables

Copy File input variables

Variable	Description
sourceHost	Name or IP address of the server containing the files you want to transfer.
sourcePort	Port number to use to communicate with the source server. The default port number is **22**.
sourceFilePath	Full path to the file to copy from the source host.
targetHost	Name or IP address of the server to which you want to move the files.
targetPort	Port number to use to communicate with the target server. The default port number is **22**.
targetFilePath	Full path to the copied file on the target host.
tempFileSuffix	Temporary suffix to use when moving a file. If this field contains a value, the activity deletes the duplicate target file, if it exists, and then copies the source file to a temporary file using *`targetFilePath + tempFileSuffix`* as the name. Upon completion, the activity renames the file to the actual target file name. If this field is blank, the activity copies the source file directly to the target file and overwrites it, if it already exists.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the source host.
targetCredentialTag	Specific credential tag this activity must use to run SSH commands on the target host.

Output variables

Copy File output variables

Variable	Description
errorMessages	The *`executionResult.errorMessages`* from the Activity designer parsing sources. If this variable is not null, the operation has failed.
result	Text message advising that the command was executed successfully.

Conditions

Copy File conditions

Condition	Description
Success	The activity succeeded in copying the file.
Failure	The activity failed to copy the file.

Create Directory activity

The Create Directory activity creates a new directory on an SFTP server.

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Input variables

Create Directory input variables

Variable	Description
sourceHost	Name or IP address of the server containing the files you want to move.
sourcePort	Port number to use to communicate with the source server. The default port number is **22**.
sourceDirectory	Path to the target directory to create.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

Output variables

Create Directory output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.
result	Text message advising that the command was executed successfully.

Conditions

Create Directory conditions

Variable	Description
Success	The activity succeeded in creating the directory.
Failure	The activity failed to create the directory.

Get File List activity

The Get File List activity returns a list of files from a given directory and its subdirectories on an SFTP server (source host).

Input variables

Get File List input variables

Variable	Description
sourceHost	Name or IP address of the server containing the files you want to list.
sourcePort	Port number to use to communicate with the target server. The default port number is **22**.
sourceDirectory	Path to the target directory containing the files to list.
sourceFiles	List of target files to return. This is a comma separated list that accepts wildcards, such as ***.txt**.
excludedFiles	List of target files to exclude. This is a comma separated list that accepts wildcards, such as ***.txt**.

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Get File List input variables (continued)

Variable	Description
includeSubfolders	True/false variable that determines if files from subfolders are included in the list. The default value for this variable is **false**.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

Output variables

Get File List output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed. An activity can examine the error message to customize a condition. For example, if the error message contains *NO_SUCH_FILE*, the activity can be considered successful, depending on circumstances.
result	List of requested files, returned as a JSON string.

Conditions

Get File List conditions

Condition	Description
Success	The activity succeeded in listing the requested files.
Failure	The activity failed to list the requested files.

Remove File or Directory activity

The Remove File or Directory activity removes a file or a directory on an SFTP server, including subdirectories, when configured.

Input variables

Remove File or Directory input variables

Variable	Description
sourceHost	Name or IP address of the server containing the files you want to remove.
sourcePort	Port number to use to communicate with the target server. The default port number is **22**.
sourceFilePath	Full path to the file or directory to remove. To remove multiple files or directories using a single activity, enter a semicolon-separated list of paths in this field.
isDirectory	True/false variable that determines if the specified file path is a directory. The default value for this variable is **false**.
includeSubfolders	True/false variable that determines if the given directory and all of its subfolders should be removed. The default value for this variable is

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Remove File or Directory input variables (continued)

Variable	Description
	false. If the value for this field is **false**, then the activity can only remove an empty directory. This field appears when the **isDirectory** checkbox is selected.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

Output variables

Remove File or Directory output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.
result	Either **success** or **failure**.
deletionResults	The *deletionResults* array contains these attributes: • *fullPath*: Full path to the file or directory targeted. • *status*: Either **succeeded** or **failed**. • *reason*: Text message describing the cause of a failure.

Conditions

Remove File or Directory conditions

Condition	Description
Success	The activity succeeded in removing the file or directory specified.
Failure	The activity failed to remove the file or directory specified.

Rename File or Directory activity

The Rename File or Directory activity renames a file or directory to a new name on an SFTP server.

Input variables

Rename File or Directory input variables

Variable	Description
sourceHost	Name or IP address of the server containing the file or directory you want to rename.
sourcePort	Port number to use to communicate with the target server. The default port number is **22**.
sourceFilePath	Full path to the file or directory to rename.
targetFilePath	Full path to the renamed file or directory.

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Rename File or Directory input variables (continued)

Variable	Description
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

Output variables

Rename File or Directory output variables

Variable	Description
errorMessages	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.
result	A message saying that the operation has been successful. For example, you might see: `Rename /tmp/sftp_test/subdir1 to /tmp/sftp_test/subdir2 complete`.

Conditions

Rename File or Directory conditions

Condition	Description
Success	The activity succeeded in renaming the file or directory.
Failure	The activity failed to rename the file or directory.

Set File Attributes activity

The Set File Attributes activity sets common file attributes, such as timestamps, size, permissions, and UID/GID, for a file or directory on an SFTP server.

A good practice is to use the Get File List activity to return a list of files and their attributes first. Then, when you moved a file from a source host to a target host, use the Set File Attributes activity to set the source file attributes on the target file. This is demonstrated in the SFTP File Transferworkflow.

Input variables

Set File Attributes input variables

Variable	Description
sourceHost	Name or IP address of the server containing the file or directory whose attributes you want to change.
sourcePort	Port number to use to communicate with the target server. The default port number is **22**.
sourceFilePath	Full path to the file or directory whose attributes you want to change.
userID	User ID attribute to apply to the file or directory. The UID and GUID variables must be set together as a pair.
groupID	Group ID attribute to apply to the file or directory. The UID and GUID variables must be set together as a pair.

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Set File Attributes input variables (continued)

Variable	Description
permissions	File or directory permissions to set for the user and group specified. This value must be expressed as an integer, such as **16877**, which defines these permissions: *rwxr-xr-x*. **Note:** The permissions number is an internal value returned by the Get File List activity.
accessTimestamp	Override the timestamp when the file or directory was last accessed. The access and modification timestamps must be set together as a pair.
modificationTimestamp	Override the timestamp when the file or directory was last modified. The access and modification timestamps must be set together as a pair.
sizeInBytes	Size of the file or directory, expressed in bytes.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

Output variables

Set File Attributes output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.
result	Text message advising that the command was executed successfully.

Conditions

Set File Attributes conditions

Condition	Description
Success	The activity succeeded in changing the attributes of the specified file or directory.
Failure	The activity failed to change the attributes of the specified file or directory.

SSH activity pack

Orchestration provides an activity pack of SSH activities that were customized using the ServiceNow activity designer.

These activities perform the same functions as SSH activities by the same name from previous releases and replace those activities for all new workflows. The custom SSH activities were built with the Create an SSH activity, which gives workflow administrators the ability to store input and output variables in the databus.

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Note:
Existing workflows from earlier versions that were created with legacy SSH activities continue to function normally after an upgrade to Geneva. However, all new workflows must use these custom SSH activities.

To use the SSH custom activities, you must request activation of the Orchestration - SSH plugin.

Secure Copy activity

The Secure Copy activity copies a file from one host to another, without storing the copied file on the MID Server.

This activity replaces an SSH activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity designer template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Secure Copy input variables

Input variable	Description
from_host	Host name or IP address of the source machine.
from_scp_file	Name of the file to copy, including the absolute path.
to_host	Host name or IP address of the target machine.
to_scp_file	Path to the target file. This path can be absolute or relative to the logged in user's home directory.
debug_mid	Check box that enables debug logging when selected.
debug_ssh	Check box that enables J2SSH debug logging when selected.

Output variables

Secure Copy output variables

Output variable	Description
payload	The *executionResult.payload* from the Activity designer parsing sources.
output	The *executionResult.output* from the parsing sources.

Conditions

Secure Copy conditions

Condition	Description
Success	Activity successfully copied the file from one host to another.
Failure	Activity failed to copy the file from one host to another.

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Files Compare activity

The Files Compare activity compares two files on a Linux or UNIX computer.

This activity replaces an SSH activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity designer template, which gives workflow administrators the ability to store input and output variables in the databus.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Global** > **Orchestration - SSH**.

Input variables

Files Compare input variables

Input variable	Description
Hostname	Hostname or IP address of the destination server for SSH activity.
Directory	Name of the working directory.
OldFile	Name of the first file to compare.
NewFile	Name of the second file to compare.

Output variables

Files Compare output variables

Output variable	Description
contents	File comparison result. This is the difference of the two compared files.
result	Either **success** or **failure**.
return-code	Either **0**, if the two files are the same, or **1**, if the two files are different.
errorMessage	The *`executionResult.errorMessages`* from the Activity designer parsing sources.

Conditions

Files Compare conditions

Condition	Description
Success	Activity successfully compared the specified files.
Failure	Activity could not complare the specified files.

File Read activity

The File Read activity reads a file on a Linux or UNIX computer.

This activity replaces an SSH activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows

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must use the custom version of this activity. This activity was built with the SSH activity designer template, which gives workflow administrators the ability to store input and output variables in the databus.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Global** > **Orchestration - SSH**.

Input variables

File read input variables

Input variable	Description
Hostname	Hostname or IP address of the destination server for SSH activity.
Directory	Name of the working directory.
File	The name of the file to read.

Output variables

File read output variables

Output variable	Description
contents	Content of the file to read.
result	Either **success** or **failure**.
errorMessage	The *`executionResult.errorMessages`* from the Activity designer parsing sources.

Conditions

File Read conditions

Condition	Description
Success	Activity successfully read the contents of the specified file.
Failure	Activity could not read the contents of the specified file.

File Write activity

The File Write activity writes a file on a Linux or UNIX computer.

The source file can be an absolute or relative path from the Directory. If an absolute path is used, then no value is required in the *Directory* field.

This activity replaces an SSH activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity template, which gives workflow administrators the ability to store input and output variables in the databus.

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Input variables

File Write input variables

Field	Description
hostname	Hostname or IP address of destination server for SSH activity.
directory	Name of the working (target) directory.
file	Name of the file to be written.
behavior	Select one of the following: • **overwrite**: Creates the file if it does not exist and overwrites the file if it does exist. • **append**: Creates the file if it does not exist and appends the new content to an existing file. • **create only**: Creates the file if it does not exist and fails if the file does exist.
contents	What to write or append (depending on the behavior) to the file

Output variables

File Write output variables

Variable	Description
return_code	Indicates whether or not the file write operation was successful.
error_message	Message that indicates if an error has occurred. Any value other than **0** indicates a failure.

Conditions

File Write conditions

Condition	Description
Success	The activity wrote a file in the target directory.
Failure	The activity failed to write a file in the target directory.

File Copy activity

The custom File Copy activity copies a file on a Linux or UNIX computer.

This activity replaces an SSH activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity designer template, which gives workflow administrators the ability to store input and output variables in the databus.

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To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Global** > **Orchestration - SSH**.

Input variables

File Copy input variables

Input variable	Description
hostname	Hostname or IP address of destination server for SSH activity.
directory	Name of the working directory.
src_file	Name of the source file.
dst_file	The name of the destination file.

Output variables

File Copy output variables

Output variable	Description
result	Either **success** or **failure**.

Conditions

File Copy conditions

Condition	Description
Success	Activity successfully copied the file on the specified host.
Failure	Activity failed to copy the file on the specified host.

File Replace String activity

The File Replace String activity finds and replaces a string in a file on a Linux or UNIX computer.

This activity replaces an SSH activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

File Replace String input variables

Variable	Description
hostname	Hostname or IP address of destination server for SSH activity.
directory	Name of the working (target) directory.
file	Name of the file in which the string is to be replaced.
find_pattern	A regular expression of the text to replace.

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File Replace String input variables (continued)

Variable	Description
replace_string	The replacement string for the text found by the expression in the *find_pattern* variable.
options	Replacement options: • **first**: Replaces the first occurence of the pattern. • **all**: Replaces all occurrences of the pattern.

Output variables

File Replace String output variables

Variable	Description
return_code	Indicates whether or not the string was replaced successfully in the target file.
error_message	Message that indicates if an error has occurred. Any value other than **0** indicates a failure.

Conditions

File Replace String conditions

Condition	Description
Success	The activity has successfully replaced the string in the file.
Failure	The activity has failed to replaced the string in the file.

Reset Linux User Password activity

The *Reset Linux User Password* activity resets the password for a given user on a Linux computer.

This activity requires that the user executing the command be able to run the **chpasswd** command and, if expiring the password immediately, to run **chage** with MID Server privileged commands.

This activity replaces an SSH activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity template, which gives workflow administrators the ability to store input and output variables in the databus.

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Input variables

Reset Linux User Password input variables

Variable	Description
hostname	IP address of the target Linux machine.
user	Name of the user whose password is being reset.
password	New password set for this user. The password is a workflow variable that is encrypted either as a **password2** field or by calling the encryption method of a *`Packages.com.glide.util.Encrypter`* object.
force_change	Indicates if this password is temporary and to force the named user to change the password at login.

Output variables

Reset Linux User Password output variables

Variable	Description
return_code	Indicates whether or not the user password reset action was successful.
error_message	Describes any error that occurred during password reset. If no error occurred, this value is null.

Conditions

Reset Linux User Password conditions

Variable	Description
Success	Activity successfully changed specified user's password
Failure	Activity failed to change specified user's password.

Global activities

Global activities are Orchestration activities created in the global scope.

Any activities you create in the global scope are listed in the Global category in the **Packs** and **Custom** tabs of the Workflow Editor.

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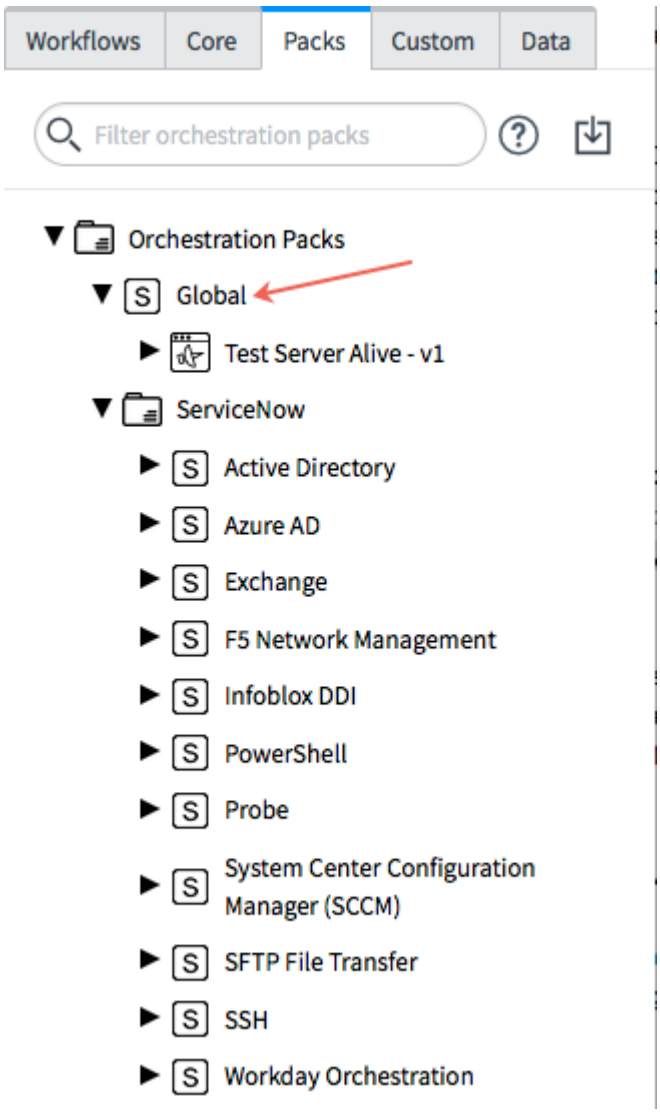
Global activities



Test Server Alive activity

The Test Server Alive activity determines if a target system is alive by its response to a particular protocol.

This activity replaces an activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the Probe activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Test Server Alive input variables

Variable	Description
port_probes	A comma separated list of protocols to use to check for signs of activity on the target machine (example: *wmi,wins,https,ssh,http,https,snmp,dns*)
hostname	Hostname or IP address of the target system to check.

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Output variables

Test Server Alive output variables

Variable	Description
alive	Code that indicates whether or not the server is alive. If any value but **'1'** is returned, the server is not alive.

Conditions

Test Server Alive conditions

Condition	Description
Success	Activity determined that the device is running.
Failure	Activity failed to determine if the target device is running. Failure could be caused by a missing protocol or a device that is not accessible.

Orchestration activity designer

The Orchestration activity designer enables a user with either the workflow_admin or activity_creator and workflow_creator roles to construct reusable activities that suit an organization's business needs.

Activities created by the activity designer offer the following advantages over core activities offered in previous releases:

- Reuse custom activities in multiple workflows.
- Upload and download custom activities from the ServiceNow Store.
- Parse data from standard input formats.
- Test input variables against a target host or endpoint and inspect the payload.
- Automatically map values from a test payload to an activity's output variables.
- Share data between activities.
- View previous versions of an activity.

Access to the activity designer requires activation of ServiceNow Orchestration. For instructions about managing transitions and conditions for all activities, see Workflow activities.

Orchestration provides numerous pre-defined activities, which are reusable components that can be used in numerous workflows without having to understand the complexities of the underlying system. These activities are grouped into activity packs, which address specific business needs, such as: Active Directory, Azure AD, Exchange, Infoblox DDI, and PowerShell. There are other ServiceNow applications which provide and maintain their own separate activity packs, such as Security Incident Response, Cloud Management, or Release Automation.

Customers can also build their own activities and activity packs. You can construct custom activities with a specified template through the Orchestration Activity Designer. Custom-built activities built with the Activity Designer are referred to as activity elements. Activity elements provide optimal operations, enable code reuse, and minimize the need to write code. They also

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enable you to follow the flow of data within a given workflow across orchestration activities. Incorporating activity elements limits the dependency on the scratchpad which reduces problems in complex workflows. Limit the use of core activities, like 'Run Script', unless you need direct access the scratchpad, for example, for a counter. Activity elements do not have direct access to the scratchpad. You can, however, pass scratchpad variables as inputs into your activities.

Orchestration activities created by the activity designer:

- Can be uploaded and shared in the ServiceNow App Store
- Use the databus, which allows the activity to have well-defined inputs and outputs
- Share data across activities within a workflow
- Use versioning
- Provide a consistent approach for activity development regardless protocol

Note:
Prior to the Fujirelease, activities were built with Activity Definitions. In Fuji, a new architecture was introduced using the Activity Designer. Orchestration Core activities, built originally as Activity Definitions, have been converted to use the new template format (Activity Elements) and the databus offered with the activity designer. Workflows in upgraded instances that use legacy activities continue to work normally.

For instructions on using activities to construct a workflow, see Add an activity to a workflow.

Introduction to credentials, connections, and aliases for Orchestration

All application integrations in Orchestration require connection information, credentials, and connection and credential aliases to their respective applications to access resources.

Before you can execute an application integration in Orchestration, you must create and configure the corresponding connection information and credentials. The Connections pertains to an integration with a system, such as an IP address or endpoint with protocols. It contains specific details, such as database particulars, when integrating with a database. The associated Credentials are the authentication data required to make the connection.

Connection information and credentials can vary between QA/Development/Production environments for the same integration. The tight coupling between this data and application metadata, such as workflow or job scheduling, make application metadata obsolete when you change environments. To alleviate this problem, the concept of an alias is introduced, for connections and credentials, to decouple this data from application metadata. These aliases allow customers to design their application metadata to couple to an alias, which during runtime resolves to connection and credential data.

There are two types of aliases, a connection and credential alias and a credential alias. There are business rules that enforce certain constraints on these aliases. Names should contain alphabets, numbers, and underscores but cannot have special characters. The alias must be unique in a scope. If you choose to have multiple active connections, you can have more than one active connection in the same domain. If you do not choose this option, you can have only one active connection in per domain.

Note:
If you enable multiple active connections, when the connection records resolve, your application picks one connection based on an established order. The order of the connections depends on the API you use to retrieve connection data.

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You can add additional connection attributes to an alias, which are available in connection data during run time. Variables overridden by connection administration during run time should not affect the alias.

The credential alias resolves only credential data. Along with alias data model, you can use a scriptable API which can get connection and credential data during runtime.

Using Connection and Credential Alias with Orchestration

Define an alias to label a credential or connection record.

The Credential and Connection Alias defines an alias that labels a credential or connection record. It is extended from the sys_metadata table. It requires the admin role. The credential_admin and connection_admin have read access to sys_alias. A connection alias contains:

Name

Name of the alias.

ID

This field is based on the format "scope name.alias name" Unique index on ID to ensure unique record based on scope name + name. If the scope is global, the ID is the alias name.

Type

You can select either 'Credential' or 'Connection and Credential'. The default is Connection and Credential.

Connection type

This field is applicable when the alias type is set to Connection and Credential. There are three connection types: HTTP, JDBC, JMS. The default is HTTP.

If you create a workday alias in global scope, the ID is set to workday

If you create a workday alias in hr app scope, the ID is set to x_hr_app.workday

- Name can only contain alphabets, numbers and underscore.
- During the upgrade, the tag in credential record will be migrated to connection alias. If the tag in previous release's credential record contains special characters other than alphabets, numbers and underscore, the tag data will be preserved during the upgrade. The user still can use these connection alias, but the user cannot update these alias, unless he removes these special characters when do the update.

Using credentials with Orchestration

Orchestration requires credentials to access resources.

Credential table

The credential table (discovery_credential) defines credentials that can be used for integration. In the previous release, the Credential table contains a string-type tag field, which labels a credential and the tag is used in Orchestration activities. In the Madrid release, the credential alias is renamed from tag, and the type is changed from string to GlideList, which is a reference to the connection alias table.

Credential types

The following credential types are provided:

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Credential type	Description	Supports Test Credential option
Applicative credentials	The credentials to explore the applications on a device or computer. Discovery patterns used by ITOM Visibility often need applicative credentials.	No
Amazon Web Service credentials	The Amazon Web Services (AWS) main account, access key ID, and secret access key. **Note:** You cannot test AWS credentials through the Test	No
Azure Service Principal and Enterprise Agreement credentials	The Azure service principals required for an Azure subscription.	No
Basic authentication credentials	A user name and password.	No
CIM credentials	The user name and password required to access a CIMOM - Common Information Model Object Manager (CIM) server, which obtains information about VMware ESX servers.	No
Cloud credentials	Credentials that Orchestration uses to access cloud resources.	No
JDBC credentials	A user name and password to access a Java Database Connectivity (JDBC) connection.	Yes
JMS credentials	A user name and password to access to a Java Message Service (JMS).	Yes
OAuth 2.0 credentials	OAuth 2.0 credentials enable ServiceNow® to obtain access to user accounts on an HTTP service.	
SNMP community credentials	The community string to access devices via SNMP.	Yes
SNMPv3 credentials	The user name and keys required to access devices on your SNMP v3 network.	Yes
SSH credentials	The user name and password to access Linux and UNIX devices.	Yes
SSH credentials	The private key credentials to access Linux and UNIX devices. **Note:** For better security, SSH private key credentials are suggested over SSH password credentials.	Yes
VMware credentials	Credentials to access vCenter resources. These credentials are required for any work that is performed on vCenter, such as cloning a virtual machine.	Yes

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Credential type	Description	Supports Test Credential option
Windows credentials	The user name and password required to access Windows computers. Several Windows credentials must be met to use Windows credentials.	Yes

How MID Servers use credentials

By default, Windows MID Servers use the login credentials of the MID Server service on the host machine to discover Windows devices in the network. You should Configure Windows MID Server service credentials so that they have domain or local administrator privileges. For Linux and UNIX machines and network devices, the MID Server uses the SSH and SNMP credentials configured in the instance in **Discovery** > **Credentials**.

MID Servers that Orchestration uses must have access to the necessary credentials to execute commands on computers in the network as specified by the Workflow activities. Orchestration can use the same SSH and SNMP credentials as Discovery, but has two additional credentials designed for specific workflow activities: Windows (for PowerShell) and VMware.

Encryption and decryption

The platform stores credentials in an encrypted field on the Credentials [discovery_credentials] table. Once they are entered, they cannot be viewed.

When credentials are requested by the MID Server, the platform decrypts the credentials using the following process:

1. The credentials are decrypted on the instance with the password2 fixed key.
2. The credentials are re-encrypted on the instance with the MID Server's public key.
3. The credentials are encrypted on the load balancer with SSL.
4. The credentials are decrypted on the MID Server with SSL.
5. The credentials are decrypted on the MID Server with the MID Server's private key.

Note:
The platform does not have separate encryption keys for multi-tenant instances.

Credential order

Credentials can be assigned an order value in the Credentials form, which forces the application to try all the credentials at their disposal in a certain sequence. If you do not specify an order value, the application tries the credentials in the Credentials [discovery_credential] table randomly, until it finds one that works, such as when Orchestration attempts to run a command on an SSH server (such as a Linux or UNIX machine), or when Discovery attempts to query an SNMP device (such as a printer, router, or UPS).

After identifying the credentials for a device, Discovery and Orchestration create an affinity between the credentials and the device using the Credential Affinity `[dscy_credentials_affinity]` table. All subsequent discoveries or Orchestration activities attempt to match the credentials in this table with a device for which an affinity exists. If credentials for a device change, Discovery and Orchestration try all available credentials again until they create a new affinity.

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Note:
If Orchestration and Discovery are installed, and credential alias is enabled, multiple affinities can exist. In this case, the platform looks up credentials for each affinity and inserts the credential for the affinity with the lowest order into the probe.

Ordering credentials is useful in the following situations:

- The credentials table contains many credentials, with some used more frequently than others. For example, if the table contains 150 SSH credentials, and 5 of those are used to log in to 90% of the devices, it is good practice to configure those five with low-order numbers, which places them at the top of the execution list. Discovery and Orchestration will work faster if they try these common credentials first. After the first successful connection, the system knows which credentials to use the next time for each device.
- The system has aggressive login security. For example, if the Solaris database servers in the network only allow three failed login attempts before they lock out the MID Server, configure the database credentials with a low-order value.

Credential alias

Credential alias enables flow and workflow creators to:

- Assign individual credentials to any activity in an Orchestration workflow.
- Assign individual credentials to any action in Workflow Studio.
- Assign different credentials to each occurrence of the same activity type in an Orchestration workflow.
- Assign different credentials to each occurrence of the same action in designer flow.

Credential alias also works with credential affinities.

External credential stores

If you do not want credentials stored in your instance, you can use external credential repositories. External credential stores save the credentials in an external site that your instance can access. Only CyberArk is supported.

Connections with Orchestration

Use the connections table to setup a JMS, JDBC, or HTTP(s) connection to a target host.

Connection Table

The Connection table (sys_connection) is the base table for all connection tables. You can setup connections for the following protocols:

- JDBC
- JMS
- HTTP(s)

The connection table references the connection alias table, which couples the connection alias to connection information. Every connection records the following information:

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Base connection properties

Field	Description
Name	Name of the connection. This field must be unique on the table.
Credential	Specify the credential to use with this connection. This is optional.
Connection alias	The connection alias resolves your connection and credentials at run time. Only one connection is active per Connection alias at any one time.
Active	Check to make the current connection active.
Domain	Domain to which the connection belongs.

Credential is unique across active connections, if not empty.

Upgrading connection information

The JDBC connection (jdbc_connection) and JMS connection (orch_jms_ds) tables are existing Orchestration connection tables. In madrid, we re-parent them to extend from Connection (sys_connection) table. They move from Orchestration run time plugins to Credentials & Connections plugins. They are originally extended from sys_metadata. The sys_metadata related data will be removed. JDBC field name changes:

- JDBC server is renamed to host
- Database port is renamed to port

Create custom activities using custom activity designer templates

You can create and update different types of custom activities in the Workflow Editor using a custom template.

Before you begin

Roles required: workflow_admin or activity_creator

About this task

The Activity Designer contains common steps which are applicable to all the activities that you create. This procedure guides you through the common steps and the order they should be set up. You specify an activity template before you create a custom activity.

Procedure

1. Navigate to **All** > **Orchestration** > **Workflow Editor**.
   The **Welcome** tab of the Workflow Editor opens.
2. On the **Custom** tab in the palette, click **+** to create a new activity select the appropriate template from the list.

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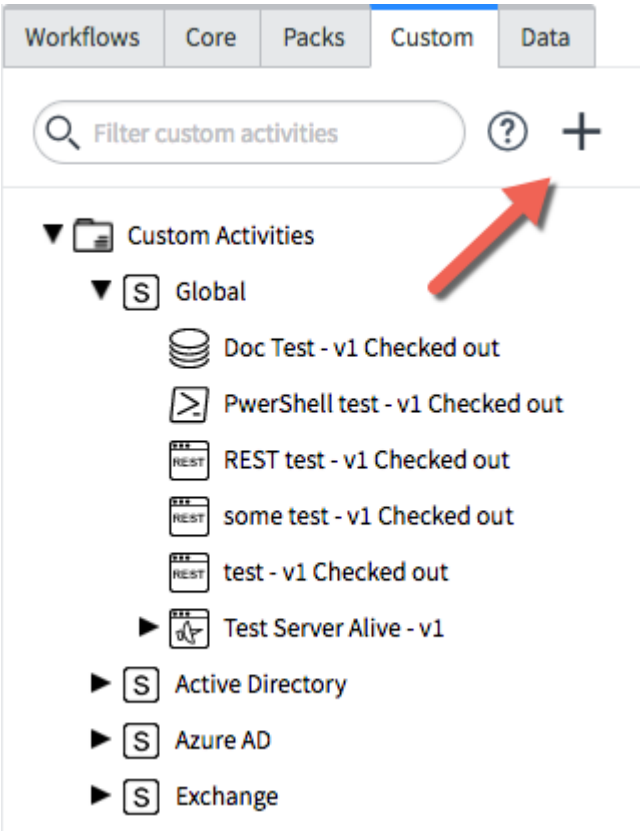
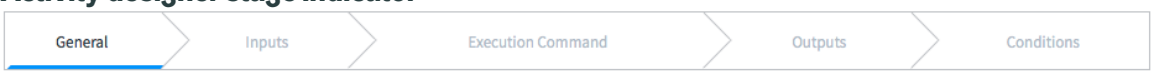


The Activity Designer form appears, with a stage indicator at the top. All new activities start at the **General** stage. The current stage shows with a blue underscore.

Activity designer stage indicator



3. Add the general properties.
   This information is standard for each custom activity, include a name, description, and other related information.
4. Create the template Create input variables for the template.
   Create the variables to pass into the activity in the Inputs form of the activity designer.
5. **Optional:** Add a pre-processing script.
   For input validation or transforming input data, you might need a pre-processing script.

   Note:
   This step is not included in the Run Script activity.

6. Click **Continue** to open the Execution Command form, then fill out the **Execution Command** step based on the corresponding execution templates:
   - Create a SOAP web service activity
   - Create a JDBC activity
   - Create a JavaScript Probe activity
   - Create a PowerShell activity
   - Create a REST web service activity
   - Create a Probe activity
   - Create an SFTP activity

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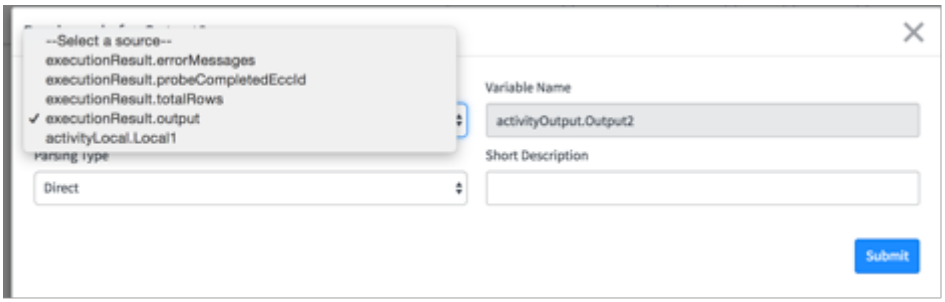
- Create a Run Script activity
- Create an SSH activity
- Create a JMS activity

7. **Optional:** Test your inputs.
8. **Optional:** In the Outputs form, define local and/or output variables.
   Local variables can be used for temporary storage when cascading parsing rules. For example, you might extract an XML payload from within a JSON payload. A local variable can access the XML document and use that as a source for another parsing rule. The graphic shows a *Local1* variable source to parse data for *Output2*.

Define local variable



9. Use one of the options to assign values to Outputs.

Option	Description
Parsing rule	You can create a parsing rule and map them to the output fields by dragging and dropping the variables into the parsing rules structure. The REST, SOAP, and JDBC templates pro vide auto-mapping to create the parsing rules automatically. If available from the test inputs form, auto-mapping should be used when possible.
Post-processing	Post-processing scripts allow you to code your own output data validation, output pars ing code, and related tasks. Post-process ing executes after the execution command results have been returned and before the parsing rules and conditions are run. Click **Go to Post-Processing (Advanced)** to create a post-processing script. **Note:** If you create a script, this step reflects as a stage in the indicator.

10. Click **Continue** to open the Conditions form to create exit condition rules for your activity and then click **Save**.

General properties for activity designer templates

The following General Property fields are common to all activity designer templates.

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General Property fields common to all activity designer templates

Fields	Description
Name	Descriptive name of the activity. Select a unique name that makes the activity easily identifiable in the palette. If you do not name the activity, it is identified in the **Data** tab of the Workflow Editor with an index number when it is added to a workflow. This index reflects the order in which the custom activity was added to the workflow. Only custom activities and their output variables appear in the **Data** tab.
Short description	Brief description of what the activity does.
Image	Icon that identifies an activity of this type in the workflow palette.
Execution template	Predefined template selected for this activity.
Application	Current Application scope set on the instance. To view the scope, click the gear icon on the right side of the title bar in any record or list and look at the value in the **Application** field. The activity runs in this scope within a workflow. You cannot view or change the scope for the instance in the Workflow Editor.
Accessible from	Accessibility setting for this activity, by scope. The following options are available: • **All application scopes**: This activity is available to all application scopes. • **This application scope only**: Use of this activity is restricted to the scope named in the **Application** field.
Category	Category for this activity in the **Custom** and **Packs** tabs. All categories are listed under their scope in the collapsible hierarchy.
Description	Detailed description of the activity.

Create input variables

Create the variables to pass into the activity in the **Inputs** form of the activity designer.

Before you begin

You must name your activity in the **General** form before you can advance to the **Inputs** stage.

Roles required: workflow_admin or activity_creator

Note:
Variable strings in the **Inputs** form have a 255 character limit.

Procedure

1. Click the **+** icon to create a new input variable.

   The designer creates a default variable called **Input1**.

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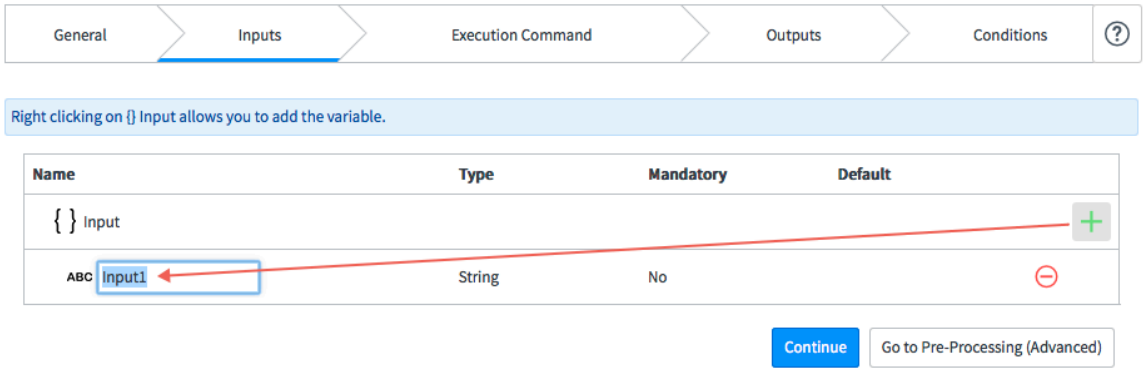

2. Type your new variable name in the field.
3. To change the name of a variable or any of its attributes, double-click the value and then select or enter a new value in the field that appears.
4. Configure your variable using these fields:

Variable configuration

Field	Description
Type	Data type for this variable. Double-click on the field to display the choice list. In addition to the usual data types, you can create input arrays and encrypt individual variables that contain sensitive data. Encrypted variables are passed to the ECC Queue and then decrypted by the MID Server when they run on the target host. Sensitive data returned from running these variables on the host can then be passed to another activity through encrypted output variables.
Mandatory	Marks an input variable as mandatory. Variables marked as mandatory are required fields in the properties form for the activity in the workflow. The input testing feature allows you to filter on mandatory variables.
Default	Default value for this input variable. Default values are prepopulated for variables in the properties form for the activity in the workflow. You can override this value when you test the variables.

5. To reorder the variable list, select a row and then drag the row to its new location.

   When you select a row to move it, the pointer icon changes to an up/down arrow icon ( ).
6. To delete a variable, click the delete icon ( ) in the row.
7. Click **Continue** to advance to the **Execution Command** stage or click **Go to Pre-Processing (Advanced)** to create a script that runs before the activity executes.

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Map an input variable

After you create the input variables, map them to the fields in the Execution Command form.

Before you begin

Role required: activity_admin, activity_creator

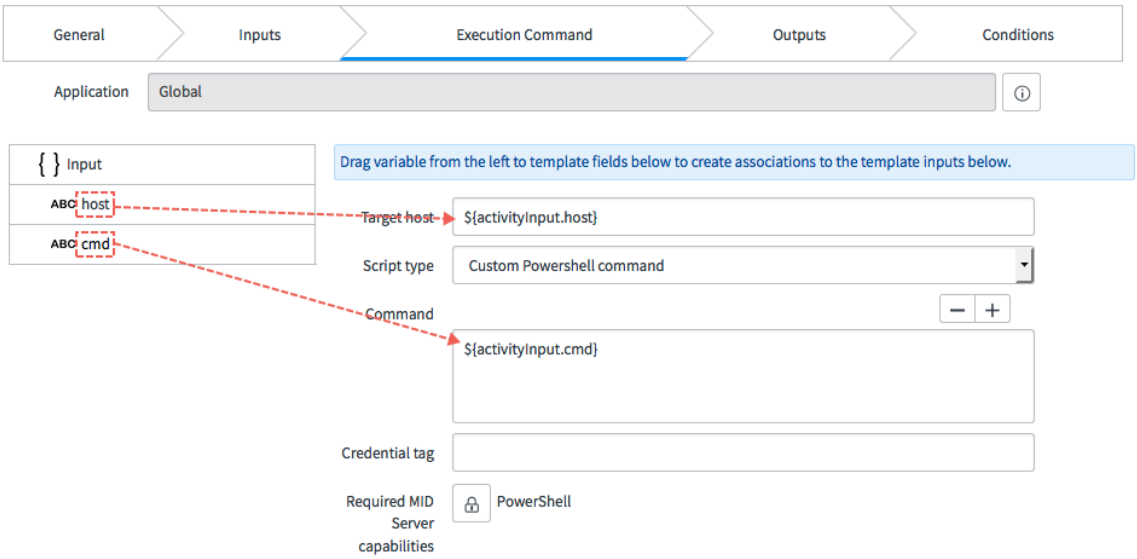
About this task

These fields contain values required by the target host or endpoint to authenticate and query for data. Included in this example are fields for a command to run on the target and the MID Server to use, if one is required.

Procedure

To map a variable, drag it into the appropriate field.

The designer automatically expresses the variable in the syntax the system requires.



Configure the PowerShell execution command

Use the input variables you created to configure the command that Orchestration executes on the Windows target machine.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: activity_creator, admin

> **Note:**
> You can test the PowerShell connection between the MID Server and the target computer without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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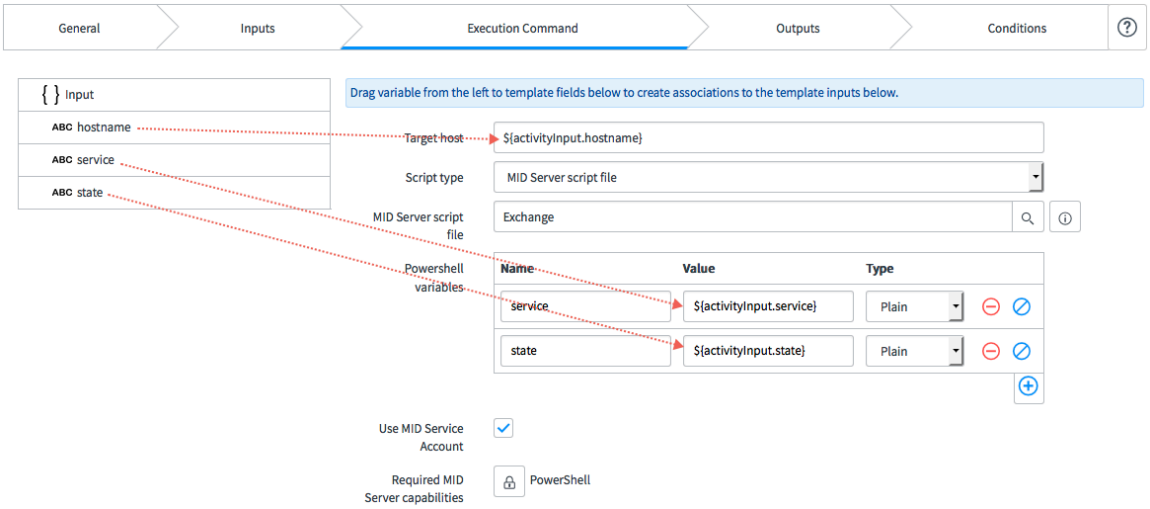
PowerShell execution command



2. Complete the fields shown in the table.

Powershell command fields

Field	Description
Input	Input variable builder. Create variables to map to available fields.
Target host	Host name or IP address of the target server for this PowerShell activity.
Script type	Type of script to run on the PowerShell host. Available options are: ○ Custom Powershell command ○ MID Server script file
MID Server script file	MID Server script file to run. This field is available when the **Script type** selected is *MID Server script file*.
Command	Command that this activity runs on the target host. This field is available when the **Script type** selected is *Custom Powershell command*. You can drag and drop input variables from the variable builder into this field to create your command.
Powershell variables	Name-value pairs to pass to the host with Powershell. You can create these variables manually, or drag input variables into the **Value** field. Encrypted input variables retain their encryption, regardless of the data type settings in this field. If you type in a value and select the **Encrypted** data type, your value appears in plain text in this field and is only encrypted when it passes to the ECC Queue.
Use MID service account	Forces this activity to authenticate on the target host using the credentials of the MID Server service account only, without trying any other credentials. When this check box is selected, the **Credential tag** field is not available.
Credential tag	Specific Credential aliases for Orchestration activities this activity must use to run Powershell commands on the host. If this field is left blank, the MID Server tries all the available credentials until it finds a valid one, ending with the MID Server service account. If a credential alias is defined, the MID Server tries the credentials for that alias only and does not try the MID Server service account. This field is not available when the **Use MID service account** check box is selected.

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Field	Description
Required MID Server capabilities	MID Server to use for querying Powershell, by capabilities. By default, the system selects a Powershell MID Server.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Test activity template inputs

You can test the input parameters of a custom activity during its development without having to run the activity in a workflow context.

Before you begin

Create input variables and map them to fields in the **Execution Command** form or provide actual values for these fields.

Role required: web_service_admin, activity_admin, activity_creator

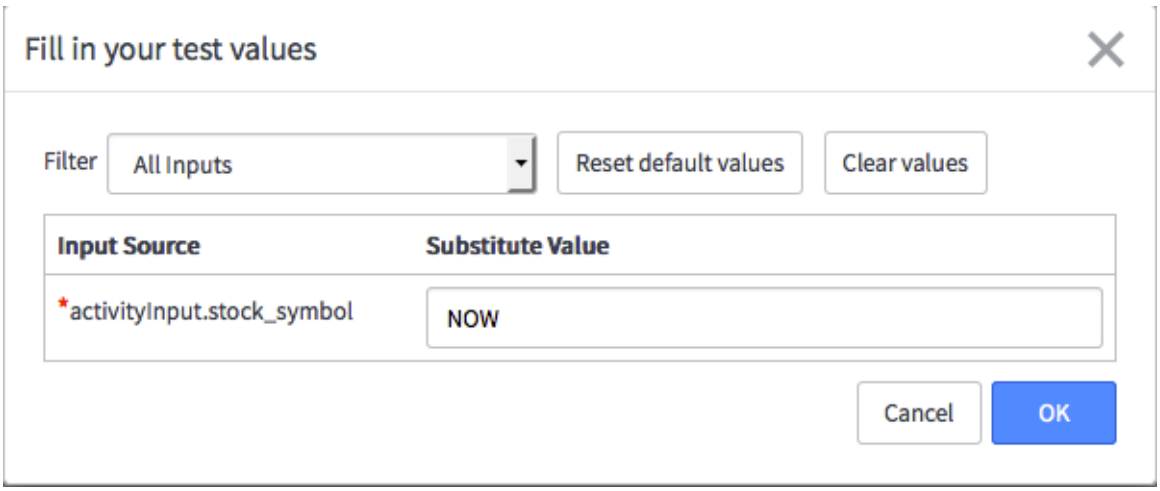
About this task

An input test executes only the input parameters against an endpoint and not the pre-processing or post-processing scripts. You need to use a workflow to test a pre-processing or post-processing scritp. You do not need to check out the activity to test it, and you can test input variables from any stage in the activity designer, if your activity is properly configured. Typically, the **Execution Command** stage is the point at which your inputs are ready for testing.

Note:
If you intend to use auto-mapping, you must test your input variables.

Procedure

1. Click **Test Inputs**.
   The list of input source variables appears. If you added default values for these variables, those values appear in the **Substitute Value** column. Mandatory variables are marked with a red star. In this example, a SOAP endpoint returns a value for a stock quote variable.



2. Filter the variable list with these controls:

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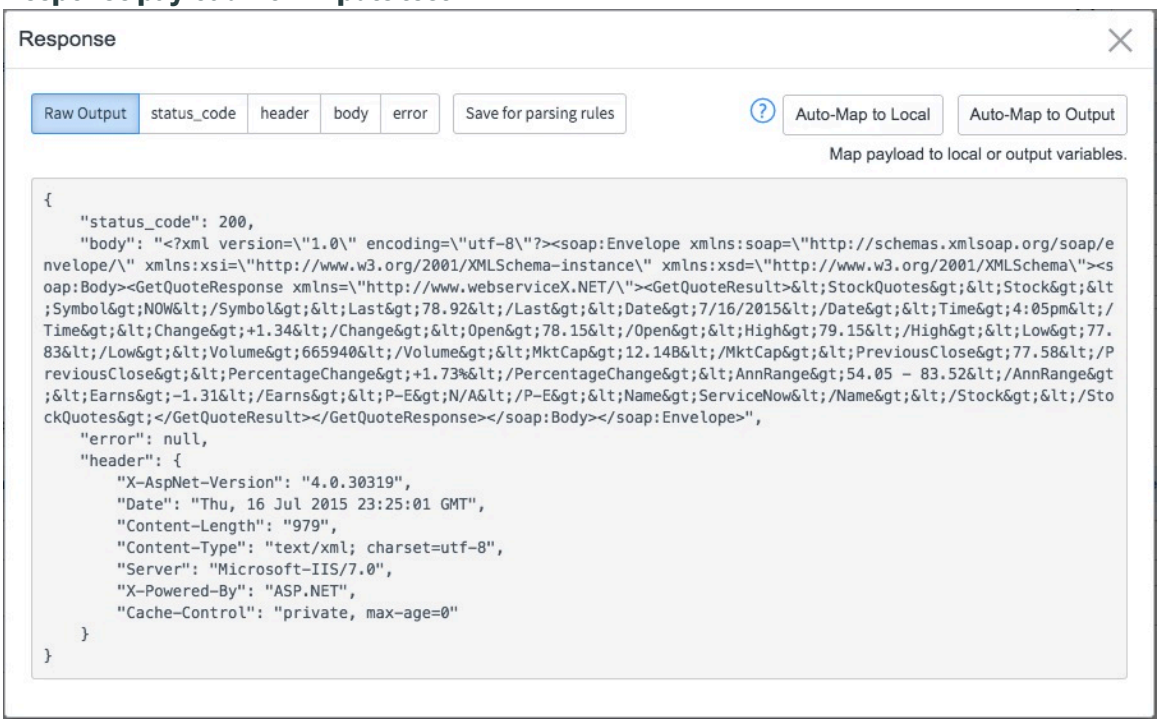
- **All Inputs**: Displays all input variables. This is the default view.
- **Mandatory Inputs**: Displays only mandatory input variables.
- **Inputs Without Defaults**: Shows input variables that do not have assigned default values.

3. Reset values as needed.
   - **Reset default values**: Replaces any test values set in this form with the default values, if they are present.
   - **Clear values**: Clears all values in the input variable list, even if default values exist.
4. When your test values are configured correctly, click **OK**.
   The system runs the values for all the inputs configured against the specified target and returns the resulting payload. The buttons in the Response form display different views of the payload. The entire payload appears in the **Raw Output** window.

Response payload from inputs test



5. To map appropriate parameter values in the payload to variables in the **Outputs** stage automatically, select an auto-mapping option.
6. Alternately, you can click **Save for parsing rules** to copy the entire payload to the parsing rules. This allows you to manually select values for the output variables directly from the payload. This action completely overwrites any previous payload that existed in the parsing rules.
7. Click the **X** in the upper right corner of the window to close it.

Data encryption for activity variables

You can protect sensitive data passed from Orchestration activities by encrypting input and output variables.

The system never stores encrypted variables as clear text. If the MID Server is used to fulfill the activity, the corresponding ECC Queue's input payload is encrypted if an encrypted output variable is defined in the template. Output variables passed to a downstream activity as input variables maintain their encryption throughout processing.

Inputs that require data encryption come from one of these sources:

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- Workflows: These inputs are provided through the Workflow Editor and must be in the password2 format for two-way encryption.
- Service catalog requests: These input values are provided to an activity as encrypted variables from a service catalog item.
- GlideRecord: These are variables attached to any ServiceNow table. The source column in the table must be a password2 type variable.
- Activity outputs: These are variables passed as outputs from one activity to a downstream activity as inputs, through the data bus.
- Empty string: The system allows you to define encrypted input variables but never pass a value into the variable.

Activity designer template pre-processing fields

Use the **Pre Processing** form of the activity designer to define a script to run before the activity executes.

Pre-processing fields

Field	Description
Input process script	Script to run before the activity executes.
Variables	Input variables that are available to use as building blocks in the input process script. Click the arrow above the field to open the variables list. Click an item in the tree to add it to your script in the appropriate syntax. The list displays execution parameters and input variables you passed into the activity on the **Inputs** form. All activity variables added in the **Inputs** form are read-only and are expressed in the pre-processing script with this syntax: `activityInput.variable`. Before the activity executes and makes a call to the service or host, you can override the effective execution value of this variable by assigning values to the `executionParam.variable_name` execution parameter. Refer to the specific execution parameters for your template.

Logging

Activity designers can add logging to the pre-processing using the *`ActivityLogger`* API, which works for scoped or global applications. Logged data from the script appears in the **Workflow Log** related list in the context records for any workflow that uses the activity. The **Source** for these messages in the workflow log is **ACTIVITY**.

Important:
To display the debug messages in the workflow log, set the *`glide.workflow.log.debug`* property to **true**.

The supported messages are:

- `ActivityLogger.debug("Pre Processing Log Message");`
- `ActivityLogger.info ("Pre Processing Log Message");`
- `ActivityLogger.warn ("Pre Processing Log Message");`
- `ActivityLogger.error("Pre Processing Log Message");`

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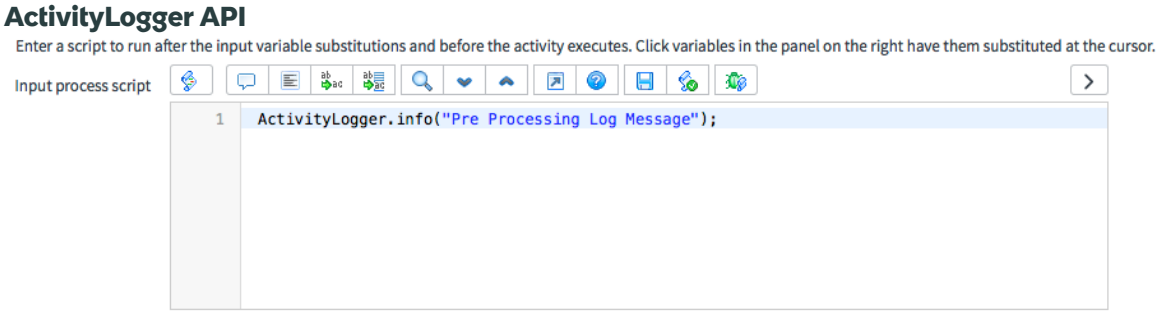

Template post-processing fields

From the **Post Processing** form in the activity designer you can define a script to run after the activity executes.

Post-processing fields

To use the results returned by the activity, append the `executionResult.` prefix to these parameters.

Field	Description
Output process script	Script to run after the activity executes.
Variables	Input variables that are available to use as building blocks in the output process script. Click the arrow above the field to open the variables list. Click an item in the tree to add it to your script in the appropriate syntax. The list displays execution results and the variables you passed into the activity on the **Inputs** form. All activity variables added in the **Inputs** form are read-only and are expressed in the post-processing script with this syntax: `activityInput.variable`. For parameter descriptions, refer to the table in the post-processing parameters topic for this activity.

Logging

Activity designers can add logging to the post-processing script using the *`ActivityLogger`* API, which works for scoped or global applications. Logged data from the script appears in the **Workflow Log** related list in the context records for any workflow that uses the activity. The **Source** for these messages in the workflow log is **ACTIVITY**.

Important:
To display the debug messages in the workflow log, set the *`glide.workflow.log.debug`* property to **true**.

The supported messages are:

- `ActivityLogger.debug("Post Processing Log Message");`
- `ActivityLogger.info ("Post Processing Log Message");`
- `ActivityLogger.warn ("Post Processing Log Message");`
- `ActivityLogger.error("Post Processing Log Message");`

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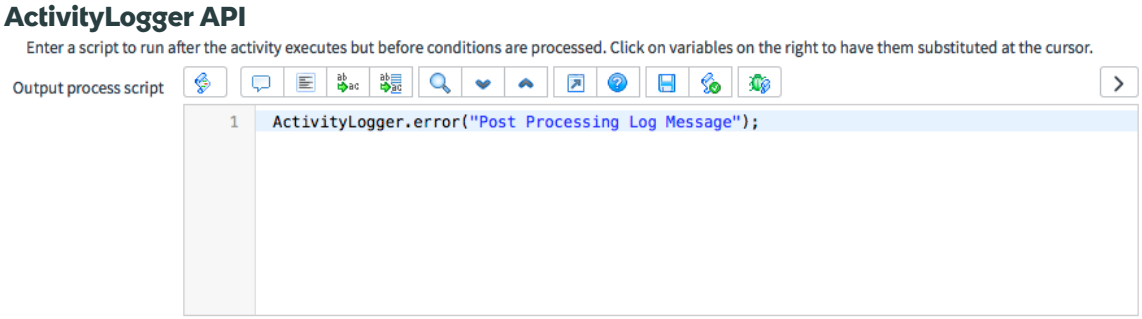


Auto-map activity output variables

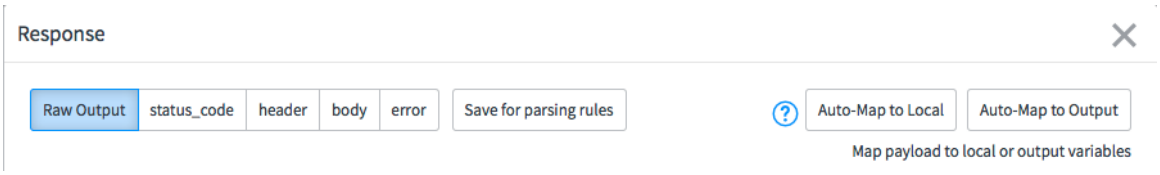
You can map parameter values in a test payload to variables in the **Outputs** tab automatically.

Before you begin

Role required: admin

Procedure

1. From the Execution Command in the template, select the **Inputs** tab.
2. Click **Test Inputs** to test the input parameters.
   If you added actual values for the parameters and fields, the system runs those values against the specified target and returns the resulting payload. If you mapped input variables to fields and parameters, the system displays a dialog box for assigning test values to those variables.
3. Provide test values, if requested, and click **OK** to display the payload.
   The entire payload appears in the **Raw Output** tab of the Response form.



4. Select an auto-mapping option.

Option	Description
Auto-Map to Local	Translates the entire payload into a JSON object and places it in the data bus. This allows for post-processing manipulation in JavaScript. This selection causes the entire data field on the right to disappear and the inputs structure to be auto-populated with these default variables: ○ output ○ totalRows ○ errorMessage ○ eccSysId

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Option	Description
Auto-Map to Output	Automatically populates the output variables in the activity with the same default variables used as inputs for the local variable.

Note:
No parsing rules are available with auto-mapping selections.

Create an output variable

The **Outputs** form in the designer contains a variable builder for creating data structures of objects and arrays.

Before you begin
Roles required: activity_admin, activity_creator

About this task
Elements in this structure are mapped with Create a parsing rule to specific data contained in payloads returned from an endpoint or host. These variables and their values are then made available locally or for reuse in other activities.

Procedure

1. Click the **+** icon in the **Outputs** column to create a local or output variable.

   Local variables are only available within an activity and are not visible in the data structures displayed in the **Custom** tab. Output variables are available for reuse in other activities, either individually or as an entire data structure. When you create a new variable of either type, the designer provides a default name of **Local1** or **Output1**.

2. Type your new variable name in the field and select a data type.

   Variable names must be unique within an array or an object. You can assign a data type of **Encrypted** to output variables that contain sensitive data. Data protected by encryption is passed to other activities or processes encrypted and is never displayed in plain text.

3. To change the name of a variable or any of its attributes, double-click the value, type a new value in the editing field, and then press **Enter**.

   The icon to the left of the name reflects the data type of the variable.

4. To reorder the variable list, select a row and then drag the row to its new location.

   When you select a row to move it, the pointer icon changes to an up/down arrow icon ( ).

5. Drag the row into another location.
6. Choose from the following options.
   - To reuse a variable from another activity, drag it from the **Custom** tab in the palette to the **Local** or **Output** heading at the top of the variable list.
   - To copy an entire data structure, drag the parent object or array into the variable list header.

   The designer duplicates the copied data structure in the outputs variable builder.

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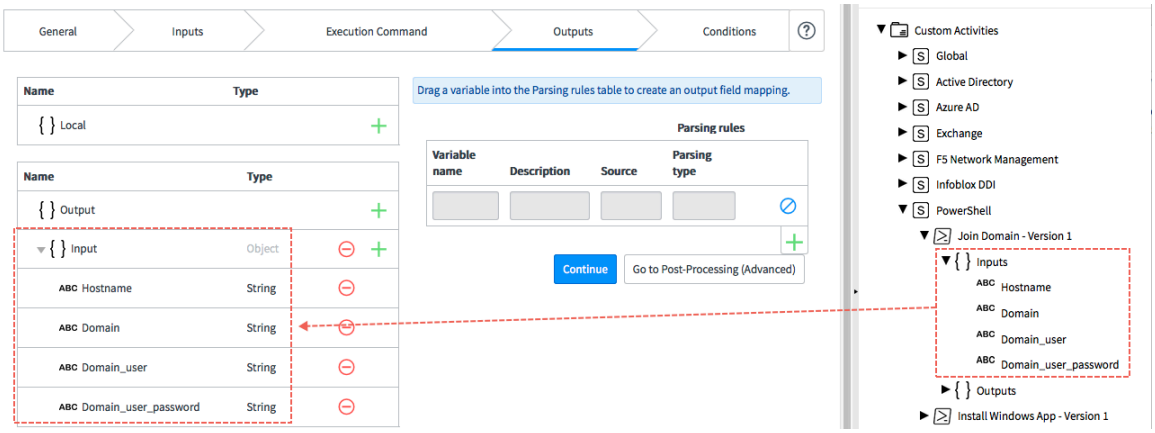
Reuse of data structures



7. To delete a variable, click the delete icon in the row.

Activity designer template outputs

Output variables contain messages returned from a destination that are available to other activities in a workflow or internally to the activity.

Activity designer output fields

Field	Description
Variable name	Name of a variable, either **Local** or **Output**, that this activity passes.
Local	Variable that contains a value used within an activity. For example, use a local variable to identify metadata that is processed within an activity before the final value is exported to an output variable.
Output	Variable that contains a value that is passed to other activities in the workflow.

Map an output field

Mapping is configured with parsing rules that allow you to build expressions in the appropriate data format for the selected payload.

Before you begin

Role required: activity_admin, activity_creator

About this task

When you are finished creating the output data structure, map each variable to the specific data you want to extract from the target host.

Procedure

To map a variable, drag it from the **Outputs** variable builder and drop it into an empty **Variable name** field in the Parsing rules section.

See create a parsing rule for instructions on configuring parsing for output variables.

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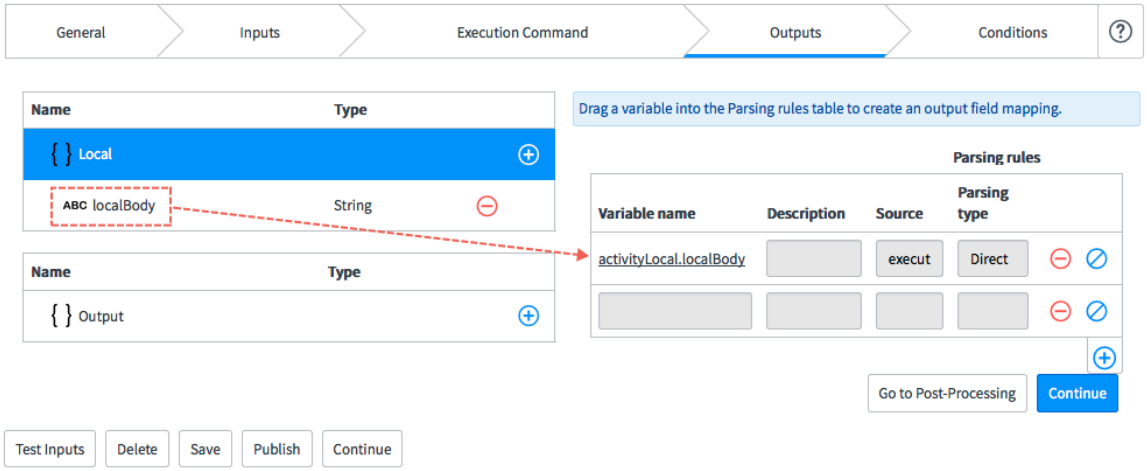


Create a parsing rule

Populate output variables defined in a custom activity with payload data returned from an inputs test on an external host or endpoint.

Before you begin

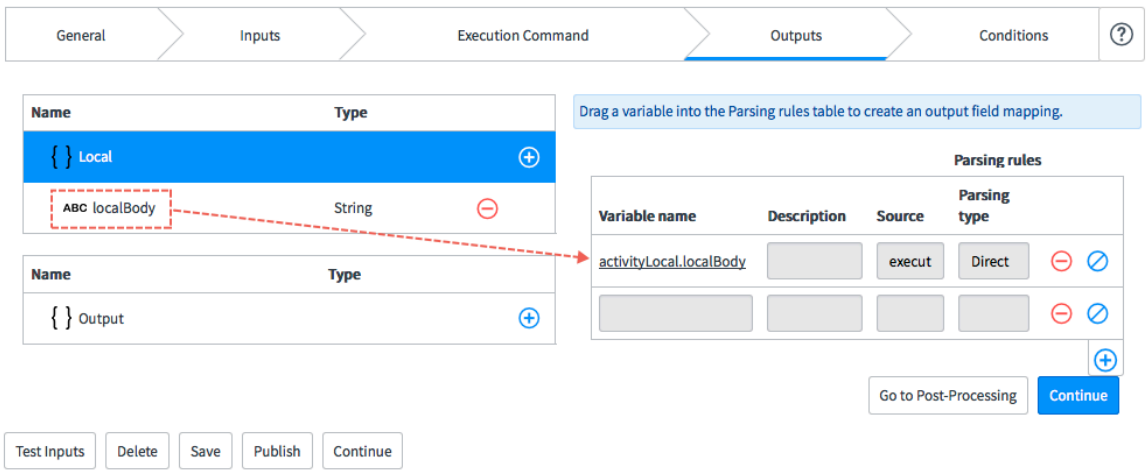
Roles required: activity_admin, activity_creator

About this task

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. From the **Custom** tab in the palette, open a custom activity.
3. In the Activity Designer form, advance to the **Output** stage.
4. Drag an output variable from the data structure builder into the **Variable name** field in the **Parsing rules** builder.

Mapping variables to parsing rules



   The parsing rules form appears for the selected variable. By default, the parsing type is set to **Direct**, which populates the variable with all the data from the selected payload, without parsing the contents. Each template has a specific default parsing source.

5. Complete the form using the fields in the table.
   In this example, the parsing type selected is **XML**, which allows you to select specific parameters from the payload to parse.

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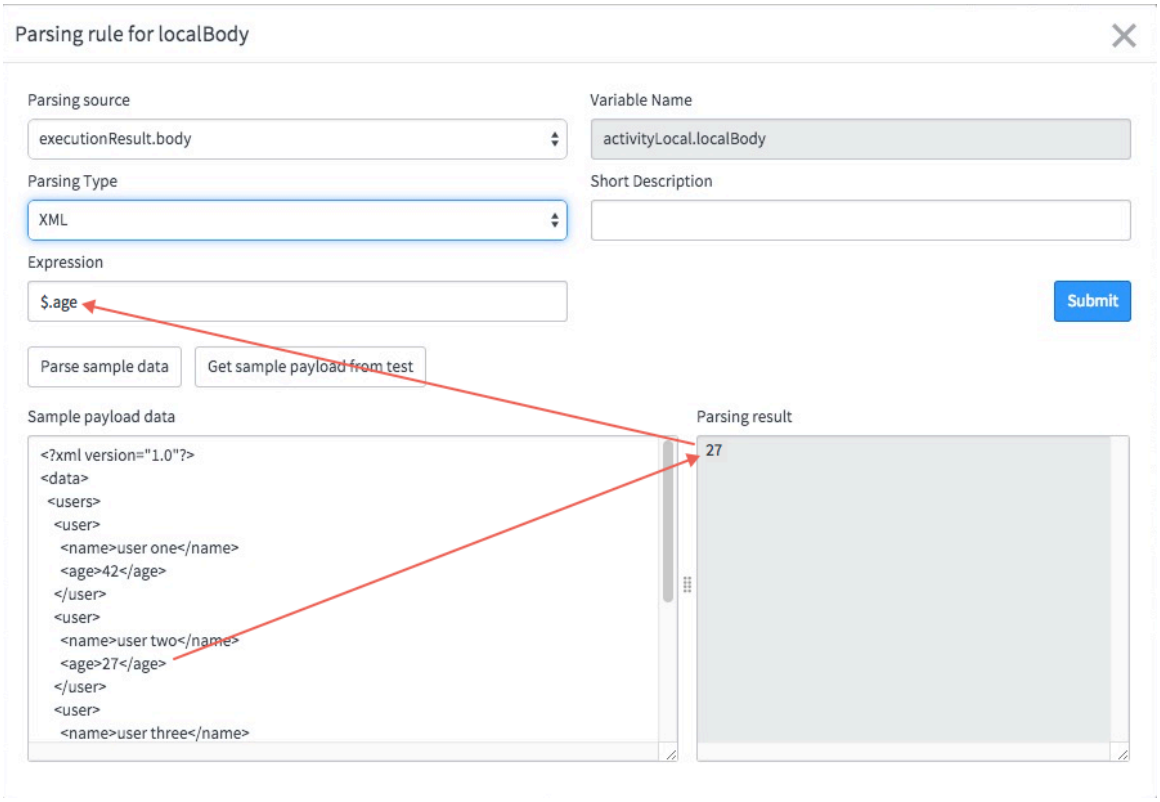

Parsing rules fields

Field	Description
Parsing source	Source of the data returned from the target host or endpoint. Each template opens to a specific, default payload. Available choices depend on the execution template selected for the activity. You can also use local variables as a parsing source if a parsing rule has previously been defined for them. For a list of the available payloads for each template, see Activity designer parsing sources.
Expression	Expression used to extract specific data from the selected parsing source. This expression is created from clickable data in the sample payload and appears in the format selected in the **Parsing type** field. When testing, the expression can return multiple results. Discern which choice gives reliable or predictable results before choosing your expression. **Note:** The system cannot generate clickable **RegEx** expressions from sample data. You must write all regular expressions manually.
Variable name	Revised variable name as it is used in the final output expression. The system adds the **activityOutput** or **activityLocal** prefix to the variable you specify.
Parsing type	The language to use for querying the target host's payload. The selections are: ○ **Direct**: Maps to the entire content of the payload selected in the **Parsing source** field, without any parsing. This is the default parsing type. ○ **XML**: XPath query used for selecting nodes from an XML payload.

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Field	Description
	○ **JSON**: JSONPath query for selecting parts of a JSON payload. ○ **RegEx**: Parsing method that uses a regular expression to extract data from a payload. The RegEx parsing type does not support multi-line parsing and is not case sensitive.
Short description	Brief description of this parsing rule.
Sample payload data	Sample data from the source containing the data requested. This field is not available for **Direct** parsing types. After you click **Parse sample data**, the data in this field cannot be edited, but becomes clickable for the purpose of creating expressions. Click **Edit sample data** to make the field editable again.
Parsing results	Displays the data returned from the source by the selected expression. This field is not available for **Direct** parsing types.

6. To retest the inputs, click **Get sample payload from test**.
   This action reopens the test form, allowing you to substitute different test values and create a different payload.
7. Click **Save** to have the parsing rules overwrite the previous payload with the one you just created.
8. To create an expression for the parsing rule, click the specific parameter you want to see in the sample payload.
   The value for that parameter appears in the **Parsing result** field, and the system creates the appropriate expression in the **Expression** field.
9. Click **Submit** to save the parsing rule for that variable.

Activity designer parsing sources

This table lists the parsing sources available with each execution template.

Parsing sources

Template	Source
SOAP Web Service	• executionResult.body (Default) • executionResult.status_code • executionResult.header • executionResult.error
JDBC	• executionResult.output (Default) • executionResult.errorMessages • executionResult.probeCompletedEccId • executionResult.totalRows
JavaScript Probe	• executionResult.payload (Default) • executionResult.output

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Parsing sources (continued)

Template	Source
	• executionResult.eccSysId • executionResult.errorMessages
Powershell	• executionResult.output (Default) • executionResult.tags • executionResult.hresult • executionResult.eccSysId • executionResult.errorMessages
REST Web Service	• executionResult.body (Default) • executionResult.status_code • executionResult.header • executionResult.error
SFTP	• executionResult.output (Default) • executionResult.eccSysId • executionResult.errorMessages • executionResult.tags
Probe	• executionResult.output (Default) • executionResult.payload • executionResult.eccSysId
SSH	• executionResult.output (Default) • executionResult.eccSysId • executionResult.errorMessages • executionResult.tags
JMS	• executionResult.status • executionResult.standardHeaders • executionResult.customHeaders • executionResult.messagePayload • executionResult.eccSysId • executionResult.errorMessages

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Activity designer parsing rule example

In this example, the parsing rule is configured to populate the *activityOutput.ipv4* variable with the value for the IP address from a domain server, using PowerShell.

Before you begin

Role required: activity_creator, activity_admin

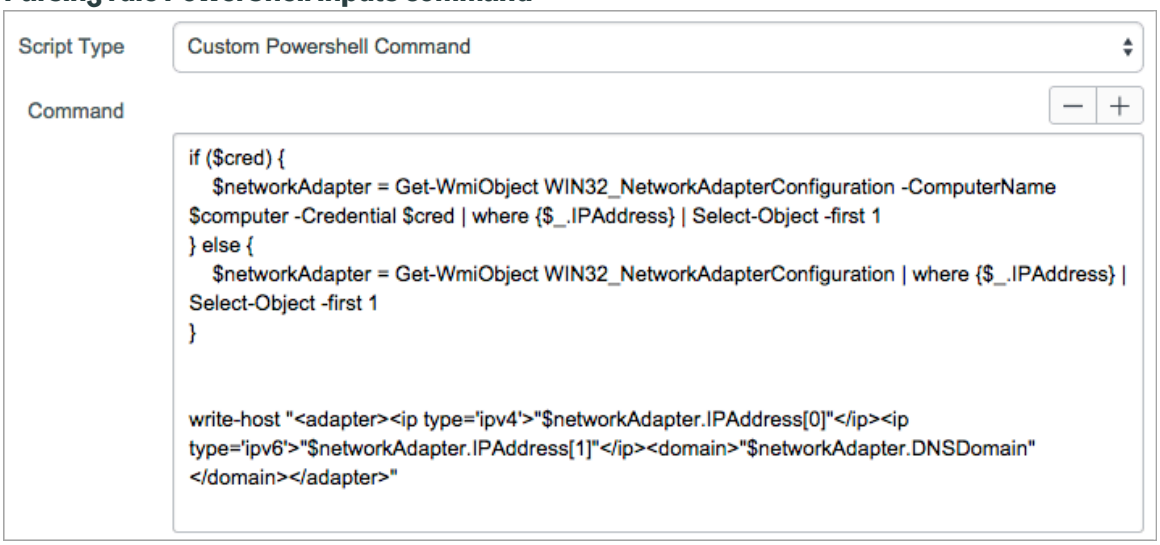
About this task

To generate the sample data, the administrator must actually run the command on the host and then paste the data returned into the **Sample payload data** field when creating the parsing rule. The administrator can then create an expression that returns IP addresses from that sample in two formats: `ipv4` and `ipv6`. In this example, the system produces two expressions to use for the parsing rule.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor** and open the activity that runs on the host.
2. Click the **Inputs** tab, and note the **Command**.

Parsing rule PowerShell inputs command



3. In a PowerShell console, run the **Command** on the host to extract the XML sample that contains the values you need.
4. Copy the data that is returned to the clipboard.
5. In the activity designer, click the **Outputs** tab and paste the returned data into the **Sample payload data** field.

   In this example, the data includes IP addresses in two different formats and the domain name.

6. Select the parsing type for the source.

   Example
   In the following example, you would select **XML**.

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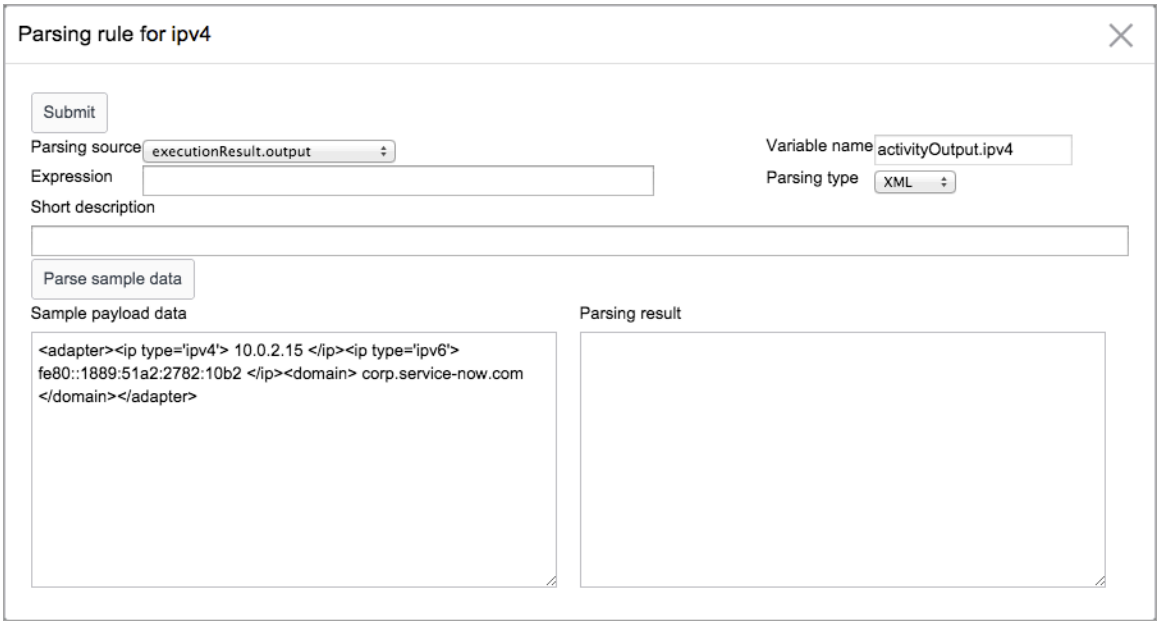
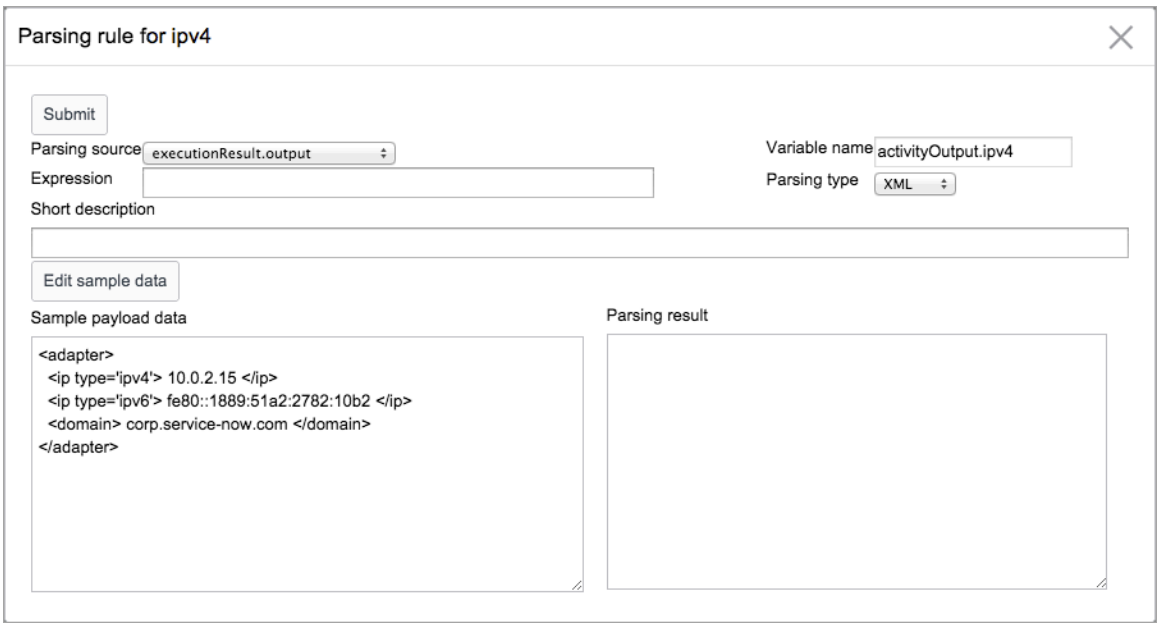


7. Click **Parse sample data**.

   The system displays the XML in the proper format, and it becomes clickable. In this view, the system can translate clicked data from the sample into an expression.



8. To create the expression, click the elements in the data sample you want to map to the variable.

   Based on the sample data you clicked, the system creates two expressions.

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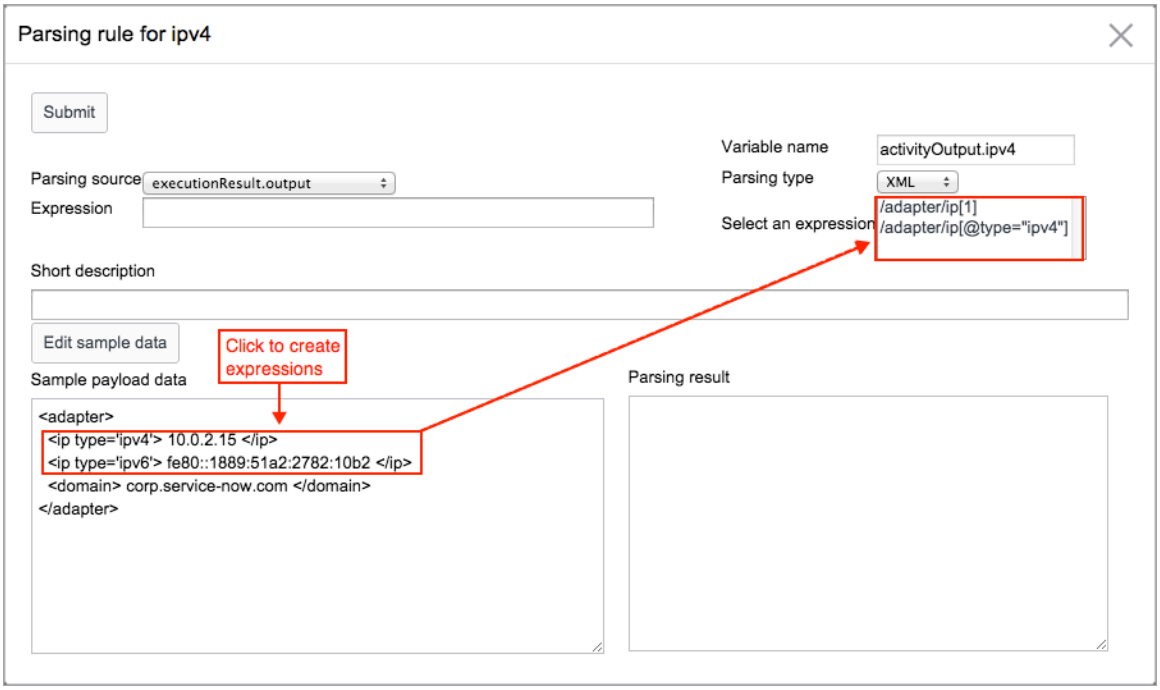

9. Select an expression from the list.

The desired result is the IP address that has a **type** attribute of **ipv4**. The system populates the **Expression** field with this choice.

10. Click **Test expression**.

The system parses the payload using the selected expression and returns the requested data in the **Parsing result** field.

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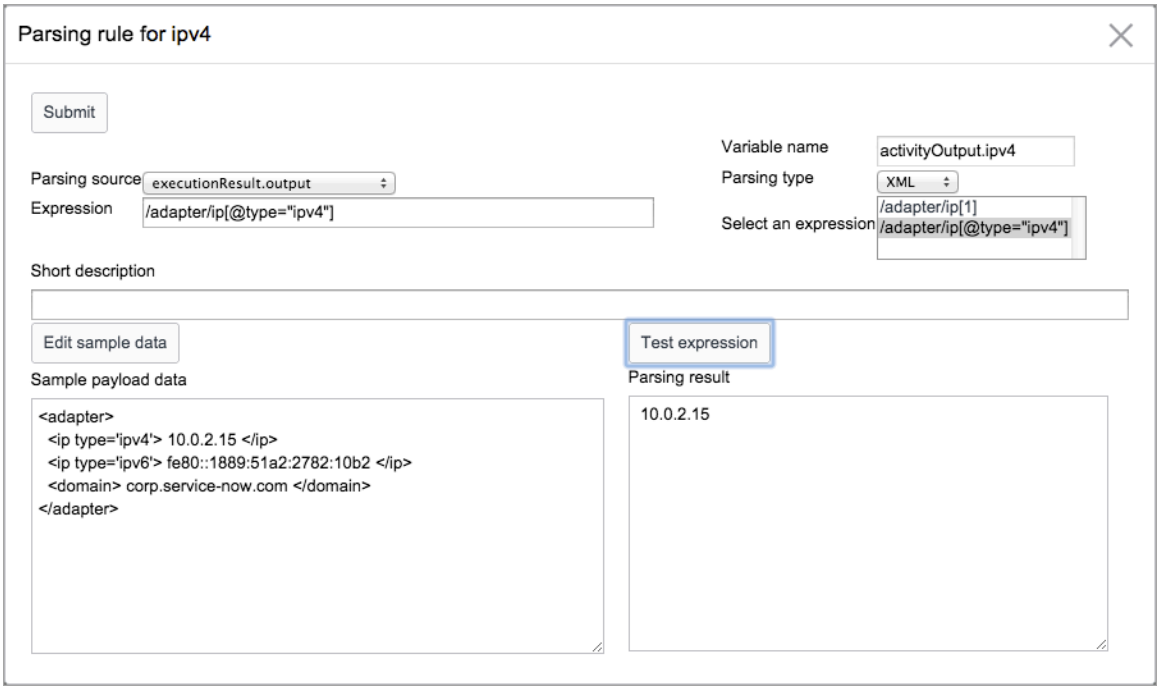

11. Click **Submit**.

The view returns to the **Outputs** tab of the activity designer. The new parsing rule is listed, and a blank row is available for another rule.

Activity conditions

Create the exit conditions for your activity in the **Condition** column and set the order for each..

The system evaluates the condition with the lowest order number first and stops when it finds the first true condition. The system delays evaluation of conditions with an **Else** value set to **true** until all conditions with an **Else** value set to **false** are evaluated. If the system does not find a true condition, it looks for a default condition in which the value for **Else** is **true** and takes this exit. You must have at least one default exit condition, or the activity hangs when the workflow runs.

The following are possible conditions you might create for an activity:

Sample activity conditions

Condition	Evaluation
Success	Tests for a success condition. **Else** is set to **false** and the **Order** is set to **100**. If this condition is true, the activity takes the **Success** exit. If this condition is false, the system evaluates the next condition in order.

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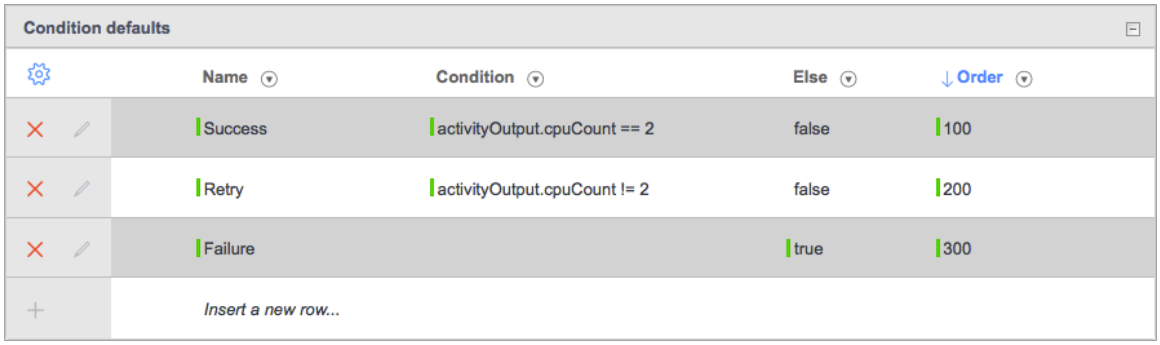
Sample activity conditions (continued)

Condition	Evaluation
Retry	Tests for a condition that runs the activity again. **Else** is set to **false**. If this condition is true, the activity runs again. If this condition is false, the system takes the default **Failure** exit.
Failure	Default condition that allows the workflow to continue if the other conditions in the activity are false. **Else** is set to **true**.



Orchestration custom activity templates

Orchestration provides customizable activity templates to create and manage custom activities in the Workflow Editor.

You create and update different types of Orchestration activities with the Activity Designer using activity templates for SSH, PowerShell, REST, SOAP, JMS, SFTP, JDBC, JavaScript Probes, and Probes.

Hundreds of workflows can share these activities simultaneously. Before you change an activity, you should check the workflows that they are part of by clicking the form menu icon ( ) and selecting **Used In**. Any central change to a versioned activity automatically updates across workflows unless you have pinned that activity .

All the Orchestration Core activities are built using the Activity Designer in scoped applications. Custom activities can be developed in the global scope or their own application scope even if that scope is different from the scope of the workflow. Use Activity scoping when build your own activity packs.

Create a JDBC activity

Create a custom JDBC activity to automate SQL commands and stored procedure calls to relational databases from workflow.

Before you begin

Role required: activity_admin, activity_creator

About this task

The JDBC activity template allows you to execute ANSI SQL statements or stored procedures on a target database. Support for stored procedures with IN, OUT, and INOUT parameters are available in Zurich. To learn how to set up these parameters, see JDBC stored procedure parameters.

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Note:
If you are transferring bulk data into a ServiceNow instance from an external data source, use Import sets key concepts. The JDBC activities allow you to transfer data between external data sources and ServiceNow within a workflow. It is not intended to replace the bulk import features of data sources.

Procedure

1. Create or verify your JDBC credential.
   Your JDBC credentials must have permission for the target database and proper configuration for the corresponding JDBC connection. Credentials must be set up before you can create a JDBC activity.
2. Create or verify your JDBC connection.
   Your JDBC connection must be configured with valid JDBC credentials set up before you can create a JDBC activity.
3. Create a custom activity.
   This action creates a custom activity using a template.
4. After setting up general properties and creating input variables, configure the JDBC Execution Command.

Option	Description
JDBC Connection	Configure or reference the appropriate JDBC Connection for the database. The connection selected provides the activity with the following information: ○ Target database information (server and database names) ○ Connection URL ○ Target database port (if different from standard port number) ○ Database instance name
Credential	JDBC credential to use for your JDBC connection.
SQL statement	Input the ANSI SQL to execute on the JDBC target database. **Note:** This field is hidden when the Stored Procedure check box is selected. You can map the input variables you created to configure the SQL statements. By default, you can run the following SQL statements. ○ select ○ insert ○ update ○ delete ○ show

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Option	Description
	○ create ○ describe For added security measure, a MID Server property controls the operations that this JDBCOrchestrationProbe executes, which restricts the SQL commands used. This property protects against potentially destructive commands, such as drop database. The mid.property.jdbc_operations contains the MID Server property controls. **Note:** You cannot run multiple statements of different types. For example, you cannot run a select statement and an update statement together, but you can run two insert statements. However, you cannot run multiple select statements in this activity.
Maximum rows	Maximum number of records to retrieve from database. The default is 1000.
Maximum payload size (KB)	You can set a limit on the maximum payload size of data retrieved from the database. The default is 64 kilobytes.
Connection timeout	How long the activity waits to make the connection. This field is populated automatically from the data source, but can be changed for this activity.
Query timeout	Elapsed time to wait after running the query until the data is returned. This field is populated automatically from the data source, but can be changed for this activity.
Required MID Server capabilities	MID Server to use for querying JDBC, by capabilities. By default, the system selects a MID Server that has JDBC capability.
Use stored procedure	If checked, you can run a stored procedure on MySQL, Oracle, or SQL Server databases by entering the procedure name and parameters. See JDBC stored procedure parameters.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

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What to do next

- Test JDBC activity inputs
- Use auto-mapping to generate outputs and parsing rules (recommended for JDBC)
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

Related topics

Create custom activities using custom activity designer templates

Create a JDBC connection for an Orchestration activity

The JDBC Connection [jdbc_connection] table provides the information custom JDBC Orchestration activities use to connect to various target databases.

Before you begin

You must have an appropriate JAR file, whether it is supplied with the instance or a custom JAR file.

Note:
The ServiceNow instance supplies `mysql-connector-java-5.1.21.jar`, `sql-server-jdbc-4.0.jar`, and `ojdbc6.jar` files as part of the current release, which supports MySQL, SQLServer, and Oracle databases. Other databases, such as Sybase or DB2 Universal, must use a custom JAR file that must be uploaded to the instance before setting the JDBC connection.

Role required: activity_admin, activity_creator

About this task

JDBC credentials JDBC credentials are retrieved separately by the activity designer template and support external credential storage, such as CyberArk.

Procedure

1. Navigate to **All** > **Orchestration** > **Credentials & Connections** > **JDBC Connections** and click **New**.
2. Complete the form using the fields in the table.
   The database selection in the **Format** field determines which fields are available.

JDBC connection fields

Field	Database Format	Description
Name	All	Unique name of this JDBC connection. For example, you might enter **JDBC MySQLProd**.
Query timeout	All	Maximum elapsed time the JDBC query is allowed to run without a response.
Connection timeout	All	Maximum elapsed time for the JDBC activity to wait while attempting to connect to the target database.
Application	All	Scope for this table. By default, the JDBC Connection [jdbc_connection] table runs in the **Global** scope.
Domain	All	Domain for this table. By default, the JDBC Connection [jdbc_connection] table runs in the **global** domain.
Format	All	Database type for this connection. The default choices are:

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Field	Database Format	Description
		○ **MySQL** ○ **Oracle** ○ **SQLServer** ○ **None** You can add **Sybase** or **DB2 Universal** to the choice list by uploading the appropriate JDBC driver JAR file to the instance. Orchestration automatically recognizes these drivers when they are loaded into the system and adds them to this list.
Server	Oracle, MySQL, SQLServer	Host name or IP address of the database server.
Oracle sid	Oracle	The Oracle database site identifier. The default value is **orcl**.
Oracle port	Oracle	Port that the Oracle database is using. The default value is **1521**.
Database name	MySQL, SQLServer	Name of the database.
Database port	My SQL, SQLServer	Port that the selected database is using.
Instance name	SQLServer	Instance name for the selected SQLServer
Connection URL	All	URL that the MID Server uses to connect to the specified database. The URL is created automatically when you save the form, and is read-only for the default databases. **Note:** If the format selected is not one of the default databases, you must create the connection URL manually so that the MID Server knows how to create the connection.
JDBC driver	None, DB2 Universal, Sybase	The JDBC driver to use for this connection when it is not a default database. **Note:** If you add a Sybase or DB2 Universal database, you must enter the driver name in this field and upload the driver JAR file to the instance.

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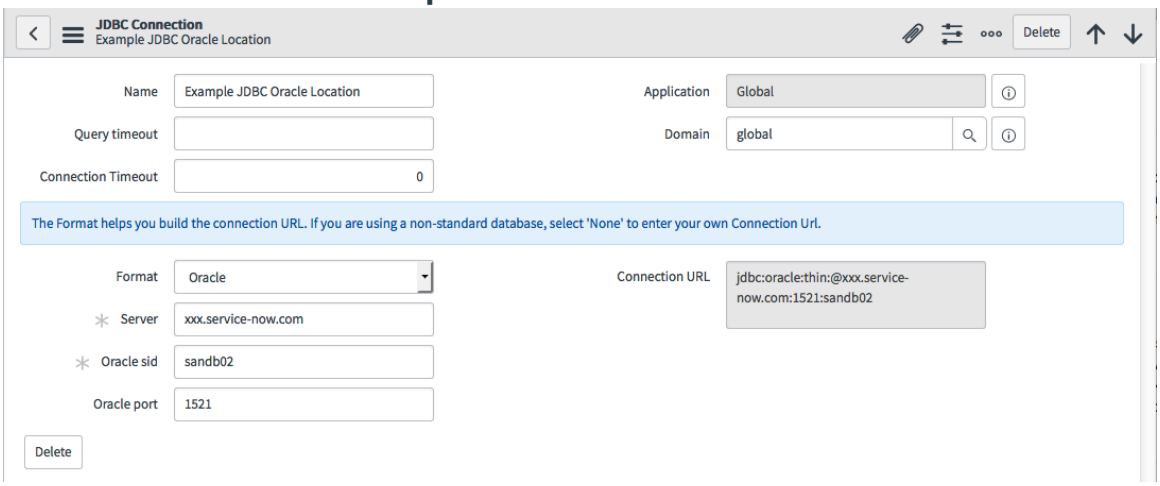
JDBC connection to Oracle example



3. Click **Submit**.

Related topics

JDBC credentials

Auto-map JDBC activity output variables

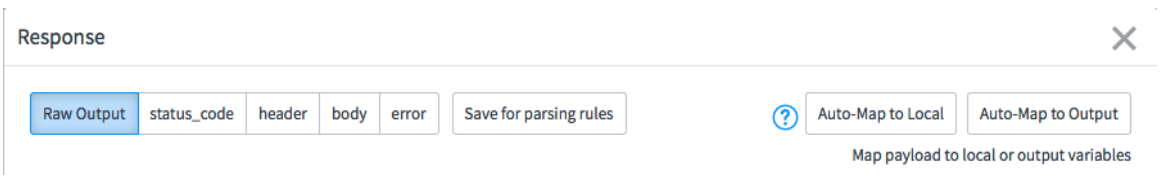
The ServiceNow activity designer allows you to map parameter values in a JDBC test payload to variables in the **Outputs** tab automatically.

Before you begin

Role required: admin

Procedure

1. In the JDBC provider template form, select the **Inputs** tab.
2. Click **Test Activity** to test the input parameters.
   If you added actual values for the parameters and fields, the system runs those values against the specified target and returns the resulting payload. If you mapped input variables to fields and parameters, the system displays a dialog box for assigning test values to those variables.
3. Provide test values, if requested, and click **OK** to display the payload.
   The entire payload appears in the **Raw Output** tab of the Response form.



4. Select one of these auto-mapping options.
   - **Auto-Map to Local**: Directly maps values to a local variable for use within the activity.
   - **Auto-Map to Output**: Directly maps values to the output variable to pass to other activities in the workflow. Auto-mapping to an output variable creates an array of objects, each of which contains the column names from the query result.

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JDBC stored procedure parameters

You can use Orchestration to run a stored procedure on MySQL, Oracle DB, and MS-SQL databases.

There is support of multiple data types, with the following limitations:

- Only one result-set is returned.
- The order of input and output data types in the stored procedure parameters must match the activity definition.
- Binary, Blob, Varbinary, and LongBinary should be base64 encoded.
- Date, Time, and Timestamp have a specific format:

  Date format: yyyy-mm-dd

  yyyy-mm-dd is the supported format.

  Time format: hh:mm:ss[.sss]

  hh:mm:ss[.sss] is the supported format. Precision is in milliseconds only, microseconds or nanoseconds cannot be handled.

  Note:
  `10:30:59` and `10:30:59.999000` are correct, but `10:30:59.` is incorrect.

  Timestamp format: yyyy-mm-dd hh:mm:ss[.ffffff]

  yyyy-mm-dd hh:mm:ss[.ffffff] is the supported format. Precision is to microseconds.

- ResultSet is the first result set coming back from database server.
- MS-SQL does not support INOUT parameters. If you use INOUT parameters, the Activity Template transparently maps them to OUT parameters.

Note:
If you do not want to do a validation of data types in stored procedure parameters, like the legacy behavior, you set the glide.stored_proc.data_type.validation as false. See MID Server properties for more information.

Stored procedure parameters

Field	Description
Mode	Type of stored procedure parameter. Supported parameters: • IN • OUT • INOUT
Sql Type	A SQL data type. Supported data types: • ARRAY • BIGINT • BINARY • BIT

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Stored procedure parameters (continued)

Field	Description
	• BLOB • CHAR • CLOB • DATE • DECIMAL • DISTINCT • DOUBLE • FLOAT • INT • INTEGER • JAVA_OBJECT • LONGVARBINARY • LONGVARCHAR • NULL • NUMERIC • OTHER • REAL • REF • REF_CURSOR • SMALLINT • STRUCT • TIME • TIMESTAMP • TINYINT • VARBINARY • VARCHAR
Name/Value	Name-value pairs to pass to the host. You can create these parameters manually, or drag and drop input variables into the parameter fields and assign a value.

Note:
Not all database providers support the entire realm of JDBC data types. Reference your database reference manual to understand the supported datatypes for your installation.

Test JDBC activity template inputs

You can test the input parameters of a custom JDBC activity during its development without having to run the activity in a workflow context.

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Before you begin

Create input variables and map them to fields in the Execution Command form or provide actual values for these fields. Role required: web_service_admin, activity_admin, activity_creator

About this task

This test executes only the input parameters against an endpoint and not the pre-processing or post-processing scripts. It is not necessary to check out the activity to test it.

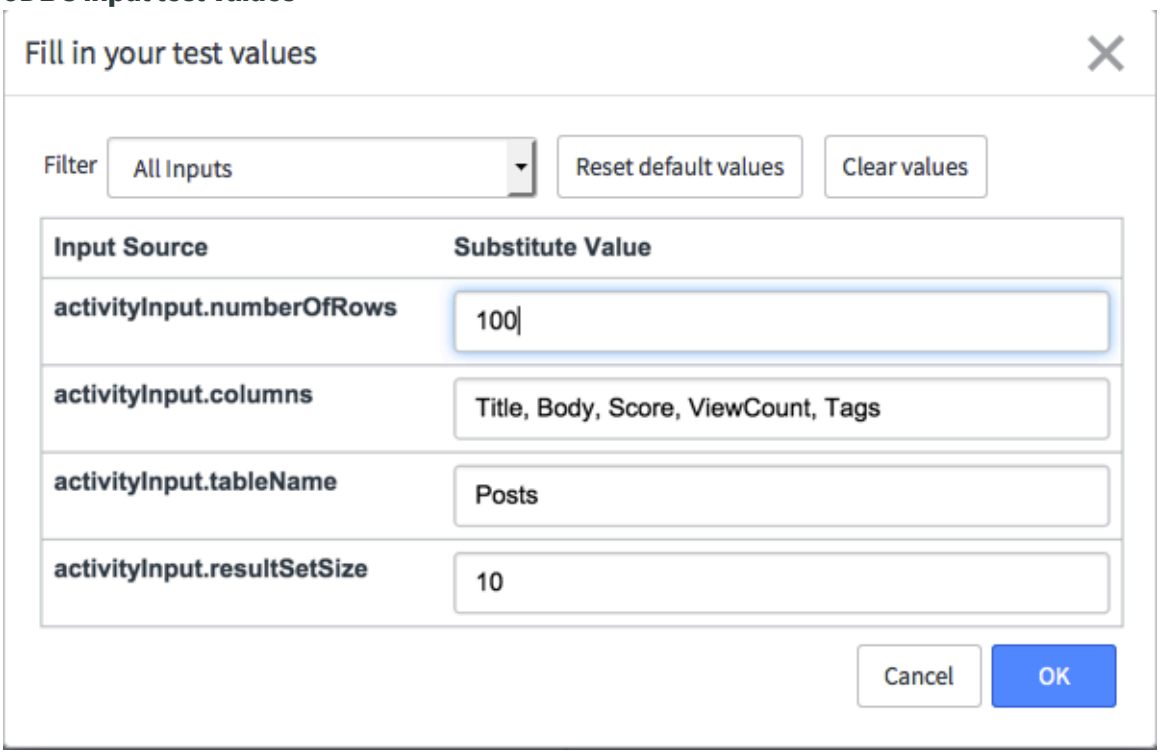
Note:
If you provide enough information for Orchestration to contact the endpoint or host and return data, you can test the input variables. You can test from any stage in the activity designer. Typically, the Execution Command stage is the point at which your inputs are ready for testing.

Procedure

1. From the JDBC Execution Command, click **Test Inputs**.
   The list of input source variables appears. If you added default values for these variables, those values appear in the **Substitute Value** column. Mandatory variables are marked with a red star.

   Note:
   The test fails if the MID Server cannot be found or if it cannot connect to the target.

   JDBC input test values

2. Filter the variable list with these controls:
   - **All Inputs**: Displays all input variables. This control is the default view.
   - **Mandatory Inputs**: Displays only mandatory variables.
   - **Inputs Without Defaults**: Shows input variables that do not have assigned default values.
3. Reset values as needed.

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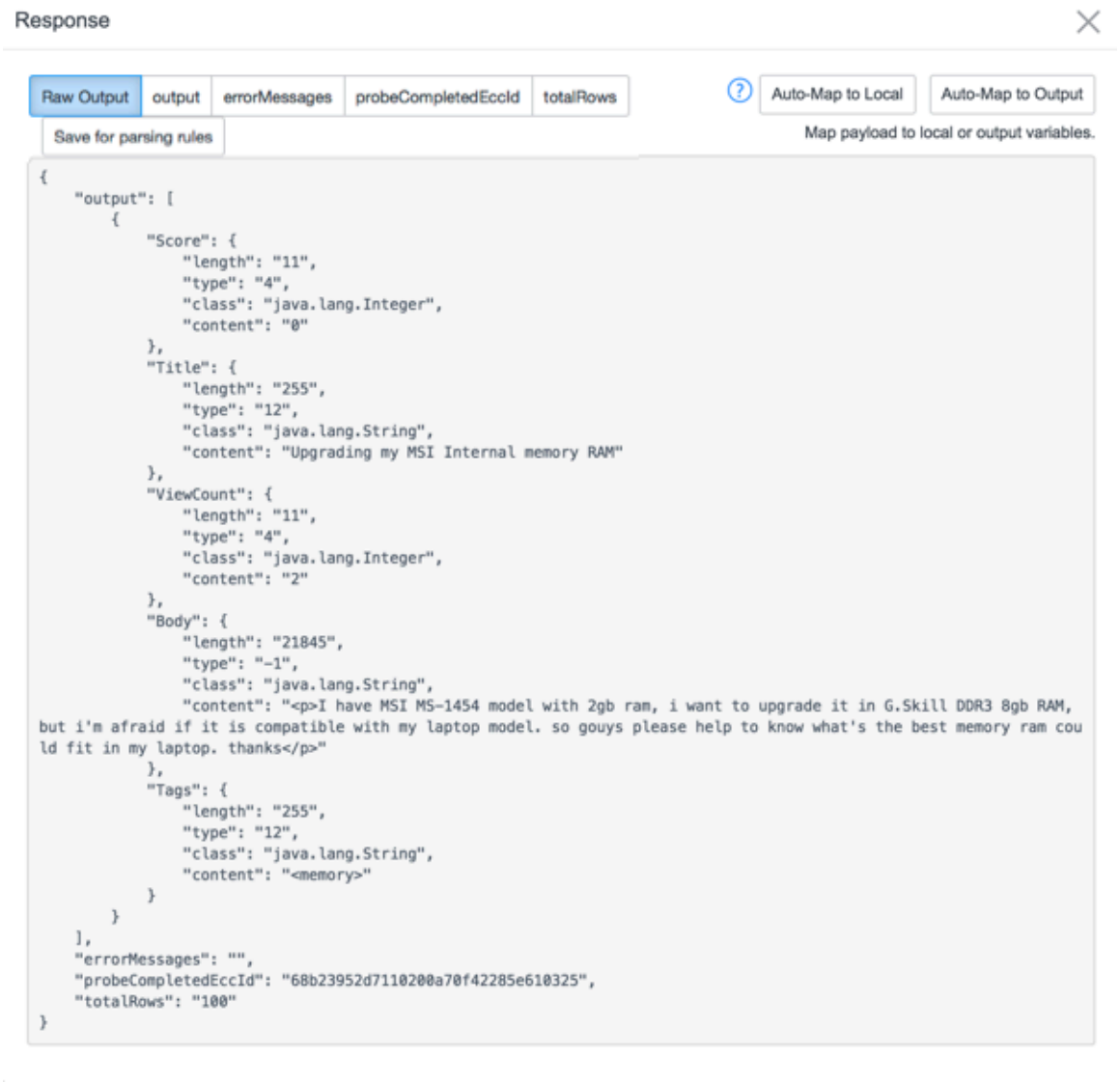
- **Reset default values**: If values are present, this control replaces any test values set in this form with the default values.
- **Clear values**: Clears all values in the input variable list, even if default values exist.

4. When your test values are configured correctly, click **OK**.
   The system runs the values for all the inputs configured against the specified target and returns the resulting payload. The buttons in the Response form display different views of the payload. The entire payload appears in the **Raw Output** window.

Response payload from inputs test



5. To map appropriate parameter values in the payload to variables in the **Outputs** stage automatically, select an auto-mapping option.
6. Click the **X** in the upper right corner of the window to close it.

Create a SOAP web service activity

Use this template to create a custom SOAP activity.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

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About this task

For instructions on using the activity template process flow, see create custom activities.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the SOAP web service Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes on the SOAP web service.
Web service message	Specify the SOAP web service message to use for this activity. If you need information on SOAP web services messages, see SOAP
Web service message function	Specify the SOAP message function available in conjunction with the SOAP web service.
Endpoint	If you enter an endpoint in this field, it over rides the endpoint URL configured in the SOAP message web service. Click the lock icon to open the input field and add the end point.
SOAP message parameters	Name-value pairs to pass to the SOAP end point. You can create these parameters man ually, or drag input variables into the parame ter fields and then assign a value. Parameters defined in the SOAP message that use ${} can be assigned data from this activity tem plate. Use the **Additional attribute** column to configure the system to not escape the text. By default, text sent to the SOAP message is escaped. The **Name** column is auto-populat ed if the users have provided variables using Variable substitution in outbound REST mes in the SOAP message.
Use MID Server	Check box that determines if a MID Server must be used to invoke the SOAP web ser vice. If the SOAP web service message func tion defines a MID Server, that MID Server is used instead of the one selected here.
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the SOAP end point. By default, the system selects a MID Server with SOAP capabilities. This field is available when the **Use MID Server** check box is selected.

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Option	Description
Timeout	Allowed duration of the SOAP web service request before it times out, in seconds. The default is **10**.
Authentication	Determines what type of authentication is required for the endpoint. The options are: ○ **Use existing credentials in SOAP message**: Uses credential definitions from the SOAP message definition. ○ **Override with Basic Authentication credentials:** Uses |Enable basic authentication credentials. Overrides the credentials in the SOAP message definition. Basic authentication credentials must be provisioned before they are available for selection. ○ **Override with Certificate Authentication credentials**: Overrides the credentials in the SOAP message definition with certificate authentication credentials. ○ **Override with Both Basic and Certificate Authentication credentials**: Overrides the credentials in the SOAP message definition with both basic authentication or certificate authentication credentials. ○ **Override with WS-Security Username profile**: Overrides the credentials in the SOAP message definition with credentials defined in WS-Security.
Credentials	Required REST endpoint basic authentication credentials. This field is available when **Override with Basic Authentication credentials** is selected in the **Authentication** field. Only basic authentication credentials appear in the selection list, which includes credentials stored on the instance and credential IDs from an external storage system. If you are using credentials stored in a CyberArk safe, you can override the default safe defined in the MID Server configuration file by adding the name of a different safe as a prefix to the credential ID, separated by a colon. For example, *newsafe:orch-test-f5*. See Configure for details.
Protocol Profile	Outbound web services mutual authentication to use for authentication. This field is available when the authentication type is either **Override with Certificate Authentica**

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Option	Description
	tion credentials or **Override with Both Basic and Certificate Authentication credentials**.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next

- Use auto-mapping to generate outputs and parsing rules (recommended for JDBC)
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

Auto-map SOAP activity output variables

The ServiceNow activity designer allows you to map parameter values in a SOAP test payload to variables in the **Outputs** stage automatically.

Before you begin

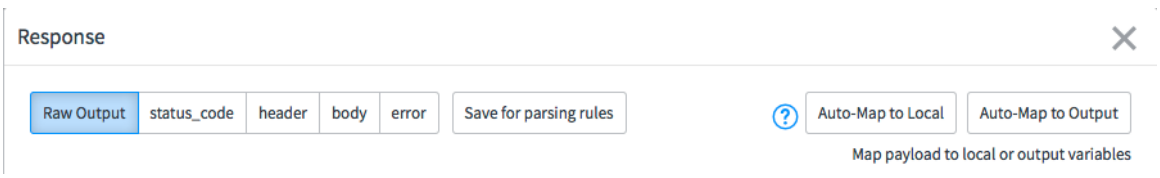
Role required: web_service_admin, activity_admin, activity_creator

About this task

Note:
You can test input variables from any stage in the activity designer if you have provided enough information for Orchestration to contact the endpoint and return data. Typically, the **Execution Command** stage is the point at which your inputs are ready for testing.

Procedure

1. In the activity designer, proceed to the **Execution Command** stage.
2. Define an appropriate MID Server, if requested.
   The test fails if the MID Server cannot be found or if it cannot connect to the target.
3. Click **Test Activity** to test the input parameters.
   If you added actual values for the parameters and fields, the system runs those values against the specified target and returns the resulting payload. If you mapped input variables to fields and parameters, the system displays a dialog box for assigning test values to those variables.
4. Provide test values, if requested, and click **OK** to display the payload.
   The entire payload appears in the **Raw Output** tab of the Response form.



5. Select one of these auto-mapping options.
   - **Auto-Map to Local**: Directly maps values to a local variable for use within the activity.
   - **Auto-Map to Output**: Directly maps values to the output variable to pass to other activities in the workflow. Auto-mapping to an output variable creates an array of objects, each of which contains the column names from the query result.

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Provide credentials to access a SOAP message WSDL

If the SOAP WSDL you are requesting in a test payload requires authentication, you must provide basic auth credentials in either the SOAP message or the SOAP activity.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

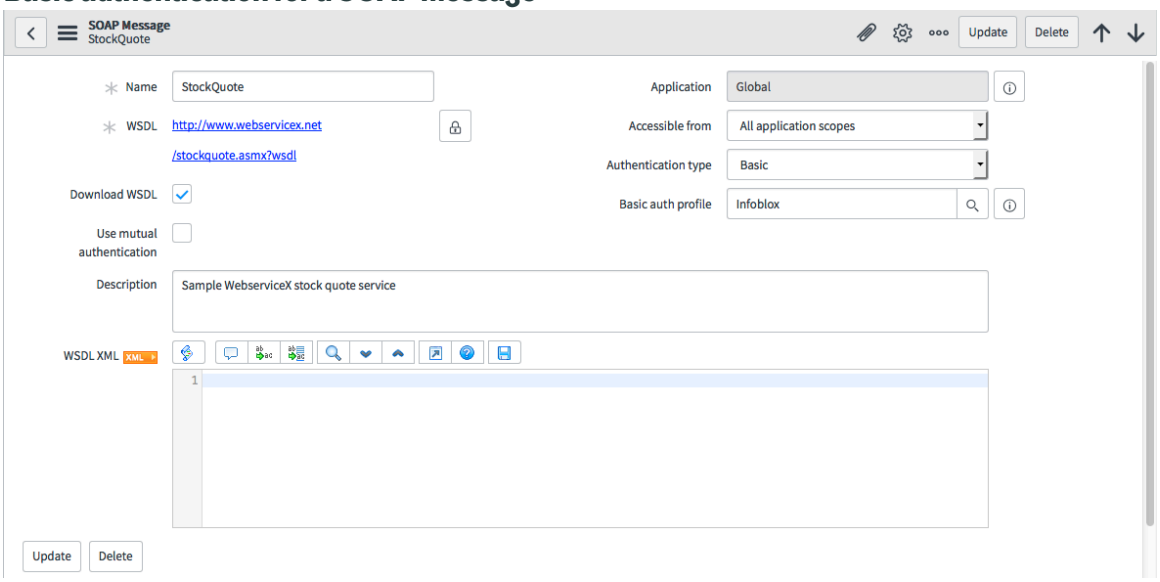
The ServiceNow instance only supports basic auth credentials for accessing a WSDL. If the SOAP function or the SOAP message does not provide these credentials, you must configure them in the SOAP activity template. Orchestration uses these priorities for deciding which basic authentication credentials to use:

- SOAP message: Credentials for a SOAP message are used if no other credentials are defined.
- SOAP function: Credentials for a SOAP function override the credentials configured for the SOAP message.
- SOAP activity template: Credentials for a SOAP activity template override both the SOAP function and SOAP message credentials.

Procedure

1. Navigate to **All** > **System Web Services** > **Outbound** > **SOAP Message**.
2. Select the SOAP message you want the activity to use.
3. In the SOAP Message record, select the **Download WSDL** check box.
4. In the **Authentication type** field, select **Basic**.
   The **Basic auth profile** field appears.
5. Select the basic auth profile to use with this SOAP message.

Basic authentication for a SOAP message



6. Alternately, you can configure basic authentication credentials in Configure the SOAP execution command.

   a. In the **Authentication** field, select **Override with Basic Authentication credentials**.
      The **Credentials** field appears.

   b. Select the basic auth credentials to use to access the WSDL.

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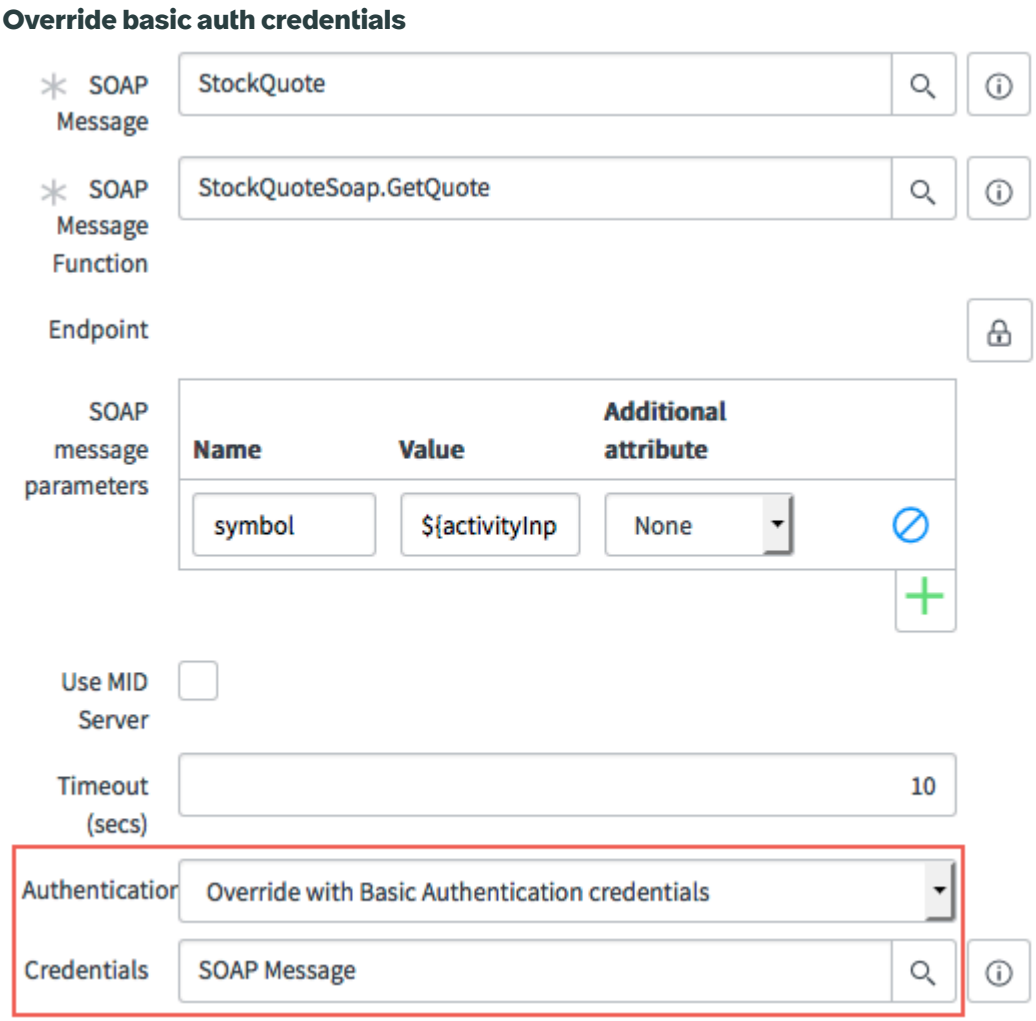
This setting overrides any credentials configured in the SOAP message.



Configure the SOAP execution command

Use the input variables you created to configure the command that Orchestration executes on the SOAP endpoint.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: web_service_admin, activity_admin, activity_creator

Note:
You can test the SOAP connection between the MID Server and the endpoint without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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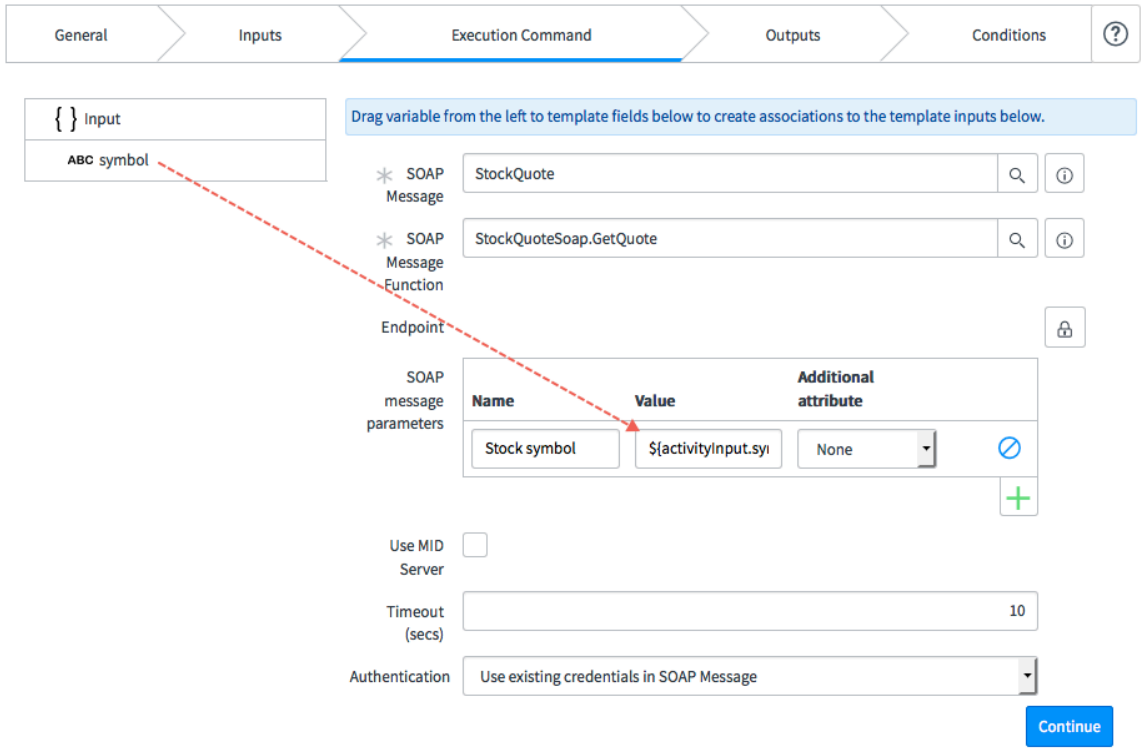
SOAP execution command



2. Complete the fields shown in the table.

SOAP template execution command fields

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
Web service message	SOAP message to use for this activity. Users must have the web_service_admin role to configure this field.
Web service message function	SOAP message SOAP message functions to use for this activity. Users must have the web_service_admin role to configure this field.
Endpoint	Endpoint URL for the SOAP web service this activity uses. Enter an endpoint in this field to override the endpoint configured in the SOAP message. Click the lock icon to open the input field.
SOAP message parameters	Name-value pairs to pass to the SOAP endpoint. You can create these parameters manually, or drag input variables into the parameter fields and then assign a value. Parameters defined in the SOAP message that use ${} can be assigned data from this activity template. Use the **Additional attribute** column to configure the system to not escape the text. By default, text sent to the SOAP message is escaped. The **Name** column is auto-populated if the users have provided variables using Variable substitution in outbound REST messages in the SOAP message.
Use MID Server	Check box that determines if a MID Server must be used to invoke the SOAP web service. **Note:**

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Field	Description
	If the SOAP web service message function defines a MID Server, that MID Server is used instead of the one selected here.
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the SOAP endpoint. By default, the system selects a MID Server with SOAP capabilities. This field is available when the **Use MID Server** check box is selected.
Timeout	Allowed duration of the SOAP web service request before it times out, in seconds. The default is **10**.
Authentication	Determines what type of authentication is required for the endpoint. The options are: ○ **Use existing credentials in SOAP message**: Uses credential definitions from the SOAP message definition. ○ **Override with Basic Authentication credentials:** Uses |Enable basic authentication for outbound SOAP credentials. Overrides the credentials in the SOAP message definition. Basic authentication credentials must be provisioned before they are available for selection. ○ **Override with Certificate Authentication credentials**: Overrides the credentials in the SOAP message definition with certificate authentication credentials. ○ **Override with Both Basic and Certificate Authentication credentials**: Overrides the credentials in the SOAP message definition with both basic authentication or certificate authentication credentials. ○ **Override with WS-Security Username profile**: Overrides the credentials in the SOAP message definition with credentials defined in WS-Security.
Credentials	Required REST endpoint basic authentication credentials. This field is available when **Override with Basic Authentication credentials** is selected in the **Authentication** field. Only basic authentication credentials appear in the selection list, which includes credentials stored on the instance and credential IDs from an external storage system. If you are using credentials stored in a CyberArk safe, you can override the Configure the MID Server for CyberArk defined in the MID Server configuration file by adding the name of a different safe as a prefix to the credential ID, separated by a colon. For example, *`newsafe:orch-test-f5`*.
Protocol Profile	Outbound web services mutual authentication to use for authentication. This field is available when the authentication type is either **Override with Certificate Authentication credentials** or **Override with Both Basic and Certificate Authentication credentials**.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

SOAP template execution parameters

You use execution parameters to create the input process script in the **Pre processing** form of the activity designer.

For descriptions of the SOAP web service command fields, see the table in Configure the SOAP execution command.

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Note:
You must use the `executionParam.` prefix with all variables in this table.

SOAP execution parameters

Name	Variable	Type	Usage
Web service message	web_service_message	Reference	The sys_id of the corresponding SOAP message.
Web service message function	web-service_message_function	Reference	The sys_id of the SOAP message function.
Web service endpoint	web_service_endpoint	String	URL of the SOAP endpoint.
Parameters	parameters	Array of JavaScript objects	Array of JavaScript objects, expressed with the `executionParam.` prefix. For instructions on creating arrays using this parameter, see Create a JavaScript array in a SOAP template.
Use mid server	use_mid_server	Boolean	When true, indicates that a MID Server is used.
MidCapabilities	midCapabilities	String (comma separated)	List of references to required MID Server capabilities.
Time out	time_out	String	Allowed duration of the SOAP web service request before it times out, in seconds. The default is **10**.
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. Use this example to customize the MID Server selection if there are additional capabilities that are assigned by value: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`
Auth Type	auth_type	Boolean	Type of credentials to use. The choices are: • basic_auth_pick_credentials • use_existing_credentials
Credentials	credentials	Reference	Credentials to use for this SOAP message when the `auth_type` is `basic_auth_pick_credentials`.

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Create a JavaScript array in a SOAP template

These are instructions for creating JavaScript arrays using SOAP execution parameters.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

About this task

To add more name-value pairs to the parameter's array, append the values to the existing array.

Procedure

1. Create a JavaScript object with the following syntax, and add it to the `executionParam.parameter` array:

```
var newParameter =
 {"name":"parameterName","value":"parameterValue","additional_a
ttribute":"none"};
executionParam.parameters.push(newParameter);
```

   By adding the new parameter JavaScript object to the array, you ensure that any elements already available in the array are not impacted.

2. Make sure to set the value in the **Additional attribute** column in the **SOAP message parameters** input field to **Do not escape text**.

   In this case, the system does not escape the value specified for the **value** attribute. An example of this is:

```
var newParameter =
 {"name":"parameterName","value":"parameterValue","additional_a
ttribute":"do_not_escape_text"};
executionParam.parameters.push(newParameter);
```

   Note:
   If the value for the **additional_attribute** field is **None**, then the system escapes the value specified by the **value** attribute. In the first example, `parameterValue` is escaped.

SOAP template post-processing parameters

Use these parameters to create a post-processing script.

Activity designer post-processing parameters

Name	Variable	Type	Usage
Status code	status_code	Integer	Contains the status code returned from the web service.
Header	header	Hashmap of JavaScript object	Contains the key value paired hashmap associated with the header values passed into the web service. You can access each value with `executionResult.header[keyName]`.
Body	body	String	Contains a string value representing the output from the SOAP message
Error	error	String	Returns the error string from the SOAP web service, unless there are no errors, in which case it returns**null**.

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Create a JavaScript Probe activity

Create a JavaScript Probe activity to instruct a MID server to execute server-side javascript.

Before you begin

Role required: activity_creator or workflow_admin

About this task

The JavascriptProbe activity has the same functionality as making 'Packages' calls into standard Java libraries. It allows you to have more control over the Java libraries on the MID Server. You can load your own JAR files on the MID Server and have the JavascriptProbe make Package calls into those java files.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the JavaScript probe activity Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes on the MID server.
Script type	Select the type of script to include. Available options are: ○ Custom JavaScript ○ MID Server script include
Script	Custom JavaScript to run with this probe. **Note:** This field is available when the **Script type** selected is **Custom JavaScript**.
MID Server script include	Script for the MID Server to run with this probe. **Note:** This field is available when the **Script type** selected is **MID Server script include**.
Select MID Server by host	MID Server on which the probe runs.
Required MID Server capabilities	MID Server to use, by capabilities.
Parameters	Name-value pairs to pass to the host with this probe. You can create these parameters manually, or drag input variables into the **Parameters** fields and assign a value.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

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What to do next

Finish creating your JavaScript probe activity by creating output variables, creating a parsing rule, or Conditions. Refer to the create custom activities topic to know your template options.

JavaScript probe template execution parameters

You use execution parameters to create the input process script in the **Preprocessing** form of the activity designer.

For descriptions of the JavaScript Probe command fields, see the table in Configure the JavaScript Probe execution command.

Note:
You must use the `executionParam.` prefix with all variables in this table.

JavaScript template execution parameters

Name	Variable	Type	Usage
Script Type	script_type	Enumerated	Type of script to run. The possible types are: • custom_javascript_typ • mid_script_include_type
Script	script	String	Script that runs custom JavaScript when the **script_type** is **custom_javascript_type**.
Mid script include	mid_script_include	Reference	The sys_id reference associated with the MID Server script include to call, when the **script_type** is **mid_script_include_type**.
Source	source	String	Target host on which to run the script.
MidCapabilities	midCapabilities	String (comma separated)	List of required MID Server capabilities.
Parameters	parameters	Array of JavaScript object	Array of JavaScript objects, expressed with the `executionParam.` prefix. To add more name-value pairs to the **parameters** array, append them to the existing array. Create a JavaScript object with the following syntax, and add it to the `executionParam.parameter` array. This assigns additional parameters to the message: `var newParameter = {"name":"parameterName","value":"parameterValue"}; executionParam.parameters.push(newParameter);`
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional

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JavaScript template execution parameters (continued)

Name	Variable	Type	Usage
			capabilities that are assigned by value, use this example to customize the MID Server selection: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`

JavaScript probe template post-processing parameters

Use these parameters to create a post-processing script.

JavaScript probe post-processing parameters

Name	Variable	Type	Usage
Payload	payload	String	Contains raw payload returned from the JavaScript Probe.
Output	output	String	Contains output data returned from the JavaScript Probe.
EccSysId	eccSysId	String	Contains the reference ID associated with the ECC Queue input message.
Error Messages	errorMessages	String	Contains the error messages returned from the JavaScript probe. If no error messages are returned, this value is null.

Configure the JavaScript Probe execution command

Use the input variables you created to configure the command that Orchestration executes on the JavaScript Probe target host.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: activity_creator, admin

Note:
You can test the JavaScript Probe connection between the MID Server and the target without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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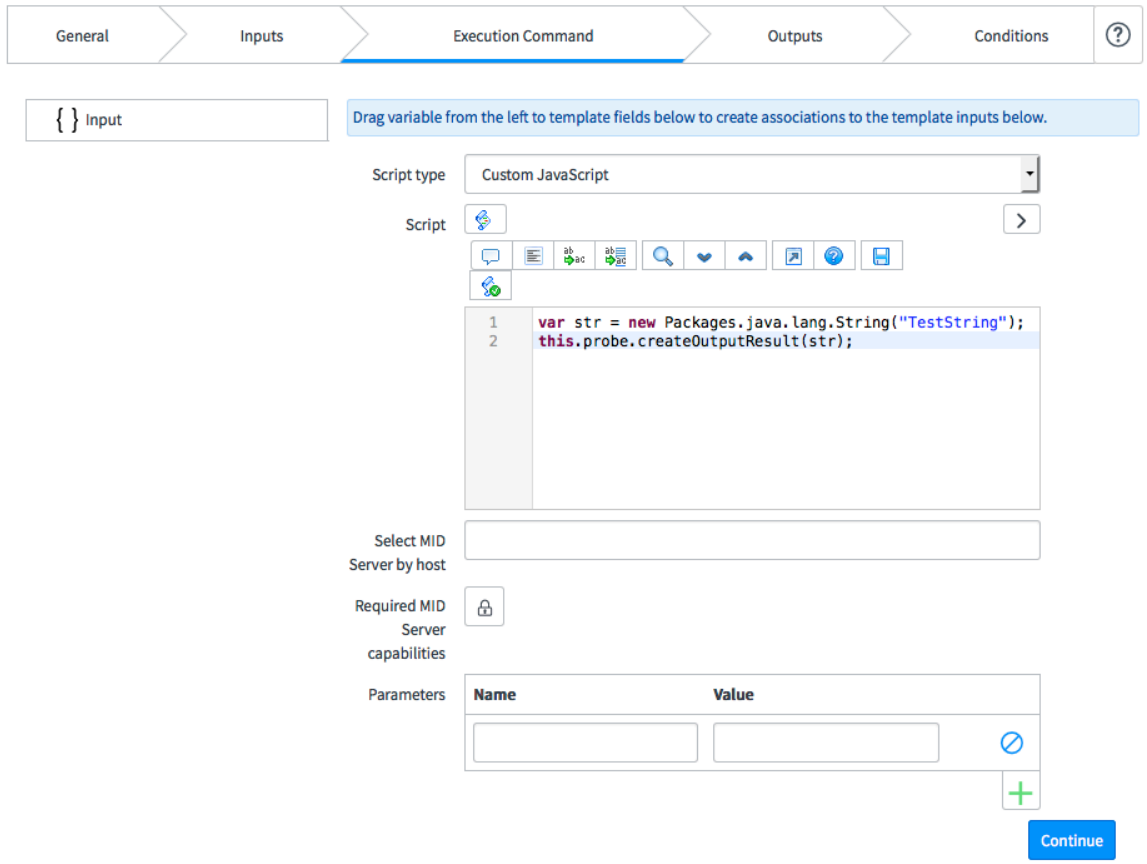
JavaScript Probe execution command



2. Complete the fields shown in the table.

JavaScript Probe execution command fields

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
Script type	Select the type of script to include. Available options are: ○ Custom JavaScript ○ MID Server script include
Script	Custom JavaScript to run with this probe. This field is available when the **Script type** selected is **Custom JavaScript**.
MID Server script include	Script for the MID Server to run with this probe. This field is available when the **Script type** selected is **MID Server script include**.
Select MID Server by host	MID Server on which the probe runs.
Required MID Server capabilities	MID Server to use, by capabilities.
Parameters	Name-value pairs to pass to the host with this probe. You can create these parameters manually, or drag input variables into the **Parameters** fields and assign a value.

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3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create a PowerShell activity

Create a custom PowerShell activity return data to a workflow from a host using Microsoft PowerShell.

Before you begin

Role required: activity_creator or workflow_admin

About this task

ServiceNow supports PowerShell 3.0 to 5.1.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the PowerShell Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes on the MID Server.
Target host	Host name or IP address of the target server for this PowerShell activity.
Script type	Type of PowerShell script to run on the Power Shell host. Available options are: ○ Custom PowerShell command ○ MID Server script file
MID Server script file	The MID Server script file contains the Power Shell scripts. This field is available when the **Script type** selected is MID Server script file.
Command	PowerShell command the activity executes. This field is available when the **Script type** se lected is *Custom PowerShell command*. You can create your commands by dragging and dropping input variables from the variable builder into this field.
PowerShell variables	Name-value pairs to pass to the host with Pow erShell. You can create these variables man ually, or drag input variables into the **Value** field. Encrypted input variables retain their en cryption, regardless of the data type settings in this field. If you type in a value and select the **Encrypted** data type, your value appears in plain text. It is only encrypted when it pass es to the ECC Queue.
Use MID Service Account	If checked, this activity authenticates on the target host using the credentials of the MID

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Option	Description
	Server service account only, without trying any other credentials. **Note:** The **Credential tag** field is not available.
Credential tag	Credential tag this activity must use to run PowerShell commands on the host. If this field is left blank, the MID Server tries all the available credentials until it finds a valid one, ending with the MID Server service account. If a credential tag is defined, the MID Server tries the credentials with that tag specified on ly and does not try the MID Server service ac count. **Note:** This field is not available when the **Use MID service account** check box is se lected.
Required MID Server capabilities	MID Server to use for querying PowerShell, by capabilities. By default, the system selects a PowerShell MID Server.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next

Finish creating your PowerShell activity by creating output variables, creating a parsing rule, or Conditions. Refer to the create custom activities topic to know your template options.

PowerShell template execution parameters

You use execution parameters to create the input process script in the **Pre Processing** form of the activity designer.

For descriptions of the Powershell command fields, see the table in Configure the PowerShell execution command.

Note:
You must use the `executionParam.` prefix with all variables in this table.

Powershell execution parameters

Name	Variable	Type	Usage
Source	source	String	Target host on which to execute the command.
Script type	script_type	Enumeration	Type of script to run. The possible types are:

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Powershell execution parameters (continued)

Name	Variable	Type	Usage
			• **command:** Custom PowerShell command. • **file:** Identifies the MID Server script file to run.
Command	command	String	Command sent to the MID Server for it to run on the target host.
MidScriptFile	midScriptFile	Reference	Reference sys_id of the MID Server script file to execute, when the **script_type** is **file**.
PowershellVariables	powershellVariables	Array of hashmap	Hashmap of JavaScript objects with **name**, **value**, and **type** for each object. The **type** of each object can be one of **plain**, **encrypted**, **boolean**, or **null**, corresponding to the PowerShell variable **type** selected in the inputs tab. For example, you might enter: `var newParameter = {"name":"parameterName","value":"parameterValue", "type": "plain" }; executionParam.powershellVariables.push(newParameter);`
Credential tag	credential_tag	String	Specific credential tag this activity must use to run PowerShell commands on the host.
MidCapabilities	midCapabilities	String (comma separated)	List of required MID Server capabilities.
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional capabilities that are assigned by value, use this example to customize the MID Server selection: `var valueCapability = {'NEW_MID_CAPABIILTY': 'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`

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Powershell post-processing parameters and payload parsing

Use these parameters to create a post-processing script, payload parsing, and tagging.

Powershell post-processing parameters

Name	Variable	Type	Usage

Tags	tags	Hashmap of tag values to return from the PowerShell command.	Contains the tags used to extract output using the PowerShell commands. The tag output is delimited by double percentage signs, as in **%%tagname%% ... %%**. Set up the command using the format in this example:
			`Write-Host %%tagname1%%`
			`output1 line 1`
			`output1 line 2`
			`…`
			`Write-Host%%`
			
			`Write-Host %%tagname2%%`
			`output2 line 1`
			`output2 line 2`
			`…`
			`Write-Host%%`
			
			The tags returned are JavaScript hashmap objects in which each key is prefixed with **tag** appended with the **tagname**.
			`{"__text__": "",`
			`"tagtagname1":"output1`
			`line1\noutput1 line2\n",`
			`"tagtagname2":"output2`
			`line1\noutput2 line2\n"}`

Hresult	hresult	String	Contains any **hresult** returned from the PowerShell command. If no **hresult** is returned, this parameter is **null**.
Output	output	String	Contains the raw output from the PowerShell command.
EccSysID	eccSysID	String	Contains the reference ID associated with the ECC Queue input message returned by the activity.
ErrorMessages	errorMessages	String	Contains any error messages retrieved from the PowerShell command. This value is **null** if there are no error messages.

Create a REST web service activity

Use this procedure to create a custom REST web service Orchestration activity.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

About this task

To create and use a REST web service workflow activity:

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- Create a Create a REST message if an appropriate one is not already configured.
- Assign the web_service_admin role to any user who must create or edit a custom REST activity.
- Determine an application, or Application scope, for this activity.
- Determine the Create a REST message to use for the activity. Use this value to override the endpoint configured in the REST message.
- Optionally, create basic authentication credentials. Use this value to override the credentials configured in the SOAP message.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the REST web service Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes.
REST message	Name of an existing REST message to use in this activity.
REST message function	REST message function to use for this activity.
Endpoint	Endpoint URL for the REST web service this activity uses. Enter an endpoint in this field to override the endpoint configured in the REST message. Click the lock to open the in put field.
Variable substitutions	Name-value pairs to pass to the REST end point. You can create these parameters manu ally, or drag input variables into the parameter fields, and then assign a value. Parameters defined in the REST message that use **${}** can be assigned data from this activity template. Use the **Additional attribute** column to config ure the system to not escape the text. By de fault the text sent to the REST message is es caped. If the users have provided variables using Variable substitution in outbound REST in the REST message, then the **Name** column is automatically populated.
Additional Headers	Additional HTTP header parameters for the REST message selected. You can also use these values to override parameters inherited from the REST message.
Additional Query Parameters	Additional query parameters for the REST message selected. You can also use these val ues to override parameters inherited from the REST message.

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Option	Description
Use MID Server	Check box that determines if a MID Server should be used to invoke the REST web service. **Note:** If the REST web service message function defines a MID Server, that MID Server is used instead of the one selected here.
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the REST endpoint. By default, the system selects a MID Server with REST capabilities. This field is available when the **Use MID Server** check box is selected.
Timeout	Allowed duration of the REST web service request before it times out, in seconds. The default is **10**.
Authentication	Determines what type of authentication is required for the endpoint. The options are: ○ **Use existing credentials in REST message**: Uses credential definitions from the REST message definition. ○ **Override with Basic Authentication credentials**: Uses Enable basic authentication credentials to override the credentials in the REST message definition. Basic authentication credentials must be provisioned before they are available for selection. ○ **Override with Certificate Authentication credentials**: Uses a certificate, such as a private key, to override the credentials in the REST message definition. ○ **Override with Both Basic and Certificate Authentication credentials**: Uses both basic authentication and certificate authentication to override the credentials in the REST message definition. ○ **Override with OAuth Authentication credentials**: Uses OAuth 2.0 credentials to override the credentials in the REST message definition. The REST message selected for this activity must have its OAuth set to **OAuth 2.0** and its OAuth profiles and configured appropriately.
Credentials	Required REST endpoint basic authentication credentials. This field is available when

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Option	Description
	Override with Basic Authentication credentials is selected in the **Authentication** field. Only basic authentication credentials appear in the selection list, which includes credentials stored on the instance and credential IDs from an external storage system. If you are using credentials stored in a CyberArk safe, you can override the default safe defined in the MID Server configuration file. See Configure for details. Add the name of a different safe as a prefix to the credential ID, separated by a colon. For example, *newsafe:orch-test-f5*.
Protocol Profile	Certificate authentication to use. This field is available when the selections in the **Authentication** are either **Override with Certificate Authentication credentials** or **Override with Both Basic and Certificate Authentication credentials**.
OAuth profile	Profile for the OAuth provider for this REST message. See for more information.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next
Finish creating your Rest web service activity by creating output variables, creating a parsing rule, or Conditions. Refer to the create custom activities topic to know your template options.

Auto-map REST activity output variables

The ServiceNow activity designer allows you to map parameter values in a REST test payload to variables in the **Outputs** stage automatically.

Before you begin
Role required: web_service_admin, activity_admin, activity_creator

About this task
Note:
You can test input variables from any stage in the activity designer if you have provided enough information for Orchestration to contact the endpoint and return data. Typically, the **Execution Command** stage is the point at which your inputs are ready for testing.

Procedure
1. In the activity designer, proceed to the **Execution Command** stage.
2. Define an appropriate MID Server, if requested.
   The test fails if the MID Server cannot be found or if it cannot connect to the target.
3. Click **Test Activity** to test the input parameters.
   If you added actual values for the parameters and fields, the system runs those values against the specified target and returns the resulting payload. If you mapped input variables to fields and parameters, the system displays a dialog box for assigning test values to those variables.

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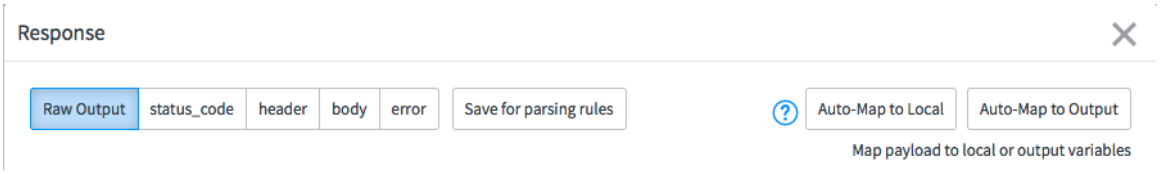
4. Provide test values, if requested, and click **OK** to display the payload.
   The entire payload appears in the **Raw Output** tab of the Response form.



5. Select one of these auto-mapping options.
   - **Auto-Map to Local**: Directly maps values to a local variable for use within the activity.
   - **Auto-Map to Output**: Directly maps values to the output variable to pass to other activities in the workflow. Auto-mapping to an output variable creates an array of objects, each of which contains the column names from the query result.

REST template execution parameters

You use execution parameters to create the input process script in the **Pre Processing** form of the activity designer.

For descriptions of the REST web service command fields, see Configure the REST execution command.

Note:
You must use the `executionParam.` prefix with all variables in this table.

REST template execution parameters

Name	Variable	Type	Usage
Web service message	web_service_message	Reference	The sys_id of the corresponding web service message.
Web service message function	web_service_message_function	Reference	The sys_id of the REST message function.
Web service endpoint	web_service_endpoint	String	URL of the REST endpoint.
Parameters	parameters	Array of JavaScript objects	Array of JavaScript objects, expressed with the `executionParam.` prefix. For instructions on creating arrays using this parameter see Create a JavaScript array in a REST template.
Use mid server	use_mid_server	Boolean	Selects whether or not to use the MID Server. A value of **true** uses the MID Server, and a value of **false** does not use the MID Server.
MidCapabilities	midCapabilities	String (comma separated)	List of references to required MID Server capabilities.

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REST template execution parameters (continued)

Name	Variable	Type	Usage
Time out	time-out	String	Allowable time out duration, expressed in seconds.
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. Use this example to customize the MID Server selection if there are additional capabilities that are assigned by value: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`
Auth Type	auth-type	Boolean	Type of credentials to use. The choices are: • basic_auth_pick_credentials • use_existing_credentials
Credentials	credentials	Reference	Contains the credentials to use for this REST message when the **auth_type** selected is **basic_auth_pick_credentials**.

Create a JavaScript array in a REST template

These are instructions for creating JavaScript arrays using REST execution parameters.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

About this task

To add more name-value pairs to the parameter's array, append the values to the existing array.

Procedure

1. Create a JavaScript object with the following syntax, and add it to the `executionParam.parameter` array:

```
var newParameter =
 {"name":"parameterName","value":"parameterValue","additional_attribute":"none"};
executionParam.parameters.push(newParameter);
```

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By adding the new parameter JavaScript object to the array, you ensure that any elements already available in the array are not impacted.

2. Make sure to set the value in the **Additional attribute** column in the **REST message parameters** input field to **Do not escape text**.

   In this case, the system does not escape the value specified for the **value** attribute. An example of this is:

```
var newParameter =
 {"name":"parameterName","value":"parameterValue","additional_a
ttribute":"do_not_escape_text"};
executionParam.parameters.push(newParameter);
```

Note:
If the value for the **additional_attribute** field is **None**, then the system escapes the value specified by the **value** attribute. In the first example, `parameterValue` is escaped.

REST template post-processing parameters

Use these parameters to create a post-processing script.

Activity designer post-processing parameters

Name	Variable	Type	Usage
Status code	status_code	Integer	Contains the status code returned from the REST web service.
Header	header	Hashmap of JavaScript object	Hashmap of key value pairs associated with the header values passed into the web service. You can access each value with `executionResult.header[keyName]`.
Body	body	String	Contains a string value representing the output from the REST message
Error	error	String	Returns the error string from the REST web service, unless there are no errors, in which case it returns**null**.

Configure the REST execution command

Use the input variables you created to configure the command that Orchestration executes on the REST endpoint.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: web_service_admin, activity_admin, activity_creator

Note:
You can test the REST connection between the MID Server and the endpoint without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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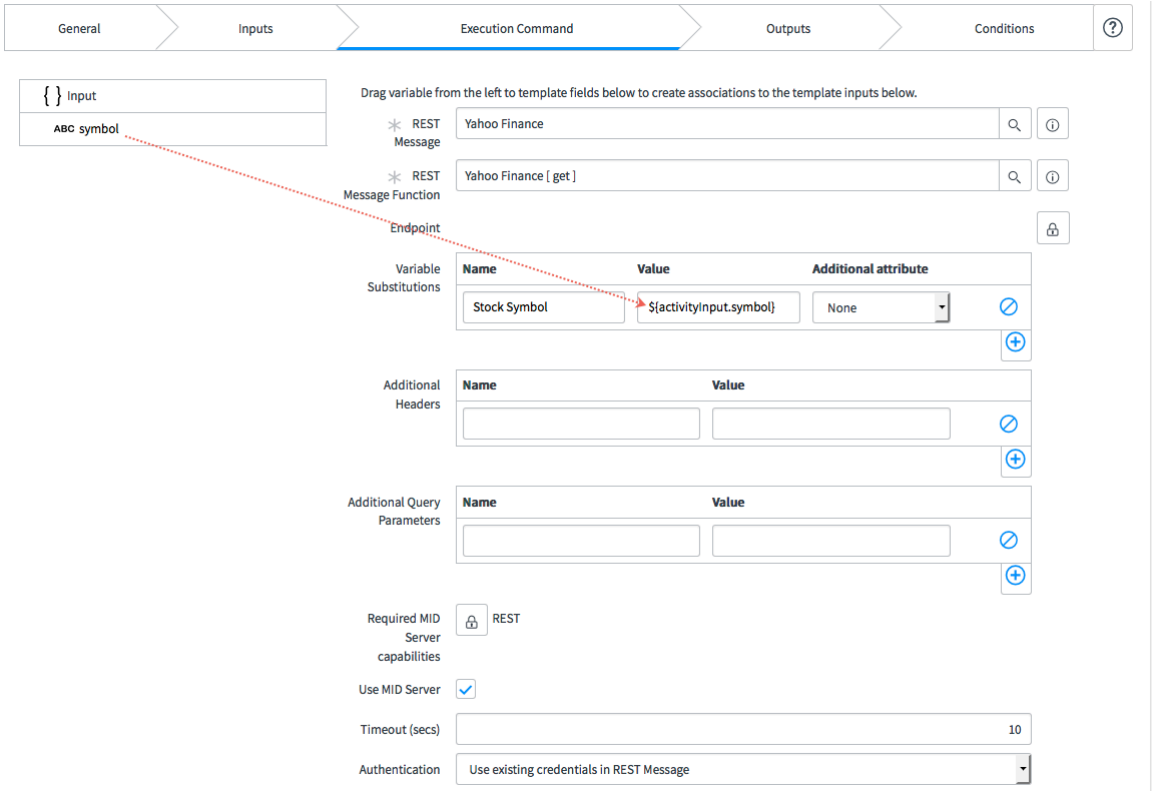
REST execution command



2. Complete the fields shown in the table.

REST execution command fields

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
REST message	Name of an existing REST message to use in this activity. Users must have the web_service_admin role to configure this field.
REST message function	REST message function to use for this activity. Users must have the web_service_admin role to configure this field.
Endpoint	Endpoint URL for the REST web service this activity uses. Enter an endpoint in this field to override the endpoint configured in the REST message. Click the lock to open the input field.
Variable substitutions	Name-value pairs to pass to the REST endpoint. You can create these parameters manually, or drag and drop input variables into the parameter fields, and then assign a value. Parameters defined in the REST message that use **${}** can be assigned data from this activity template. Use the **Additional attribute** column to configure the system to not escape the text. By default the text sent to the REST message is escaped. The **Name** column is automatically populated if the users have provided variables using Variable substitution in outbound REST messages in the REST message.
Additional Headers	Additional HTTP header parameters for the REST message selected. You can also use these values to override parameters inherited from the REST message.

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Field	Description
Additional Query Parameters	Additional query parameters for the REST message selected. You can also use these values to override parameters inherited from the REST message.
Use MID Server	Check box that determines if a MID Server should be used to invoke the REST web service. **Note:** If the REST web service message function defines a MID Server, that MID Server is used instead of the one selected here.
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the REST endpoint. By default, the system selects a MID Server with REST capabilities. This field is available when the **Use MID Server** check box is selected.
Timeout	Allowed duration of the REST web service request before it times out, in seconds. The default is **10**.
Authentication	Determines what type of authentication is required for the endpoint. The options are: ○ **Use existing credentials in REST message**: Uses credential definitions from the REST message definition. ○ **Override with Basic Authentication credentials**: Uses Enable basic authentication for outbound SOAP credentials to override the credentials in the REST message definition. Basic authentication credentials must be provisioned before they are available for selection. ○ **Override with Certificate Authentication credentials**: Uses a certificate, such as a private key, to override the credentials in the REST message definition. ○ **Override with Both Basic and Certificate Authentication credentials**: Uses both basic authentication and certificate authentication to override the credentials in the REST message definition. ○ **Override with OAuth Authentication credentials**: Uses OAuth 2.0 credentials to override the credentials in the REST message definition. The REST message selected for this activity must have its OAuth 2.0 tutorial - create a REST message set to **OAuth 2.0** and its OAuth profiles and scopes configured appropriately.
Credentials	Required REST endpoint basic authentication credentials. This field is available when **Override with Basic Authentication credentials** is selected in the **Authentication** field. Only basic authentication credentials appear in the selection list, which includes credentials stored on the instance and credential IDs from an external storage system. If you are using credentials stored in a CyberArk safe, you can override the Configure the MID Server for CyberArk defined in the MID Server configuration file by adding the name of a different safe as a prefix to the credential ID, separated by a colon. For example, *`newsafe:orch-test-f5`*.
Protocol Profile	Certificate authentication to use. This field is available when the selections in the **Authentication** field is either **Override with Certificate Authentication credentials** or **Override with Both Basic and Certificate Authentication credentials**.

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Field	Description
OAuth profile	Profile for the OAuth provider for this REST message. See Specify an OAuth profile for more information.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create an SFTP activity

Create an activity that executes basic SFTP commands on a remote server.

Before you begin

Roles required: activity_creator or workflow_admin

About this task

You can create a custom activity that manages files and directories on a target host or copies a file from one SFTP server to another. The file content is streamed through a MID Server, which avoids having to store the data on the hard drive of the MID Server host machine.

Note:
This activity requires the credentials of a user who can execute SFTP commands on the source host. The Copy File activity, provided in the activity pack, requires separate credentials to access the target host.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the SFTP Execution Command.

Option	Description
Command	Type of activity to create. The choices are: ○ Copy file ○ Create directory ○ Get file list ○ Remove file or directory ○ Rename file or directory ○ Set file attributes **Note:** The fields that display on the form de pend on the command you select.
Source host	Name or IP address of the server containing the files targeted by the activity.
Source port	Port number to use to communicate with the source server. The default port number is **22**.
Source file path	Full path to a file (`/temp/test_data_file.txt`) or directory (`/temp/test_dir`) on a source host depending on the se

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Option	Description
	lected command. Field available on following commands: ○ Copy file ○ Remove file or directory ○ Set file attributes
Source directory	Path to the directory where the source files are located. Field available on following com mands: ○ Create directory ○ Get file list
Source files	Names of specific source files to include in the file transfer. Separate the file names with semi-colons. This field supports a semi-colon separated list of wild-card patterns. For ex ample: `*.txt; a?cd.pdf`. If this field is blank, all files are included. Field available on following command: Get file list **Note:** For information about how the values in this field affect options in other fields, see the logic explanation which follows.
Is a directory	If checked, specifies the file path is a directo ry. Field available on following command: Re move file or directory
Credential tag for source	Specific credential tag this activity must use to run SFTP commands on the source host.
Credential tag for target	Specific credential tag this activity must use to run SFTP commands on the target host. Field available on following command: Copy file
Excluded files	Names of specific source files to exclude from the file transfer. The activity acts on all other files found in the source directory or subfold ers. Separate the file names with commas. This field supports comma-separated list of wild-card patterns. For example: `*.txt, a?cd.pdf`. Field available on following com mand: Get file list **Note:** For information about how the values in this field affect options in other fields, see the logic explanation which follows.
Include subfolders	If checked, includes the files from subfolders in the source directory. Field available on fol lowing command: Get file list

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Option	Description
	Note: For information about how your selec tion affects other fields in the form, see the logic explanation which follows.
Target host	Name or IP address of the server to which the files are being transferred. Field available on following command: Copy file
Target port	Port number to use to communicate with the target host. The default port number is **22**. Field available on following command: Copy file
Target file path	Full path to a file on a target host. Field avail able on following commands: ○ Copy file ○ Rename file or directory
Suffix for temporary file	If a file exists on a target host, this command enables a temporary suffix to use for a file name. If this field contains a value, the activity first copies the source file to a temporary file on the target host using *`targetFilePath + tempFileSuffix`* as the name. Up on completion, the activity renames the file to the actual target file name. If this field is blank, the activity copies the source file direct ly to the target file and overwrites it, if it exists. Field available on following command: Copy file
UID	User ID attribute to apply to a file or directory. The UID and GID values must be set together as a pair or they are ignored. The UID and GID numbers are internal values returned by the Get File List activity. Typically, you first use the Get File List activity to return a list of files and their attributes. Then you can move a file from a source host to a target host and set the source file attributes on the target file. This flow is demonstrated in the SFTP File Trans fer workflow. Field available on following com mand: Set file attributes
GID	Group ID attribute to apply to a file or direc tory. The UID and GID values must be set to gether as a pair or they are ignored. The UID and GID numbers are internal values returned by the Get File List activity. Typically, you first use the Get File List activity to return a list of files and their attributes. Then you can move a file from a source host to a target host and set the source file attributes on the target file. This flow is demonstrated in the SFTP File

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Option	Description
	Transfer workflow. Field available on following command: Set file attributes
Permissions	File or directory permissions to set for the user and group specified. This value must be expressed as an integer, such as **16877**, which defines these permissions: *rwxr-xr-x*. The permissions numbers are internal val ues returned by the Get File List activity. Typ ically, you first use the Get File List activity to return a list of files and their attributes. Then you can move a file from a source host to a tar get host and set the source file attributes on the target file. This flow is demonstrated in the SFTP File Transfer workflow. Field available on following command: Set file attributes
Access timestamp	Override the timestamp when the file or direc tory was last accessed. The access and mod ification timestamps must be set together as a pair. Field available on following command: Set file attributes
Modification timestamp	Override the timestamp when the file or direc tory was last modified. The access and modi fication timestamps must be set together as a pair. Field available on following command: Set file attributes
Size in bytes	Size of a file, expressed in bytes. Field avail able on following command: Set file attributes
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the source and target servers.

The system uses this logic to determine which files to move from the source host:

- If the Source files field is empty, the system selects all the files in the source directory. Otherwise, it only selects those files whose names match one of the file name patterns given in the field.
- If the Excluded files field is empty, the system excludes nothing. Otherwise, it excludes those files whose names match one of the file name patterns given in the field.
- The exclude rule has a higher preference than the include rule. If a file name matches one of the file name patterns in the Excluded files field, it does not get into the selection regardless of the include rule.
- When the Include subfolders check box is cleared, the system looks only in the source directory for files to include or exclude. Otherwise, it looks in the source directory and any of its subfolders for files to include or exclude.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

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What to do next

- Use auto-mapping to generate outputs and parsing rules (recommended for JDBC)
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

SFTP template execution parameters

You use execution parameters to create the input process script in the **Preprocessing** form.

For descriptions of the command fields, see Configure the SFTP execution command.

Note:
You must use the `executionParam.` prefix with all variables in this table.

SFTP execution parameters

Name	Variable	Type	Usage
Command	command	String	Identifies the function of this activity. The possible commands are: • Copy file • Create directory • Get file list • Remove file or directory • Rename file or directory • Set file attributes
Source	source	String	Identifies the source host.
Source port	source_port	Integer	Identifies the port used to communicate with the source host.
Source directory	source_directory	String	Path to the source directory of the files to be moved.
Source files	source_files	String	Names of the files on the source to be moved.
Excluded files	excluded_files	String	Lists the files excluded from the operation.
Source file path	source_file_path	String	Path to the source files to be moved.
Target host	target_host	String	Identifies the target host.
Target port	target_port	Integer	Identifies the port used to communicate with the target host.
Target directory	target_directory	String	Full path to the target directory on the target host.
Target file path	target_file_path	String	Full path to a file or directory on the source host or on the target host. For example, this value is used in the Rename File or Directory activity in the activity pack.

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SFTP execution parameters (continued)

Name	Variable	Type	Usage
Temp file postfix	temp_file_postfix	String	Temporary file name extension used by the Copy File activity when moving a file. If this field contains an extension, the source file is copied to a temporary file using *target file name + temp_file_postfix*, before being renamed to the actual target file. If this field is blank, the source file is copied directly to the target file.
Is directory	is_directory	Boolean	Indicates whether the given file path is a directory.
Include subfolders	include_subfolders	Boolean	Indicates whether the system looks into subfolders of the source directory for files to include and exclude.
File attribute uid	file_attribute_uid	Integer	User ID associated with a file or directory.
File attribute gid	file_attribute_gid	Integer	Group ID associated with a file or directory.
File attribute permissions	file_attribute_permissions	Integer	File or directory permissions for the user and group specified.
File attribute atime	file_attribute_atime	Integer	Access time stamp from the file attributes.
File attribute mtime	file_attribute_mtime	Integer	Modification time stamp from the file attributes.
File attribute size	file_attribute_size	Integer	Size of the file, in bytes.
Source credential tag	source_credential_tag	String	Credential aliases for Orchestration activities used to run the command on the source host.
Target credential tag	target_credential_tag	String	Credential tag used to run the command on the target host.
MidCapabilities	midCapabilities	String (comma separated)	List of required MID Server capabilities.

SFTP post-processing parameters and payload parsing

Use these parameters to create a post-processing script, payload parsing, and tagging.

SFTP post-processing parameters

Name	Variable	Type	Usage
Output	output	String	Contains output data returned by the query.

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SFTP post-processing parameters (continued)

Name	Variable	Type	Usage
EccSysId	eccSysId	String	Contains the Reference ID associated with the ECC Queue input message.
ErrorMessages	errorMessages	String	Contains the error messages returned from the query. If no error messages are returned, this value is null.

Tags	tags	Hashmap of tag values returned from the SSH command	Contains the tags used to extract output using the SSH commands. The tag output is delimited by double percentage signs, as in `%%tagname %% ... %%`. Set up the command using the following format:
			`%%tagname1%%`
			`output1 line 1`
			`output1 line 2`
			`...`
			`%%`
			
			`%%tagname2%%`
			`output2 line 1`
			`output2 line 2`
			`...`
			`%%`
			
			The tags returned are JavaScript hashmap objects in which each key is prefixed with `tag` appended with the tagname.
			`{"__text__": "",`
			`"tagtagname1":"output1 line1\noutput1 line2\n",`
			`"tagtagname2":"output2 line1\noutput2 line2\n"}`

Configure the SFTP execution command

Use the input variables you created to configure the command that Orchestration executes on the SFTP target.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: activity_creator, admin

Note:
You can test the JDBC connection between the MID Server and the target without having to run the activity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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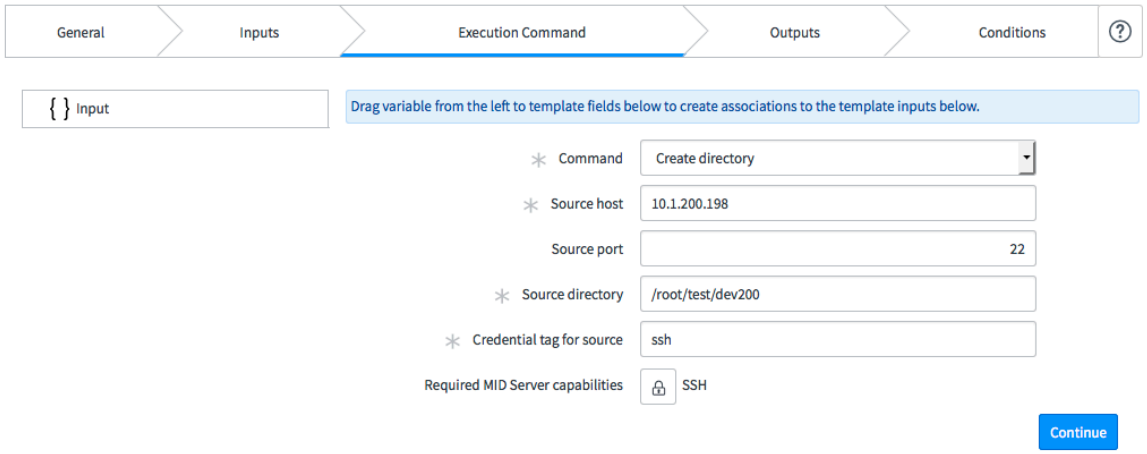
SFTP execution command



2. Complete the fields shown in the table.

SFTP command fields

Field	Description	Command
Command	Type of activity to create. The choices are: ○ Copy file ○ Create directory ○ Get file list ○ Remove file or directory ○ Rename file or directory ○ Set file attributes **Note:** The fields displayed on the form depend on the command selected.	All
Source host	Name or IP address of the server containing the files targeted by the activity.	All
Source port	Port number to use to communicate with the source server. The default port number is **22**.	All
Source file path	Full path to a file on a source host.	○ Copy file ○ Remove file or directory ○ Set file attributes
Source directory	Path to the directory where the source files are located.	○ Create directory ○ Get file list

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Field	Description	Command
Source files	Names of specific source files to include in the management action. Separate the file names in this list with semi-colons. This field supports the use of wild cards. If this field is blank, all files are included. For information about how the values in this field are affected by options in other fields, see the section below the table.	Get file list
Is a directory	Check box that determines if the specified file path is a directory.	Remove file or directory
Credential tag for source	Specific Credential aliases for Orchestration activities this activity must use to run SFTP commands on the source host.	All
Credential tag for target	Specific credential tag this activity must use to run SFTP commands on the target host.	Copy file
Excluded files	Names of specific source files to exclude from the management action. The activity acts on all other files found in the source directory or subfolders. Separate the file names in this list with semi-colons. This field supports the use of wild cards. For information about how the values in this field are affected by options in other fields, see the section below the table.	Get file list
Include subfolders	Check box to manage the files from subfolders in the source directory. For information about how your selection affects other fields in the form, see the section below the table.	Get file list
Target host	Name or IP address of the server to which the files are being transferred.	Copy file
Target port	Port number to use to communicate with the target host. The default port number is **22**.	Copy file
Target file path	Full path to a file on a target host.	○ Copy file ○ Rename file or directory
Suffix for temporary file	Temporary suffix to use for a file name if the file already exists on a target host. If this field contains a value, the activity deletes the duplicate target file if it exists, and then copies the source file to a temporary file using *targetFilePath + tempFileSuffix* as the name. Upon completion, the activity renames the file to the actual target file name. If this field is blank, the activity copies the source file directly to the target file and overwrites it, if it already exists.	Copy file
UID	User ID attribute to apply to a file or directory. The UID and GID values must be set together as a pair or they are ignored.	Set file attributes
GID	Group ID attribute to apply to a file or directory. The UID and GID values must be set together as a pair or they are ignored.	Set file attributes
Permissions	File or directory permissions to set for the user and group specified. This value must be expressed as an integer, such as **16877**, which defines these permissions: *rwxr-xr-x*. The permissions number is an internal value returned by the Get	Set file attributes

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Field	Description	Command
	File List activity. Typically, you first use the Get File List activity to return a list of files and their attributes. Then you can move a file from a source host to a target host and set the source file attributes on the target file. This is demonstrated in the SFTP File Transfer workflow.	
Access timestamp	Override the timestamp when the file or directory was last accessed. The access and modification timestamps must be set together as a pair.	Set file attributes
Modification timestamp	Override the timestamp when the file or directory was last modified. The access and modification timestamps must be set together as a pair.	Set file attributes
Size in bytes	Size of a file, expressed in bytes.	Set file attributes
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the source and target servers. By default, the system selects an SSH MID Server.	All

The system uses this logic to determine which files to move from the source host:

- If the **Source files** field is empty, the system select all the files in the source directory. Otherwise, it only selects those files whose names match one of the file name patterns given in the field.
- If the **Excluded files** field is empty, the system excludes nothing. Otherwise, it excludes those files whose names match one of the file name patterns given in the field.
- The exclude rule has a higher preference than the include rule. A file whose name matches one of the file name patterns in the **Excluded files** field does not get into the selection, even though it would be selected by the include rule.
- When the **Include subfolders** check box is cleared, the system looks only in the source directory for files to include or exclude. Otherwise, it looks in the source directory and any of its subfolders for files to include or exclude.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create a probe activity

Create an activity that runs a probe on the target host that is configured to return specific information..

Before you begin

Role required: activity_creator or workflow_admin

About this task

For instructions on using the activity template process flow, see create custom activities.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the Probe Execution Command.

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Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes.
Probe	Probe to run with this activity, from the list of probes in the system
Target host	Host name or IP address of the target server for this activity.
Parameters	MID Server to use, by capabilities.
Required MID Server capabilities	Name-value pairs to pass to the host with this probe. You can create these parameters man ually, or drag and drop input variables into the parameter fields and assign a value.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next

- Use auto-mapping to generate outputs and parsing rules
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

Probe template execution parameters

You use execution parameters to create the input process script in the **Pre Processing** form.

For descriptions of the command fields, see Configure the Probe execution command.

Note:
You must use the `executionParam.` prefix with all variables in this table.

Probe activity execution parameters

Name	Variable	Type	Usage
Probe	probe	Reference	The sys_id of the MID Server probe.
Source	source	String	Intended target host
Parameters	parameters	Array of JS object	Array of JavaScript objects, expressed with the `executionParam.` prefix. To add more name-value pairs to the **parameters** array, append them to the existing array. Create a JavaScript object with the following syntax, and add it to the `executionParam.parameter` array. This assigns additional parameters to the message: `var newParameter = {"name":"parameterName","value":"parameterValue"};`

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Probe activity execution parameters (continued)

Name	Variable	Type	Usage
			`executionParam.parameters.push(newParameter);`
MidCapabilities	midCapabilities	String (comma separated)	List of required MID server capabilities.

ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional capabilities that are assigned by value, use this example to customize the MID Server selection:
			`var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'};`
			`executionParam.valueCapabilities.push(valueCapability);`

Probe template post-processing parameters

Use these parameters to create a post-processing script.

Probe post-processing parameters

Name	Variable	Type	Usage
Payload	payload	String	Contains raw payload returned from the probe.
Output	output	String	Contains output data returned from the probe.
EccSysId	eccSysId	String	Contains the reference ID associated with the ECC Queue input message.

Configure the Probe execution command

Use the input variables you created to configure the command that Orchestration executes on the target.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: activity_creator, admin

Note:
You can test the activity connection between the MID Server and the target without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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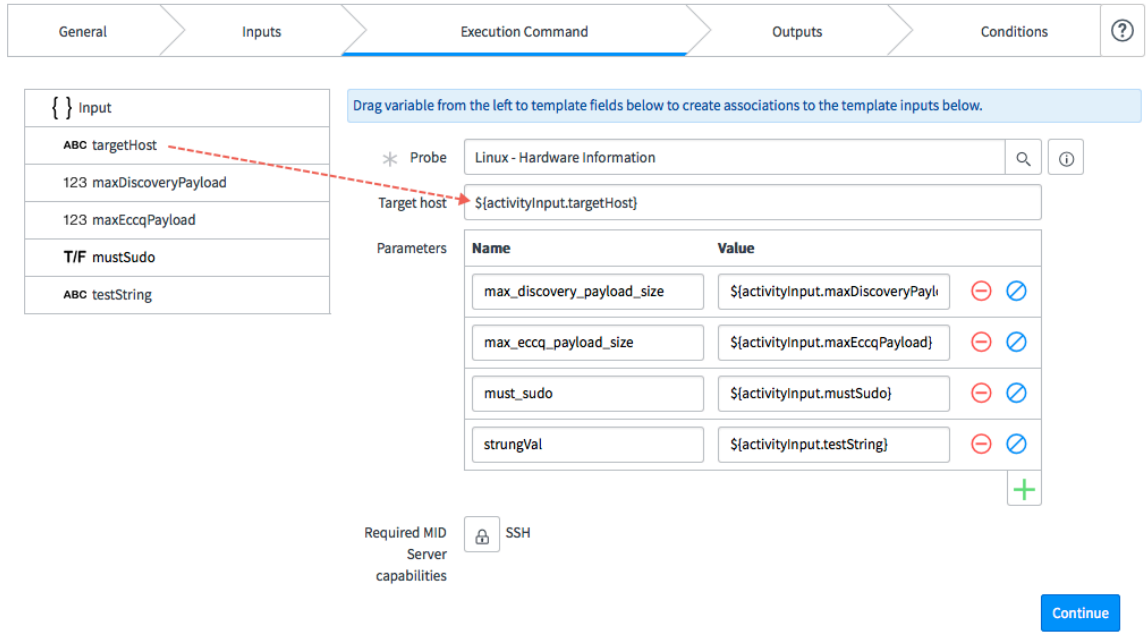
Probe execution command



2. Complete the fields shown in the table.

Probe execution command fields

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
Probe	Probe to run with this activity, from the list of probes in the system.
Target host	Host name or IP address of the target server for this activity.
Required MID Server capabilities	MID Server to use, by capabilities.
Parameters	Name-value pairs to pass to the host with this probe. You can create these parameters manually, or drag and drop input variables into the parameter fields and assign a value.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create an SSH activity

Create an activity that extracts data from a target host that uses the SSH network protocol.

Before you begin

Role required: activity_creator or workflow_admin

About this task

For instructions on using the activity template process flow, see create custom activities.

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Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the SSH Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes.
Target host	Host name or IP address of the target server for this activity.
Command	Command this activity runs on the target host. You can invoke a MID Server script from this field using any script type that the SSH command line supports. For more information, see **Advanced SSH script options** below the table.
Directory	Directory on the target host where the command is run.
Credential tag	The Orchestration credential tag to use when running the command.
Required MID Server capabilities	MID Server with the appropriate capabilities for connecting to the host. By default, the system selects a MID Server with SSH capabilities.
Long running	If checked, disables the SSH connection timeout for commands that might take longer to run than the default 60 seconds. Orchestration periodically checks the running process to determine its status until it is finished.
Must Sudo	If checked, enables the use of [redacted] to run commands.

Note:
You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

Example: Advanced SSH script options

To run a MID Server script on the target host, specify the script type and pass the name of the script into the `${syncFile()}` parameter. The system uses this parameter to locate the named script in the MID Server Script File [ecc_agent_script_file] table and run it on the target host. For example, a bash script can be expressed as:

```
bash ${syncFile("<MID script name>")} argument1 argument2
 argument3
```

A base script (`main_script.bash`) can reference another script (`my_include.bash`) as well as a separate file (`.my_profile`) located on the target host. Both scripts and the file referenced must be synced to the MID Server, using the `${syncFile()}` parameter, to execute properly.

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```
source ${syncFile(".my_profile")}
cp ${syncFile("my_include.bash")} /usr/ssmith/my_include.bash
bash ${syncFile("main_script.bash")} one two three four five six
rm /usr/ssmith/my_include.bash
```

A Python example with inline comments might look like this:

```
set $LIB_DIR=/usr/bin;.
# Sync a file that is referenced inside myF5CreateLBPool.py
cp ${syncFile("specialFunctions.py")} ~/specialFunctions.py
# set up environment variables
source ${syncFile(".python_profile")}
# call script that sets up dependencies on the box from remote
 package repos
python ${syncFile("setupPythonDependencies.py")} pycontrol
# call a script that requires functions from the package as well
 as a function from myIncludedFile
python ${syncFile("myF5CreateLBPool.py")} snow_pool
 myActualValue
# user is responsible for their own cleanup
rm ~/specialFunctions.py
```

What to do next

- Use auto-mapping to generate outputs and parsing rules
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

SSH template execution parameters

Use execution parameters to create the input process script in the **Pre Processing** form of the activity designer.

For descriptions of the command fields, see Configure the SSH execution command.

Note:
You must use the `executionParam.` prefix with all variables in this table.

SSH execution parameters

Name	Variable	Type	Usage
Source	source	String	Intended target or host.
Command	command	String	Comment to run on the host.
Directory	directory	String	Directory on the host in which to run the command.
Credential tag	credential_tag	String	Orchestration credential tag to use when running the command.
MidCapabilities	midCapabilities	String (comma separated)	List of required MID Server capabilities.
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional capabilities that are assigned by value, use

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SSH execution parameters (continued)

Name	Variable	Type	Usage
			this example to customize the MID Server selection: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`
Long running	long_running	Boolean	Indicates whether or not the command is long running. A value of true indicates that the command is long running.
Must sudo	must_sudo	Boolean	Indicates whether or not this activity must use sudo to run root commands. A value of true indicates that sudo SSH credentials must be used.

SSH post-processing parameters and payload parsing

Use these parameters to create a post-processing script, payload parsing, and tagging.

SSH post-processing parameters

Name	Variable	Type	Usage
Output	output	String	Contains the output returned from the SSH command.
EccSysID	eccSysID	String	Contains the reference ID associated with the ECC Queue input message returned by the activity.
ErrorMessages	errorMessages	String	Contains the error messages retrieved from the SSH command. This value is **null** if there are no error messages.

Tags	tags	Hashmap of tag values returned from the SSH command	Contains the tags used to extract output using the SSH commands. The tag output is delimited by double percentage signs, as in `%%tagname%% ... %%`. Set up the command using the following format:
			`%%tagname1%%`
			`output1 line 1`
			`output1 line 2`
			`...`
			`%%`
			
			`%%tagname2%%`
			`output2 line 1`
			`output2 line 2`
			`...`
			`%%`

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SSH post-processing parameters (continued)

Name	Variable	Type	Usage
			The tags returned are JavaScript hashmap objects in which each key is prefixed with `tag` appended with the tagname. `{"__text__": "", "tagtagname1":"output1 line1\noutput1 line2\n", "tagtagname2":"output2 line1\noutput2 line2\n"}`

Configure the SSH execution command

Use the input variables you created to configure the command that Orchestration executes on the host target.

Before you begin

Create the input variables you need in the **Inputs** form before you advance to the **Execution Command** stage.

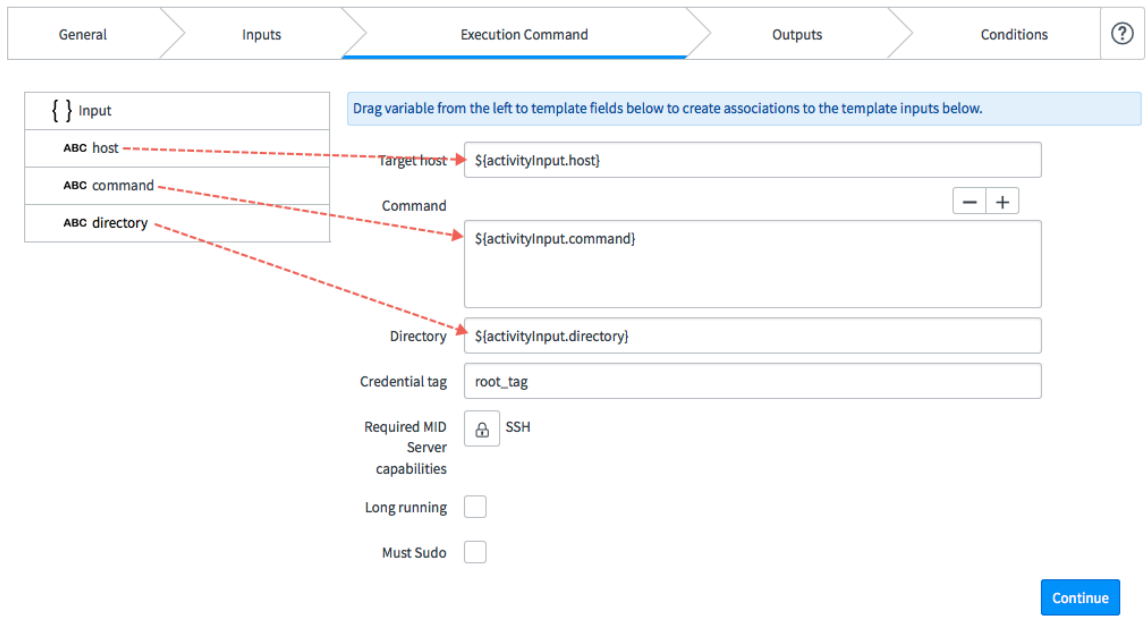
Role required: activity_creator, admin

Note:
You can test the SSH connection between the MID Server and the target without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

SSH execution command



2. Complete the fields shown in the table.

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SSH activity inputs

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
Target host	Host name or IP address of the target server for this activity.
Command	Command this activity runs on the target host. You can invoke a MID Server script from this field using any script type that is supported by the SSH command line. For more information, see **Advanced SSH script options** below the table.
Directory	Directory on the target host where the command is run.
Credential tag	The Credential aliases for Orchestration activities to use when running the command.
Select MID Server by capabilities	MID Server with the appropriate capabilities for connecting to the host. By default, the system selects a MID Server with SSH capabilities
Long running	Check box to disable the SSH connection timeout for commands that might take longer to run than the default 60 seconds. Orchestration periodically checks the running process to determine its status until it is finished.
Must Sudo	Check box to allow the use of SSH credentials to run commands.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create a run script activity

Create an activity that runs any script.

Before you begin

Role required: activity_creator or workflow_admin

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the Run Script Execution Command:
   Create a script for this activity to execute.

> **Note:**
> You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next

- Use auto-mapping to generate outputs and parsing rules
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

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Run Script template processing script

Use the Run Script custom template Script form to enter a script to call and use with other activities.

Run Script processing script

Field	Description
Processing script	Script that the activity runs.
Variables	Input variables that are available to use as building blocks in the input process script. Click the arrow above the field to open the variables list. Click an item in the tree to add it to your script in the appropriate syntax. The list displays input variables you passed into the activity on the **Inputs** form. All activity variables added in the **Inputs** form are read-only and are expressed in the processing script with this syntax: `activityInput.variable`.

Create a JMS activity

Create a custom JMS activity to retrieve or send messages to external systems using the Java Messaging Service.

Before you begin

Role required: activity_creator or workflow_admin

About this task

The JMS activity supports third party JMS providers whose JMS client application is written with a typical Java EE pattern and can support these operations:

- Using JNDI to find a ConnectionFactory object.
- Using JNDI to find one or more destination objects.
- Using the ConnectionFactory to create a JMS connection object.
- Using the JMS connection to create one or more JMS session objects.
- Using a JMS session and the destinations to create the MessageProducer and MessageConsumer objects.
- Starting the JMS connection to enable delivery or consumption of messages.

Note:
The JMS activity designer has been tested with the JMS providers ActiveMQ and Tibco EMS. When connecting to a JMS provider, refer to your third party user documentation.

Procedure

1. Create or verify your JMS credential .
   Your JMS credentials must have permission for the target database and proper configuration for the corresponding JMS connection. Credentials must be set up before you can create a JMS activity.
2. Create or verify your JMS connection .
   Your JMS connection must be configured with valid JMS credentials set up before you can create a JMS activity.
3. Create a custom activity .
   This action creates a custom activity using a template.

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4. After setting up general properties and creating input variables, configure the JMS Execution Command.

Option	Description
Configure your credential	Fill in the fields necessary for your database connection.
Connection Factory	Name of the JMS Connection Factory. You should create or verify your JMS connection. This configuration links the name of the Ini tial Context Factory with the URL of the JMS provider.
Destination Type	Type of destination used for this message: ○ **Queue**: Message is queued for point-to-point communications. **Note:** The **GET** operation is only supported for the Queue destination type. ○ **Topic**: Message is used for publish and sub scribe communication.
Destination Name	Name of the queue or topic destination that is configured on the JMS provider.
Message Type	The JMS message type value. Only the **Text Message** type is supported. The queue or top ic destination must be configured to receive or send only Text Message. Other message types are dropped, since the JMS Activity can not process them.
Operation	The programmatic operation to perform on the destination. The choices are **PUT** or **GET**.
Timeout (Secs)	Allowed time to wait for a message in the mes sage queue before it times out, in seconds. The default is **30**.
Custom message headers	The custom header values in a name/value pair format, that is available on the JMS desti nation. **Note:** This is only supported for a **PUT** opera tion.
Message payload	Actual message content or payload that is sent to the JMS destination. **Note:** This is only supported for a **PUT** opera tion.

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Option	Description
Credential tag	A tag for an individual credential for a JMS activity in an Orchestration workflow.
Required MID Server capabilities	MID Server to use, by capabilities.

What to do next

- Use auto-mapping to generate outputs and parsing rules
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

Create a JMS connection for an Orchestration activity

Configure your system to use Java Messaging Service (JMS) with a custom Orchestration JMS activity.

Before you begin

Role required: admin

About this task

The MID Server must have the correct JMS connection factories for your organization. Configure those values in the *mid.property.jms.command.allowed_factory_names* property, found in **MID Server** > **Properties**. The default values for this property can be changed to any value or comma-separated list of values that the third-party JMS provider advertises.

Procedure

1. Navigate to **MID Server** > **JAR Files**.
2. Click **New** and add.

Option	Description
Name	A unique and descriptive name for identifying the file in the instance.
Version	A version number for the file, if one is available.
Source	Location of the JAR file for reference purposes. Source information is not used by the system.
Description	Short description of the JAR file and its purpose in the instance.

3. Click the paper clip icon in the banner and attach the JMS driver jar file.
   The JMS driver jar file should be available as part of JMS provider installation. Few JMS vendors make them available as a separate product. Refer to the JMS provider documentation to determine which JMS client driver jar files require the client applications to connect to the JMS provider. For example, if you are trying to connect to ActiveMQ V5.10 (JMS provider), you need the `activemq-all-5.10.1.jar` file.
4. Navigate to **Orchestration** > **Credentials & Connections** > **JMS Connection Factory**.
5. Click **New**, add the following, and click **Submit**.

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Option	Description
Name	Unique name of this connection factory.
Initial Context Factory	Name of the JNDI class that is used to create the InitialContext. **Note:** For example, to connect to Active MQ V5.10 (JMS Provider), the value is `org.apache.activemq.jndi.ActiveMQInitialContextFactory`.
Provider URL	Location of the running JMS provider installation. **Note:** For example, to connect to ActiveMQ V5.1: `tcp://ipAddressOrHostName:61616`.

6. Navigate to **Orchestration** > **Credentials**.
7. Click **New**, select **JMS Credentials**, and provide the user name and password the MID should use to communicate with the JMS provider.
   For more information, see JMS credentials JMS credentials.
8. Click **Submit**.
   You are ready to create a custom JMS activity.

JMS template execution parameters

You use execution parameters to create the input process script in the **Preprocessing** form.

You must use the `executionParam.` prefix with all variables in this table.

JDBC execution parameters

Name	Variable	Type	Usage
Jms ds	jms_ds	Reference	Selected JMS data source.
Destination type	destination_type	Enumerated	
Destination name	destination_name	String	
Message type	message_type	Enumerated	
Operation	operation	Enumerated	
Time out	time_out	Integer	Length of time to wait for the query to return results.
Custom headers	custom_headers	Array of JavaScript objects	

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JDBC execution parameters (continued)

Name	Variable	Type	Usage
Message payload	message_payload	String	
Credential tag	credential_tag	String	List of required MID Server capabilities.
MidCapabilities	midCapabilities	String (comma separated)	
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional capabilities that are assigned by value, use this example to customize the MID Server selection: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`

JMS template post-processing parameters

Use these parameters to create a post-processing script.

JMS post-processing parameters

Name	Variable	Type	Usage
Status	status	String	Status of the operation (Put or Get) on the JMS destination.
StandardHeaders	standardHeaders	String	All the standard headers, as specified by JMS, that are obtained as part of the JMS message during a Get operation. This field is applicable only for Get operations.
CustomHeaders	customHeaders	String	All custom headers added by a producer or publisher application that are obtained as part of the JMS message during a Get operation. This field is applicable only for Get operations.
MessagePayload	messagePayload	String	Message payload that is obtained as part of the JMS message during a Get operation. This field is applicable only for Get operations.
EccSysID	eccSysID	String	Contains the reference ID associated with the ECC Queue input message returned by the activity.
ErrorMessages	errorMessages	String	Contains any error messages retrieved from the JMS command. This value is **null** if there are no error messages.

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Activity scoping

Custom activities run in their own scope, even if it is different from that of the workflow.

Any script that runs inside a custom activity with a scope can only access outside artifacts that are within the scope of that activity or artifacts that are configured to run in any scope. Conversely, an outside artifact can only access the script inside that private activity if the outside artifact is running in the same scope. Activities with public scopes can interact with outside artifacts in any application scope.

You can use private activities as part of a workflow that has a public application scope. These activities are protected from reaching outside of the workflow or from being reached from outside the workflow. For details about setting application scoping for custom activities, see the field description table for the appropriate activity template.

Note:
Custom activities uploaded to the ServiceNow Store must be configured as accessible to all application scopes.

Publish a custom activity

When a user creates a custom activity and saves or submits it, that activity appears in the **Custom** and **Packs** tabs of the designer palette, but is visible only to the user who created it.

Before you begin

Roles required: admin, activity_admin, activity_creator

Procedure

1. When you finish configuring the activity, click **Publish**.

   This makes the activity accessible to other users on the instance with the workflow_admin or activity_creator role. Published activities are available for upload to the ServiceNow Store, can be added to workflows, and can be edited by any user with the proper roles.

2. To edit a published activity, click **Checkout**.

   When an activity is checked out by a user, only that user can modify it. The fields of a checked out activity are read-only for all other users.

3. When you are finished editing the checked out activity, publish it again.

   The system adds a new version of this activity to the **Custom** tab in the Workflow Editor palette.

   Note:
   Activities you create and publish are visible in the **Packs** tab only if they were created in the current application scope.

Return a locked activity to a published state

Problems can arise if an activity version is checked out by a user and not checked back in. An activity in this state cannot be checked out for update.

Before you begin

Role required: admin, activity_admin, activity_creator

About this task

An administrator can return a locked activity to a published state.

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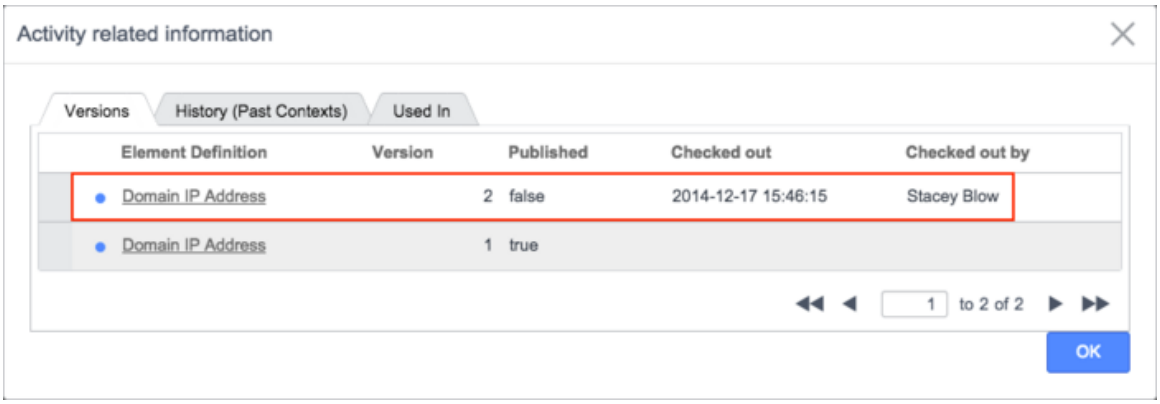
Procedure

1. Open the Workflow Editor.
2. From the **Custom** tab, open the activity that is locked.
3. Click the menu icon in the title bar and select **Versions** from the context menu.

   A list of all the versions of that activity appears. The locked version displays the user who checked it out.



4. Select the checked out version.

   The system opens the record in the activity designer.

5. Click the menu icon again and select **Force Checkout** from the context menu.

   The activity fields become editable.

6. Click **Publish**.

   The activity becomes available to users with the appropriate roles.

Copy a custom activity

You can copy activities for reuse from the **Custom** tab in the global scope.

Before you begin

Role required: admin, activity_admin, activity_creator

About this task

Note:
You cannot copy an activity in a private scope.

Procedure

1. To reuse an activity in the global scope, expand the parent category to display the activities.
2. Right-click the activity you want to copy and select one of these options:

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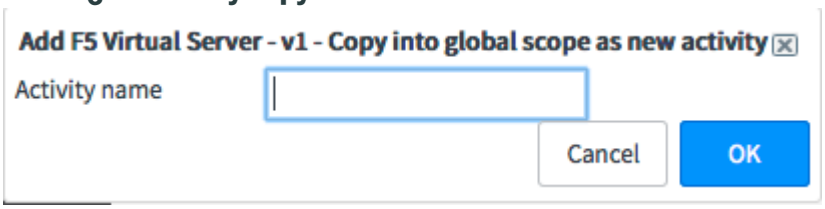
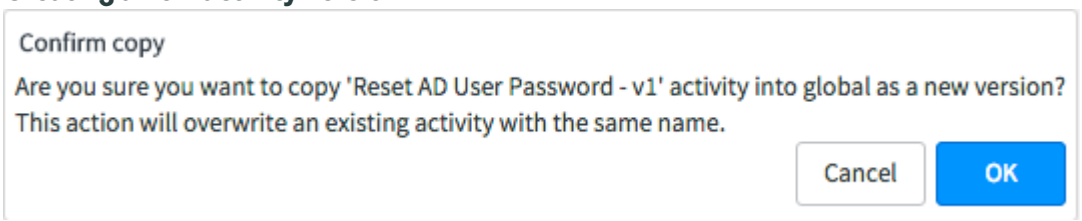
- *Copy into global scope as new activity*: Copies the activity with the new name you provide, uses the same version number as the original activity, and moves it to the global scope in the **Custom** tab.

Naming an activity copy



- *Copy into global scope as new version*: Copies the activity using the same name, increments the version number, and moves it to the global scope in the **Custom** tab. The system automatically adds the parent category to the **Custom** tab if it does not already exist. This action will overwrite another activity with the same name and version number.

Creating a new activity version



Note:
If the activity is in any other scope but global, the system displays this message: `Cannot copy privately scoped activity.`

Orchestration databus

The databus allows workflow designers to track the flow of data through an Orchestration workflow and provides access to output data that can be consumed by other custom activities.

Data is made available in a workflow when you use activities created with the Orchestration activity designer. The activity designer provides the ability to specify well defined inputs and outputs for your activities. When you use those activities on the workflow canvas, the outputs appear in the **Data** tab and are available for use as inputs in subsequent activities.

Note:
Orchestration does not filter the data you are given for reuse in the **Data** tab. You must make sure an activity in the workflow canvas has executed before you consume its output data.

When you drop a custom activity onto the workflow canvas, the system assigns it an index. If you delete an activity from the canvas and add a new one, the indexes are not reused. This ensures that you don't accidentally start subscribing to data you did not intend to use. If you update an activity in the activity designer, the system automatically updates the activity on the canvas to ensure the data you are subscribing to downstream is not affected.

Reuse data in the activity designer

The **Data** tab in the Workflow Editor lists all custom activities used in the current workflow that produce data and displays that data for reuse in other custom activities.

Before you begin
Roles required: workflow_creator

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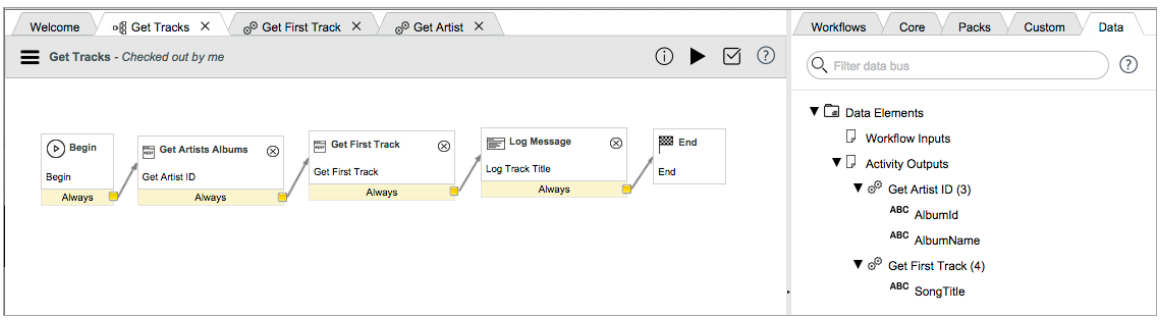
About this task

Activities are categorized by application in this tab and are available for use as data sources for other activities. The **Data** tab is a graphical representation of the workflow Databus, which manages all the temporary data used by the current workflow.

Procedure

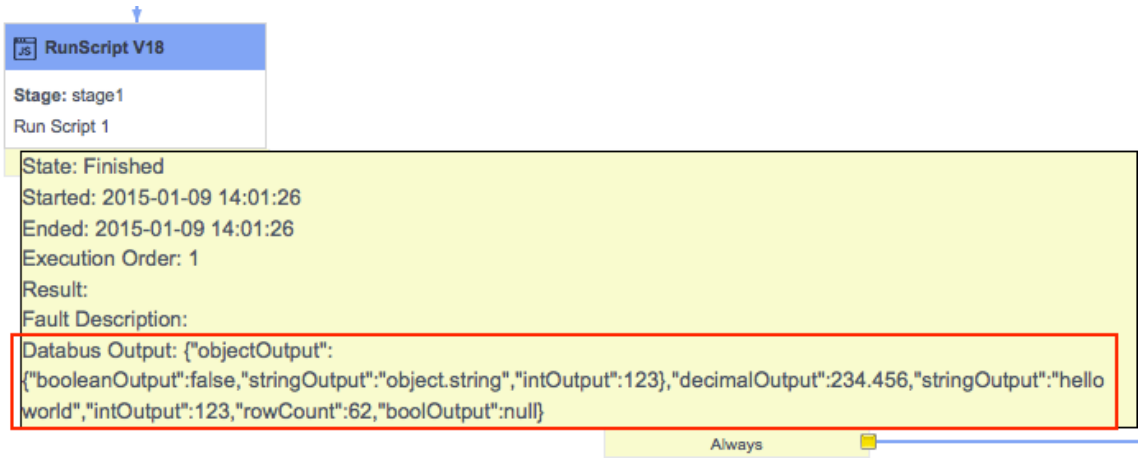
1. Drag output variables from an activity in this tab into the inputs of another activity on the workflow canvas to link the activities together.

   You can use any of the outputs in the structure, regardless of the application to which they belong. An index number in parenthesis after the activity name provides a unique identifier for the parameters that you use as input data in other activities. If you do not name a custom activity, the only identifier for that activity in the **Data** tab is the index number. Index numbers indicate the sequence in which custom activities were added to the workflow and are not reused. When you drag a custom activity onto the workflow canvas, the system adds that activity and its output data to the structure. Conversely, if you remove a custom activity from the canvas, that activity and its outputs disappear from the data list.



2. Point to an activity to display information about it in a pop-up window.

   Any output data reused by the activity is listed in the **Databus Output** field of the pop-up window.



MID Servers for Orchestration

Orchestration automatically selects an appropriate MID Server based on the capabilities that you configure in activities, the IP addresses of target devices, and the application that the MID Server is allowed to use.

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To allow a MID Server to work with Orchestration, it must have the **Orchestration** application or the **ALL** application assigned to it. See Configure a default MID Server for each application for instructions.

You can have MID Servers focus on different capabilities and separate sections of your network. See:

- MID Server capabilities
- Map an IP address to a DNS name

You can also specify a default MID Server to use if no MID Servers meet the capability and IP range criteria for an activity. See Select the default MID Server for Orchestration.

Related topics

MID Server capabilities

MID Server capabilities

MID Server capabilities define the specific functions of a MID Server within an IP address range.

Nmap capability

The **Nmap** capability is only assigned to MID Servers for which the Network Mapper (Nmap) scanner has been installed for credential-less Discovery. This capability cannot be added to or removed from any MID Server manually. For instructions on installing or uninstalling Nmap, see Install and uninstall Nmap on a MID Server

MID Server capability values

Capabilities provided in the base system do not have a defined value string. The capability value can be blank, a single value, or a * (wildcard). A MID Server configured to use a capability that has no value can locate any device using that capability's protocol. If a capability has a defined value, the MID Server using that capability finds only those devices using that protocol that match the value string exactly. The exception to this is the Resolve DNS capability, which is configured to resolve any DNS name into an IP address using a partial string match. The * (wildcard) will match a request capability specifying any non-blank value.

Starting with the Madrid release, the **[capability name]:[value]** combination appears in the slushbucket when you add a capability to a MID Server. This combination allows you to see all the capabilities that have different values, even if the capability name is the same. For example, if you are using the Cloud Management capability, and you use the value field to specify the us-west logical datacenter on one of the capability records, you can see the combination in the **Collection** list.

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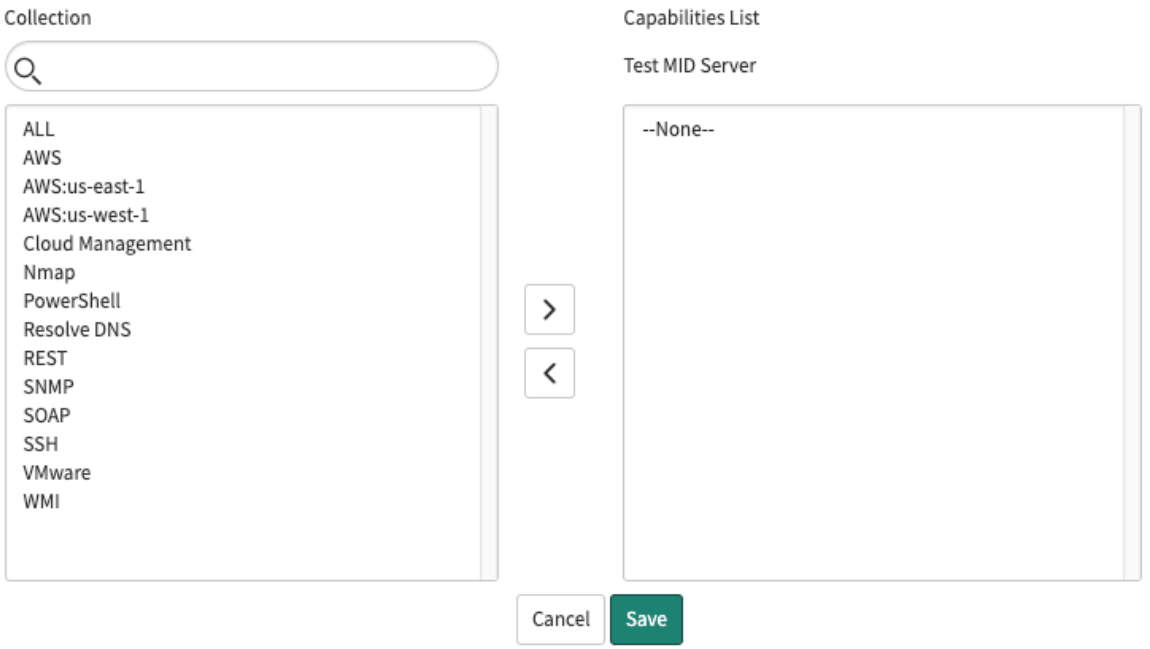

MID Server selection

The MID Server is selected using an algorithm based on the capabilities available. The selector produces a list of suitable MIDs using filters in the following order: **server status** > **applications** > **IP range** > **capabilities**. The algorithm searches the capabilities in the following sequence and, if a step finds at least one MID server, the remaining steps are skipped:

1. **Exact value match:** Find each MID Server containing capabilities with name/value pairs with an exact match to all requested capability name/value pairs. Blank is a valid value. * (wildcard) values are ignored.
2. **Wildcard value match:** The same as an exact value match, but also allows a non-blank request value to match MID server capability records containing value *.
3. **Special capability name ALL:** Find each MID Server containing the special capability name ALL, ignoring capability's value field.

Note:
If the requested capability name does not exist in the ecc_agent_capability table, **BadArgumentException** is thrown rather than falling back to the ALL capability.

Scripted MID Server capability value matching

You can use value tests to create capabilities that find devices using values without requiring exact string matching. Action on these values is controlled by a user-defined script.

The Resolve DNS capability is provided in the base system and is configured to resolve DNS names into IP addresses for devices whose names end with a specified domain name. The capability **Value** entered is automatically prefaced with a dot during processing to match domain syntax. This value can contain one or more sub-domains, but must include the end of the domain string. Matching devices must end with the identical syntax. The script for the Resolve DNS capability determines if a device name matches the criteria defined by **Value**. If a match exists, the platform performs the address resolution automatically. For example, if the value for the Resolve DNS capability is `service-now.com`, the MID Server with this capability finds `lnxlab01.sandiego.service-now.com` and `dbsrv101.sanjose.service-now.com`. If the value is changed to `sandiego.service-now.com`, then the MID Server finds only `lnxlab01`.

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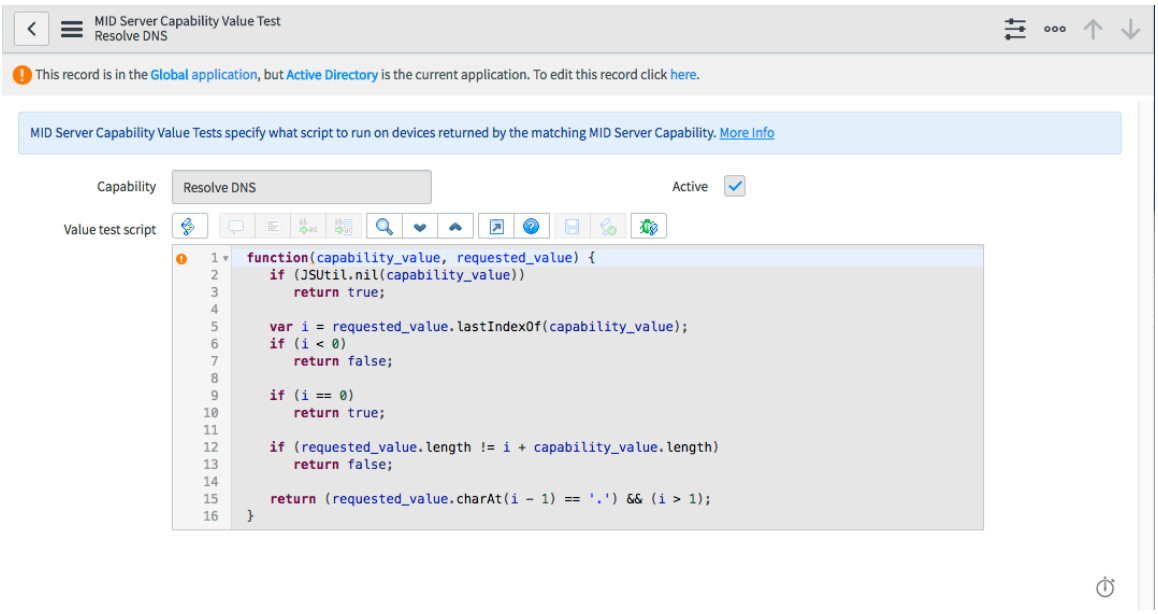
Note:
If **Value** in the Resolve DNS capability is blank, then all domains match.

To view the script for evaluating this capability, navigate to **MID Server** > **Capability Value Tests** and select **Resolve DNS** from the list.



Configure MID Server capabilities

MID Server capabilities define the specific functions of a MID Server within an IP address range, allowing an application to select the most appropriate MID Server. Configure capabilities on MID Servers for applications like Orchestration, Cloud Management, and Service Mapping.

Before you begin

Role required: admin or sm_admin

About this task

Several applications use capabilities, IP ranges, and MID Server selection to narrow the pool of MID Servers the applications need.

Note:
At least one capability is required for each MID Server used by Orchestration. See MID Servers for Orchestration for more information.

The following capabilities are available by default with Discovery:

All	IBM	Resolve DNS
Ansible	JDBC	REST
AWS	NetApp	SNMP
Azure	Nmap	SOAP
Chef	OpenStack	SSH
Cloud Management	PowerShell	VMware
Google	RCA	WMI

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Procedure

1. Navigate to **All** > **MID Server** > **Capabilities**.
2. Select an existing capability or select **ALL** to include all capabilities.

   Note:
   Ensure that each IP address range has MID Servers with the necessary capabilities to complete the Orchestration activities on that network segment.

3. Create a new capability:

   a. Select **New**.

   b. Configure the value for a custom capability.

   Example
   An example is a capability for **DOMAIN**, with a value of **service-now**.

   c. Select **Submit**.

4. Select **Edit** in the MID Servers related list to add MID Servers to the capability.
5. Select one or more MID Servers for this capability from the **Available** list.
6. Select **Save**.

   The capability defined here also appears in the primary record for this MID Server.

Select the default MID Server for Orchestration

Orchestration uses the default MID Server if it cannot find a MID Server with the correct IP range and capability.

Specify the default MID Server in either of these locations:

- The **Default MID Server** field on the Orchestration application record. See Configure a default MID Server for each application for instructions.
- The **Default MID Server to use for Orchestration Activities** property. Navigate to **Orchestration** > **MID Server Properties** to set this value.

These two values are automatically kept in synch. You can change the default MID Server in either location.

PowerShell probe version 2 system property

View detailed PowerShell credential information and view extended logging information.

Starting with the madrid release, there is a new system property for the PowerShell probe which enables the version 2 of the probe. This new version enables you to view detailed credential information on why PowerShell credentials fail or succeed. You can also view logging information for an ECC Queue payload and Workflow Context log.

mid.server.rba_powershell_v2

Enables the PowerShell probe version 2 for use with all PowerShell activities. The default value is true. If you choose false, the legacy PowerShell probe is used. Unless there are issues, use version 2, as the legacy version is going to be deprecated.

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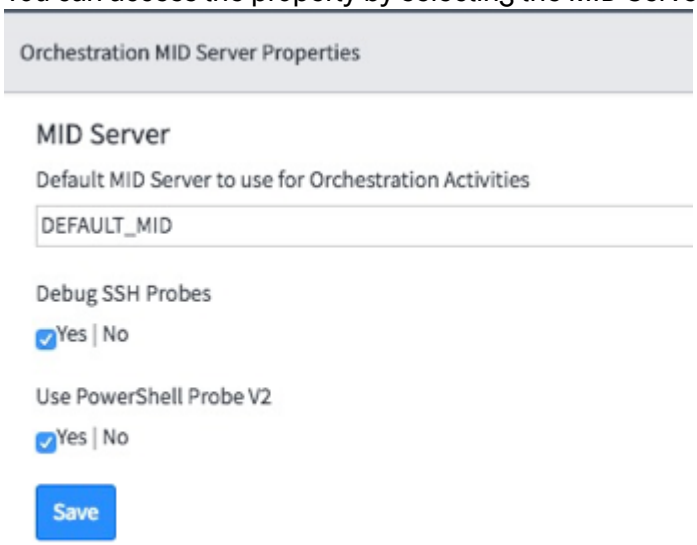
Note:
This property only applies to Orchestration activities. Discovery probes are not affected.

You can access the property by selecting the MID Server Properties link in the navigation pane:



PowerShell log property

Enable debug messages to display from PowerShell.

This property enables control of when and where to display debug messages generated by debug statements embedded in the PowerShell scripts.

mid.property.powershell.log_info

The new MID Server PowerShell log property:

- Displays logging information.

  Note:
  Once logging is enabled, OOB PowerShell scripts log information.

- Adds logging information to your developed PowerShell scripts and PowerShell activities.

  Note:
  Logging information is only available when property is enabled.

- Logging is not enabled by default.

If the property is set to true, debug messages display from the workflow context or from the Response popup after you test inputs. The ecc_queue entry payload for each of the PowerShell activities is going to show all the debug messages that were logged.

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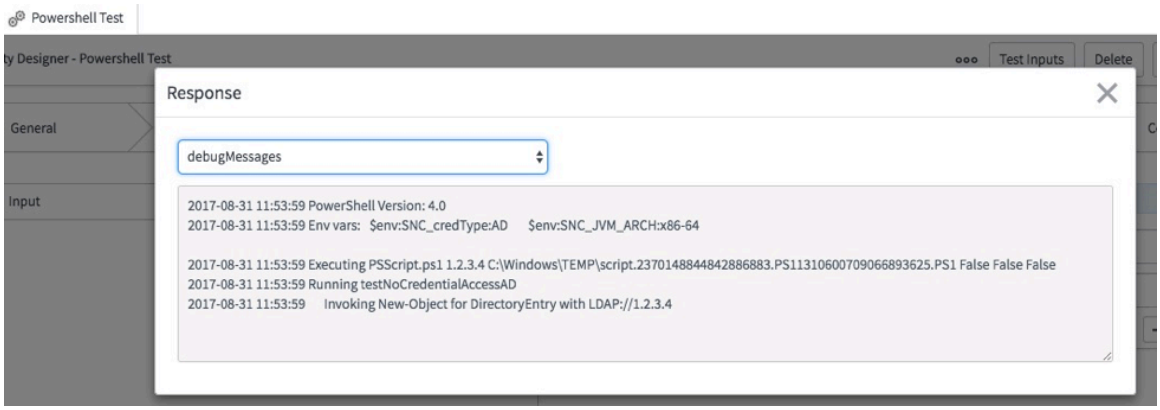

Enable the PowerShell log property for each MID Server. If the MID Server field is empty, the property applies to all MID Servers. There are separate credential debug messages that always come back regardless of this setting. The credential debug messages show which credentials have been used and other related information.

Note:
All the debug messages that come back to the instance are also saved to the MID Server log file. The log file might have additional debug messages generated from Java code, which might help the debug process.

Use the Orchestration Usage dashboard

This dashboard shows an overview of Orchestration usage metrics to show customers how their organization uses Orchestration and to support license compliance.

Before you begin

Role required: orchestration_manager

Procedure

1. To view the dashboard, navigate to **Orchestration** > **Operations & Troubleshooting** > **Orchestration Usage Dashboard**.
   The Orchestration Usage dashboard is displayed. The tabs on the dashboard include Licensable Usage and Orchestration Usage. Reports on these tabs include:

Orchestration Usage Metrics

Metric	Description
Transaction Summary Last 12 months	A running transaction count of all Orchestration transactions over the last 12 months. Includes: ○ The count of orchestration transactions associated with the HR Application ○ The count of Orchestration transactions associated with the Security Operations Application
Transaction Summary YTD	Cumulative count of all transactions since the time the Orchestration plugin was activated or the customer upgraded to Geneva.
365 day Running Average of Server	The running average over the last 365 days for cmdb_ci_computer - cmdb_ci_server. This

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Metric	Description
	includes all physical and virtual client nodes and excludes server nodes from the count.
365 day Running Average of Client	The running average over the last 365 days for cmdb_ci_server. This includes all physical and virtual server nodes.
Orchestration Transactions by Month for Last 12 Months	
Average Client Nodes Orchestrated Last 365 Days	
Average Server Nodes Orchestrated Last 365 Days	
Number of Orchestration Activities Developed Last 365 Days	The aggregate number of activity definitions you have developed and OOB activity definitions you have modified. This number includes activity elements (Activities build with the Activity Designer) you have developed and OOB activity definitions you have modified. **Note:** his number excludes activity elements that are shipped with ServiceNow Applications that use the Orchestration Runtime e.g. ServiceNow Security Operations and Human Resources Apps.
Cumulative Client Nodes Orchestrated by Month	
Cumulative Server Nodes Orchestrated by Month	
Usage by Provider Last 12 Months	Breaks down emphasis by provider, such as PowerShell, JDBC, SSH, etc.
Top 10 Orchestration Activities	

2. **Optional:** You can add more widgets to the dashboard by clicking the **Add Content** icon ( ) in the upper right corner of the dashboard.

Note:
You should not modify the first tab in this Dashboard. If you want a different dashboard experience, add a tab and customize that with your usage reports.

Task Communications Management

Task Communications Management (TCM) provides a framework for defining and managing a communication process for any entity that extends the task table.

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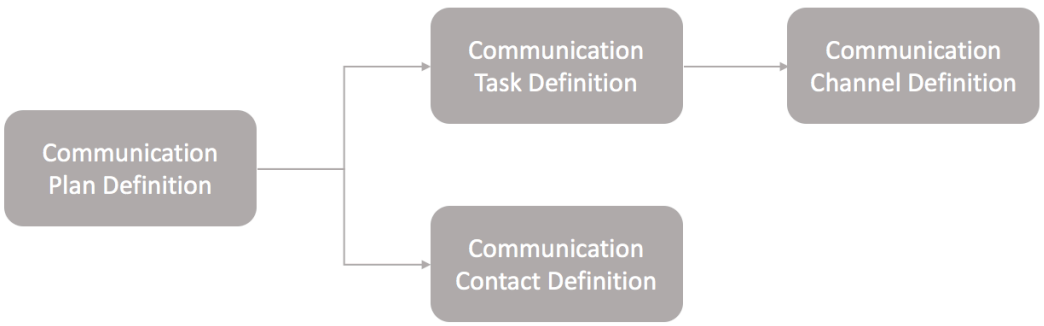
Explore • Task Communications Management process • Slack Communication	Set up Activate Task Communications Management	AdministerWorking with Task Communications Management
Develop • Developer training • Developer documentation	Troubleshoot and get help • Ask or answer questions in the Incident Management community • Search the Known Error Portal for known error articles • Contact Customer Service and Support	

Task Communications Management process

Task Communications Management helps you to streamline the process by creating designated communication plans for effective communication during an event. The communication plan, with its defined tasks, helps you to focus on resolving the current issue instead of deciding when to send a communication, what information to share, and whom to inform.

Task Communications Management basic components



How Task Communications Management works

With Task Communications Management, you can predefine a communication plan for an event such as major incident, planned maintenance, and release. Each plan generally involves a series of tasks that define different communication and collaboration activities along with frequency and method of communication. For each task, you must specify the communication channel for contacting the stakeholders. You can also define templates for email and SMS messages.

After defining the task and channel for communication, you can define the contacts or the target audience to be contacted for each task.

After a communication plan is defined, the plan gets associated with the appropriate task table based on the conditions defined. Thereafter, the tasks defined in the plan get executed sequentially and stakeholders are contacted as defined in the plan. The communication plan

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makes communication and collaboration process smoother and brings a quicker resolution of the issue.

Example: Task Communications Management flow in major incident management

Assume that you want an incident communication plan generated for a high-priority major incident.

- As the major incident manager, you can predefine a communication plan and the conditions that drive its attachment. In this case, the conditions are: Priority = High and Major Incident state = Accepted. Consider that the target audience is the technical stakeholders of the incident and the communication plan definition is named Technical Communications.
- The plan definition can have multiple communication task definitions such as:
  - Initiate Technical Communications
  - Technical Status Update
- Each communication task definition also specifies the channel of communication and the communication frequency (one time or recurring).
  - Initiate Technical Communications uses email as a channel of communication and communication frequency is one time.
  - Technical Status Update uses email and SMS as channel of communication and the communication frequency is recurring.
- The target audience for in the communications is defined as communication contact definitions on the plan definition. In this case, consider Service owners of the affected configuration items (CIs) related to the incident as technical stakeholders.
- When an incident meets these conditions, an incident communication plan together with its tasks gets attached to the incident record.
- As the major incident manager, you can effectively carry out the communication without any delay in the resolution of the major incident.

Request apps on the Store

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

Task Communications Management plugins

The Task Communications Management plugins is activated in the base system. The plugin includes demo data.

Activate Task Communications Management

The Task Communications Management plugin (com.snc.task_communication_management) is activated when you activate the Incident Communications Management plugin (com.snc.iam) or the Incident Management - Major Incident Management plugin (com.snc.incident.mim). This plugin includes demo data and activates related plugins if they are not already active.

Before you begin

Role required: admin

About this task

Task Communications Management activates these related plugins if they are not already active.

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Plugins for Task Communications Management

Plugin	Description
Contact Management [com.snc.contact_management]	The Contact Management plugin manages the connections between users or groups and other resources in the system.
Targeted Communications [com.sn_publications]	The Targeted Communications plugin provides a way to publish and send out newsletter like articles to targeted internal or external customers.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Related topics

List of plugins (Zurich)

Components installed with Task Communications Management

Several types of components are installed with the Task Communications Management plugin, including tables and user roles.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available for this feature.

Tables installed

Table	Description
Communication Plan Type Lookup [comm_plan_type_lookup]	Stores the communication plan types.
Communication Task Type Lookup	Stores the communication task types.

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Table	Description
[comm_task_type_lookup]	
Communication Plan Definition [comm_plan_definition]	The definition table for the communication plan entity.
Communication Task Definition [comm_task_definition]	The definition table for the communication task entity.
Communication Channel Definition [comm_channel_definition]	Main table for channel definitions.
Communication Channel Definition — Email [comm_channel_def_email]	Defines email as a channel.
Communication Channel Definition — SMS [comm_channel_def_sms]	Defines SMS as a channel. **Note:** This table is available only when you install the Notify plugin (com.snc.notify).
Communication Channel Definition — Conference [comm_channel_def_conference]	Defines Conference as a channel. **Note:** This table is available only when the Notify plugin (com.snc.notify) is installed.
Communication Contact Definition [comm_contact_definition]	Defines the contacts for sending out communications. Contacts can be users, groups, or recipient lists.
Communication Channel Configuration [comm_channel_config]	Lists all available channels for an instance. **Note:** Configuration script for each channel is a script include.
Communication Plan [comm_plan]	Stores the communication plan that outlines the communication activity during an event.
Communication Task [comm_task]	Stores the task to be carried out to communicate with the involved contacts.
Communication Channel [comm_channel]	Main table for channel instances.

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Table	Description
Communication Channel — Email [comm_channel_email]	Stores record that indicate email is used as a communication channel for a communication task.
Communication Channel — SMS [comm_channel_sms]	Stores record that indicate SMS is used as a communication channel for a communication task.
Communication Channel — Conference [comm_channel_conference]	Stores record that indicate conference is used as a communication channel for a communication task.
Communication Task Handler [comm_task_handler]	Lists specific handlers for various task types. Example: For incident, CommunicationManagementIncidentHandler. **Note:** Users with the admin role cannot delete this table.

Roles installed

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Communication Plan Admin [sn_comm_management.comm_plan_admin]

Provides overall accountability of Task Communications Management.

Contains Roles

List of roles contained within the role.

- *Notifications administrator [notify_admin]*
- *Publications recipients list user [sn_publications_recipients_list_user]*

Groups

List of groups this role is assigned to by default.

None.

Special considerations

Important:
Avoid granting an admin role when more specialized roles are available.

This role has create and edit access to Task Communications Management tables including Communication Plan Definitions and other related records.

Communication Plan Viewer [sn_comm_management.comm_plan_viewer]

This role has read access to Task Communications Management tables.

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Contains Roles

List of roles contained within the role.

- *Notification viewer [notify_view]*
- *Publications recipients list user [sn_publications_recipients_list_user]*

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Communication Plan Manager [sn_comm_management.comm_plan_manager]

This role has create and edit access to Task Communications Management instance tables such as Communication Plans, Communication Tasks. Users with this role can send impromptu communications.

Contains Roles

The Communication Plan Manager [sn_comm_management.comm_plan_manager] role contains the *Communication Plan Viewer [sn_comm_management.comm_plan_viewer]* role.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

None.

Install Collaboration Services for Task Communications Management

Install the Collaboration Services for Task Communications Management plugin (sn_tcm_collab_hook) from ServiceNow Store to get the Slack functionality.

Before you begin
Role required: admin

About this task

Procedure

1. Navigate to ServiceNow Store.
2. Find the Collaboration Services for Task Communications Management store application.
3. Click the Collaboration Services for Task Communications Management store application and then click **Request App**.

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Related topics

- List of plugins (Zurich)
- Configure Slack workspace

Components installed with Collaboration Services for Task Communications Management

Several types of components are installed with the Collaboration Services for Task Communications Management (sn_tcm_collab_hook) plugin, including tables.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Tables installed

Table	Description
Communication Channel Definition – Slack [comm_channel_def_slack]	The table extends the Communication Channel Definition [comm_channel_definition] table.
Communication Channel – Slack [comm_channel_slack]	The table extends the Communication Channel [comm_channel] table.
Communication Plan — Collaboration Service Data [comm_plan_collab_data]	Stores Collaboration Service related data.

Related topics

- Configure Slack workspace

Working with Task Communications Management

The section covers topics that help you with a variety of technical concepts related to Task Communications Management such as creating communication plan definition, task definition, channel definition, and contact definition.

Define a communication plan

Define a communication plan for a task record to specify communication task and contact definitions. When specified conditions for the plan definition are met, the communication plan and its associated records are automatically attached to the task record, eliminating manual effort.

Before you begin
Role required: sn_comm_management.comm_plan_admin or admin

Procedure

1. Navigate to **All** > **Task Communications Management** > **Plan Definitions**, and click **New**.
2. On the form, fill in the fields.

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Communication Plan Definition form

Field	Description
Name	Unique name for the communication plan.
Table	Table that the plan is attached to when the conditions are met.
Type	Type of communication plan such as Technical, Internal, External, Customer.
Order	Order in which the communication plans must be associated to the table.
Condition based	Option to define whether the plan is attached to a table based on the conditions. For example, if you want to attach a communication plan to an incident of priority = 2, you can mention the condition in the **Condition** field.
Active	Option to define whether the plan definition is active.
Description	Detailed description of the plan definition.
Condition	Condition under which a communication plan gets attached to a table.

3. Click **Submit**.
   The communication plan is submitted. The following related lists appear in the communication plan definition:
   - Communication Task Definitions
   - Communication Contact Definitions

What to do next
Define a communication task for the plan.

Define a communication task

Define a communication task for a communication plan. When a plan gets attached to a table, the tasks related to the plan need to be executed to resolve the issue. You can associate multiple tasks with a communication plan.

Before you begin
Role required: sn_comm_management.comm_plan_admin or admin

You have defined a communication plan.

Procedure

1. Navigate to **All** > **Task Communications Management** > **Plan Definitions**.
2. Click the communication plan for which you want to define a communication task.
3. Click the Communication Task Definitions related list and then click **New**.
4. On the form, fill in the fields.

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Communication Task Definition form

Field	Description
Communication plan definition	Unique name of the communication plan definition that you are defining the task for.
Name	Unique name for the communication task definition.
Type	Type of task, such as internal communication, that is applicable globally or to a particular table. **Note:** The value in the **Type** field helps you to filter a task by its type. The value also helps to generate a report of a particular task type or to create SLAs on any communication task.
Application	Application scope of the task definition. The task definition is available for all applications or for scoped applications.
Order	Order that the communication tasks appear in the plan. This field indicates which communication task to execute first.
Active	Option to define whether the task is active or not.
Description	Detailed description of the task definition.
Communication frequency	Frequency of the communication task execution. You can send the notification once or the notification can be repeated.
Duration	Time by which you want to send a notification. For example, if the communication frequency is **One time** and the **Duration** is 15 minutes, then the notification is sent only once in 15 minutes. If the communication frequency is **Recurring**, then the notification is sent every 15 minutes.

5. Click **Update**.
   The communication task is defined for the communication plan.

What to do next
Define communication channel for the task.

Define a communication channel

Define a communication channel for each communication task to determine which mode of communication to use for the task when a plan is attached to a table.

Before you begin
Role required: sn_comm_management.comm_plan_admin or admin

You have defined a communication plan and its related tasks.

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About this task

- The modes of communication available are: email, SMS, conference, and Slack.
- For the incident table, the functionality for SMS and conference appears only if you activate the Notify plugin (com.snc.notify) and the *com.snc.iam.notify_number* property value is set to the registered notify number. The notify number is registered while configuring the Twilio account.
- For the incident table, the functionality for Slack appears only if you activate the Collaboration Services for Task Communications Management plugin (sn_tcm_collab_hook). To activate the Collaboration Services for Task Communications Management plugin, navigate to ServiceNow Store and install the Collaboration Services for Task Communications Management application. For more information, refer Collaboration services for Task Communications Management.

  Note:
  For information on how to configure Slack, refer to Configure Slack workspace .

- **Add Channel – Conference** is mutually exclusive to **Add Channel – SMS** and **Add Channel – Email**. If you select **Add Channel – Conference**, you cannot select **Add Channel – Email** or **Add Channel – SMS**.

Procedure

1. Navigate to **All** > **Task Communications Management** > **Plan Definitions**.
2. Click a communication plan.
3. Click the Communication Task Definitions related list and then click the task for which you want to define the communication channel.
4. On the Communication Task Definition form, click any one of the following related links based on your requirement:
   - **Add channel - DEX Desktop Assistant**
   - **Add Channel – Conference**
   - **Add Channel – Email**
   - **Add Channel – SMS**
   - **Add Channel – Slack**
5. On the form, fill in the fields.

Communication Channel Definition form

Field	Description
Add Channel – Conference	
Communication task definition	Communication task definition that the channel definition is associated with.
Notify provider selector	Lookup icon ( ) to select the selector from the Provider Selector [notify_group_selector] table.

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Field	Description
	Note: The selector can be associated with notify number group or conference provider. Each notify number group can have one or more Notify numbers that can be used to make conference calls.
Add Channel – Email	
Communication task definition	Communication task definition that this channel definition is associated with.
Email client template	Lookup icon ( ) to select the email client template used to send emails to the targeted audience. **Note:** This email template must be defined in the Communication task table.
Recipient field	List to select where you want the recipients list to be populated. Options include **To**, **CC**, and **BCC**. The default value is populated based on what you define in the **Default recipient location of emails for Communication Tasks** property (*sn_comm_management.default_email_recipient_fie*
Add Channel – SMS	
Communication task definition	Communication task definition this channel definition is associated with.
Notify SMS template	Lookup icon to select the notify SMS template used to send an SMS to the targeted audience. **Note:** This SMS template must be defined in the Communication task table.
Notify provider selector	Lookup icon ( ) to select the selector from the Provider Selector [notify_group_selector] table. **Note:** The selector can be associated with notify number group or conference provider. Each notify number group can have one or more Notify numbers that can be used to send SMS.
Add Channel – Slack	
Communication task definition	Communication task definition this channel definition is associated with.
Channel Type	Channel type is Slack.
Add Channel – Desktop Assistant	

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Field	Description
Communication task definition	Communication task definition this channel definition is associated with.
Channel Type	Channel type is Desktop Assistant.
Notification template	Template applied when composing the notification message.

6. Click **Submit**.
   A communication channel is defined for the communication task.

What to do next
After creating communication tasks and communication channels for those tasks, define contacts for the communication plan.

Define a communication contact

Define the recipients of a particular plan to determine the target audience involved in each communication task and the responsibilities the recipients are expected to handle. A notification for a task is sent to all individuals specified for that task.

Before you begin
Role required: sn_comm_management.communication_plan_admin or admin

You have defined a communication plan.

About this task
You can add or remove any particular communication contact manually.

Procedure
1. Navigate to **All** > **Task Communications Management** > **Plan Definitions**.
2. Click the communication plan that you want to define the contacts for.
3. Click the **Communication Contact Definitions** related list and then click **New**.
4. On the form, fill in the fields.

Communication Contact Definition form

Field	Description
Type	Type of contact such as user, group, or recipient list that you want to involve in the plan. The contact type is assigned dynamically at the time of the table execution. For information on recipient lists, refer Define a recipient list for communication contact.
Responsibility	Responsibility that the user, group, or individuals in the recipient list are expected to handle.
User	Name of the user, group, or recipient list to be added to the contact list.

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Field	Description
	Note: You can use the recipient list to specify dynamic criteria for fetching the list of users for a particular communication plan.

5. Click **Submit**.
   A communication contact is defined for the communication plan.

Define a recipient list for communication contact

A recipient list lets you specify a filter to fetch a list of users. Use the recipient list as the contact for a particular communication plan.

Before you begin
Role required: sn_comm_management.comm_plan_admin or admin

About this task
Sometimes, the contacts that you want to include in a plan can only be known dynamically. For example, you might want the support group associated with a particular business service in an incident to be involved in the communication plan. The support group might change depending on the business service that you select. In such a case, a recipient list provides the flexibility to add recipients dynamically.

Procedure
1. Navigate to **All** > **Task Communications Management** > **Administration** > **Recipients Lists**.
2. Click **New** to create a new recipient list.
3. On the form, fill in the fields.

Recipients Lists form

Field	Description
Name	Name of the recipient list.
Type	Type of recipient.
State	[Read only] The state of the recipient list.
Setup	
Method	The method used to generate the recipient list. ○ Upload File: Upload an Excel file with the recipient information to create a recipient list. This list is static. ○ Dynamic Condition: Use scripts or conditions to receive recipient information.

4. Click **Submit**.
   A recipient list is defined for the contact.

What to do next
Define a communication contact for the task.

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Create a plan type

Create the communication plan type and specify whether the plan type is applicable globally or to a particular table. When you create the communication plan type, it is referenced in the communication plan definition. The type of the communication plan helps you to filter the plan by its type, generate a report of a particular plan type, or create SLAs for any communication plan.

Before you begin

Role required: sn_comm_management.comm_plan_admin or admin

Procedure

1. Navigate to **All** > **Task Communication Management** > **Administration** > **Plan Types**, and click **New**.
2. On the form, fill in the fields.

Communication Plan Type Lookup form

Field	Description
Name	Unique name of the communication plan type.
Global	Option to determine whether the plan type is available for all tables or for a specific table. If the check box is not selected, the **Table** field appears where you can select the table for which the plan type appears.
Application	Application scope of the plan type. The plan type is available for all applications or for scoped applications.
Active	Option to define whether the plan type is active.
Description	Detailed description of the plan type.

3. Click **Submit**.
   A communication plan type is created.

What to do next

Define a communication plan.

Create a task type

Create the communication task type and specify whether the task is applicable to a particular table or is globally applicable. The communication task type helps you to filter a task by its type, generate a report of a particular task type, or create SLAs for any communication task.

Before you begin

Role required: sn_comm_management.comm_plan_admin

Procedure

1. Navigate to **All** > **Task Communication Management** > **Administration** > **Task Types**, and click **New**.
2. On the form, fill in the fields.

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Communication Task Type Lookup form

Field	Description
Name	Unique name of the communication task type.
Global	Option to determine whether the task type is available for all tables or for a specific table. If the check box is not selected, the **Table** field appears where you can select the table the task type appears for.
Application	Application scope of the task type. The task type is available for all applications or for scoped applications.
Active	Option to define whether the task type is active or not.
Description	Detailed description regarding the type of the task.

3. Click **Submit**.
   A communication task type is created.

What to do next
Define a communication task.

Define contact responsibilities

Define the different contacts or target audience involved in the communication process and their responsibility to understand the expectations from those contacts throughout the process.

Before you begin
Role required: sn_comm_management.comm_plan_admin or admin

Procedure

1. Navigate to **All** > **Task Communication Management** > **Administration** > **Contact Responsibilities**, and click **New**.
2. On the form, fill in the fields.

Contact Responsibility form

Field	Description
Global	Option to determine whether the contact responsibility is available for all tables or for a specific table. If the check box is not selected, the **Table** field appears where you can select the table that you are defining the contact responsibility for.
Name	Unique name of the contact, such as Business Director or Communication Manager, involved in the communication process.
Type	Type of contact such as user, group, or recipient list.
Table	Table that the contact is activated on when a communication plan is attached.

3. Click **Submit**.
   Contact responsibilities are defined.

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What to do next
Define a communication contact for the task.

View communication channel configuration

View the configuration of different communication channels that are used to contact the target audience in the communication process. By default, the communication channels available are email, SMS, Slack, and conference.

Before you begin
Role required: sn_comm_management.comm_plan_admin or admin

Procedure

1. Navigate to **All** > **Task Communication Management** > **Administration** > **Channel Configuration**.
2. Open any communication channel record.
3. On the form, view the fields.

Communication Channel Configuration form

Field	Description
Type	[Read only] Mode of channel.
Configuration script	[Read only] Lookup icon ( ) to select the script that defines the channel configuration.
Active	[Read only] Option to define whether the communication channel is active or not.
Classification	[Read only] Internally used to group the channels between conference or major incident management workbench.

Configure Slack for a communication task

Configure Slack as a mode of communication for a communication task to send direct message to the users.

Before you begin
Role required: sn_comm_management.comm_plan_admin or admin

Install the Collaboration Services for Task Communications Management plugin (sn_tcm_collab_hook) from ServiceNow Store.

Procedure

1. Navigate to **All** > **Incident** > **Communication Plan Definitions**.
2. Open the communication plan where you want to add Slack as a communication channel for a communication task.
3. Open the communication task definition for which you want to add Slack as the mode of communication.
4. Click the **Add Channel – Slack** related links.
5. Click **Submit**.
   Slack gets added as a communication channel for the communication task.

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Classic Workflow

Workflow is a legacy application that provided a drag-and-drop interface for automating multi-step processes across the platform. Each workflow consists of a sequence of activities, such as generating records, notifying users of pending approvals, or running scripts. The graphical Workflow Editor represents workflows visually as a type of flowchart. It shows activities as boxes labeled with information about that activity and transitions from one activity to the next as lines connecting the boxes.

Important:
As of the Zurich release, new customers no longer receive the legacy workflows created and published by ServiceNow, Inc.. All legacy workflow functionality has been replaced by Workflow Studio content. Only customers who upgraded from prior versions retain the ability to use and edit existing legacy workflows. While all customers retain the ability to create legacy workflows, you are strongly encouraged to instead use Workflow Studio to create process automation content. Only Workflow Studio will receive new features and enhancements.

Explore

- Zurich
- Workflow movement with update sets
- Workflow activity pinning
- Domain separation and Workflow
- Workflow training on the ServiceNow® Developer Site

Set up

- Getting started with workflows

Administer

- Workflow roles
- Administering workflow contexts

Use

- Workflow editor
- Create a workflow
- Workflow activities

Develop

- Developer training
- Developer documentation
- Workflow API reference
- Using variables in a workflow

Troubleshoot and get help

- Ask or answer questions in the Developer Community
- Troubleshoot workflows
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Getting started with workflows

The graphical Workflow Editor provides a drag-and-drop interface for automating multi-step processes across the platform.

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Workflow support

Important:
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Parts of a workflow

Workflows consist of these parts.

Properties

Specify configuration settings such as the workflow name, the table whose records the workflow acts on, and the conditions under which to run it.

Activities

Specify the sequence of operations the workflow performs such as generating records, notifying users of pending approvals, or running scripts.

Transitions

Specify the conditions under which to run an activity.

Exit conditions

Specify the conditions under which to run a transition.

Contexts

Store historical runtime information about a specific workflow run in a Workflow Context record.

Versions

Store historical design information about a specific workflow in a Workflow version record.

Workflow life cycle

A workflow starts when a triggering event occurs. Common triggers include a record being inserted into a specific table, or a particular field in a table being set to a specified value. For example, you might create a workflow that runs whenever a user requests approval for an item they want to order from the catalog. You can also schedule workflows to run periodically or call them from scripts such as business rules.

When an activity completes, the workflow transitions to the next activity. An activity might have several different possible transitions to various activities, depending on the outcome of the activity. Continuing the example above, if the user's request is approved, the activity might transition to an activity that notifies someone to order the item. If the user's request is denied, the activity might transition to notifying the user that their request has been denied.

The graphical Workflow Editor represents workflows visually as a type of flowchart. It shows activities as boxes labelled with information about that activity and transitions from one activity to the next as lines connecting the boxes.

At each step in a workflow:

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1. An activity is processed and an action defined by that activity occurs.
2. At the completion of an action by an activity, the workflow checks the activity's conditions.
3. For each matching condition, the workflow follows the transition to the next activity.

When the workflow runs out of activities, the workflow is complete. The Workflow Context stores the execution history of the activities and transitions run. The Workflow Version stores the design history of the activities, transitions, and exit conditions available to run.

Workflow properties

The workflow properties specify when to run a workflow and what records it acts on. For more information about workflow properties, see Workflow properties.

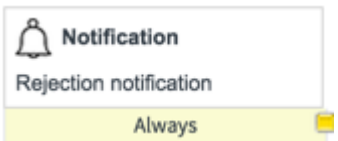
Workflow activities

A workflow activity contains instructions that are processed by the workflow.

Activities can include running scripts, manipulating records, waiting for a set period of time, or logging an event. Workflow conditions determine whether or not the activity is performed. Activities can be added, removed, or rearranged. Transitions can be drawn between activities.

This is an activity that triggers a notification:

Sample activity



Workflow runs activities as the user session that starts them. Workflows started from record operations will run activities as the user session that performed the record operation. Workflows started from schedules or restarted from timers run activities as the System user. Workflows started from script calls run activities as the user session that started the script.

For more information on available activities and their behaviors, see Workflow activities.

Transitions

After the workflow condition is evaluated, the workflow transition determines which activity is performed when the workflow condition is met.

This is a transition that always leads from the *`Change Approved`* script to the **Change Task** activity:

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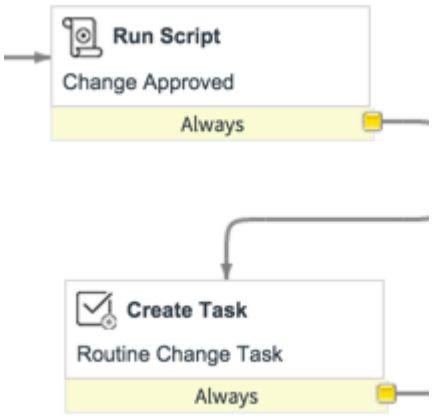
Sample transition



Exit conditions

After a workflow activity is performed, the workflow condition is evaluated to determine which transition is activated.

The condition determines behavior based on a change being approved or rejected:

Sample exit conditions

Workflow example

During workflow editing or while an unpublished workflow is running, only the person who checked out the workflow can view the changes.

After a workflow is published, it is available to other users. The workflow moves through the process as defined in the Workflow Editor. The entire workflow is represented in one screen. For example, this is the Standard Change workflow:

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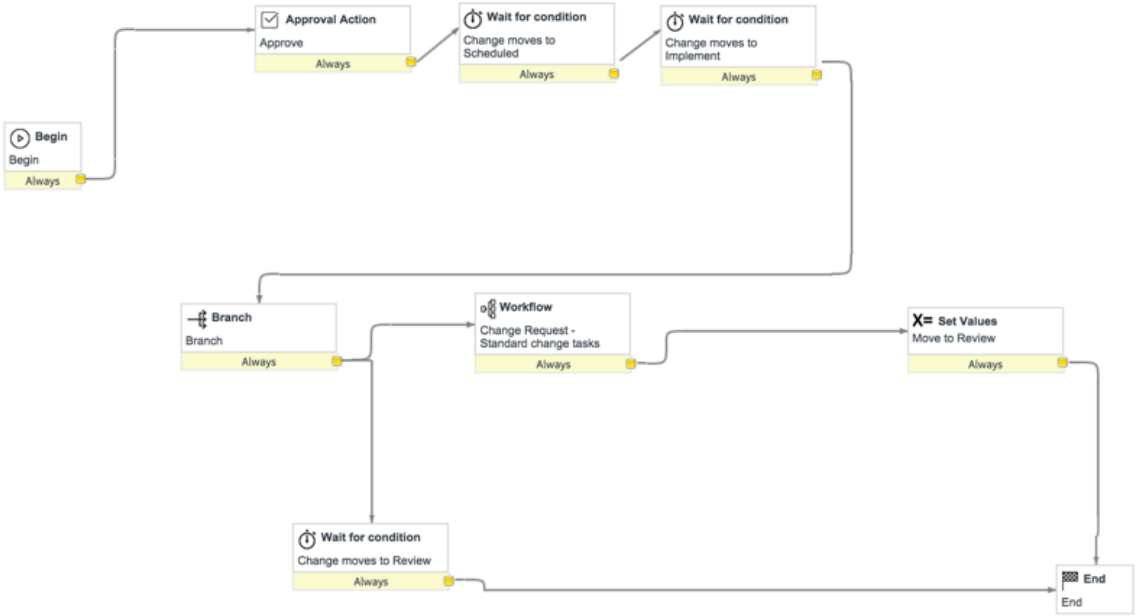
Sample change workflow



Workflow editor

The Workflow Editor is an interface for creating and modifying workflows by arranging and connecting activities to drive processes.

Important:
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You can manage multiple workflows in the same screen, create custom workflow activities, and use existing activities as data sources. Users with the workflow_creator role can create workflows. Users with the workflow_admin role can create, modify, delete, and publish workflows.

To open the Workflow Editor, navigate to **Workflow** > **Workflow Editor**. For information about using the editor, see Create a workflow.

Welcome screen

The editor opens with the **Welcome** page, which displays a list of active, published workflows. From this tab, you can open existing workflows, create new workflows, and open help resources related to workflow.

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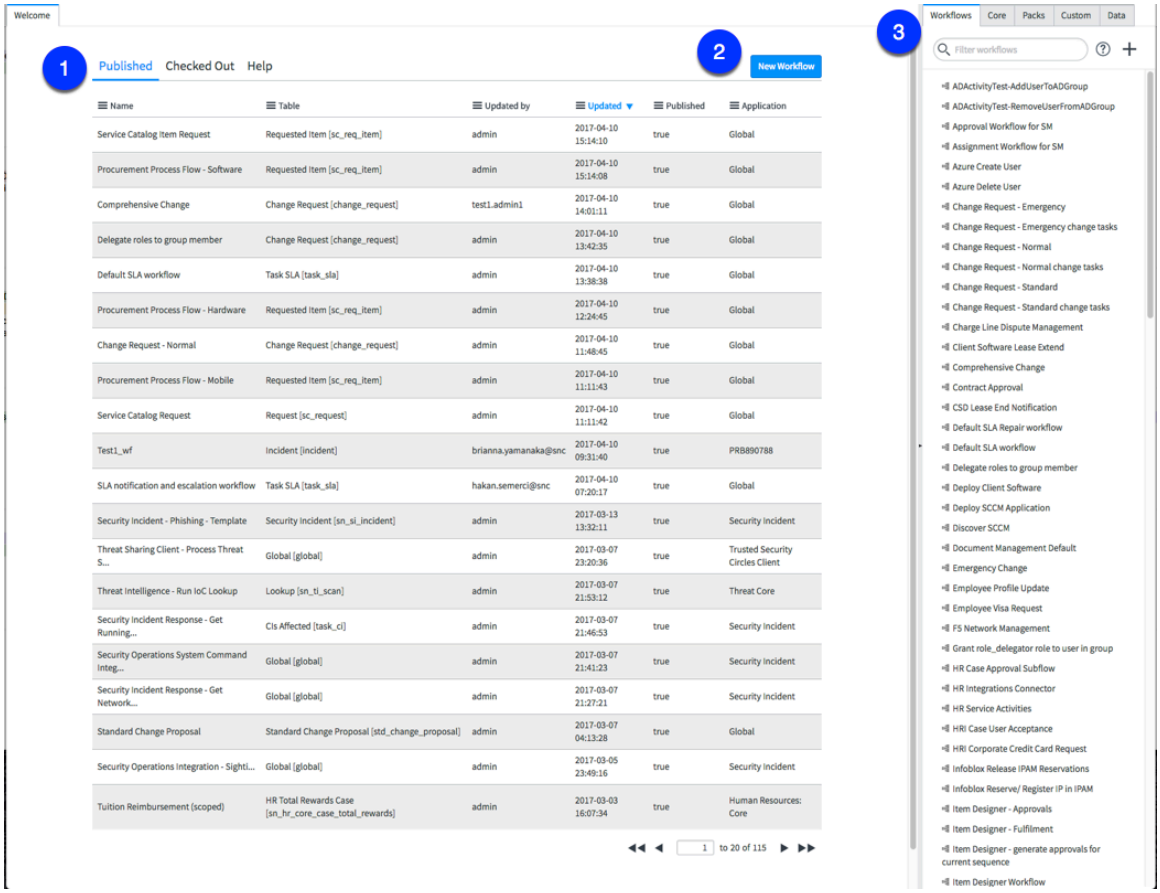

1 List display filters

Published: Click to view list of published workflows

Checked Out: Click to view list of workflows checked out to current user

Help: Click to view links to help resources for workflow

2 New Workflow button

Click to create a new workflow

3 Palette tabs

Workflows: Workflow activities and workflows you can use as subflows.

Core: Available workflow activities appropriate for the selected workflow. Contents can include activities provided by the base system and those purchased with orchestration.

Packs: Orchestration activity packs downloaded from the ServiceNow® App Store, organized by vendor and scope. Custom activities and workflows that you scope also appear as packs. Only visible if the orchestration plugin is installed.

Custom: Orchestration custom activities available. Only visible if the orchestration plugin is installed.

Data: Activities in the current workflow that output data. You can use these activities as data sources for other activities. Only visible if the orchestration plugin is installed.

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Note:
If your workflow welcome page does not look like this example, you may have customized the workflow welcome page before upgrading to Zurich. You can update the workflow welcome page to the latest version by editing the UI pages .

Navigate to **System UI** > **UI Pages** > **Workflow Editor welcome**. In the UI page record for workflow_editor_welcome, scroll to the **Versions** related list. Select the row for the version corresponding to the upgrade to Zurich, right-click and select **Revert to this version**.

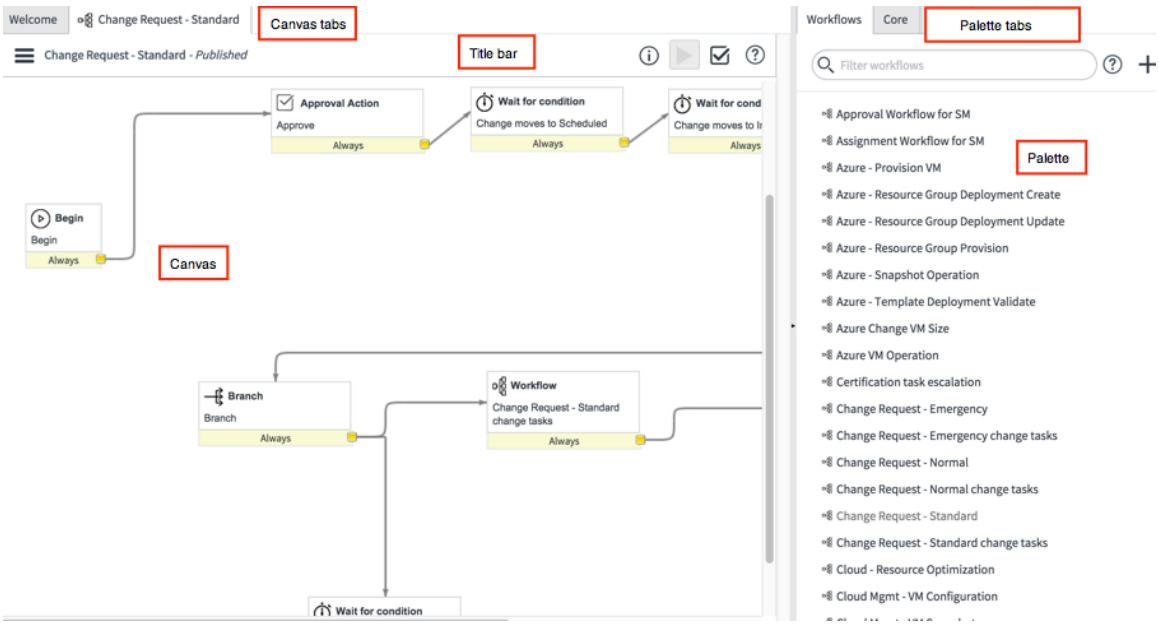
Workflow canvas

After you open or create a new workflow, the system displays the workflow canvas. On the canvas you interact with the Workflow Editor through several different elements: the canvas itself, the canvas tabs, the title bar, the palette, and the palette tabs.

The drawing canvas is where you add activities and configure transitions for checked out workflows. Add an activity by dragging it from the palette to the workflow in the canvas. For more information, see Create a workflow.

- **Canvas tabs**: Contains tabs for accessing workflows being edited or created.
- **Title bar:** Displays the workflow name and status. Provides a menu and controls for configuring, testing, and validating workflows.
- **Canvas**: Provides the working surface for creating new workflows or editing existing ones.
- **Palette tabs**: Contains tabs for accessing activities being edited or created.
- **Palette**: Contains all available workflow activities and existing workflows you can use as subflows. Drag activities and subflows to the canvas to create new workflows or edit existing ones.

Workflow user interface



Workflow palette

The default workflow palette contains workflow activities and existing workflows you can use as subflows.

The basic workflow palette contains these tabs:

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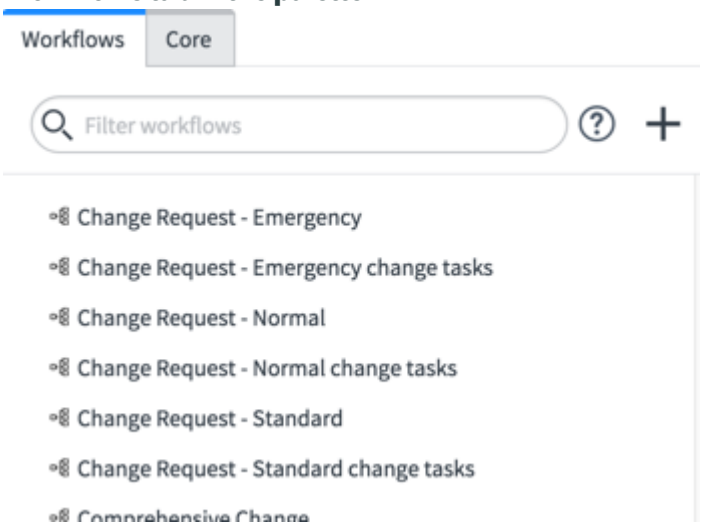
- **Workflows**: Displays existing workflows and provides controls for creating new ones.
- **Core**: Displays baseline workflow activities available to all systems and Orchestration activities (when Orchestration is activated).

Workflows tab

The **Workflows** tab lists existing workflows that you can edit or use as subflows in other workflows. Double-click a workflow to open it in the canvas. To add a workflow as a subflow, drag it to another workflow in the canvas. Click the **+** icon to create a new workflow.

Workflows tab in the palette



Core tab

The **Core** tab contains the standard activities available by default to all workflows and any activities purchased with Orchestration, organized by category. Click the arrow icons to expand or collapse the activity lists under each category. To add an activity to a workflow, drag it to the canvas. For more information, see Add an activity to a workflow.

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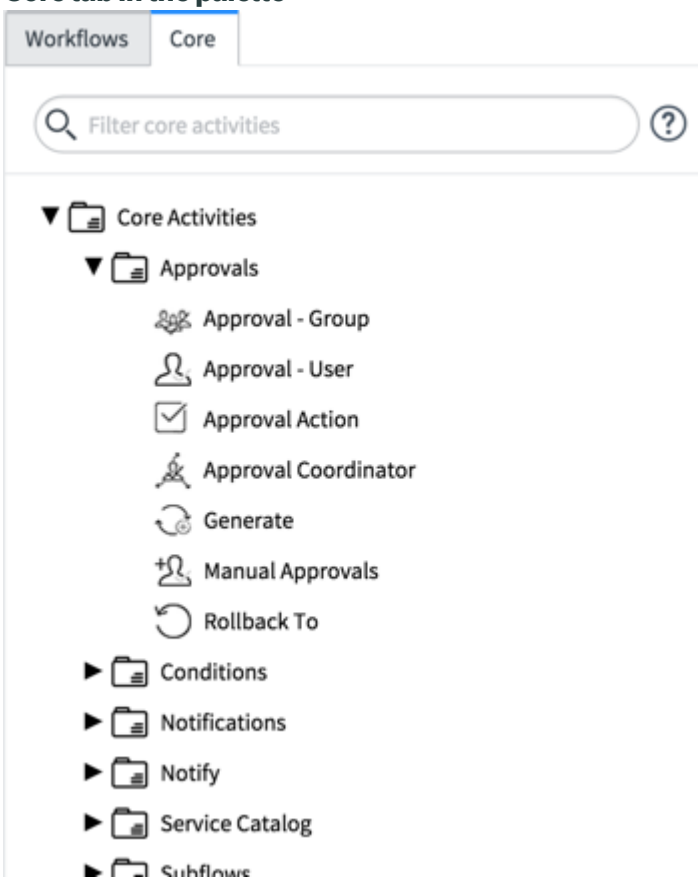
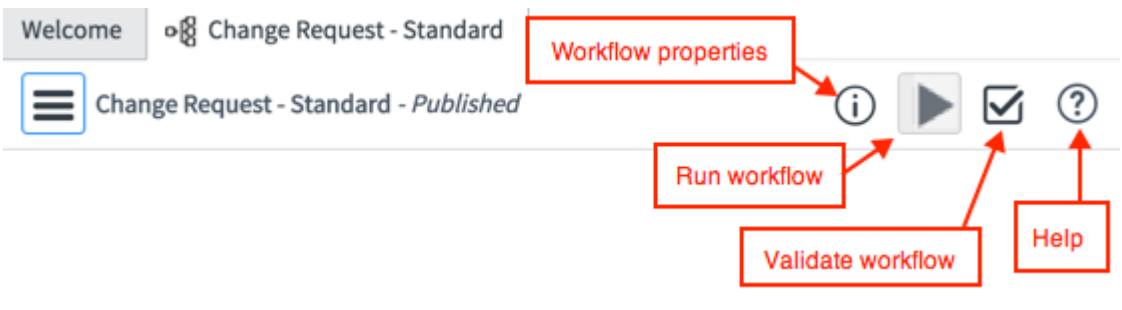
Core tab in the palette



Workflow editor title bar

When a workflow is opened in the canvas, the title bar displays the workflow title and the workflow status in italics. Possible states are **Checked out by <name>** and **Published**.

Workflow editor title bar



Controls on the right side of the title bar manage the workflow.

- **Workflow Properties** ⓘ: Opens the current workflow's properties form.
- **Start** ▶: Runs the workflow. This control is only available for workflows running on the Global table that are accessible from all application scopes. To test workflows that are on other tables, insert a record into that table that meets the condition of the workflow.
- **Validate** ☑: Tests the workflow prior to publication. Validation detects potential problems that can prevent the workflow from publishing or cause the workflow to fail. For more information, see Workflow Validation.
- **Help** ⓘ: Opens documentation to help you create the workflow.

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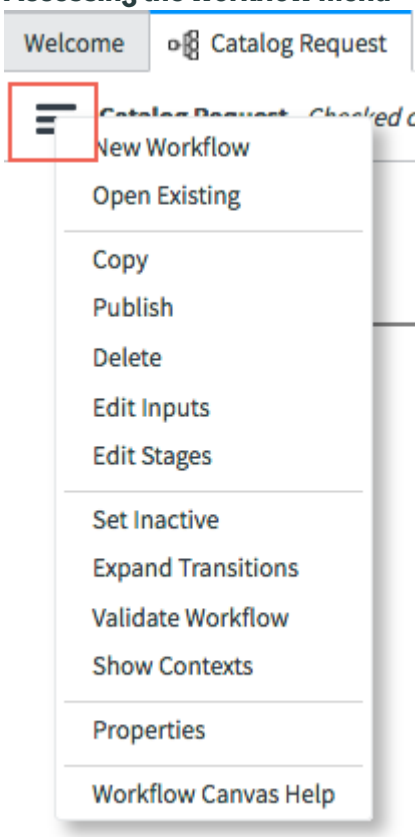
Workflow menu

Click the menu icon in the title bar for additional options to configure the workflow.

Accessing the workflow menu



These menu options are available:

Workflow menu options

Option	Description
New Workflow	Creates a new workflow.
Open Existing	Opens another existing workflow.
Copy	Creates a duplicate of the workflow. Give the copy a different name.
Publish	Makes the personal workflow version public, overwriting the current published workflow version. This option is only available for checked out workflows.
Checkout	Creates a personal version of the workflow for you, which you can edit. This option is only available for published workflows.
Delete	Deletes the workflow. You cannot delete workflows that have contexts associated with them.
Set Inactive	Inactivates the workflow so that it cannot be used.
Expand Transitions	Redraws the transitions so that they do not overlap when they leave the activity condition.

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Workflow menu options (continued)

Option	Description
Start Workflow	Starts a test run of the current workflow.
Validate Workflow	Runs validation tests on your workflow prior to publication. Use this validation to detect potential problems that can prevent the workflow from publishing or cause the workflow to fail. For more information, see Work on workflows.
Collapse Transitions	Redraws the transitions so they overlap when they leave the activity condition.
Show Contexts	Displays all the contexts for the current workflow. You can use this option to troubleshoot a workflow.
Properties	Opens the Workflow Properties form, which defines the workflow's attributes.
Edit Inputs	Opens the Workflow Inputs list of variables that the workflow can accept when used as a subflow. For more information, see Pass a variable from a workflow to a subflow.
Edit Stages	Opens the Workflow Stages list. For more information, see Workflow stages. For tables with a column of Type = Workflow.

Workflow editor keyboard navigation

The platform includes accessibility features that makes the interface accessible to users with disabilities.

These features improve the user experience when accessing platform functions with Using accessibility features. In general, you use the following set of standard keyboard navigation functions:

- Press **Tab** to navigate major groupings in a pre-defined sequence. This usually includes moving between standard interface controls (fields and lists) in a module, or between records within a tab.

  Press **Shift Tab** to move backwards in a pre-defined sequence.

- Use arrow keys (left, right, up, down) to navigate between individual elements within a group. This usually includes moving between tabs, or between available selections within a specific control (for example, within a list).
- Press **Enter** to select a control or tab, or enter text within a control.

The Workflow Editor is constructed in a unique manner. It includes a series of main (left) panel tabs, a series of side (right) panel tabs, and a drawing canvas for workflow creation or editing. As such, it has its own unique set of keyboard accessibility functions and commands.

Welcome page keyboard commands

Use keyboard commands to navigate and operate the Workflow Editor Welcome page.

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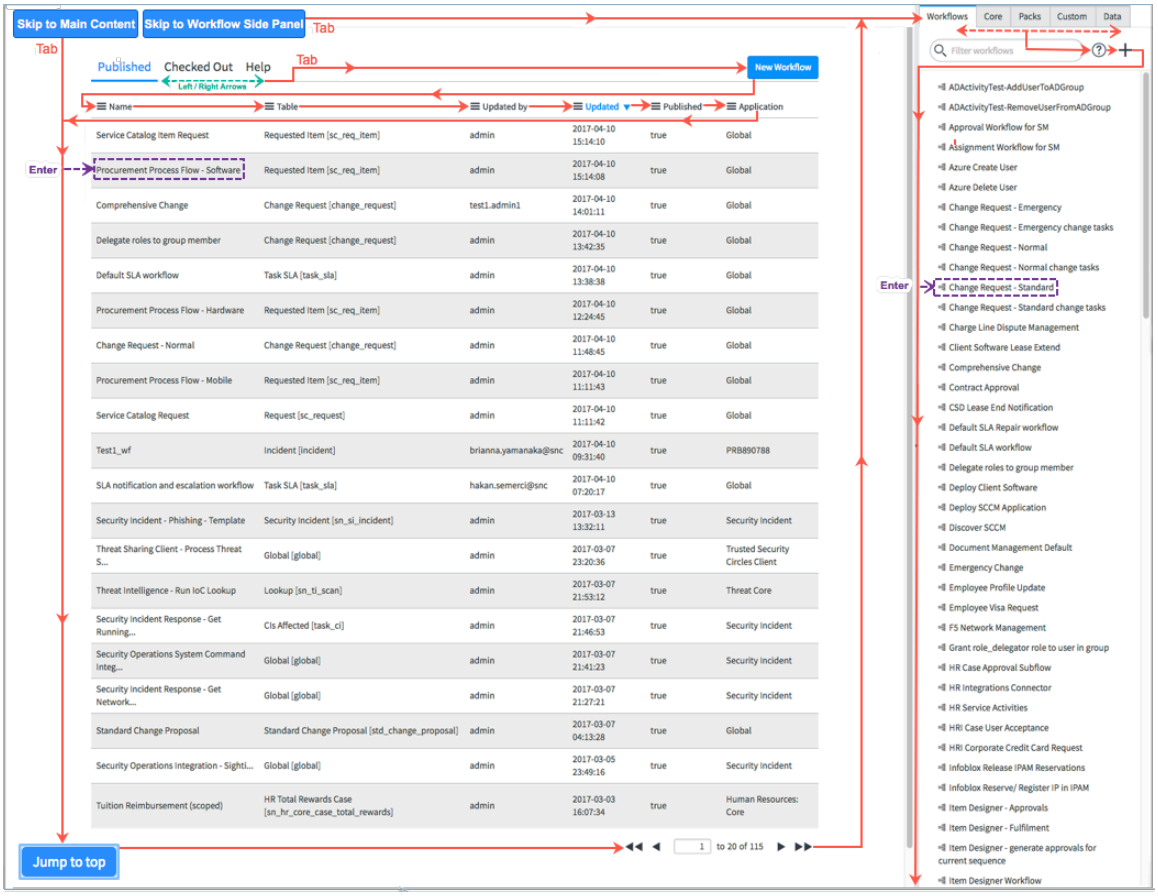

Task or Action	Keyboard Commands
Navigate to main content (left) panel, and select a workflow	**1.** After accessing the Workflow Editor from a menu, press **Tab**. Skip to Main Content appears in the upper left corner. **2.** Press **Enter** to position the cursor in the first record displayed in the **Published** tab. **3.** Press **Tab** to navigate down the listing of workflow records. Press **Enter** to select and open a workflow record in the Workflow drawing canvas.
Select a checked out workflow or a help function in main content panel	**1.** After accessing the Workflow Editor from a menu, press **Tab** until the **Published** tab is highlighted. **Note:** Do not select Skip to Main Content or Skip to Workflow Side Panel.

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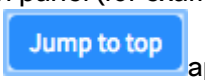
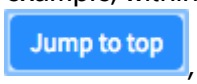
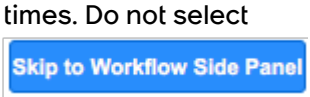
Task or Action	Keyboard Commands
	2. Press the right or left arrow keys to navigate between the **Published**, **Checked Out**, or **Help** tabs. **3.** Press **Tab** to navigate across the columns and down the listing of checked out workflow records or help selections. Press **Enter** to select and open a checked out workflow record in the Workflow drawing canvas, or open a help selection (work or orchestration videos, documentation, community discussions, knowledge base, or Live Feed).
Create a workflow	**1.** After accessing the Workflow Editor from a menu, press **Tab** until is highlighted. **2.** Press **Enter** to open New Workflow
Jump to Top	After tabbing through the displayed records in a tab in the main panel (for example, within the **Published** tab),  appears at the bottom of the listing. Press **Enter** to return to the Welcome tab at the top of the Workflow Editor.
Navigate to page selection controls 	**1.** After tabbing through the displayed records in a tab in the main panel (for example, within the **Published** tab), including  , press **Tab** to access the page selection controls. Continue to press **Tab** until you access the desired one. **2.** Press **Enter** to operate the selected page control.
Navigate directly to side (right) panel to open help, create a new workflow, or open an existing one	**1.** After accessing the Workflow Editor from a menu, press **Tab** two times. Do not select  appears in the upper left corner. **2.** Press **Enter** to position the cursor in the **Workflows** tab in the side panel. **3.** To open help, press **Tab** to navigate to . Press **Enter** to open help, or press **Tab** to skip.

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Task or Action	Keyboard Commands
	4. To create a new workflow, press **Tab** to navigate to +. Press **Enter** to open New Workflow, or press **Tab** to skip. **5.** To open an existing workflow: ○ As needed, stop at the filter field to filter workflows. ○ Press **Tab** to navigate down the workflow list. ○ Press **Enter** to select and open a workflow record in the Workflow drawing canvas,
Add a core activity to a checked out workflow in the Workflow drawing canvas	If a checked out workflow is open in the Workflow drawing canvas, core activity records display in the **Core** tab. To select a core activity and place it in the checked out workflow: **Note:** Core activity records only display when a checked out workflow is open in the Workflow drawing canvas. Other tabs display in the side panel only if Orchestration functions are enabled. **1.** In the Workflow drawing canvas, press **Shift Tab** until Skip to Workflow Side Panel appears in the upper left corner. **2.** Press **Enter** to position the cursor in the **Workflows** tab in the side panel. **3.** Press the right arrow key to navigate to the **Core** tab. **4.** Press **Tab** or the down arrow key to navigate down the listing of core activities. ○ To open a core activities folder (for example, Approvals), press the right arrow key. ○ To navigate up the list, press the left or up arrow keys. **5.** Press **Tab** to select a core activity and open the New Activity dialog to specify properties for it. **6.** After creating the activity, remember to link it to another activity in the workflow. See Create a connection from a condition on one activity to the next activity that follows in Workflow drawing canvas keyboard commands.

Workflow drawing canvas keyboard commands

Use keyboard commands to navigate and operate the Workflow Editor canvas.

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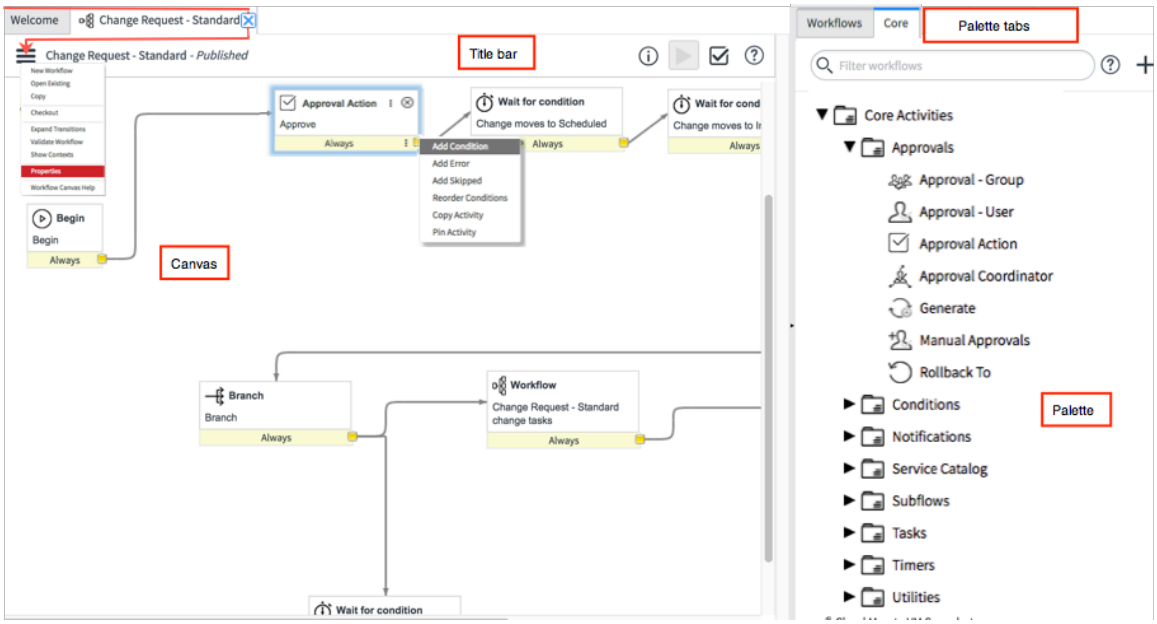

Task or Action	Keyboard Commands
Select Workflow Actions menu command (for example, **Validate Workflow** or **Publish Workflow**)	**1.** Press **Tab** until the context menu (☰) is highlighted. **2.** Press **Enter** to open the context menu. **3.** Use the down arrow key to move to the command, then press **Enter** to select it.
Set general workflow properties	**1.** Press **Tab** until ⓘ is highlighted. **2.** Press **Enter** to open Workflow Properties.
Navigate from activity box to activity box.	Simply press **Tab** or use the arrow keys (right, left, up and down) to navigate from activity to activity within the workflow. **Note:** Depending on the complexity and number of activity boxes in the workflow, the sequence of navigation is not always predictable. Depending on how you are navigating within the workflow, the navigation sequence is generally (but not always) row-by-row, and focus is usually placed on the nearest activity box.
Modify a selected activity.	**1.** Navigate to the activity box, then press **Enter** to select it and place it in Edit mode. When you select an activity box, it appears as highlighted. **2.** Once in Edit mode, use **Tab** to move around within the activity box to change or access elements such as: ○ Activity Properties (☑) ○ Title ○ Node context menu ○ Delete Node (⊗)

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Task or Action	Keyboard Commands
	○ Condition Properties (Always) ○ Node conditional context menu ( ) ○ Node conditional port options ( ) **Note:** All elements in a selected activity are only accessible when working with a checked out workflow. When working with a published workflow, you can only access its activity properties and title, **3.** Press **Enter** to select an element, or press **Esc** to escape an element without making changes.
Add a condition to an activity.	**1.** Within an activity box, select to access **Condition Properties**. **2.** In **Condition Properties**, specify the conditions for the activity.
Create a connection from a condition on one activity to the next activity that follows	**1.** Within an activity box, select **Node conditional context menu** ( ). **2.** Select **Link to...** to create a connection to the next activity box that follows, or select **Delete** to delete an existing connection.
Add a core or custom activity	**1.** Within an activity box, select **Node conditional port options** ( ). **2.** Select **Add Core Activity** to access Workflow Activity Definitions to add a new core activity, or select **Add Custom Activity** to add a custom activity to the workflow.
Move an activity box	**1.** Press **Tab** to navigate to the activity box, enter press **Enter** to select it. **2.** Use the arrow keys to move the activity box. To move the activity box one pixel at a time, press **Shift** while using the arrow keys.
Validate a workflow	**1.** Press **Tab** until is highlighted. **2.** Press **Enter** to validate the workflow. You can also select **Validate** from the Workflow Actions menu.
Run a workflow	**1.** Press **Tab** until is highlighted. **2.** Press **Enter** to run the workflow. **Note:** If the workflow is tied to a database table, this function is disabled. The workflow runs when the proper table conditions are activated (for example, insertion of a new record into the table).

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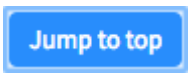
Task or Action	Keyboard Commands
Close workflow drawing canvas	1. Press **Tab** until (on the right side of the tab that contains the name of the workflow) appears. 2. Press **Enter** to close the canvas.
Publish a workflow	1. Press **Tab** until the context menu ( ) is highlighted. 2. Press **Enter** to open the context menu. 3. Use the down arrow key to move to the **Publish** command, then press **Enter** to select it.
Jump to Top	After tabbing through the entire workflow,  appears at the bottom of the listing. Press **Enter** to jump to the top of the Workflow drawing canvas.

Workflow management

Create, edit, validate, and publish workflows to automate multi-step processes across the platform. Understand workflow activities and variables and how to use them effectively. Take a deeper look at how workflows are constructed, validated, and used.

Create a workflow

Automate a multi-step process by creating a workflow with the Workflow Editor.

Before you begin

Role required:

- You must have the snc_required_script_writer and either the workflow_admin or workflow_creator role to use the Workflow Editor.
- If you are designing the workflow as part of an update set process, see Workflow movement with update sets before creating the workflow.

About this task

Important:
As of the Zurich release, new customers no longer receive the legacy workflows created and published by ServiceNow, Inc.. All legacy workflow functionality has been replaced by Workflow Studio content. Only customers who upgraded from prior versions retain the ability to use and edit existing legacy workflows. While all customers retain the ability to create legacy workflows, you are strongly encouraged to instead use Workflow Studio to create process automation content. Only Workflow Studio will receive new features and enhancements.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
   The **Welcome** tab of the Workflow Editor opens.
2. On the **Workflows** tab in the palette, click **New Workflow**.

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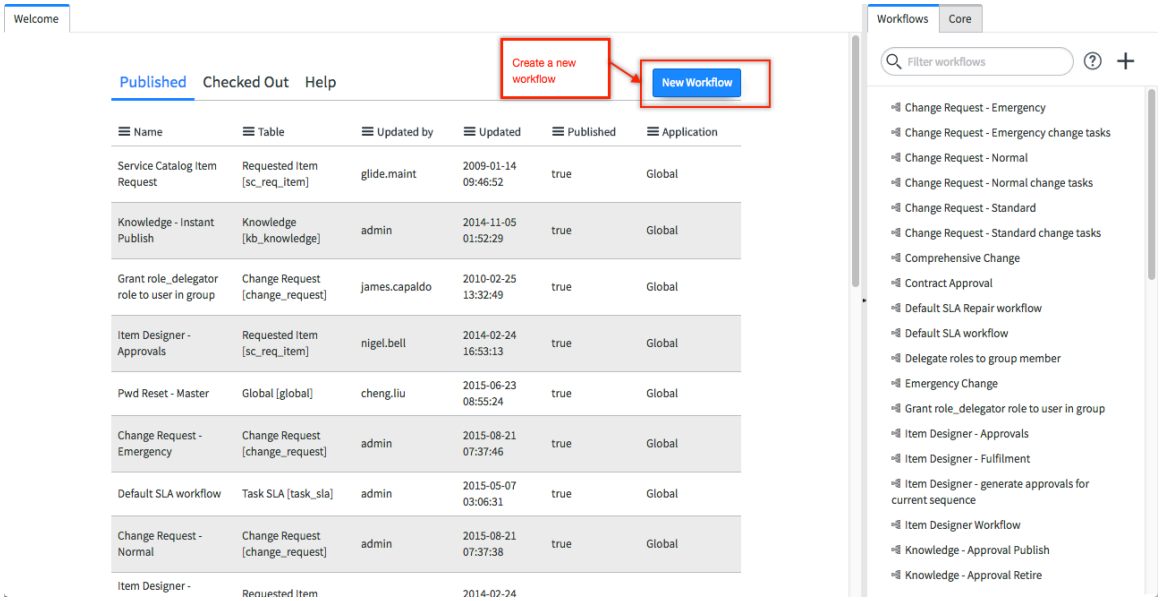


A simplified version of the New Workflow form opens.

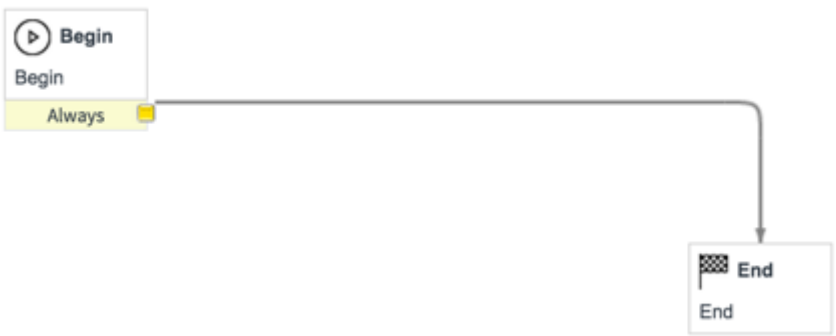
3. Fill in the **Name** and **Table** fields
4. **Optional:** Add a **Description**.
5. **Optional:** Do one of the following:

   a. If the **Conditions** UI section is displayed, specify a **Condition** if needed and edit the fields.
   The **Conditions** UI section shows only if the selected table supports conditions for launching workflows. For example, if you select the sc_req_item table, conditions are not applicable and the **Conditions** UI section is not displayed.

   b. If the **Stages** UI section is displayed, check that the **State rendering** and **Stage order** fields contain the correct information.
   The **Stages** UI section shows only if the selected table supports stages. For example, if you select the sc_req_item table, the **Stages** UI section is displayed.

6. Click **Submit**.

   The new workflow is created with the **Begin** and **End**activities connected by a single transition.



7. Finish creating the workflow by adding activities, validating, and publishing so the workflow is available to other users.
   For more information, see Work on workflows.

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8. To change advanced settings for the workflow, click the **Properties** icon ⓘ.
9. If you make changes, click **Update**.

Workflow properties

In the properties of a workflow, you can configure settings such as its application scope, start conditions, schedule, inputs, stages, and run time metrics. You can also view information such as the workflow author, version, and history.

When you create a new workflow, the following fields are available in the dialog box:

- **Name**
- **Table**
- **Description**
- **If condition matches**
- **Condition**

If you click **Diagrammer view**, in **Related Lists**, the following UI sections are available in the dialog box:

- General
- Conditions
- Inputs
- Activities
- Application
- Schedule
- Stages
- Estimated Runtime

General

Field	Description
Name	A name to identify the workflow.
Table	The table for the workflow to run on. Workflows that run on specific tables can still interact with other tables. Select **Global [global]** to run the workflow on all tables. **Note:** The list shows only tables and database views that are in the same scope as the workflow. Also, all users who edit the workflow must have access to the necessary tables and domains.
Checked out	[Read-only] When the workflow was checked out. Automatically set by the **Checkout** action in the workflow menu.
Checked out by	[Read-only] The user who has this workflow checked out. This value is automatically set by the **Checkout** action in the workflow menu.
Published	[Read-only] Check box to indicate whether the workflow has been published. Automatically set by the **Publish** action in the workflow menu.

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Field	Description
Description	The purpose of the workflow.

Conditions

Create conditions to trigger the workflow. The Conditions section does not appear if you select a table, such as sc_req_item, that does not require a condition.

Field	Description
If condition matches	When the condition evaluates to true, the workflow launches an active context: • **None**: The workflow is not automatically started by the workflow engine. To run this workflow, write a script to start the workflow. • **Run the Workflow**: The default value. The workflow engine starts the workflow if the information in the **Condition** field matches a record that is inserting into the table. • **Run if no other workflows match yet (deprecated)**: The workflow only runs if no other workflows are running on the execution thread that started this workflow. Avoid using. • **Run if no other workflows matched**: The workflow only runs if no other workflows are running on a specific record. For example, there are four workflows inserted into the Incident table, which have a condition such as **short_desc** contains **test**. A new workflow, which has **If condition matches** is set to **Run if no other workflows match yet**, only runs if none of the four workflows have started running on the Incident record.
Condition	A condition builder for specifying workflow conditions that trigger the behavior selected from the If condition matches list.
Order	Numeric value that determines the order of the workflow, relative to other workflows. Workflows are evaluated in order from the lowest order number to the highest. A workflow runs if it is the first to match conditions.

Inputs

The Inputs section lists all the activities in the current workflow that input data, the data type, and the default value. The Inputs section is only available after a workflow has been created. To create a variable, click **New**.

Field	Description
Label	Displayed column label. Localized depending on user locale.
Reference	Input field from another table.
Type	Data type. For example, integer or string.
Default value	Value used if you do not provide a value.

Activities

The Activities section enables you to set activity pinning and maximum activity count.

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Field	Description
Activity pinning	List of options that control updates to custom activities at the workflow level. Pinning protects custom activities from being updated automatically when downloaded from the ServiceNow Store. For more information, see Workflow activity pinning. The possible options are: • **Set by activity**: Allows all activities in the workflow to use their own pinning settings. This is the default pinning option. • **Pin all activities**: Pins all activities in the workflow to their current version. • **Unpin all activities**: Allows all activities in the workflow to be updated.
Max activity count	The maximum number of activities performed by the workflow. This value is used to prevent infinite loops and is set to **100** by default. When the stated maximum count is reached, the workflow is canceled. If this field is blank, the maximum count is set to **-1**, and the workflow is canceled.

Application

The Application section enables you to see application scope and scope restrictions.

Field	Description
Application	[Read-only] Scope of this activity. For more information, see Application Scope.
Accessible from	Scope restrictions for this workflow. Possible settings are: • **All application scopes**: Workflow is accessible to all application scopes. • **This application scope only**: Workflow access is limited to the scope named in the **Application** field. For more information see Workflow scope.

Schedule

Use the Schedule section to create a schedule for this workflow using the schedule builder.

Field	Description
Delivery based on	The schedule type for this workflow. Possible types are: • **User-specified duration**: Duration based on a user-specified value. This is the default schedule type. • **Relative duration**: Duration calculated from a preconfigured schedule, such as **8-5 weekdays**.
Expected time	User-defined interval. This field is visible when the schedule type is **User-specified duration**.
Schedule	Preconfigured schedule that determines when this workflow runs.
Timezone	Time zone for this instance.

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Stages

The Stages section appears if you select a table with **Type** = **Workflow**.

Field	Description
Stage	Displays the workflow stage progress on the selected table. Optionally, select **Stage rendering** and **Stage order** schemes to customize the appearance of the stage field. The default values cover typical scenarios.
Stage rendering	The renderer to use when displaying stage icons on a form or list view. For more information about renderers, see Workflow stage renderers.
Stage order	The order of workflow stages when you view a workflow field in a list. Select **Computed** to let the workflow engine compute the stage order from the order of execution in the workflow. Select **User Specified** to use the **Order** field from that Workflow stages.
Name	The name of the stage as it appears in workflow fields..
Duration	Time allocated for the specific stage.
Order	The order of workflow stages when you view a workflow field in a list. Select **Computed** to let the workflow engine compute the stage order from the order of execution in the workflow. Select **User Specified** to use the **Order** field from that Workflow stages.
Value	The value of the stage when it is referenced from elsewhere in the system, such as in a script.

Estimated Runtime

The **Estimated Runtime** section opens the controls for configuring the **ERT** for the workflow. Core workflows included in the base system are not configured for estimated run time by default. All new workflows are configured with default ERT values automatically. You can edit existing run time estimates or configure new ones for any existing workflow. For details about how estimated run times are configured and calculated, see Workflow run time metrics.

Field	Description
Requires ERT	Check box to indicate that this workflow requires an estimated runtime configuration. You can use the ERT calculations to determine if workflows are running longer or shorter than expected and to identify errors in workflow processing. By default, new workflows require an ERT.
Estimated Run Time	The initial estimate for the workflow's run time.
Number of data points	[Read only] The number of times the system has compared the estimated run time to an actual run time result.
Outlier Percentage Threshold for ERT	[Required] The percentage deviation from the estimated run time that identifies an outlier workflow run time. The system uses a default value of 20. For more information, see Outlying workflow run times.

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Create a workflow from a table

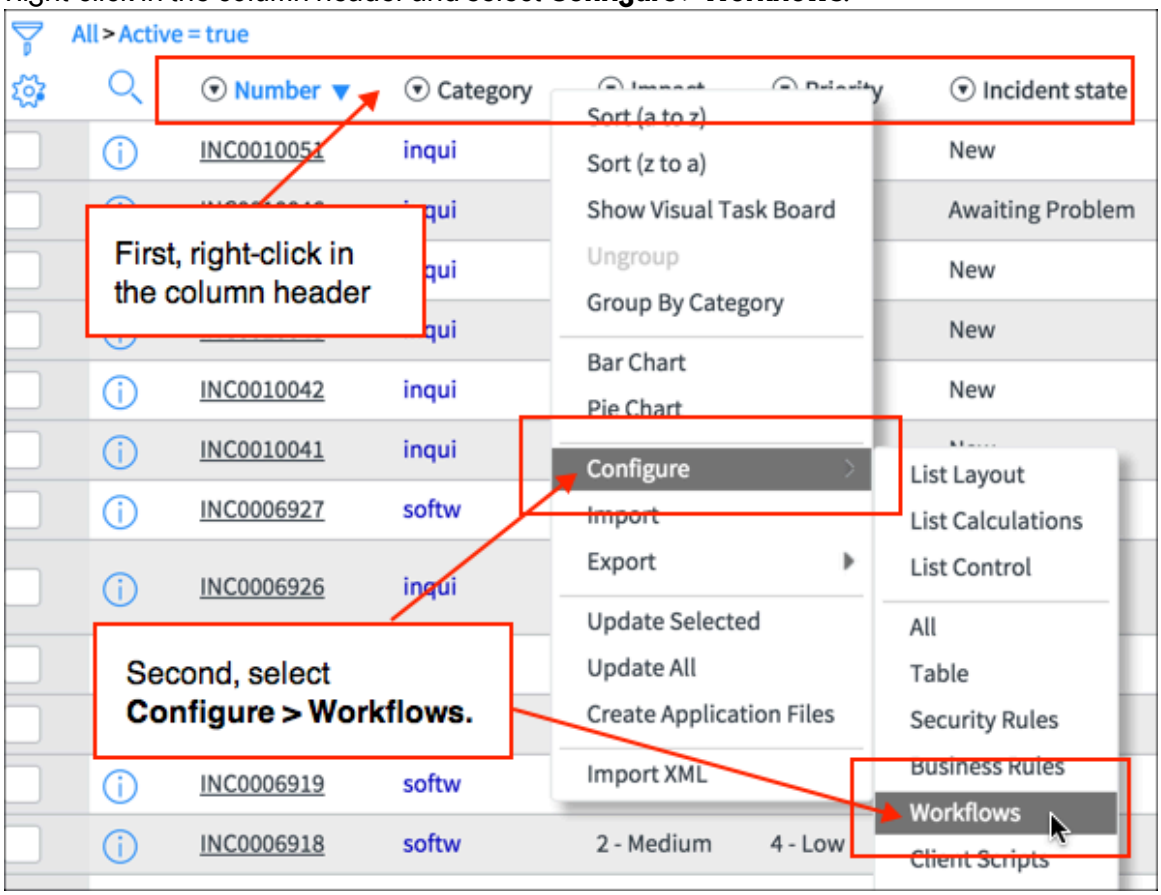
Automate a multi-step process by creating a workflow from the list view of any table that supports workflows.

Before you begin

- If you are designing the workflow as part of an update set process, see Workflow movement with update sets before creating the workflow.

Procedure

1. Open a table, such as Incident or Problem, in list view. For example, navigate to **Incident > Open**.
2. Right-click in the column header and select **Configure > Workflows**.



The **Workflow Versions** on that table appear in a list.

3. Click**New**.
   The **Workflow Version** opens in **New Workflow** view. The **Table** field is filled in with the table you selected in step 1 and is read-only.
4. Enter **Name**.
5. **Optional:** Enter **Description**.
6. **Optional:** Edit conditions fields as necessary.
7. Click **Submit**.
   The new workflow is added to the **Workflow Versions** list.
8. Click the workflow **Name**.
   The new workflow is created with the **Begin** and **End**activities connected by a single transition.

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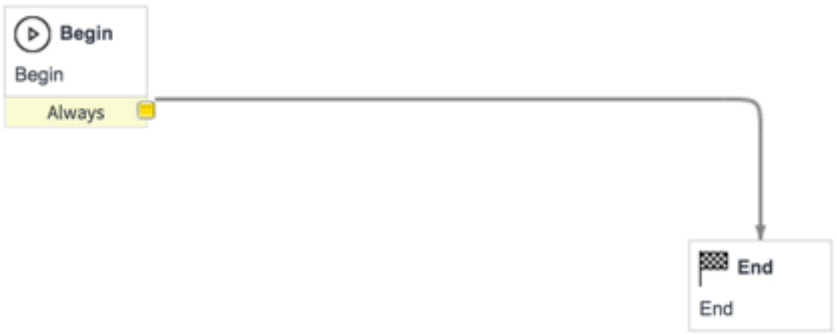

9. Finish creating the workflow by adding activities, validating, and publishing so the workflow is available to other users.
   For more information, see Work on workflows.
10. **Optional:** To change advanced settings for the workflow, click the **Properties** icon . If you make changes, click **Update**.

Create a workflow for a new service catalog item

When you create a new service catalog item, you can create a new corresponding workflow at the same time.

Before you begin

- If you are designing the workflow as part of an update set process, see Workflow movement with update sets before creating the workflow.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Items**.
2. At the top of the form, next to **Catalog Items**, click **New** .
   The Catalog Item form opens.
3. Add a **Name**.
4. Select the **Process Engine** tab.
5. Next to the **Workflow** field, click the lookup icon .
6. Next to Workflow at the top, click **New**.

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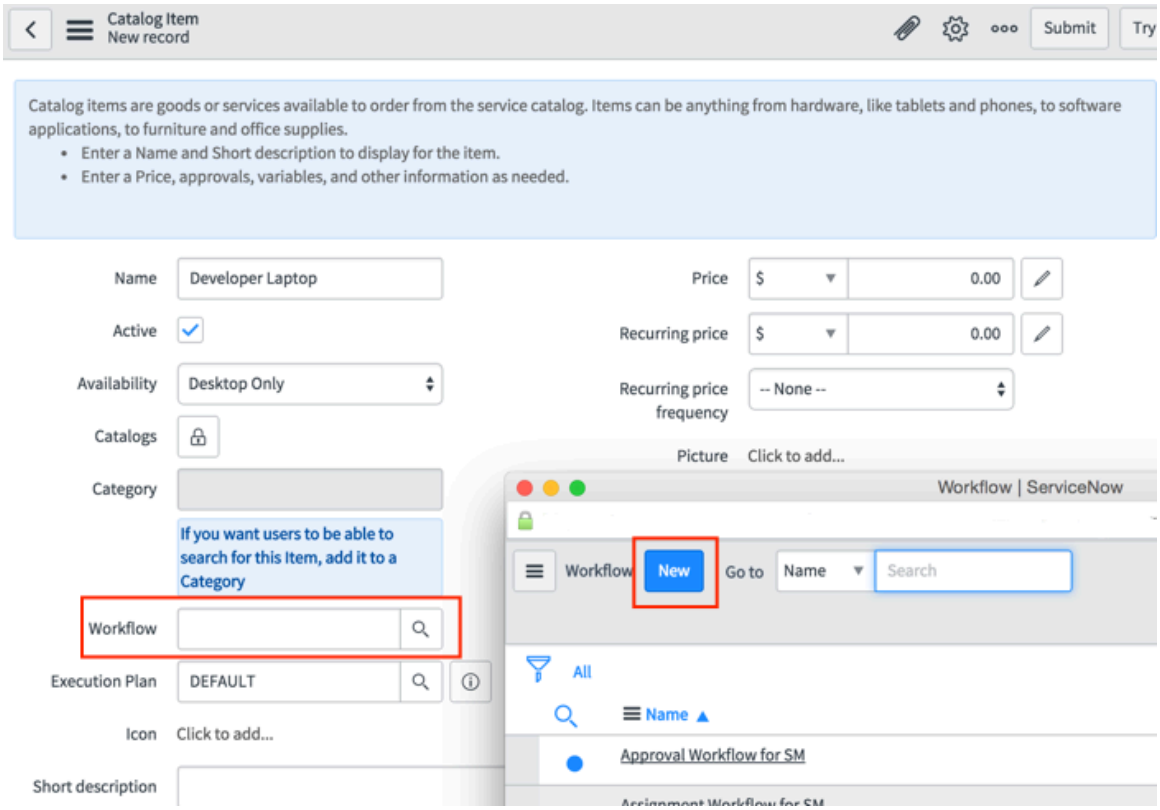

The Workflow version dialog opens in the New Workflow View. The **Table** field is set to **Requested Item (sc_req_item)** and is read-only.

7. Add a **Name**.
8. [Optional]Add a **Description**.
9. [Optional] Change the stage information as necessary.
10. Click **Submit**.
    The new workflow is created with the **Begin** and **End**activities connected by a single transition.

11. Finish creating the workflow by adding activities, validating, and publishing so the workflow is available to other users.
    For more information, see Work on workflows.
12. To change advanced settings for the workflow, click the **Properties** icon.
13. Click **Update**.
    If you close the Workflow Editor, you can see the Catalog Item record. Note that the workflow is added to the Workflow field. The Show Workflow and Information icons appear next to the **Workflow** field. Hover over the information icon to view a read-only summary of the workflow.

Create a workflow for an SLA Definition

Automate a multi-step process by creating a workflow from an SLA definition.

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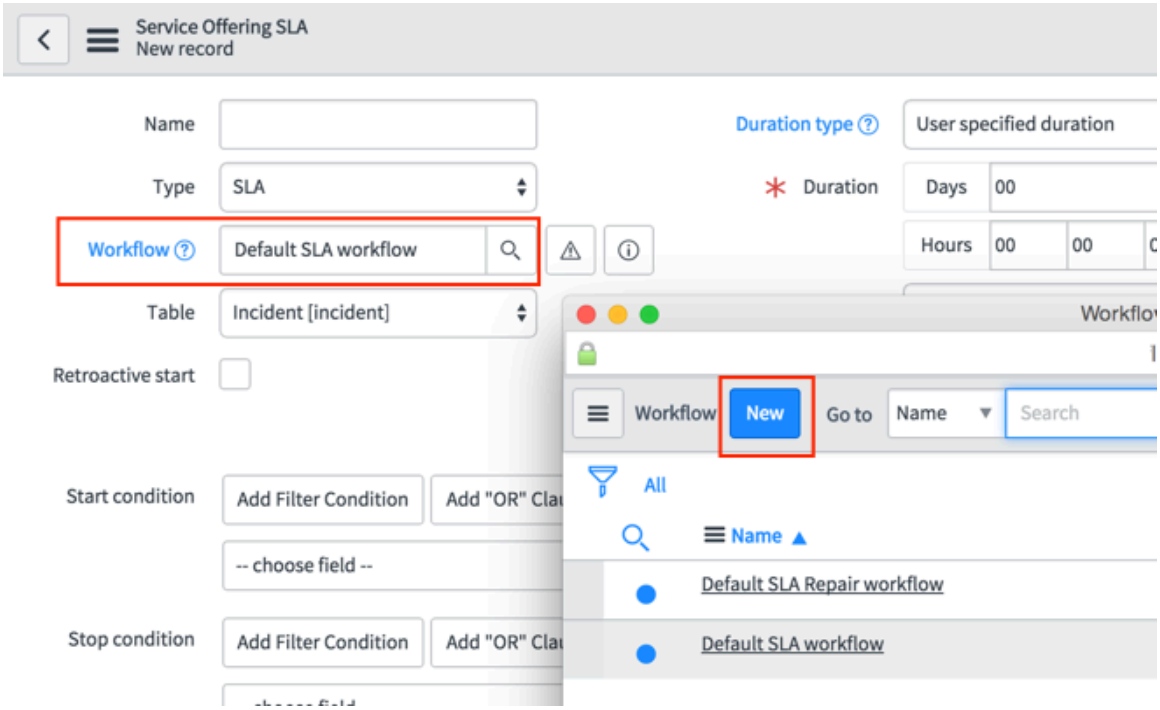
Before you begin

- If you're designing the workflow as part of an update set process, see Workflow movement with update sets before creating the workflow.

Procedure

1. Open a list of SLA definitions.
   For example **Facilities > SLA Definitions** or **Service Level Management > SLA Definitions**.
2. At the top of the form, next to **SLA Definitions**, click the new icon (New).
3. Select **Contract SLA** or **Service Offering SLA**.
4. Next to the **Workflow** field, click the lookup icon.
5. Next to **Workflow** at the top, click **New**.



   The Workflow Version dialog shows in the New Workflow view. The **Table** field is set to **SLA Definition (contract_sla)** or **Service Offering SLA (service_offering_sla)** and is read-only.

6. Enter a **Name**.
7. [Optional] Enter a **Description**.
8. [Optional] Edit the conditions fields as necessary.
9. Click **Submit**.
   The new workflow is created with the **Begin** and **End** activities connected by a single transition.

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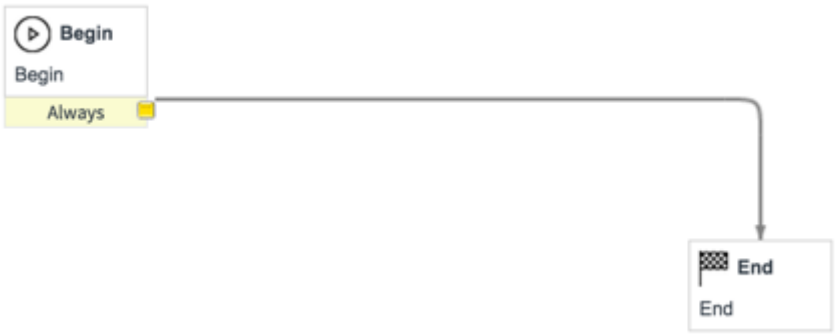


10. Finish creating the workflow by adding activities, validating, and publishing so the workflow is available to other users.
    For more information, see Work on workflows.

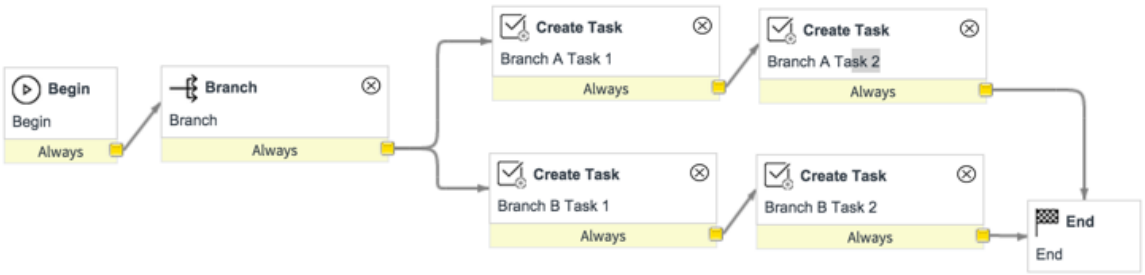
11. [Optional] Change the advanced settings for the workflow by clicking the properties icon ( ).
    If you make changes, click **Update**.

Ending workflows with multiple branches

A workflow is complete when it reaches the **End** activity, even if there are still active branches of the workflow in progress. To ensure that both branches are completed, add a **Join** activity to resolve the branches.

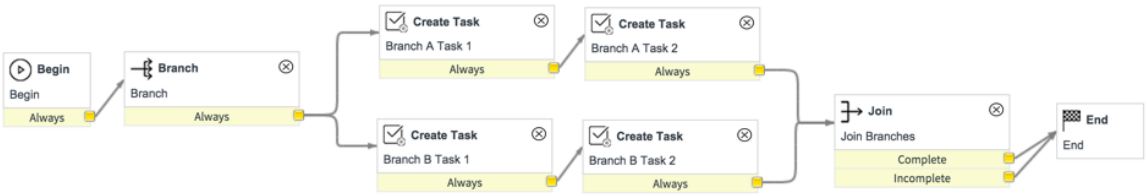
For example, the following figure shows a workflow with two branches that execute independently. When Task 1 and Task 2 of Branch B are completed, the workflow is marked complete even if the Branch A tasks are not completed.

Workflow with uncompleted branch



For both branches to complete, add a **Join** activity to resolve the branches. When one branch reaches the join, the workflow waits for the other branch. When both branches are complete, the workflow reaches the end. The **Incomplete** condition of the a **Join** activity is met only if one of the branches cannot be completed.

Workflow with completed branches



Work on workflows

To complete a workflow, you add workflow activities, validate the workflow, and publish it.

Before you begin

Role required: snc_required_script_writer and either workflow_creator or workflow_admin.

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Add a workflow activity

Activities determine the functionality of the workflow.

Before you begin
Role required: snc_required_script_writer and workflow_admin, workflow_creator, or admin

About this task
When they are created, all workflows contain **Start** and **End** activities.

For more information, see Workflow activities.

Procedure
1. Open a workflow.
2. Check out the workflow.
3. Drag a workflow activity from the Activities menu into the workflow body.
4. Populate the Workflow Activity form that appears.

Publish a workflow

When a workflow is complete, publish the workflow so that it is available to all users.

Before you begin
Before you publish a workflow, validate it to test it for issues that might cause it to fail, such as missing subflows or disconnected transitions. For more information, see #unique_3229.

Role required: snc_required_script_writer and workflow_admin, workflow_creator, workflow_publisher, or admin

About this task
To publish a workflow:

Procedure
1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open the workflow that you want to publish.
3. In the title bar, click the menu icon and select **Publish**.

Result
If you published a new version of workflow, the changes are not applied to running workflow contexts. Any currently running workflow context continues using the workflow version that was available when the workflow started. The next time the workflow runs, it uses the new version.

Edit a published workflow

You can edit a published workflow after you check it out.

Before you begin
Role required: snc_required_script_writer and workflow_admin, workflow_creator, workflow_publisher, or admin

About this task

Note:
You cannot check out or delete workflows that are associated with a read-only application file.

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To check out a workflow:

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open the workflow that you want to edit.
3. In the title bar, click the menu icon and select **Checkout**.

   A new version of the workflow is created and assigned to you.

   If you are in a different domain than the published workflow, the new workflow version is created in your domain.

What to do next

After you finish editing the workflow, validate and publish the workflow to make the new version available to other users.

Copy a workflow between two application scopes

Application scoping protects applications by identifying and restricting access to application files and data. You can copy a workflow created in one application scope (for example, Test) to another (Production) as needed.

Before you begin

Role required: snc_required_script_writer and admin

Procedure

1. On the Home page, click , located next to the logged in user name.
2. In the **Developer** tab, in the **Application** field, select the application scope (for example, Test) in which you want to operate the ServiceNow platform.
3. Close the System Settings page.
4. Navigate to **Workflow** > **Workflow Editor**.
5. Create a workflow in the Workflow Editor.
   For more details, see Create a workflow.
6. In the Workflow Editor, click .
7. In the **Application** tab, **Application** is set to the current application scope selected in System Settings.
8. In **Accessible from**, select **All application scopes** if the workflow is available to all application scopes, or select **This application scope only** if it is only available to, and accessible in the current application scope only.
   Only those workflows that are accessible from all application scopes can be copied to another application scope.
9. Go back to the Homepage, click .
10. In the **Developer** tab, in the **Application** field, select the application scope (for example, Production) to which you want to copy the workflow.
11. Navigate to **Workflow** > **Workflow Editor**.
12. Refresh the page, then open the same workflow you created.
    An **Out of scope workflow, workflow belongs to <scope name> scope** message appears, where <scope name> is the application scope in which the workflow was originally created.

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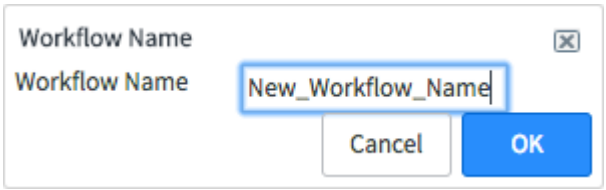
13. In the Workflow Editor, click ☰.
14. Select **Copy**.
    The **Workflow Name** dialog appears:



    a. In **Workflow Name**, type the new name for the copied workflow.

    b. Click **OK**.
    The system creates a workflow in the current application scope.

15. In the Workflow Editor, click ⓘ.
16. In the **Application** tab, **Application** is set to the current application scope.
17. In **Accessible from**, select **This application scope only** if to make the newly copied workflow a private one that cannot be accessed from outside current scope.
18. Click **Update**.

Result

A new workflow record is created in the selected application scope and marked as private if designated as one in the Workflow Editor.

Workflows used as subflows

A workflow can launch another workflow as an activity.

The parent workflow triggers the subflow and then waits for the subflow to complete before continuing. Run the workflow validation tool prior to publishing to detect missing subflows and other dependency problems, such as those involving update sets.

The **Workflows** tab in the Workflow Editor contains a list of the workflows available for use as subflows.

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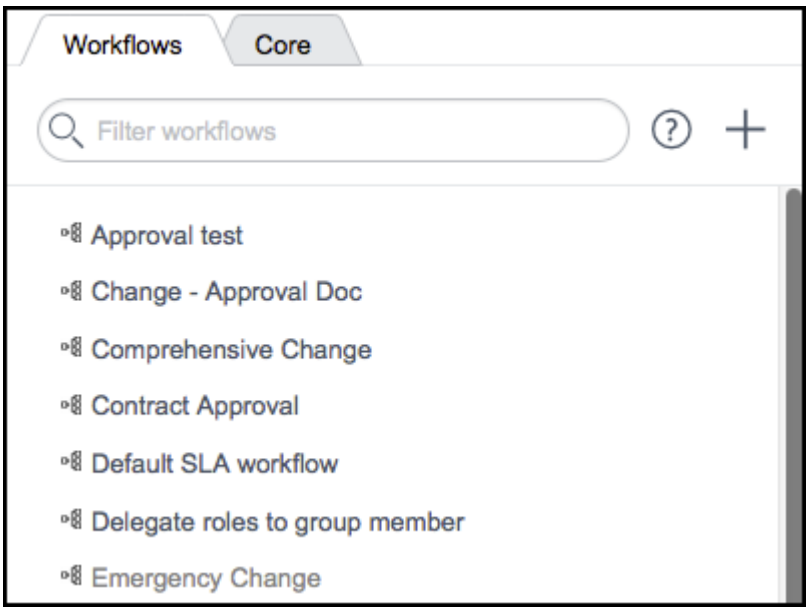
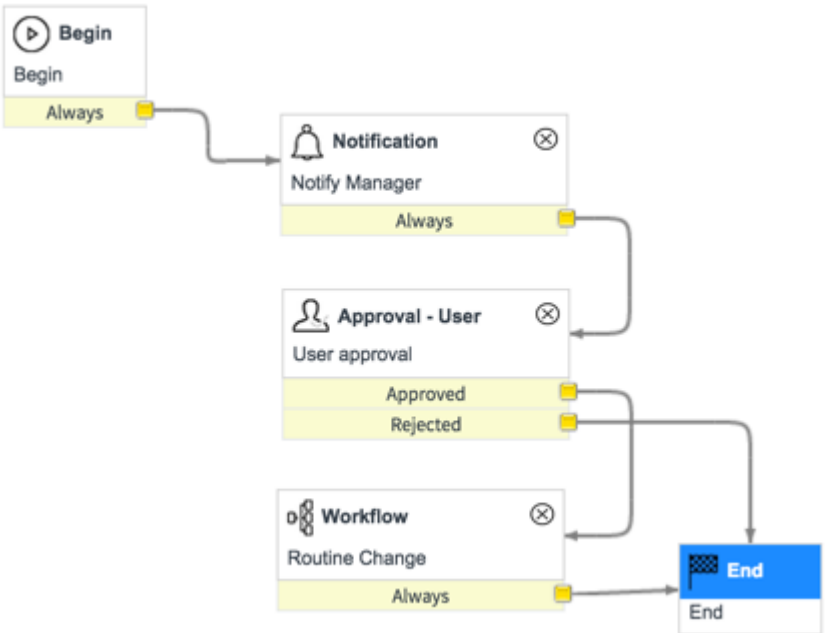
Workflows available to use as subflows



Make sure that the selected subflow is active. If the subflow is inactive, the main workflow will hang with a **Loading** message. If you place an inactive subflow into a workflow, the subflow appears with a red banner, indicating that it cannot run. An active subflow is highlighted in blue when selected.

Workflow with active subflows



Subflows and the Create Task activity

If a workflow contains a **Create Task** activity that has executed on the current record, additional task activities in the workflow might not execute as expected.

This can happen when the same subflow containing a Create Task activity runs more than once in a parent flow. When the subflow reruns and attempts to execute the **Create Task** activity again, the system reopens the first task activity instead and does not create an additional task.

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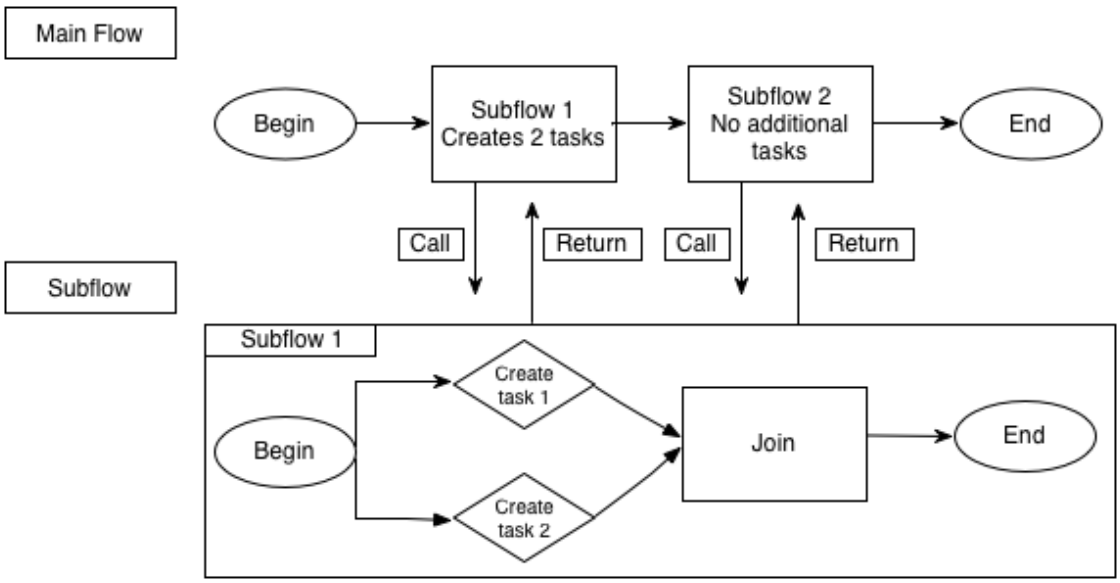
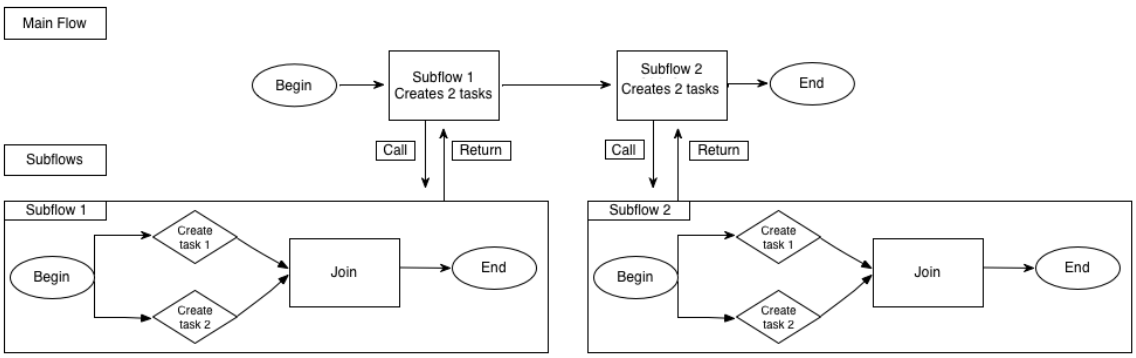
Note:
An alternative to creating duplicate subflows that use the **Create Task** activity is to add a **Run Script** activity to the workflow that creates a task with a script.

The same create task activity runs twice in a workflow



In this configuration, the workflow does not run the same subflow containing a **Create Task** activity more than once. This allows the workflow to create additional tasks.

Running different subflows containing the Create Task activity



Pass a variable from a workflow to a subflow

Use this process to pass variables from a parent workflow to a subflow.

Before you begin

Role required: workflow_admin, workflow_creator, or admin

About this task

Note:
You can also use the **Return Value** activity in the subflow to return values to the parent workflow. Make sure to have a **Return Value** on every ending transition path.

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Procedure

1. Prepare the subflow to accept variables from the parent workflow by defining the inputs.
2. Include the subflow in the parent workflow and connect the inputs to the parent workflow variables.

Note:
You cannot pass variables to a subflow that runs on the Requested Item [sc_req_item] table.

Define inputs for a subflow

Define the input variables for a workflow to request from parent workflows when it is launched as a subflow.

About this task
All inputs are stored in the Variables [var_dictionary] table.

Procedure

1. In the editor, open and check out the workflow.
2. In the title bar, click the menu icon and select **Edit Inputs**.
3. In the Workflow Inputs window, click **New**.
4. Populate the record with the definition of the variable, including the column name, the label that is displayed to the user, and the type of field.
5. Click **Submit**.

Invoke a subflow in a workflow

Use this procedure to add a subflow to a workflow.

Procedure

1. In the Workflow Editor, open and check out the parent workflow.
2. Drag the subflow from the **Workflows** tab to the parent workflow.
3. In the New Activity dialog box, define the variables defined by the subflow's **Inputs**.

   These fields can accept both static values or variables in the following format:

   `${variable_name}`

4. Click **Submit**.

   The workflow triggers the subflow at the appropriate time and passes the variables as indicated by the **Inputs** definition.

Prepare a subflow

Review the process of preparing a subflow for use in a parent workflow, and for preparing the parent workflow to use a subflow.

Procedure

1. In the editor, open and check out the workflow that you want to use as a subflow.
2. In the title bar, click the menu icon and select **Edit Inputs**.

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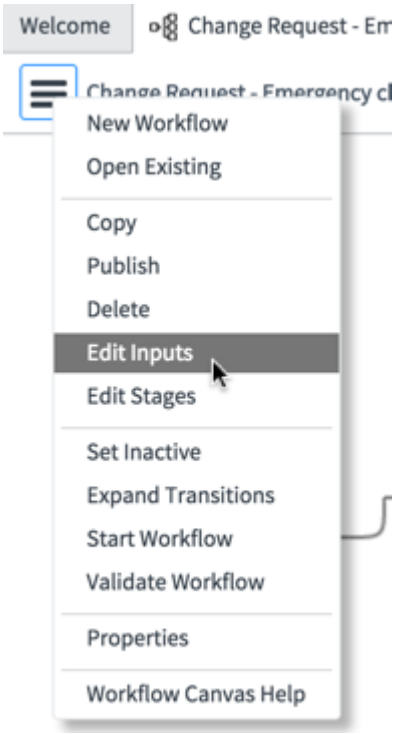
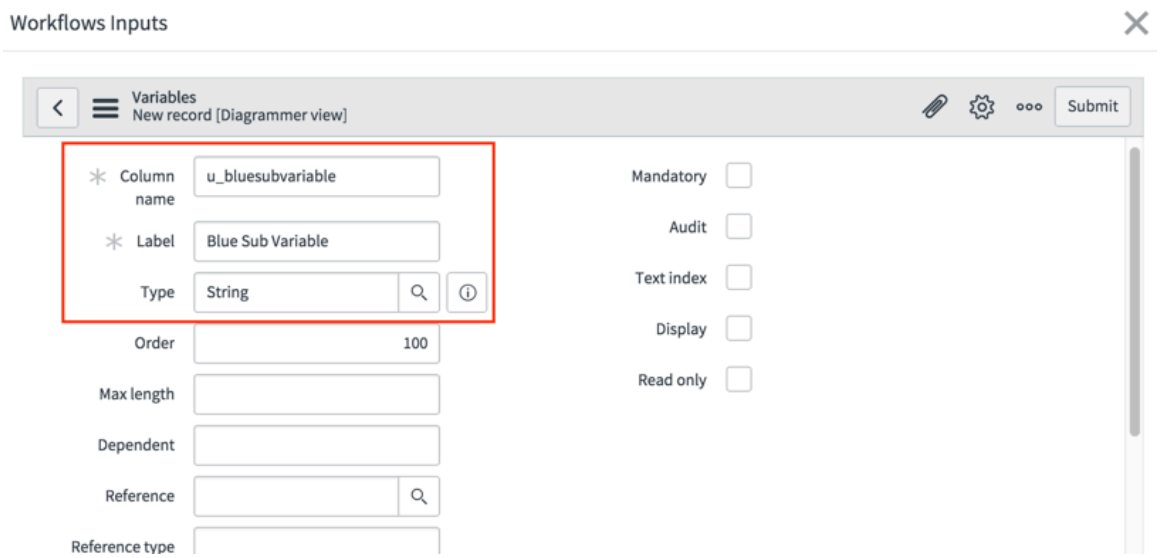


3. In the Workflow Inputs window, click **New** in the **Variables** list.
4. Add a new variable depending on the type of values that it is going to store.

   The following example sets up a string value.



5. Click **Submit**.
6. Close the **Workflows Inputs** dialog.
7. Create a **Run Script** activity on the subflow.
   - Set the value from the parameter to a field on the current form. This is important because the **Notification** activity can only pull values from the current variable and not from the newly added variable. The following example sets the value in the **Description** field.

     ```
     current.description = workflow.inputs.bluesubvariable;
     ```

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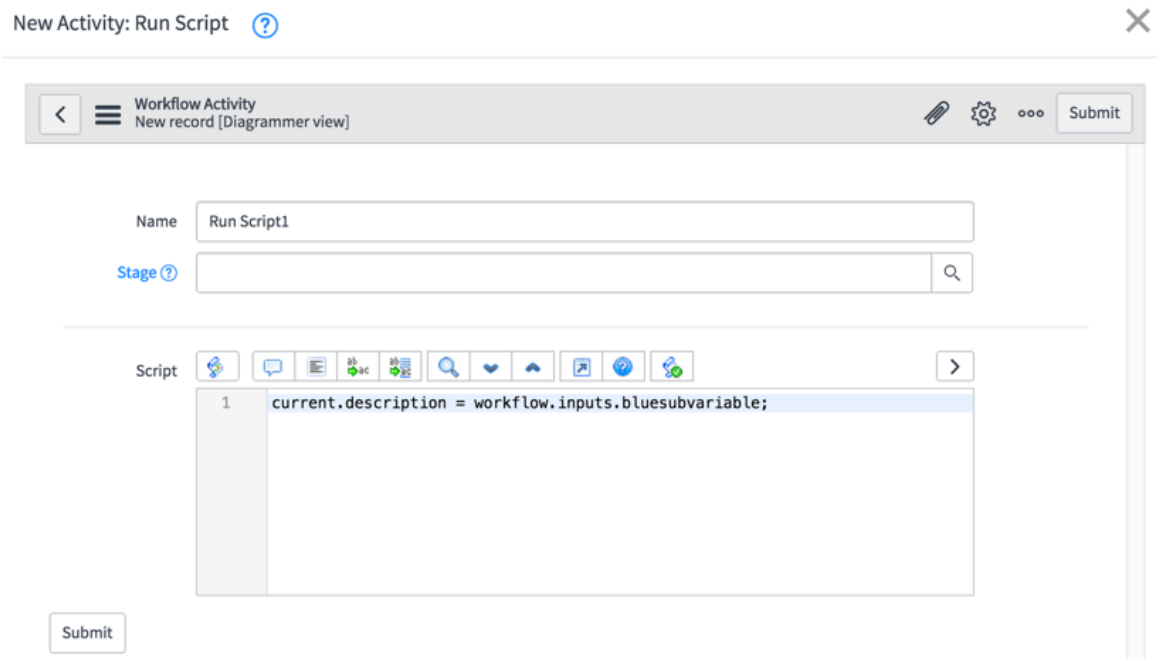
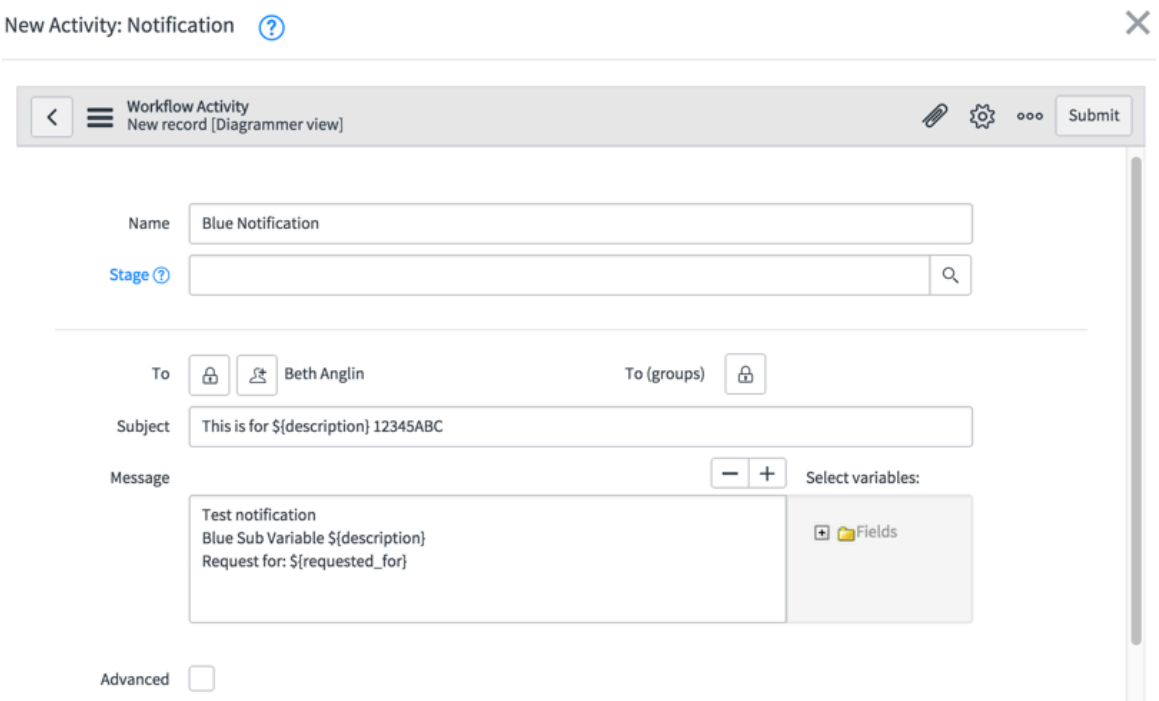
- Create a new field on the request form but do not display the field. This serves as temporary storage.



8. Create a **Notification** activity on the subflow and use `${description}` in the subject to return the value from the field.



This is what the subflow would look like:

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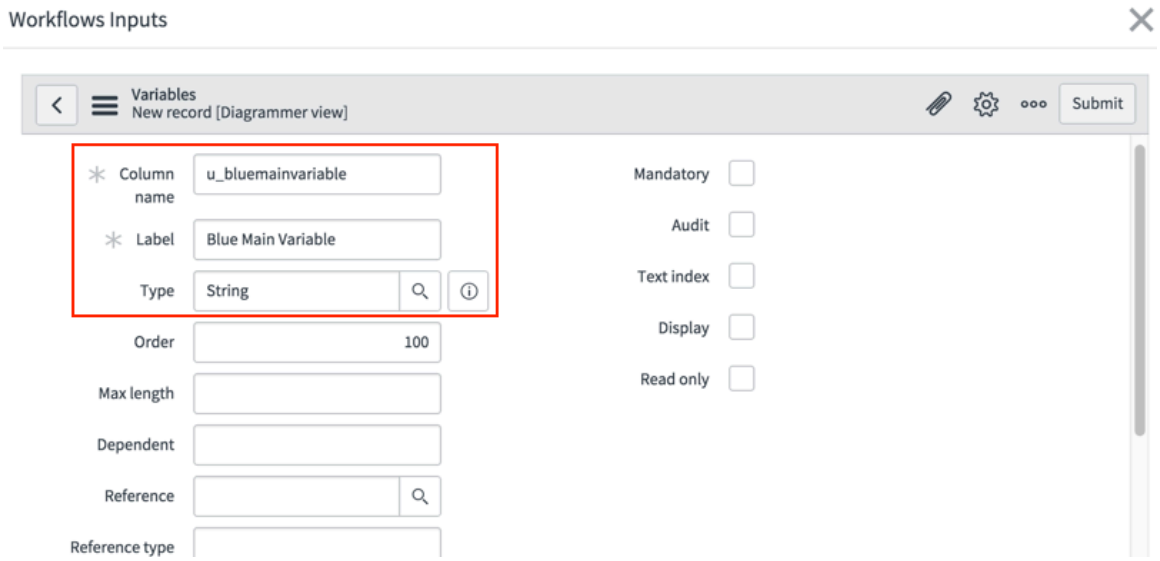
Prepare a workflow to use a subflow

After you create a subflow, use this procedure to prepare the parent workflow.

Procedure

1. On the parent workflow, create a variable similar to what you did on the subflow, but name it something different.

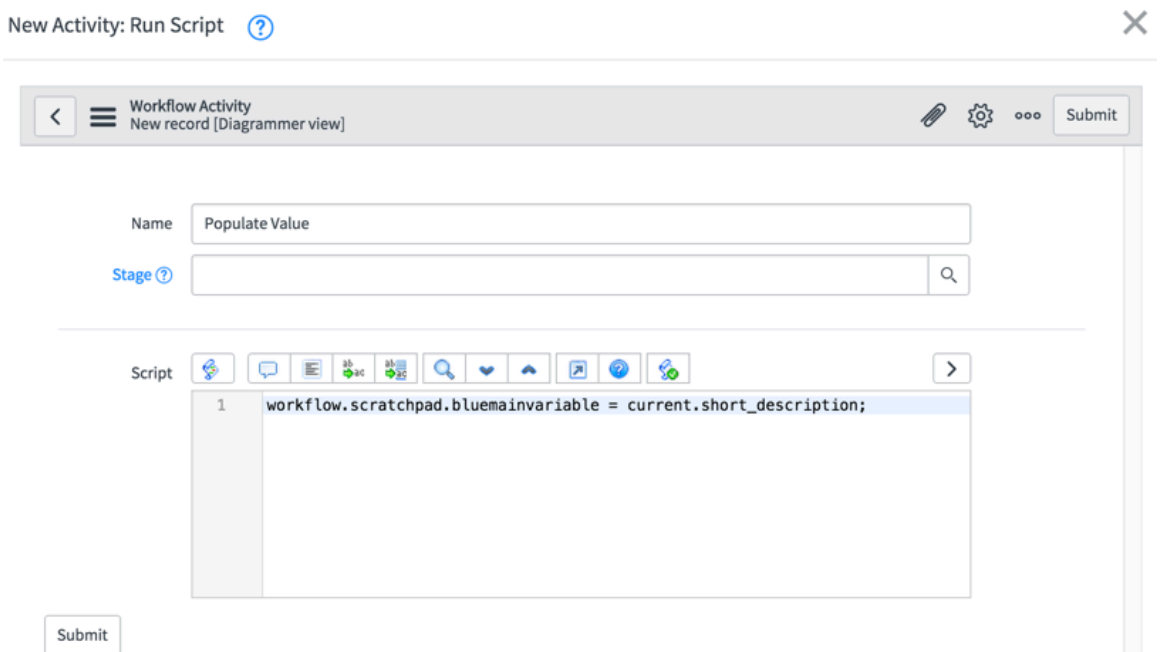
   In the following example, the variable is named **Blue Main Variable**.



2. Click **Submit**.
3. Insert a **Run Script** activity to return the value from a field to the newly created variable.

   In this example, the value of the **Short Description** field is returned and given to the newly created variable.

```
workflow.scratchpad.bluemainvariable =
current.short_description;
```



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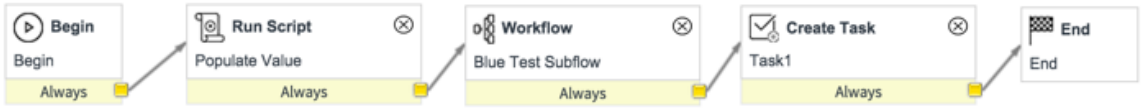
4. Click **Submit**.
5. In the subflow activity, set the **Blue Sub Variable** to pass the `bluemainvariable` to the `bluesubvariable`.

   `${workflow.scratchpad.bluemainvariable}`

   This is what the main workflow looks like:



Using variables in a workflow

Within workflow there are several different types of variables that are available.

Some variables define, describe, or compose the pieces of the workflow (such as workflow activities). Some variables are available specifically to facilitate the execution of a workflow (such as scratchpad variables). Some variables define, describe, or compose the data records being manipulated by the workflow process (for example, the elements of a Glide Record that are defined in a dictionary.xml file describing a record, such as an incident).

Activity variables

Activity variables are properties specifically associated with a workflow activity.

Before you begin

Role required: admin

About this task

These are the inputs that appear on the activity definition when a specific activity is dragged onto the workflow canvas. These variables are properties that define, compose or describe the workflow activity, or the work it is designed to perform.

Activity variables are declared in a related list within the Workflow Activity Definition.

To add, view, or modify a variable:

Procedure

1. Navigate to **All** > **Workflow** > **Activity Definitions**.
2. Select a workflow activity, such as **Approval - User**.
3. In the **Activity Variables** section or tab, add, view, or modify the variables. Activity variables are defined using the same fields as System dictionary.

   Note:
   If defining a new activity variable that is dependent on another activity variable, put the prefix "vars." before the name of the parent activity variable. For example, if the child field is dependent on a field named **parent**, put the value `vars.parent` in the **Dependent** field.

   To control the visibility of an activity variable on the workflow canvas after the activity has been dragged to the canvas, use a UI policy on the wf_activity table.

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To access the variables or assign values to these variables within the workflow activity, use the *vars* variable of the workflow activity.

```
activity.vars.variable_name = new_variable_value
```

Workflow input variables

Workflow variables are external values that are passed into and referenced by a workflow during its execution.

Before you begin

Role required: admin

About this task

Workflow variables can be declared externally in a script and passed into a main workflow or they can be declared within a main workflow and passed as inputs to a subflow.

Note:
There is a specific kind of input variable for any workflow that is declared against the table Requested Item [sc_request_item]. To understand the use of these variables, see Workflow catalog variables.

Workflow variables are declared in a form available from the Workflow Editor gear menu.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Edit and check out a workflow.
3. Select the Workflow Activities menu and select **Edit Inputs**.
4. Select an existing variable or select **New**.

Note the **Column name** field. Use this value when accessing the variable from a script.

Workflow variables do not appear on the workflow canvas, they are only available for view from the Workflow Activity menu.

The input variables are available to use in scripts. To access an input variable from a script:

```
var input  = workflow. variables. variableName //get the workflow
variable identified by column name .
```

Assigning values to variables from outside of workflow

After being declared in a workflow, values can be assigned to the variables from where the workflow is kicked off.

The following example demonstrates how a workflow variable's value can be set in a script include, business rule, or UI action:

```
//Declare an instance  of workflow.js
var wf  = new Workflow ( ) //Get the workflow id
var  wfId  = wf. getWorkflowFromName ( "Workflow Name" ) ;
//Start workflow, passing along name : value pair(s) for mapping
 to variable
//where input_var_name is the name of the variable declared in
 gear menu
```

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```
//and input_var_value is whatever that value should be for this
 execution of
//workflow
wf. startFlow (wfId , null , "Workflow Name" , {input_var_name :
 input_var_value } ) ;
```

Another example that demonstrates a more readable way of passing multiple variables involves declaring an object, adding the names/values to the object, and passing it:

```
//Declare an instance  of workflow.js
var wf  = new Workflow ( )
//Get the workflow id
var  wfId  = wf. getWorkflowFromName ( "Workflow Name" ) ;
//Start workflow, passing along object containing name/value
 pairs mapping to inputs expected by the workflow
var vars  = { } ;
vars. input_var_name1 = input_var_value1 ;
vars. input_var_name2 = input_var_value2 ;
// add as many variables as your workflow is expecting, then
 pass the object
wf. startFlow (wfId , null , "Workflow Name" , vars ) ;
```

Assigning Values for Subflow Inputs from inside of a Main Workflow

If a workflow that accepts inputs is called from within another workflow, those input values can be set from the workflow canvas within the UI of the workflow activity. Each input variable declared for a subflow will have a text box input area displayed on the activity. Within these text boxes, the variables can be set with any value either from the scratchpad or from within the current record.

For more information, see Workflows used as subflows.

Reading the Value of a Workflow Input Variable

The value of a Workflow input variable is accessible anywhere within the workflow that accepts javascript by dot walking the current workflow object:

```
var readValue = workflow.inputs.variable_name;
```

Workflow scratchpad variables

Store and share string-based variables as name-value pairs between workflow activities.

The scratchpad is global to the instance of the running workflow and as such, is available equally to all activities.

Declaration

The scratchpad itself is automatically available to an executing workflow and requires no specific declaration. Variables are declared and stored in the scratchpad simultaneously by referencing it. For example:

```
workflow.scratchpad.variableName = variableValue;
```

Display

View activity scratchpad values from the Workflow Activity History Scratchpad [wf_history_scratchpad] table. Workflow Activity History Scratchpad is also an embedded list in Worfklow Activity History records.

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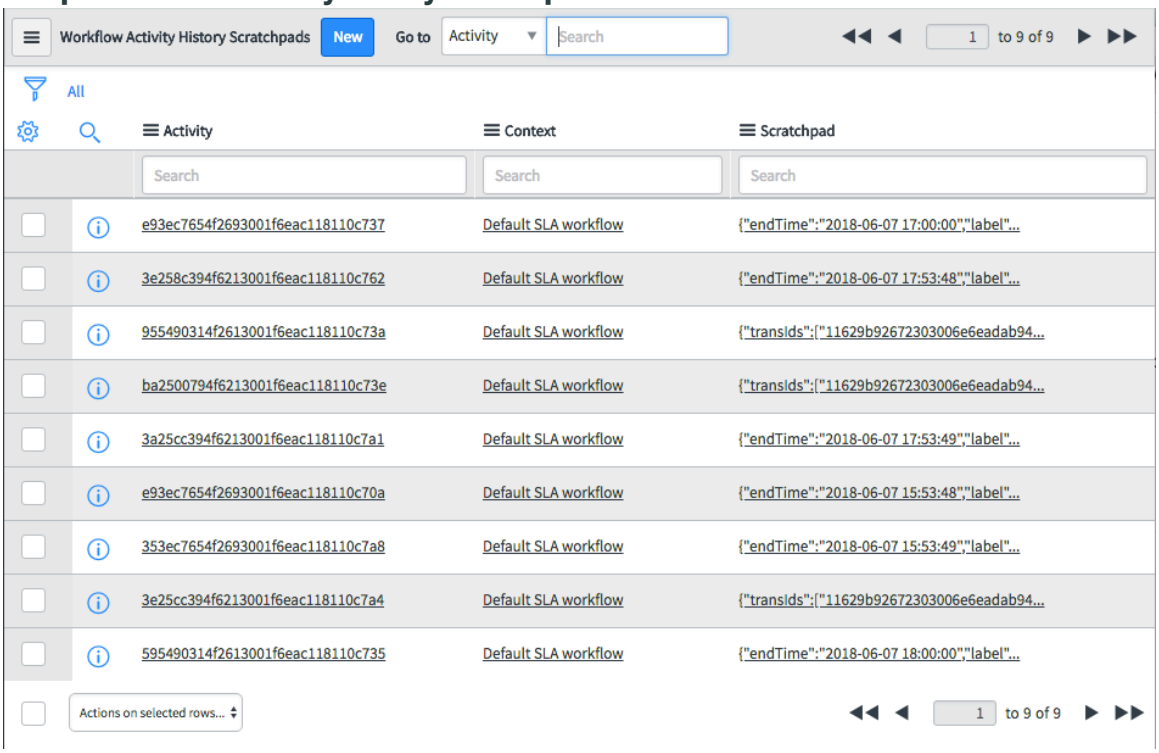
Sample Workflow Activity History Scratchpad records



Access and Assignment

Use standard JavaScript object notation to access or assign scratchpad values. For example, use this format to assign a particular scratchpad variable value.

```
workflow.scratchpad.variableName = variableValue;
```

Use this format to assign a JavaScript variable to a scratchpad variable.

```
var myValue = workflow.scratchpad.variableName;
```

Current variables

Current is the database GlideRecord that kicked off the workflow, either by association to the table in the Workflow properties table or by being associated with a catalog item.

Declaration

Variables in current are the columns that are defined in the `dictionary.xml` file that support the database record. There is no way at runtime to add variables to the current record.

Display

Variables of a current record are displayed on the Glide Forms and Lists throughout the applications that use them.

Access and Assignment

To access the variables or assign values to the variables within the workflow activity, get the value from the current record by referencing the Glide Element.

```
var myVarValue = current.getElement(nameOfTheField);
```

or

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```
var myVarValue = current.fieldName;
```

or

```
current.variableName.setValue( "A Variable Value");
```

Workflow catalog variables

Workflows that are associated with the Requested Item [sc_req_item] table have a specific type of workflow input.

The inputs into this workflow are essentially question:answer pairings that, when associated with a specific catalog task, become options on the task form. These options are generated by that catalog task activity within a workflow.

Scope

For the purposes of Service Catalog and workflow, a variable's scope determines its availability to a catalog task activity within a workflow. You can define variables as global or catalog item-specific. When a variable is associated to a catalog item and the workflow generating the catalog task is associated to the catalog item, the variable scope determines which variables are available for mapping within the catalog task activity in a workflow. If a workflow is associated with Requested Item [sc_request_item], and is not specifically associated with a catalog item, any catalog variable with a blank Cat Item field value is available to all catalog task activities within the workflow.

Declaration

You can declare requested item catalog variables at the catalog item level or at a global level.

About this task

You can declare global catalog variables using the Workflow Editor context menu.

Also see, Global variable declaration option 2.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out a workflow that runs against the Requested Item [sc_req_item] table.
3. Click the menu icon and select **Edit Catalog Variables**.
4. Click **New** to create a new variable or select an existing variable.
5. Select the **Global** check box.
6. Click **Submit**.

Global variable declaration option 2

You can declare global catalog variables using the Service Catalog.

Procedure

1. Navigate to **All** > **Service Catalog** > **Item Variables**.
2. The list of variables that appears in the workspace has a default filter of **Cat Item != <blank>**. Change the filter to **Cat Item = <blank>** and run the query.

   The catalog variables that appear are available to any catalog task that is initiated from within a workflow.

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3. Click **New** to create a new variable.
4. Leave the **Cat Item** field blank.
5. Select the **Global** check box.
6. Click **Submit**.
   Also see, Global variable declaration option 1.

Catalog item specific variable declaration option 1

You can declare a catalog item-specific variable.

About this task

These variables are only available to the catalog item referenced in the **Cat Item** field on the variable record.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Variables** > **Item Variables**.
   Note the list of variables that appears in the workspace has a default filter of **Cat Item != <blank>**.
2. Enter or select a catalog item in the **Cat Item** reference field.
   Selecting a **Cat Item** restricts the scope and availability of the catalog variable to that specific catalog item.
3. Click **Submit**.
   Also see, Catalog item specific variable declaration option 2.

Catalog item specific variable declaration option 2

You can declare a catalog item-specific variable directly from a catalog item record.

About this task

Creating a catalog variable in this way automatically sets the **Cat Item** reference to the catalog item selected.

Procedure

1. Navigate to **All** > **Service Catalog** > **Catalog Definitions** > **Maintain Items**.
2. Select or create an a catalog item.
   Note the **Variables** related list. All variables declared using this related list have a **Cat Item** reference value of the current catalog item.
3. From the **Variables** related list, click **New**.
4. Ensure that the **Cat Item** field correctly references the catalog item previously selected or created.
5. Go to or open the **Question** section or tab.
6. Add a **Question**.
7. Add a **Name**.
   Variable names should not include white space and cannot begin with a number.
8. Click **Submit**.
   Also see, Catalog item specific variable declaration option 1.

Display

Catalog specific item variables are visible in several places depending on where in the process the variable is viewed.

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Declaration can happen and variables can be seen from within the menu, inside both the **Maintain Items** module and in the **Item Variable** modules of the Service Catalog.

Within a workflow, the Catalog Specific Item variables are available to the **Catalog Task** activity in the form of a slushbucket at the bottom of the **Catalog Task** activity. Item variables that are selected, are the question and answer pairs that will appear on the task that is generated by that instance of **Catalog Task** when executing that workflow.

If a workflow is associated with a specific catalog item, the association acts as a filter for item variables that appear in the slushbucket of the **Catalog Task** activity.

The last place the variables are seen is in the task form that is generated by the Catalog Task Item. The variables selected in the slushbucket are the question and answer pairs that appear to the user on the task form.

Access and assignment

The Catalog Item Variables are available and assigned to a specific **Catalog Task** activity (thereby to a specific task) using the slushbucket entry of a catalog task.

The user working the task enters the values of the variables.

To access the values of a Catalog Item Variable inside a script:

```
var now_GR  = current ; // or create and query a new GlideRecord
var itemVariable  = now_GR. variables [ variableName
  ] ; //access the service catalog variable identified by the
 variable name.
var itemVariableValue  = itemVariable. getValue ( ) ;
var itemVariableName  = itemVariable. getName ( ) ;
var itemQuestion  = itemVariable. getQuestion ( ); //All
 GlideappQuestion API are accessible on itemQuestion
```

Workflow events

The system employs two types of events: registered platform events and workflow events.

Registered platform events

Registered events are created in business rules and are used for such tasks as sending email notifications when records are inserted into the database. Workflow events are registered within workflows only and are not used anywhere else in the platform. Registered platform events can be triggered by a workflow for external use, but cannot be used within a workflow.

Workflow events

Workflow events follow different rules than platform events that are registered using the event registry. Platform events are entered into the Event Registration [sysevent_register] table and are available for platform processes to use. Workflow events are triggered exclusively for the workflow engine and are used only to direct the work of executing workflow contexts. When an event is registered in a workflow, it is attached to a currently executing activity in the **registered_events** column of the Workflow Executing Activity [wf_executing] table.

Workflow events also can be broadcast to a workflow from any scripting source that has access to the workflow context, such as a script include or a **Run Script** activity. In this case, the event, such as **cancel**, is passed to all records in the Workflow Executing [wf_executing] table for a specific context.

Whether by registry or by broadcast, an event is handled by the activity definition associated with the currently executing activity. Each activity definition comes with a set of handlers.

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For example, most activities come with `onExecute`, `onCancel`, and `onUpdate` event handlers. As an example of a more specific event, the **Approval - User** activity also comes with `onDetermineApprovalState`, which is specific to the work of the approval activity.

Multiple parallel events

A single workflow can have multiple event threads running concurrently, such as when a workflow has timers that overlap on separate workflow branches. If any additional thread completes before the first thread, the system stores event information from the additional thread on the Workflow Queued Commands [wf_command] table. After the first thread completes, the system retrieves the information stored by the additional thread and proceeds through the workflow with the event information from each thread.

Workflow events in the base system

Several workflow events are available in the base system.

Workflow events in the base system

Event	Description	Purpose	To use
activityComplete	String value used by activity definitions to respond to the `onActivityComplete` event handler.	Informs records in the Workflow Executing Activity [wf_executing] table about the completion of other activities in the same workflow context.	If the activity is allowed to set the boolean value for `wf_executing.notify_ter` then set the value to `true` `(activity.notify_termin` `true)` during the `onExecute` e
otherEvent	String value used by the **Join** activity to respond to an otherEvent.	Informs records in the Workflow Executing Activity [wf_executing] table about an otherEvent that has completed.	The **Join** activity transitions from **r** preceding activities. These preced all create a wf_executing record, w a check to see if the record alread **Join** already exists, then the **Join** the executing transition sets the w record for deletion.
timer	String value used by workflow activities to respond to a **Timer** activity that has expired.	Allows wf_executing records to be informed about a timer activity that has completed and has fired the timer event.	The **Timer** activity schedules a job script. The script calls fireEvent (w timer).
execute	String value used by workflow activities to respond to a **Timer** activity that has expired.	Informs a record in the wf_executing table with the initial state of **Executing** to proceed with its primary work.	The workflow engine, for each tran executed, creates an executing re state of **Executing**. Once created, record is put in a queue for proces each item in the queue, the Rhino established, the activity definition the executing record is instantiate `run()` function is called. When th record is **Executing**, this function a `onExecute`.
execute (specific to **Lock**)	String value used by the **Lock** activity to respond to a waiting lock that is	Informs a wf_executing record waiting to execute	**Lock** activity schedules a job with that uses the workflow script inclu

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Workflow events in the base system (continued)

Event	Description	Purpose	To use
	ready to make another attempt to obtain a specific lock. This execute is different than the previous execute because it is called on a separate thread, at specified intervals, and is treated as an outside event.	that the specified wait interval has passed and that it should attempt to get the lock again.	*`fireEvent(wf_executing, 'execute')`* method.
determineApprovalState	String value used by approval activities to respond to a change in the overall approval status of the current record.	Informs wf_executing records for approval activities about an approval that completed and triggered the timer event.	**Approval Coordinator** both regist the event and triggers the event. T approvals have listeners that dete approval state.
cancel (from within activity definitions)	String value used by workflow activities to respond to a request for cancellation.	Informs all wf_executing records in a context that the workflow is being canceled.	The **End** activity uses the global *`workflow.broadcastEvent`* to interrupt the currently running w records. This changes the state of to **Cancelled**.
cancel (outside current context)	String value used by workflow activities to respond to a request for cancellation.	This event is the same as the cancel event above and handled the same. However, the management of this event is subtly different. This event informs all wf_executing records in a context that the workflow is being canceled. The event is managed via the *`onCancel`* event handler of each executing activity definition, but the event is called differently. In particular, the call to cancel from outside an activity definition is blocked by the current mutex. This is a significant difference in that	Any script can call cancel on a kno context via the workflow script incl example, `var w = new Work w.cancel(context); //wh` is a GlideRecord of the context to

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Workflow events in the base system (continued)

Event	Description	Purpose	To use
		the event does not interrupt a currently executing activity that is still operating within the parameters of the current mutex.	
stop (see **End** activity)	The **End** activity checks for this event.	If the stop event is the current event, then the cancel operation of the **End** activity is bypassed.	Only in the **End** activity.
listener	String value that the workflow (subflow) activity triggers as an event.	When a main workflow calls a subflow, the workflow keeps the ID of the subflow's context in the scratchpad. When the subflow is complete, it triggers the listener event via a business rule.	The listener event is passed to the context on completion of a subflow managed by the onListener action workflow activity.
probe_complete	String value triggered in the workflow by an Orchestration activity indicating that the MID Server has completed a task.	The probe_complete event is triggered from Orchestration sensor processors via the workflow helper function `handleEventById`.	The `onProbe_complete` event the `WebServiceActivityHan` used by most Orchestration activi
pause	String value sent to a workflow from an SLA to pause the **Timer** activity.	When an SLA is paused, the SLA workflows must be paused if there is a timer running.	Use is exclusive to the SLA timer
resume	String value used by the **Timer** activity to resume a paused timer (see pause).	When an SLA is resumed, the SLA workflows must be resumed as well.	Use is exclusive to the SLA timer.

Glide events relative to workflows

Workflow uses several Glide events.

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Workflow Glide events

Event	Description	Purpose	To Use	Source	Thread	Listeners
Insert	Global event set upon the insert of a GlideRecord that causes the script engine, and through that the workflow engine, to wake up.	Starts workflows that are associated with the current GlideRecord either by reference, as in request items and SLA timers, or by conditions associated with the GlideRecord's table.	There is no explicit customer-facing use for this in a workflow. It is part of the Glide engine, and with this event, the only thing workflows can do is start. Workflows can also be started manually using a script.	Workflow Engine, RunEngine	Current thread, current mutex	User action of insert
Update	Global event set upon the update of a GlideRecord that causes the script engine, and through that the workflow engine, to wake up.	Looks to the Workflow Context [wf_context] table to find running workflows that are associated with the current GlideRecord by document ID.	There is no explicit customer-facing use for this in a workflow. It is part of the Glide engine, and with this event, the only thing workflows can do is advance through the next set of transitions.	Workflow Engine, RunEngine	Current thread, current mutex	User action of update of a GlideRecord
Delete	Global event set upon the delete of a GlideRecord that causes the script engine, and through that the workflow engine, to wake up.	Looks to the Workflow Context [wf_context] table to find running workflows that are associated with the current GlideRecord by document ID.	There is no explicit customer-facing use for this in a workflow. It is part of the Glide engine, and with this event, the only thing workflows can do is advance through the next set of transitions.	Workflow Engine, RunEngine	Current thread, current mutex	User action of delete of a GlideRecord
Query	Global event set upon the query of the Glide database that causes the script engine, and through that the	Looks to the Workflow Context [wf_context] table to find running workflows that are associated with the current GlideRecord by document ID.	There is no explicit customer-facing use for this in a workflow. It is part of the Glide engine, and with this event, the only thing workflows can do is advance	Workflow Engine, RunEngine	Current thread, current mutex	User action of query of a GlideRecord

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Workflow Glide events (continued)

Event	Description	Purpose	To Use	Source	Thread	Listeners
	workflow engine, to wake up.		through the next set of transitions.			

Workflow event-specific functions

There are several functions that relate specifically to workflow events.

Workflow event-specific functions

Function	Description	Purpose
registerForEvent (eventName)	Function in the workflow environment that writes events represented as strings to the `wf_executing.registered_events` field.	The workflow events are just strings. When an activity that has registered for an event executes, a comma delimited set of events is stored with the Workflow Executing Activity [wf_executing] record. When the event is triggered in the workflow context, the wf_executing table looks for all executing records that contain the string that represents the event in the `wf_executing.registered_event` field
unRegisterForEvent (eventName)	Function in the workflow environment that removes a string value representing an event that has been written to the `wf_executing.registered_events` field.	The workflow events are just strings that are written to the `wf_executing.registered_event` field. When an activity unRegisters for an event, the comma delimited set of events stored with the Workflow Executing Activity [wf_executing] record is searched, and if that string is found, it is removed.
fireEvent (eventName)	Function in the workflow environment that examines the contents of the `wf_executing.registered_events` field, comparing its contents to the `eventName` passed in.	The workflow events are just strings that are written to the `wf_executing.registered_event` field. When *`fireEvent(eventName)`* is called by a workflow activity, the workflow engine queues up any executing records that contain the string in the registered field.
fireEvent (eventRecord, eventName)	Function in the workflow environment that sends an event to a specific Workflow Executing Activity [wf_executing] record. The `eventRecord` is a GlideRecord of the type wf_executing.	This event call expects an *`onMyEvent`* event handler in the activity represented in the event record (Workflow Executing Activity [wf_executing] table). When *`fireEvent(eventRecord, eventName)`* is called by a workflow activity, the workflow engine queues up the specific executing record with that event and passes the event into the activity definition for the on<eventName> handler to manage. This event is queued up in its

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Workflow event-specific functions (continued)

Function	Description	Purpose
		own mutex, so the current queue complete before this event is processed.
fireEvent (eventRecordSysId, eventName)	Function in the workflow environment that sends an event to a specific Workflow Executing Activity [wf_executing] record. The `eventRecordSysId` is the sys_id of a GlideRecord of the type wf_executing.	This is the same as the *`fireEvent`* above except that it accepts an ID and returns the Workflow Executing Activity [wf_executing] record.
fireEvent (eventRecordSysId, eventName, optionalJSONObject)	Function in the workflow environment that sends an event to a specific Workflow Executing Activity [wf_executing] record. The `eventRecordSysId` is the sys_id of a GlideRecord of the type wf_executing.	This is the same as the *`fireEvent`* above except that it accepts a JSON object as a third parameter. This object can specify any data expressible as JSON. You can also specify additional functionality when creating a workflow activity.
broadcastEvent (contextId, eventName)	Function in the workflow environment that sends an event to all currently running Workflow Executing Activity [wf_executing] records in a specified context, regardless of their state.	This is the same as the *`fireEvent`* above except that it accepts an ID and returns the Workflow Executing Activity [wf_executing] record.
broadcastEvent (eventName)	Function in the workflow environment that sends an event to all currently running Workflow Executing Activity [wf_executing] records in the current context, regardless of their state.	This should not be confused with *`broadcastEvent`* above. This event is only available to current Workflow Executin Activity [wf_executing] records.

Event-specific workflow activities

The following workflow activities trigger events.

Event-specific workflow activities

Activity Name	Description	Purpose	To Use	Source	Thread	Listeners
Create Event	Requires an event from the event registry rather than a workflow event. This activity is located in the **Notification** category of the workflow tree.	Fires the notification event specified in the Workflow Activity [wf_activity] table.	1. Navigate to **System Policy** > **Events** > **Registry** 2. Create an event. 3. Navigate to **System Policy** > **Templates** and create an Email templates. 4. Navigate to **System Policy** > **Email** > **Notifications**. 5. Create an email notification	Event Registry	Triggered in the current thread and handled on the worker thread in notifications. Never processed by a workflow	On the notificati thread, outside c workflow

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Event-specific workflow activities (continued)

Activity Name	Description	Purpose	To Use	Source	Thread	Listeners
			that is triggered by the event you created and sends the template you created. 6. On the workflow canvas, drag the **Create Event** activity onto the canvas and associate it with the newly registered event. When the workflow executes, the event is created and the email associated with the event is sent.			
Wait for WF Event	Listens for workflow events, as described in the Workflow Events in the Base System table, and only within the current context. This activity is located in the **Conditions** category of the workflow tree.	Waits for another transition branch of the current context to trigger an event.	Takes an event name as input. When the activity is executed, the specified event name is added to a string array stored in the **registered_events** column. The values in this column are in a list of all events the activity waits for when it is executing.	The **Wait for WF Event** activity has a generic `onUnhandledEvent` that tests the current event against the value that was passed to the variable. If they match, the **Wait for WF Event** moves the workflow forward.	Triggered in the current thread or from a script include	The `onUnhandled` of the **Wait for W Event** activity

Workflow stages

Workflows can indicate workflow progress by updating any field designated as a stage field.

For example, the Incident [incident] table has an **Incident state** field that indicates progress, but the service catalog uses the **Stage** field.

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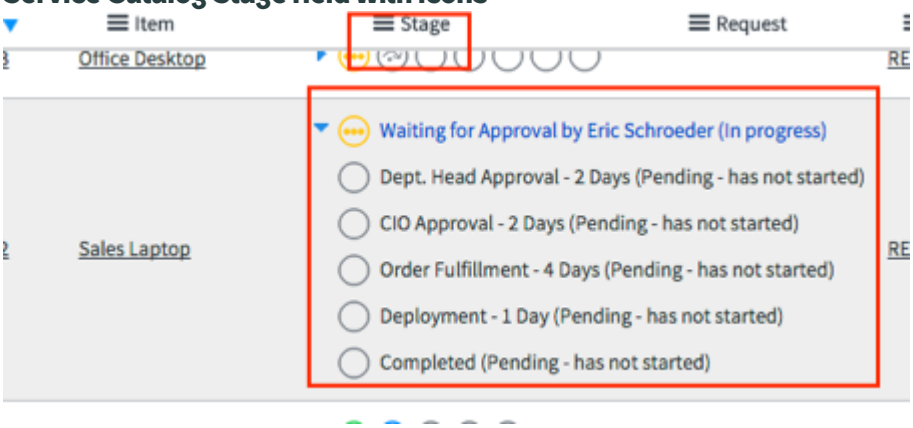
To indicate the workflow's progress through the possible stage values, the interface updates the **Stage field** selected in the workflow properties. Available fields depend on the table used by the workflow. If the field provides a choice list, then the choices are available as stage values for the workflow. If the field is a workflow field, it displays an icon to indicate the workflow's progress, as with the Service Catalog's **Stage** field.

Service Catalog Stage field with icons



After stages are added to the workflow, they can be assigned to each workflow activity. If an activity with an assigned stage is encountered when the workflow runs, the workflow engine assigns the stage to the record associated with the workflow context.

For workflows that use the Requested Item [sc_req_item] table, the stage field is automatically set to the **Stage** field of the table and cannot be changed. The stage state displayed for a workflow running on the Requested Item table is based on the state of the workflow activities.

- If an activity is active, then the stage is shown with the state of **In progress**.
- If an activity is in the **Pending** or **Completed** state, the stage reflects this state.
- If an activity is canceled, **Request Cancelled** appears in the **Stage** field. The "Cancelled" label set in the wf_stage table is a reserved word, and does not display in the **Stage** field.

How stage values are derived

Stage values are derived from various sources in the interface.

> **Note:**
> An updated method for managing workflow stages as a set is also available. For information about grouping and reusing stages, see Workflow stage sets.

Stage values are derived from the following sources:

- **Choices for Stage column**: Choices defined for the column selected as the **Stage** column for the workflow.
- **Default stages for table**: Stages defined in the Stage Default [wf_stage_default] table for the table selected.
- **Workflow-specific stages**: Applied only to the workflow for which they were defined in the Workflow Stage [wf_stage] table.
- **Stage values in existing records**: Values from the designated **Stage** column in the table assigned to the workflow are inherited from existing records.

If the stage field for a workflow is the table column named **Stage**, then the progress of the workflow appears in any list view containing the **Stage** column.

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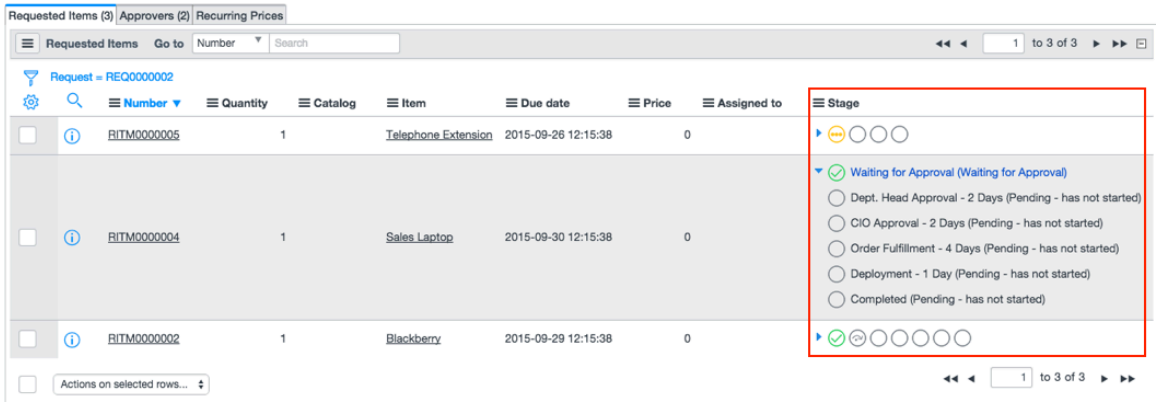
Stages in a list



Stage values shown in the list views are accompanied by the state, based on the workflow activities being executed. If an activity has a stage specified for it, and the activity is currently active in the workflow, then the stage is shown with a state of **In progress**. Similarly, if the activity is in the **Pending** or **Completed** state, the stage reflects this state.

Example

If the workflow table is Request Item [sc_req_item], then the stage field is automatically set to the **Stage** column of that table and cannot be changed. The following stage values for the request item are displayed in a choice list from the Dictionary Entry [sys_dictionary] table:

- Waiting for Approval
- Fulfillment
- Delivery

In addition, the Request Item table has the following default stages:

- Request Cancelled
- Completed

Note:
If an activity is cancelled, Request Cancelled appears in the **Stage** field. The "Cancelled" label set in the wf_stage table is a reserved word, and does not display in the **Stage** field.

When you edit available activity stages in the Workflow Editor, the list displays the following stage values:

- Waiting for Approval
- Fulfillment
- Delivery
- Request Cancelled
- Completed

The following diagram depicts the process used to gather stage values from the Request Item table to populate the **Stages** list in workflow activities.

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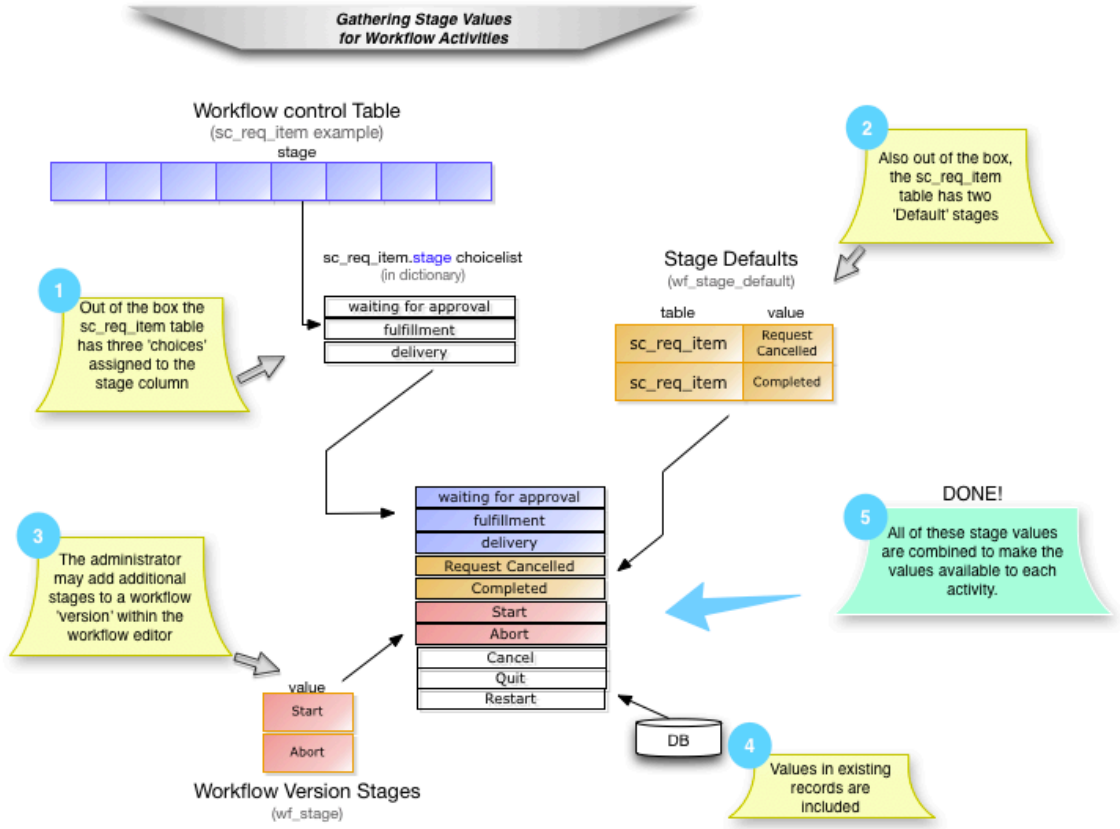

Note:
If you are creating a workflow with a table other than Request Item [sc_req_item], you must select a **Stage field** in the workflow properties for the workflow to have stages.

Use workflow stages

You can add or modify workflow stages.

Before you begin

Role required: workflow_admin, workflow_creator, or admin

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Create a new workflow by clicking **New** or open an existing workflow.
3. In the Workflow Properties form, if the table is not the Requested Item [sc_req_item] table, select a field to display stages in the **Stage** field property.

   Available fields depend on the table selected for the workflow.
4. After assigning a list of stages to the workflow, you can set a stage value in any of the workflow activities that provide a **Stage** field in their dialog box.

   Setting a stage value in a workflow activity tells the workflow engine to assign that stage to the record associated with the workflow context when the activity is encountered during a run.

   When an activity starts with a specified stage, the platform updates the **Stage** field with the current value. In workflows run against the Requested Item [sc_req_item] table, the `sc_req_item.stage` field is defined as a workflow type field.

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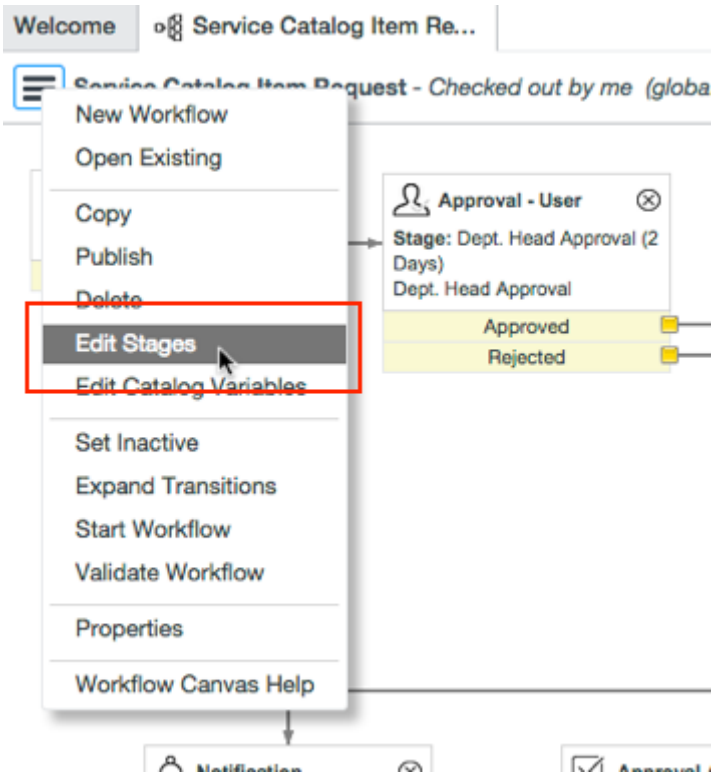
When displaying the stages for a workflow on the Requested Item [sc_req_item] table, the stage state is based on the state of the workflow activities. If an activity has a stage specified for it, and the activity is currently active in the workflow, then the stage is shown with an **In progress** state. Similarly, if the activity is in the **Pending** or **Completed** state, the stage reflects this state.

5. To edit the workflow-specific stages for an existing workflow, click the gear icon in the header bar and select **Edit Stages**.

   Again, these stage values are combined with the choices, defaults, and existing values.



Example: Workflow stages

To optimize the use of stages, you can assign a stage to multiple activities in a workflow. For example, if your workflow uses the following activities to create tasks:

1. Get approval
2. Order equipment
3. Receive equipment
4. Add equipment to CMDB
5. Set up equipment
6. Install software
7. Configure software
8. Deliver to user

The following stages might be used:

- Approval
- Order

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- Configure
- Deliver

A good practice is to assign stages to the activities as follows:

Examples of stages added to workflow activities

Activity	Assigned stage
Get approval	Approval
Order equipment	Order
Receive equipment	Order
Add equipment to CMDB	Order
Set up equipment	Configure
Install software	Configure
Configure software	Configure
Deliver to user	Deliver

When the **Order equipment**, **Receive equipment**, or **Add equipment to CMDB** activity is active, the **Stage** display shows that the **Order** stage is **In progress**.

Add and translate stages

You can add default stages to use for a table, and stages to existing workflow

Add default stages for a table

You can assign a stage set as a default set to any number of tables.

About this task

The stages in the assigned stage set pre-fill the workflow version stages when you create a new workflow for the associated table.

Procedure

1. Navigate to **All** > **Workflow** > **Default Stages (by table)**.
2. Click **New**.
3. Select a stage **Set**.
   You can create a new set by clicking **New**, typing a name, and clicking **Submit**.
4. Select a corresponding **Table**.
5. Click **Submit**.

   The stages in the selected stage set are automatically added to any new workflows that use the corresponding table.

Add a stage to an existing workflow

If a stage required for a workflow has not been imported or is not in the stage set assigned to the workflow table, you can add it to the workflow manually.

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Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out the workflow.
3. In the title bar, click the menu icon and select **Edit Stages**.
4. In the Workflow Stages list, click **New**.
5. On the Workflow Stage form, fill in the fields as appropriate.

   Do not use a **Name** or **Value** field value that already exists in the base system.

   #### Workflow stage fields

Field	Description
Name	The name of the stage as it appears in workflow fields.
Value	The value of the stage when it is referenced from elsewhere in the system, such as in a script.
Duration	The default duration for the stage. Currently not used.

6. Click **Submit**.
7. Publish the workflow.

Add a stage to a workflow activity

After stages are added to a workflow, you can assign them to the workflow activities.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out the workflow.
3. Double-click the activity.
4. In the **Stage** field on the Activity Properties form, find and select the stage to display when the workflow reaches the activity.
5. Click **Update**.

Translate workflow stages

You can provide translations for workflow stage names so the names appear in the language selected for the instance.

Before you begin

The instance must already have language internationalization plugins installed. For more information, see Activate a language.

About this task

Language-specific text appears in Field types displayed in a list, workflow stage sets, and the Workflow Editor for users with that language selected. Language-specific text does not automatically appear when displaying stages on a form. To translate stages on a form, add translated text to the workflow field choices.

You can add translated text for any language enabled on the instance. For example, to translate workflow stages into French:

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Procedure

1. Set the interface language to **French**.
2. Navigate to **Workflow** > **Workflow Editor**.
3. Open and check out a workflow.
4. In the title bar, click the menu icon and select **Edit Stages**.
5. Edit the **Name** field for each stage and enter the text to display to French users.

   Do not change the **Value** field.
6. Confirm that the workflow stages display the French text.

Result

Alternatively, to translate stages for multiple workflows at once, you can directly edit the Workflow Stages [wf_stage] table. For example, to translate workflow stages from multiple workflows into French:

1. Set the interface language to **French**.
2. In the application navigation filter, enter `wf_stage.list`.
3. Edit the **Name** field for each stage and enter the text to display to French users. Do not change the **Value** field.

Workflow stage sets

Stage sets are named groups of workflow stages commonly used together. Create a stage set and assign it as a default set to any number of tables. You can import the choice list values of a workflow field as stages for a workflow, and export a stage set to create a new one.

A single stage set usually represents a process, such as the stages required to display the progress of a service catalog request. You can also assign a stage set as the default set for workflows on specific tables.

In an active context, workflow stages provide summary-level feedback about the progress of a workflow. Stage icons display the status of each activity as it is being driven by a workflow. The system updates a **Stage** field, defined in the workflow properties, to indicate the progress of the workflow through the possible stage values.

Updates to workflow stage values

During an upgrade, the system makes changes to the **Value** field of records in the Workflow Stage [wf_stage] table.

- All entries are made lowercase.
- All spaces and special characters are replaced with underscores.

These changes support System Localization and enable workflows to display translated text in the **Stage** field.

Create a new stage set

You can create a new stage set by creating a stage set record and adding stage set entries manually.

About this task

Create a stage set record only when you want additional stages that are not available on the table by default.

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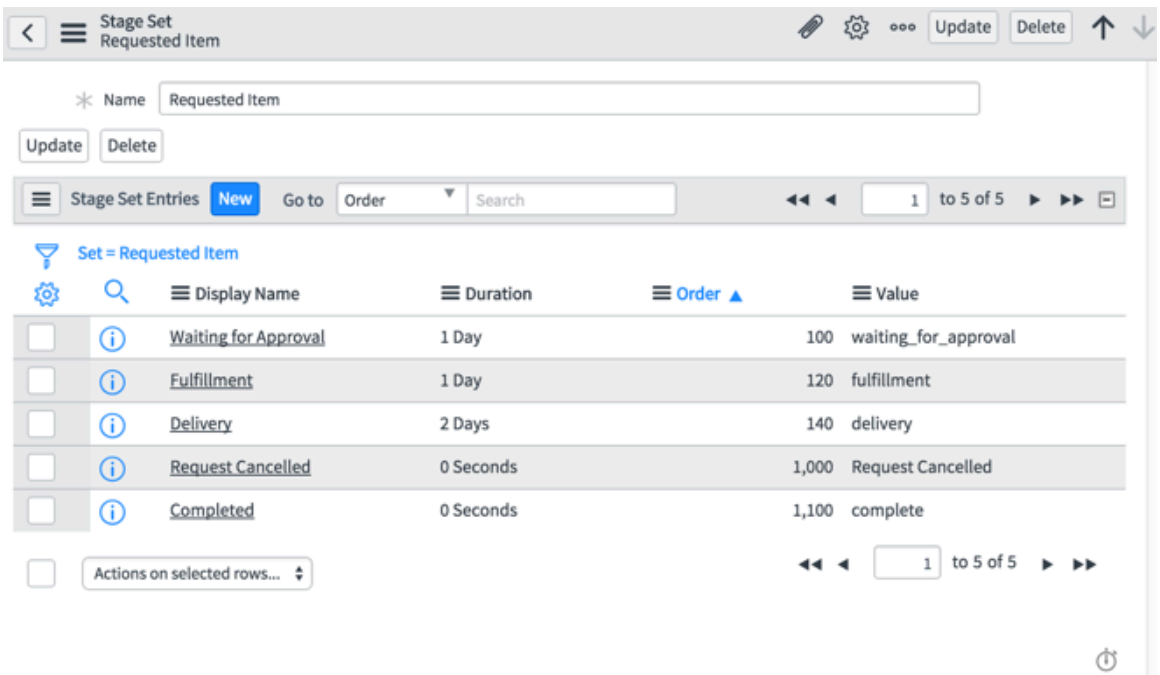
Procedure

1. Navigate to **All** > **Workflow** > **Stage Sets**.
2. Click **New**.
3. Enter a **Name** that indicates the purpose of the stage set.

   Example
   For example, you can create a Requested Item stage set to hold the stages commonly used by inventory tracking workflows or service catalog fulfillment workflows.
4. Click **Submit**.
5. Open the new stage set record.
6. In the **Stage Set Entries** related list, click **New**.
   Each stage set entry can be used as the **Stage** for an activity in a workflow that uses this stage set.
7. Enter a **Name** that indicates the stage name to appear in workflow fields.
8. Enter a **Value** to use when referencing the entry, such as in a script.
9. Click **Submit**.
10. In the **Stage Set Entries** related list, ensure that each entry has a unique **Order** value.
    Enter a low value for stages that should appear early in the workflow and a higher value for later stages.



What to do next

The stage set can be added to a workflow or assigned as the default stage set for workflows that are created for a specific table.

Use a default stage set

You can assign a stage set as a default set to any number of tables.

About this task

The stages in the assigned stage set pre-fill the workflow version stages when you create a new workflow for the associated table.

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Procedure

1. Navigate to **All** > **Workflow** > **Default Stages (by table)**.
2. Click **New**.
3. Select a **Table**.
4. Select the **Set** you want to assign to the selected table.
5. Click **Submit**.

Import stages from a choice list

You can import the choice list values of a workflow field as stages for a workflow.

Before you begin

Create a choice list as follows:

- Add a custom field of Type **Workflow** to the table.
- Configure the custom field to use a choice list.
- If you are creating a new field, set the **Choice List type** to **Display without --None--** and create the choices for the newly created field.

For more information, see Create a workflow stage field.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out the workflow.
3. In the title bar, click the menu icon and select **Properties**
4. In the Workflow Properties dialog box, click the **Stages** tab.
5. From the **Stage field** list, verify that the correct workflow field is selected.
6. In the Related Links section, click **Import Stages from Choice List**.
7. In the dialog box asking you to confirm that you want to import the choice list, click **OK**.
8. Click **Update**.

What to do next

The stage set can be added to a workflow or assigned as the default set for workflows that are created for a specific table.

Export a stage set from a workflow

You can create a new stage set by exporting the stages from an existing workflow as a set, instead of manually adding stage set entries to a stage set record.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out the workflow containing stages that you want to export as a new stage set.
3. In the title bar, click the menu icon and select **Edit Stages** to open the Workflow Stages dialog box.
4. In the Related Links section, click **Export to Stage Set**.
5. Enter a unique **Name** for the new stage set.
6. Click **OK**.

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What to do next
The stage set can be added to a workflow or assigned as the default set for workflows that are created for a specific table.

Add a stage set to a workflow

You can add any number of stage sets to an existing workflow.

About this task
When multiple stage sets have stage set entries with the same **Value**, the stage appears on the workflow only once.

Procedure
1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out the workflow.
3. In the title bar, click the menu icon and select **Edit Stages** to open the Workflow Stages dialog box.
4. In the Related Links section, click **Import from Stage Set**.
5. Select the stage set.
6. Click **Ok**.
7. Import additional stage sets as needed for the workflow.

What to do next
After you add all necessary stage sets to the workflow, you can add them to the workflow activities. For more information, see Add a stage to a workflow activity.

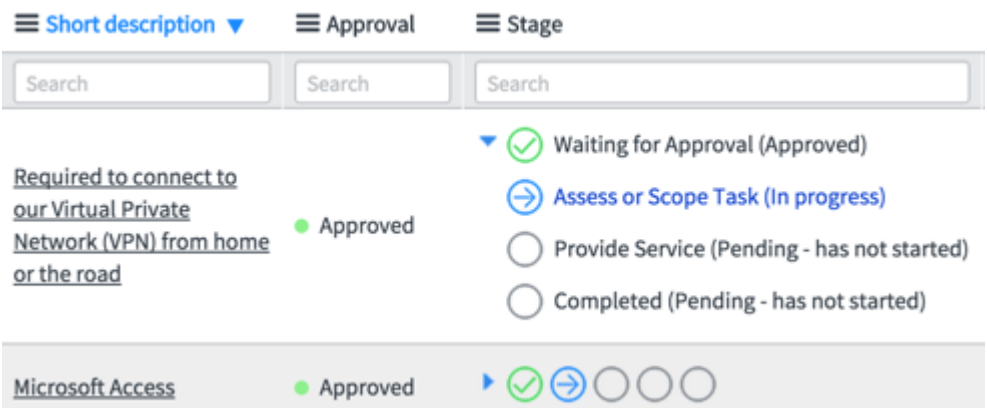
Create a workflow stage field

Workflows can provide a summary of workflow progress by updating any field of the **Workflow** type. If the field is a workflow field, it displays an icon to indicate the workflow stage progress.

Before you begin
Role required: admin

About this task
In a form, the workflow field displays the current stage as a choice list value.

In a list, the workflow field displays stage icons that represent the series of states, stages, phases, or tasks within a workflow. The stage icons are populated using the activity stages from the associated workflow. For more information, see Workflow stages.



To create a workflow stage field:

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Procedure

1. Navigate to **All** > **Workflow** > **Default Stages (by table)**.
2. Right-click near a column header and select **Configure** > **List Layout**.
3. Create a new field in lower right.
4. On the form view of the table used by the workflow, create a field with the **Type** set to **Workflow**.
   For detailed steps, see Add and customize a field in a table.
5. Click **Save**.
6. Right-click the field label and select **Configure Dictionary**.
7. Open a dictionary entry.
8. In the Choice List Specification section of the Dictionary Entries form, select **Dropdown with --None--** from the **Choice** list.
9. Click **Update**.
10. To ensure that the workflow field properly displays stages on the form, define a choice for each workflow stage.
    - To create workflow stages using a choice list that already has choices, you can import the stages from the choice list. A stage is created for each choice defined for the **Stage field** selected in the workflow properties. For detailed steps about importing a choice list, see Import stages from a choice list.
    - The **Value** of each choice must match the **Value** of the corresponding workflow stage.
    - Do not use spaces in the **Value** field for either choices or stages. Use underscores in place of spaces.
    - Make the choice list read-only. If a user changes the stage value for a record from the choice list rather than allowing the workflow to control the value, the workflow-driven, legacy, and linear renders may not work as intended. You can also use business rules or events to ensure the workflow progresses accordingly.

    For detailed steps on defining choice lists, see Define an option for a choice list.
11. To see workflow stages as icons, add the field to the list layout of the workflow table.
    For detailed steps, see Configure the list layout.

What to do next

After you create or update the workflow field:

- Unless the workflow uses the Requested Item [sc_req_item] table, ensure that the workflow field is selected from the **Stage field** list in the workflow properties. For detailed steps, see Select a stage field. If a workflow uses the Requested Item table, the stage field is automatically set to the **Stage** field of the table and cannot be changed.
- Work through the workflow. Any other updates made to the workflow field, such as updates from business rules or other scripts, can interfere with displaying workflow stages.

Select a stage field

A **Stage field** allows the workflow context to show additional workflow information, such as the stage name and the estimated completion time for an activity.

Before you begin

Ensure that the workflow field you want to use as the stage field is configured to properly display stages. For detailed steps, see Create a workflow stage field.

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About this task

Unless the workflow uses the Requested Item [sc_req_item] table, you can specify which field from the workflow table is the stage field. For workflows that use the Requested Item [sc_req_item] table, the stage field is automatically set to the **Stage** field of the table and cannot be changed.

To add or edit a workflow stage field:

Procedure

1. Navigate to **Workflow > Workflow Editor**.
2. Create or check out the workflow.
3. In the title bar, click the menu icon and select **Properties**.
4. In the Workflow Properties dialog box, click the **General** tab.
5. In the **Table** list, verify that the table containing the workflow field is selected.
6. Click the **Stages** tab.
7. From the **Stage field** list, select the workflow field.
8. Click **Update**.

Display approvers in workflow stage fields

Enable workflow stage fields to display approvers, change the number of approvers to display, or disable displaying approvers.

Before you begin

Role required: admin

About this task

By default, only workflow stage fields that use the Workflow-driven renderer can display a list of approvers. Only these workflow stage renderer types support displaying approvers.

- Linear renderer
- Main flow renderer
- Workflow-driven renderer

Procedure

1. Navigate to **All** > **Workflow** > **Administration** > **Properties**.
   The system displays the Workflow Properties page.
2. Set the following properties.

Property	Description
Number of approvers to show if approvers are displayed for workflow stages. Only valid for supported list v2 renderers. glide.workflow.renderer.show_approver_limit	Sets the maximum number of approvers to display within a workflow stage field. The system displays an ellipsis character when there are more approvers than the display limit allows. ○ Type: integer ○ Default value: 5
Show approvers when displaying workflow stages with the Linear renderer.	Enables (true) or disables (false) the Linear renderer to display approvers.

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Property	Description
glide.workflow.renderer.linear.show_approver	○ Type: true | false ○ Default value: false
Show approvers when displaying workflow stages with the Main flow renderer. glide.workflow.renderer.mainflow.show_approver	Enables (true) or disables (false) the Main flow renderer to display approvers. ○ Type: true | false ○ Default value: false
Show approvers when displaying workflow stages with the Workflow-driven renderer. glide.workflow.renderer.workflowdriven.show_approver	Enables (true) or disables (false) the Workflow-driven renderer to display approvers. ○ Type: true | false ○ Default value: true

3. Click **Save**.
4. Add stages to workflows that have associated workflow stage fields.

> **Note:**
> If you add stages to a subflow, the parent workflow must also have stages.

5. For each approval activity you want to display approvers, select a **Stage** value.

Example
For example, the sample workflow **Service Catalog Item Request** has two approval activities. The first **Approval - User** activity has a **Stage** value of `Dept. Head Approval`. The second **Approval - User** activity has a **Stage** value of `CIO Approval`.

Result

The workflow stage field renderers you enabled display approvers up to the approver display limit. For example, a Workflow-driven stage field displays up to five approvers when the workflow reaches an approval stage.

Workflow stage field icons and tooltips

A workflow stage field displays icons to indicate the workflow stage.

Based on the stage renderer selected for the workflow, these icons may display a tooltip with additional information.

Workflow field icons

Icon	Workflow stage
	Current active step
	Approval pending
	Approval rejected
	Complete
	Late (Change/Request) or Canceled (Catalog)

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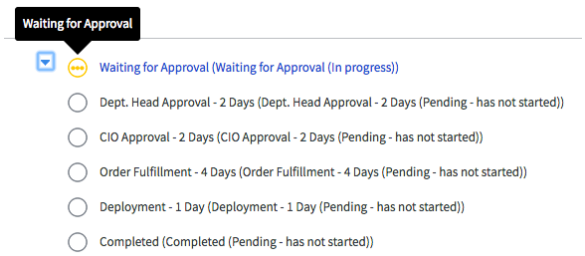
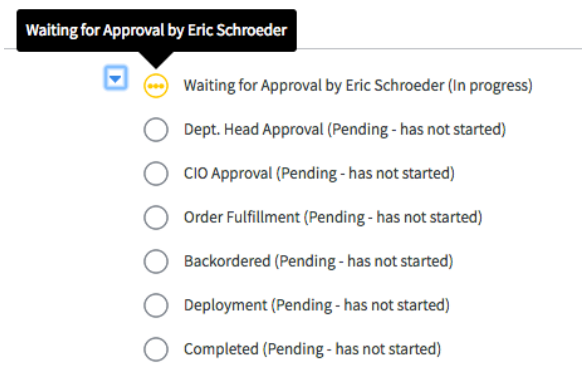
Workflow field icons (continued)

Icon	Workflow stage
	Skipped (Catalog only)

Stage tooltips

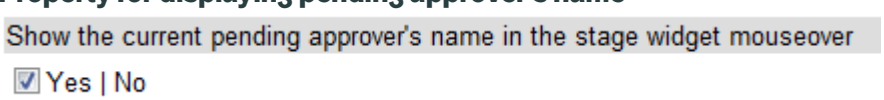
Based on the stage renderer selected for a workflow, workflow stage icons may display tooltips with detailed information about a stage.

Stage renderers and tooltip behavior

Renderer	Tooltip behavior
Legacy	When a user points to a stage, the tooltip displays the name of the stage. In the expanded view, the activity status appears in parentheses next to the stage. 
Other renderers	When a user points to a stage, the tooltip displays the name of the stage. If the stage is a gated approval, the tooltip also shows the name of the approver. In the expanded view, the activity status appears in parentheses next to the stage. 

If you do not want the approver's name included in the tooltip, navigate to **System Properties** > **Service Catalog** and clear the **Show the current pending approver's name in the stage widget mouseover** check box.

Property for displaying pending approver's name



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Workflow stage renderers

Workflow stage renderers determine how a workflow displays stages in a workflow field.

There are multiple renderers available.

Note:
Most workflows should use the workflow-driven renderer. This renderer is used by default for all workflows. Use a different stage renderer only after careful consideration and to satisfy specific requirements for how the stages appear.

Workflow-driven

Use the workflow-driven renderer as much as possible. This renderer displays icons for stages using the stage state controlled by the workflow. Icons are displayed in a way that is meaningful for many situations. This renderer can display stages from a main workflow and subflows. The order of the icons is determined by the expected path of the executing workflow. As the workflow progresses, stages on paths that the workflow did not take are removed from the display. Stages from paths other than the expected path are not included unless the workflow follows that path.

The **Stage order** field on the **Stages** tab has two options:

- **Computed** uses the actual workflow path in order
- **User-specified** uses the order specified in the **Order** column on the Workflow Stages record

Note:
If the workflow context for a request item has been deleted, the stages for that request item can no longer be rendered. This stage history is stored on the workflow context.

Main flow

The main flow renderer displays icons for stages defined in the main workflow only. Use this renderer when you do not want to expose the details of the subflows. For example, a single main workflow may run several subflows to handle implementation details. The stages in these subflows do not provide useful information for the user who starts the workflow, but are useful when editing the subflow. In this scenario, using the main flow renderer leads to the best user experience. The stage field displays the high-level process of the workflow without exposing unnecessary details.

The **Stage order** field on the **Stages** tab has two options:

- **Computed** uses the actual workflow path in order
- **User-specified** uses the order specified in the **Order** column on the Workflow Stages record

Linear

Linear rendering displays all stage icons from the main workflow and all subflows within a single workflow field on a list or form. It displays icons in a linear sequence regardless of the paths the workflow follows as it executes. This renderer uses stages defined in both the main workflow and any subflows that the main flow launches. The icons appear in the user-specified order. Skipped stages do not appear.

Use this renderer when the workflow stages must display in a consistent order and the actual details of how the workflow runs are less important. For example, a workflow may revisit or revert to previous stages based on one or more Condition Workflow activities. Displaying these loops in the stage field does not provide useful information to the user. In this scenario, using the linear renderer leads to the best user experience. The stage field displays the predefined process, including stages from subflows, in a consistent order.

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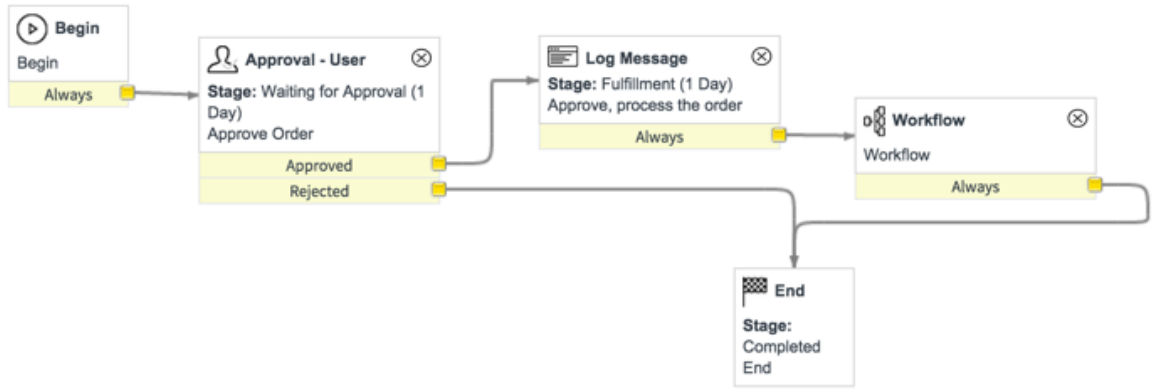
For example, you can create a service catalog workflow that uses a subflow to complete delivery of the requested item. The following images illustrate the main flow and subflow for ordering corporate-branded supplies.

Linear main flow



Linear subflow

The linear renderer displays all these stages in one workflow field. The parent workflow specifies the **Waiting for approval**, **Fulfillment**, and **Completed** stages. The subflow specifies the **Delivery** and **Waiting for Task**, and **Delivery OK** stages.

Progress bar

The progress bar renderer displays a single progress bar instead of a sequence of stage icons. This renderer is particularly useful when you want to display the general progress of the workflow as a percent. Each stage in the workflow controls an equal percentage of the progress bar. For example, if a workflow has 10 stages, reaching each stage causes the workflow field to display an additional 10% of the progress bar. Stage names do not appear in the progress bar.

The progress bar renderer provides a way to display the status of a workflow that has a large number of stages. Other rendering options may provide a better user experience when rendering fewer than four stages in a single workflow.

The **Stage order** field on the **Stages** tab has two options:

- **Computed** uses the actual workflow path in order
- **User-specified** uses the order specified in the **Order** column on the Workflow Stages record

Workflow field progress bar

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Legacy

The legacy renderer displays stages in the same way as releases prior to Dublin. When an instance is upgraded from a release prior to Dublin, all existing workflows are set to use the legacy renderer. Whenever possible, use a different stage renderer instead. If you want your workflow to maintain pre-Dublin behavior, use the Legacy option. The legacy renderer sometimes assigns incorrect data to and/or reports incorrect data from the workflow stage field. If possible, we recommend all workflows use the Workflow-driven renderer.

With the legacy renderer, you can create and reference a custom workflow field icon set by setting the icons attribute to a new script include. For example, to use the *WorkflowIconsSCR* script include to define which icons to use, add the attribute *icons=WorkflowIconsSCR* to the **Attributes** field of the dictionary entry for the workflow field. To use the default icon display behavior, use the attribute *icons=WorkflowIconsStages*.

The legacy renderer works with all tables except the Requested item [sc_req_item] table. In this case, use the requested item renderer instead.

Requested item

The requested item renderer functions the same way as the legacy renderer, but is for use with the Requested item [sc_req_item] table.

Only in Now Mobile, default stage renderer is used.

Select a stage renderer

In most cases, the default workflow-driven renderer should be used. If you have specific requirements for displaying stages, you can select a different stage renderer.

Before you begin

Consider the following when selecting a stage renderer:

- Use the workflow-driven renderer if possible. This is the default renderer that should be used in most cases.
- Use the legacy renderer only if your instance was upgraded from a release prior to Dublin and you want your workflow to maintain pre-Dublin behavior.

To use linear, main flow, or progress bar rendering, satisfy the following requirements.

Linear and progress bar renderer requirements

Renderer	Requirements
Linear	• The parent workflow and all subflows must modify the same current record. • In the properties for all subflows, the **Stage field** value for all subflows must match that of the parent workflow. • The parent flow and all subflows must contain the same stages. Use a stage set to ensure the parent flow and all subflows have the same stages. • On the workflow canvas, each workflow needs only the stages used directly by that workflow. It is not necessary to add stages from subflows to activities on the parent flow, or stages from the parent flow to activities on the subflows.

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Linear and progress bar renderer requirements (continued)

Renderer	Requirements
Main flow	• The workflow contains subflows. • You do not want or need to reveal the details about the subflows.
Progress bar	• The workflow properties must have a **Stage ordering** value of **User-defined** • There must be workflow stages within the workflow. • Because stage names do not appear in a workflow field when using the progress bar renderer, you can simplify stage names to represent a percentage of the workflow. For example, if a process has four main steps, name the workflow stages as 25%, 50%, 75%, and 100%. Enter the numerical value of each stage, such as 25, in the **Value** and **Order** fields.

About this task

To select a stage renderer:

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out the workflow.
3. In the title bar, click the menu icon and select **Properties**.
4. In the Workflow Properties dialog box, click the **Stages** tab.
5. From the **Stage rendering** list, select a stage renderer.
   - If you are using two workflows to update two unique workflow fields on a single record, both workflows must use a non-legacy renderer. You can select a different stage renderer for each workflow but do not select **Legacy** for either one.
   - If you want to use the linear renderer, make sure you select **Linear** in the properties for the parent workflow and all subflows.
6. Click **Update**.

Workflow fields with deleted records

Workflow fields may indicate when a record required by the workflow is deleted.

After a referenced record is deleted, the reference in the primary record is no longer valid. If the stage renderer detects a reference that is no longer valid, the stage field displays a message about the deleted record.

Administrators can restore deleted records. For more information, see Use the Deleted Records module to restore a deleted record.

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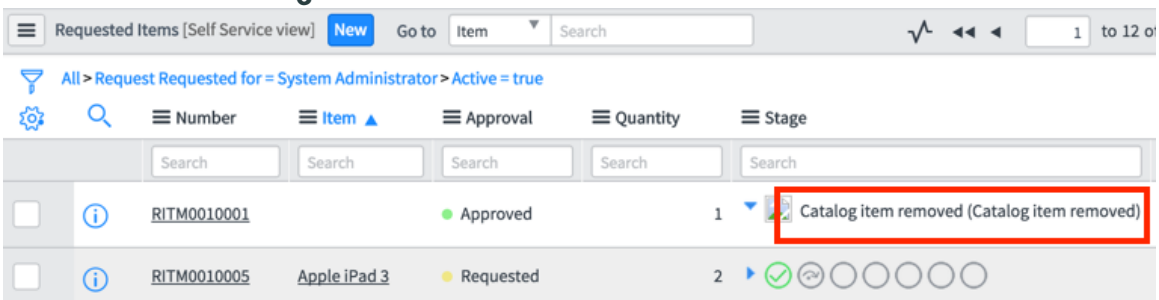
Workflows with missing records



The image shows a list with two workflows. The top request does not have an associated request item. The bottom request has an associated request item, but the item does not have an associated workflow context.

Workflow concepts

You can do many things using the Workflow Editor.

Important:
As of the Zurich release, new customers no longer receive the legacy workflows created and published by ServiceNow, Inc.. All legacy workflow functionality has been replaced by Workflow Studio content. Only customers who upgraded from prior versions retain the ability to use and edit existing legacy workflows. While all customers retain the ability to create legacy workflows, you are strongly encouraged to instead use Workflow Studio to create process automation content. Only Workflow Studio will receive new features and enhancements.

- Modify core activities and exit conditions.
- Create custom activities and reuse the data for other workflows.

  See Orchestration activity designer.
- Download activity packs from the ServiceNow Store and create packs for upload.
- Edit workflows graphically.
- Define transitions between workflow activities.
- For the table that corresponds to the workflow, customize business rules.
- Summarize workflow progress through stages.
- Validate workflows to identify potential problems.
- Publish workflows for other users.
- Edit multiple tables without needing to directly modify them.

Workflow versions

To prevent users from making changes to a workflow that affect other users of the system, workflows must be checked out before they can be edited.

Only one user can check out a workflow at a time. When a workflow is checked out, changes apply only to the user who has the workflow checked out. Other users can continue to use the published workflow. After the changes are complete, the workflow can be published so that it is available to all users.

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Note:
Because each workflow has a unique sys_id, different workflows can have the same name. This is typically expected in a domain-separated environment where users in different companies cannot see each other's workflows because they are in different domains. However, this can lead to confusion in other environments. In general, give each workflow a unique name to prevent workflow designers from making changes to the wrong workflow.

When a new version of an existing workflow is published, the changes are not applied to running workflow contexts. Any currently running workflow context continues using the workflow version that was available when the workflow started. The next time the workflow runs, it uses the updated, published version.

Workflow scope

Workflow application scope determines the access that an application has to the information in a workflow, specifically to the data contained in the activities in that workflow.

When a workflow is created, it inherits the application scope from the gear menu for the logged in user. This scope cannot be changed in the Workflow Editor. When the workflow executes, it runs in this scope and can only be called from a different application if the workflow's accessibility setting permits access to all scopes (public). Otherwise, the workflow's application scope is private to the application.

Note:
Any script that is created in the Workflow Editor, such as an advanced script in an *If* activity, runs in the scope of the workflow. All core activities provided in the base system or for Orchestration run in the scope of the workflow.

Custom activities run in their own scope, even if it is different from that of the workflow. The scope of a custom activity can be private or public. Any script that runs inside a custom activity with a scope can only access outside artifacts that are within the scope of that activity or artifacts that are configured to run in any scope. Conversely, an outside artifact can only access the script inside that private activity if the outside artifact is running in the same scope. Activities with public scopes can interact with outside artifacts in any application scope.

You can use private activities as part of a workflow that has a public application scope. These activities are protected from reaching outside of the workflow or from being reached from outside the workflow. For details about setting application scoping for custom activities, see the field description table for the appropriate activity template.

Note:
Custom activities uploaded to the ServiceNow Store must be configured as accessible to all application scopes.

Workflow scope restrictions

There are some restrictions to public and private application scopes.

During runtime, publicly scoped workflows can access other application resources, as long as these resources are set to be accessible to all application scopes. Privately scoped workflows in a private application scope can only access resources private to its scope. Due to scope access boundaries, any privately scoped workflows that make calls out to other scoped resources fail with either an exception or a hung activity while waiting for returned results. This occurs when making calls to these common global resources:

- ECC queues
- Tasks
- Approvals

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- Events
- SLA timers
- Timers
- Script includes
- Business rules
- Workflow APIs

As you design workflows, validate the visibility and accessibility of all resources prior to deployment.

See Application scope.

For information on how to configure the scope for a workflow, see Workflow properties.

Domain separation and Workflow

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

Support level: Standard*

- Includes **Basic** level
- Business logic: Processes can be created or modified per customer by the service provider. The use cases reflect proper use of the application by multiple service provider customers in a single instance.
- The owner of the instance needs to be able to configure MVP business logic and data parameters per tenant as expected for the specific application.

Use case: As an admin, I need the ability to make comments mandatory on close of a record for one tenant, but not for another.

Overview

When domain separation is enabled, workflows and workflow activities inherit the domain of the user who publishes or creates them.

How domain separation works in the Workflow application

While workflows are managed by multiple tables, only the following tables are used for domain separation features:

- **Workflow [wf_workflow]** and **Workflow Version [wf_workflow_version]**: used for Process administration or process separation.
- **Workflow Context [wf_context]**: used for Understanding domain separation.

> **Note:**
> The Workflow Version table [wf_workflow_version] table does not contain a domain field; Workflow Version records inherit their domain from the parent Workflow record.

The Workflow Editor displays a workflow's domain in the title bar after the workflow name.

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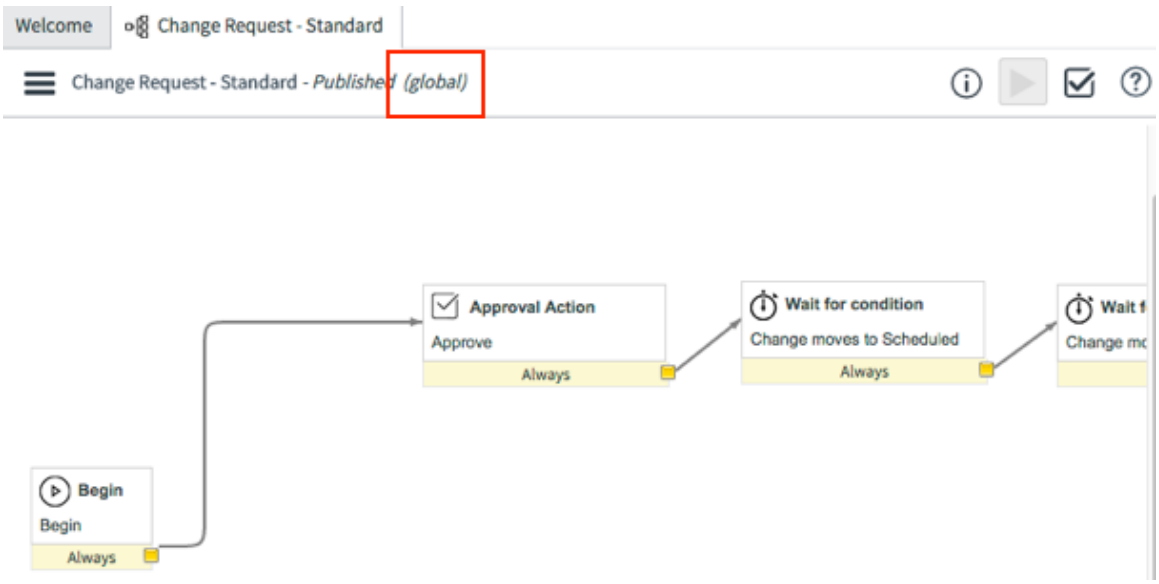
Workflow editor domain



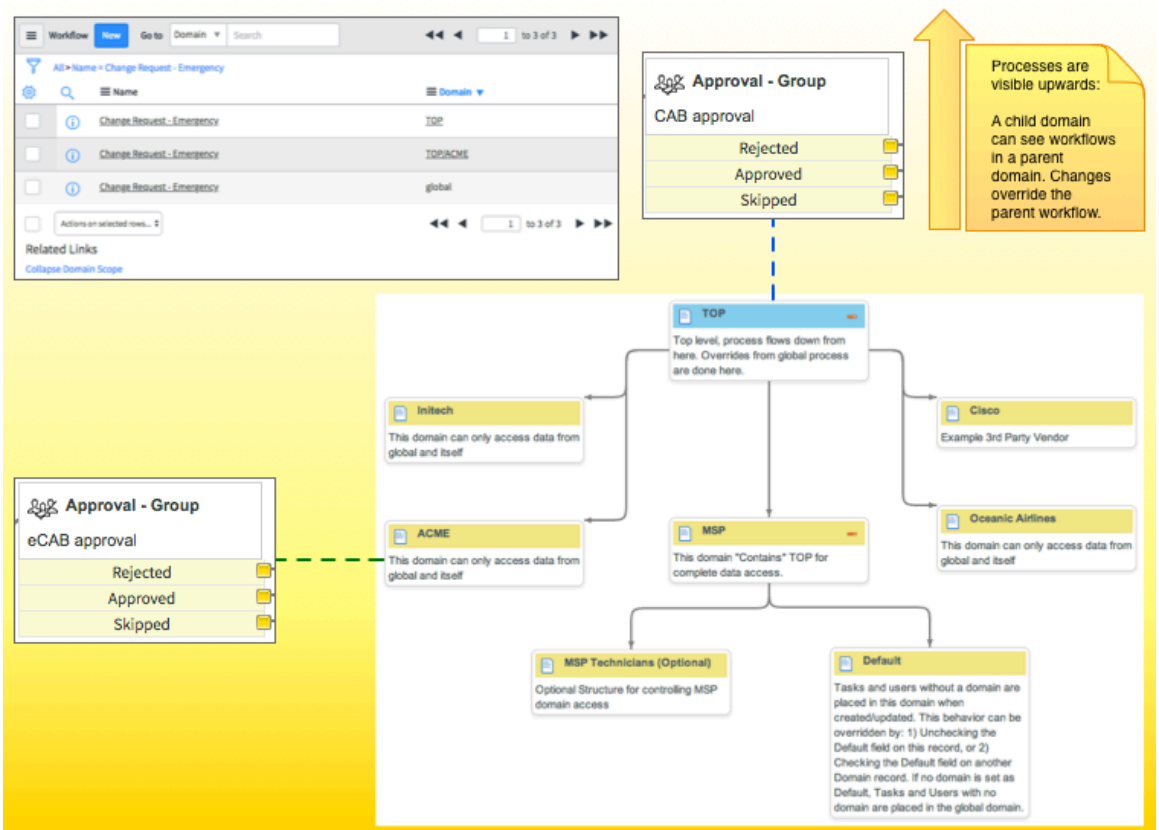
Related topics

Domain separation for service providers

Workflows and delegated administration

Delegated administration allows child domains to inherit workflows from higher up the domain hierarchy and to override them with domain-specific versions if necessary.

Workflow and delegated administration



Workflow records in the Workflow [wf_workflow] and Workflow Version [wf_workflow_version] tables are considered processes. A user in a child domain may check out but not copy a

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workflow from a parent domain. When a user in a child domain checks out a workflow from a parent domain, the system creates a version of the workflow in that user's domain. This new version is a unique record in the Workflow [wf_workflow] table. After the user publishes this new workflow, other users in the child domain use the new workflow, which overrides the workflow from the parent domain. The original workflow in the parent domain is no longer visible to users in the child domain.

For example, a managed service provider (MSP) hosts ITSM services for several companies, including ACME and Initech, on a single instance. As administrators, the MSP creates a Change Request - Emergency workflow that applies to all domains because it was created in the TOP domain, which is the highest domain in the domain hierarchy. This workflow overrides the global Change Request - Emergency workflow and specifies that emergency change requests require approval from the CAB approval group. Because of delegated administration, every domain in the hierarchy sees and uses this workflow. Now suppose the ACME domain requires a different approval policy where emergency change requests require approval from the emergency CAB approval group. The MSP creates another version of the Change Request - Emergency workflow in the ACME domain. This workflow overrides the version in the TOP domain and only applies to users in the ACME domain.

Workflow permissions

When a user starts a new workflow, the workflow runs with that user's domain and credentials.

The workflow preserves a user's domain and credentials until an activity causes the workflow to wait, such as an approval activity waiting for approval or rejection. When the stopped workflow resumes, such as when a user approves a request, the workflow uses the credentials of the approving user, but continues to run within the domain of the original user.

Workflows and data separation

Data separation restricts workflow contexts to users who are either in the same domain of the workflow or are members of a parent domain.

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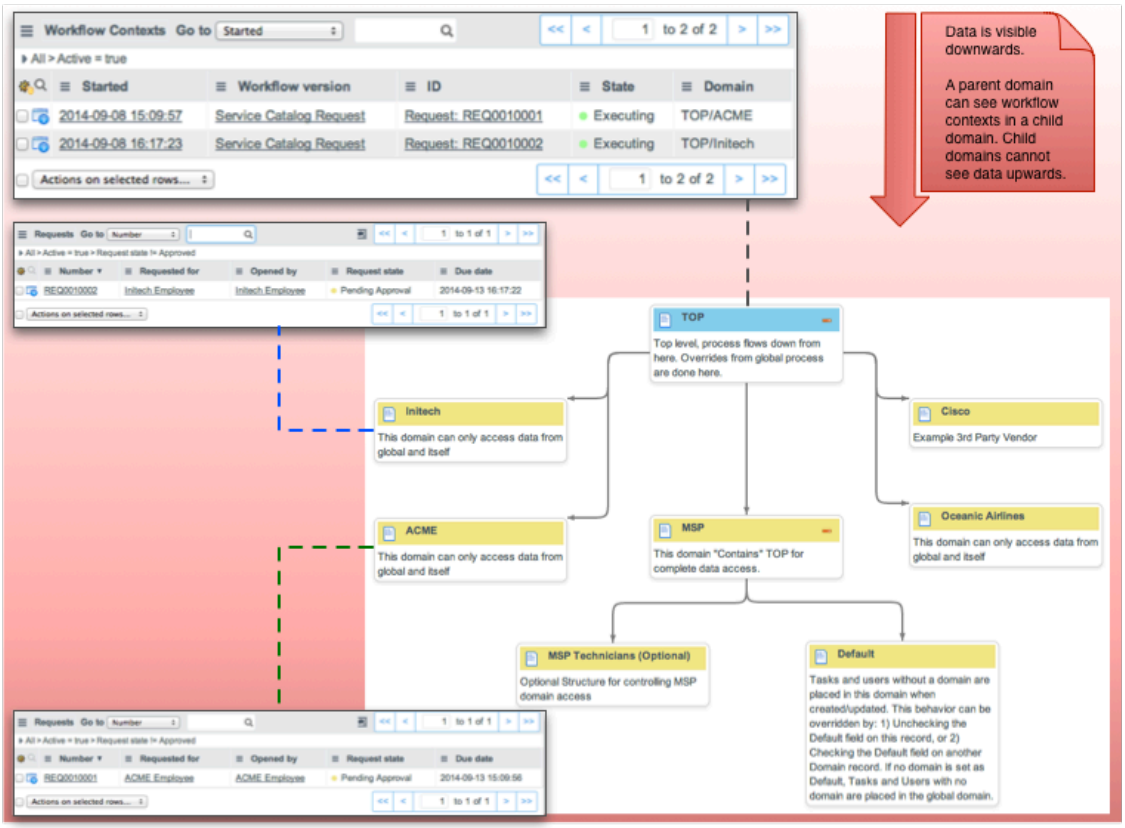
Workflow and data separation



Workflow records in the Workflow Contexts [wf_contexts] table are considered data. Data separation restricts workflow contexts to users who are either in the same domain of the workflow or are members of a parent domain. While a user in a parent domain can see running workflows in a child domain, a user in a child domain cannot see running workflows in a parent domain. If necessary, administrators can use visibility or contains domains to expand who can see domain-specific data.

For example, when an ACME user requests something from the service catalog, a Service Catalog Request workflow context is created in the ACME domain. Similarly, a service catalog request from an Initech user creates a workflow context in the Initech domain. An MSP user in the TOP domain can see both workflow contexts because it is the parent domain for both the ACME and Initech domains. However when an ACME or Initech user logs in, data separation prevents them from seeing each other's service catalog requests. This is expected behavior because each workflow context contains data specific to that domain, such as the item requested and the request's approval history.

Workflow engine operation order

The workflow engine runs in a predefined order relative to business rules and database operations. It caches commonly-used published workflows to improve performance.

The **Run after bus. rules run** workflow property defines if a workflow is **Default** or **Deferred**.

The diagram below shows the workflow engine order of operations and when Default and Deferred flows are executed. For a more general overview of engine operation order, see Execution order of scripts and engines.

Workflow caching

The workflow engine caches commonly-used published workflows to improve performance.

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Caching significantly reduces the number of database queries per workflow. By default, the engine caches up to 300 unique workflow versions. Caching very large workflows may reduce this number as the cache size cannot exceed the Java Virtual Machine (JVM) heap size.

To change the maximum number of cached workflow versions, navigate to **Workflow** > **Administration** > **Properties** and modify the value of the **The max number of models that will be concurrently held in the LRU cache** (*glide.workflow.model.cache.max*) property. You must restart the instance to apply this change.

Workflow tables

For full flexibility, workflows store information over a number of different tables.

Usually tables containing workflow information are not edited one-by-one. Instead, use the Workflow Editor to edit workflows. The following lists are provided for reference purposes.

Workflow tables

Table	Description
Workflows	
Column Renderer [column_renderer]	A renderer widget for a stage column. Stage renderers are written in Jelly as a UI Macro. The default is Workflow-Driven; it covers most workflow related stage scenarios.
Version [wf_versionable]	Tracks different versions of element definitions [wf_element_activity].
Workflow [wf_workflow]	The primary records of workflows.
Workflow Binding [wf_workflow_binding]	History of workflows run and the triggering record. Workflow Binding records prevent the system from running workflows again when the associated Workflow Context record has been deleted.
Workflow Context [wf_context]	Individual instances of a workflow being used.
Workflow Execution [wf_workflow_execution]	Synthetic "current" records for workflows that run on Global.
Workflow Instance [wf_workflow_instance]	Connections of workflows to subflows.
Workflow Version [wf_workflow_version]	Particular versions of a workflow, either published versions or versions that have been checked out.
Activities	
Activity Designer [wf_element_activity]	Custom activity definitions.
Activity Variables [wf_activity_variable]	Variables for activities.
Workflow Activity [wf_activity]	Activities as they are being used in workflows.
Workflow Activity Definition [wf_activity_definition]	Definitions of activities that can be used in a workflow.
Workflow Executing Activity [wf_executing]	Individual instances of activities being performed in active contexts.
Workflow components	

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Workflow tables (continued)

Table	Description
Element Provider [wf_element_provider]	Template definitions for custom activities.
Group approval [sysapproval_group]	Group-level approvals.
Variable [item_option_new]	
Workflow Condition [wf_condition]	All of the defined conditions in workflows.
Workflow Element Definition [wf_element_definition]	Parent table for activity definitions.
Workflow Estimated Runtime Configuration [wf_estimated_runtime_config]	Runtime performance data for completed workflows.
Workflow Queued Command [wf_command]	Temporary internal storage for workflows that are currently executing.
Workflow SC Variable [wf_variable]	The Service Catalog variables for a workflow.
Workflow Schedule [wf_workflow_schedule]	Definitions of the times to run specific workflows.
Workflow Timing [wf_workflow_timing]	Timing performance data for workflows.
Workflow Transition [wf_transition]	All of the defined transitions in workflows.
History	
Workflow Activity History [wf_history]	The history of executed activities.
Workflow Log Entry [wf_log]	All of the events and history of the workflow.
Workflow Transition History [wf_transition_history]	The history of executed transitions.
Stages	
Stage Default [wf_stage_default]	Definitions of default stage fields for tables to use.
Stage Set [stage_set]	A named set of stages that can be used to populate workflow stages for multiple workflows.
Stage Set Entry [stage_set_entry]	The stages that belong to a named stage set.
Stage Set for Table [stage_set_table]	Defines a relationship of a stage set to a table so that the stage set can be used as the default stages when a new workflow is created for the table. This replaces the wf_default_stage table and is the view that shows when you click **Default Stages (by table)** in the menu.
Workflow Stage [wf_stage]	Definitions of stages used by workflows.

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Workflow administration

Tailor workflows exactly the way you want them.

Workflow roles

Certain roles are required to use workflows.

Important:
As of the Zurich release, new customers no longer receive the legacy workflows created and published by ServiceNow, Inc.. All legacy workflow functionality has been replaced by Workflow Studio content. Only customers who upgraded from prior versions retain the ability to use and edit existing legacy workflows. While all customers retain the ability to create legacy workflows, you are strongly encouraged to instead use Workflow Studio to create process automation content. Only Workflow Studio will receive new features and enhancements.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Workflow roles

Role title [name]	Description
[snc_required_script_writer]	Provides access to the Workflow UI and allows scripting.
Activity creator [activity_creator]	Creates and edits custom workflow activities, reuses custom activity data, and manages activity packs downloaded from the ServiceNow Store.
Web service administrator [web_service_admin]	Accesses and uses REST and SOAP messages in the Orchestration activity designer. Creates and edits custom activities that use the REST web service and SOAP web service templates.
Workflow administrator [workflow_admin]	Checks out, creates, edits, publishes, and deletes graphical workflows. **Warning:** Granting this role to a user is equivalent to giving the user the admin role, because workflow Script activities bypass access controls and grant access to all tables and database operations. Script activities do not bypass application scope settings.
Workflow creator [workflow_creator]	Checks out, creates, edits, and deletes graphical workflows. **Warning:** Granting this role to a user is equivalent to giving the user the admin role, because workflow Script activities bypass access controls and grant access to all tables and database operations. Script activities do not bypass application scope settings.
Workflow publisher	Checks out with force checkout option, validates, publishes, and deletes graphical workflows.

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Workflow roles (continued)

Role title [name]	Description
[workflow_publisher]	

Administering workflow contexts

The workflow context performs the activities and transitions defined in the workflow with the new record as current.

Workflow in ServiceNow names a running workflow a Workflow Context. The Workflow Context maintains the state of the overall process in the Workflow Context record. The Workflow Context maintains the state of the individual activities as they execute in a series of related lists. These lists maintain the state of currently executing activities, the result of finished activities, and the execution path the workflow took through the process model.

The Workflow Context canvas provides a visual representation of the execution path the workflow took through the process model. The state of each activity (finished, executing, cancelled, error) is represented using the color palette. The executed paths are represented in the color blue; the non-executed paths are represented in grey. Active and historic workflow contexts, as well as the activities within them, can be viewed using the Live Workflows section of the Workflow application menu.

Viewing a workflow context

Workflow contexts can be found in two places:

- From the **Workflow Context** related link on the form of the task being powered by the workflow.
- By navigating to **Workflow** > **All Contexts** and selecting an active context.

Displaying workflow progress

Two related links on the Workflow Context form allow you to view the progress of a workflow in different formats.

- **Show Timeline** displays the workflow context as a timeline.
- **Show Workflow** displays the workflow context in the graphical Workflow Editor.

Graphical interface

To view the workflow context in the graphical Workflow Editor interface, click the **Show Workflow** link from either the workflow context record or the current record.

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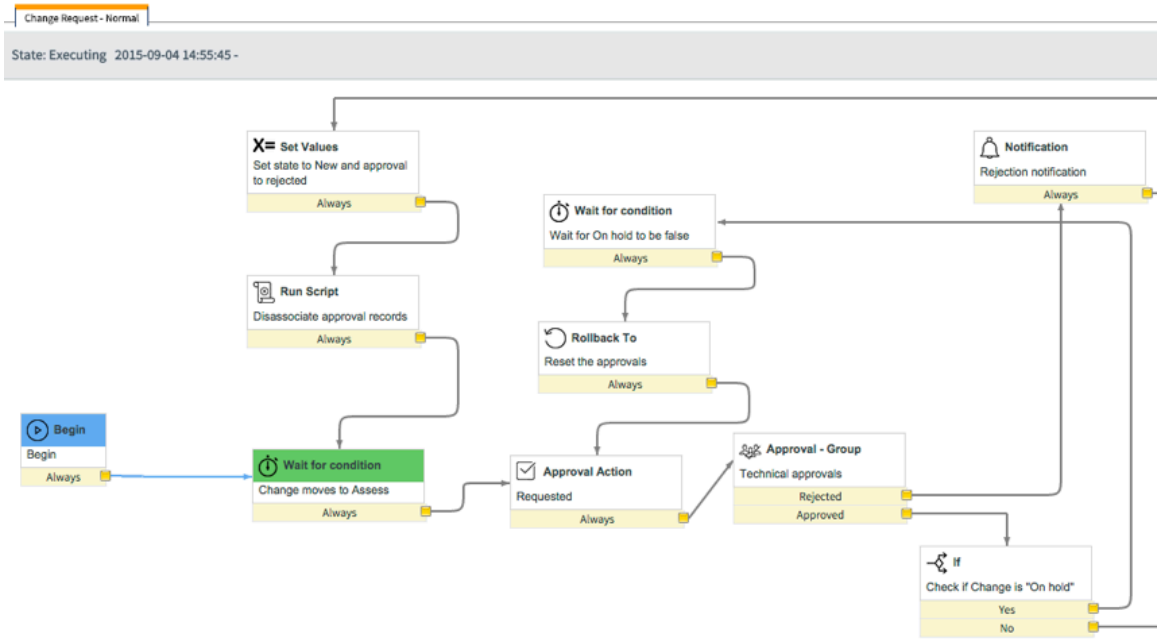
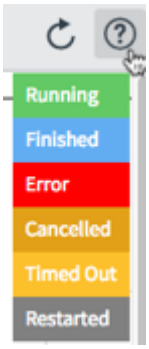
Show workflow



In the top right hand corner are two controls:

	Refreshes the workflow context.
	Displays a key of the colors used in the workflow to denote the state of activities and transitions: 

Execution order

View tooltip text in the workflow context graphical view to see the execution order of individual activities.

In **Workflow** > **Live Workflows** > **Active Contexts** or **All Contexts**, Open the context you want to examine. Click **Show Workflow**, and point to a finished or executing activity. The tooltip shows error data, execution time, and the order in which the activity executed in the workflow. Use this data to help troubleshoot activities in an error state.

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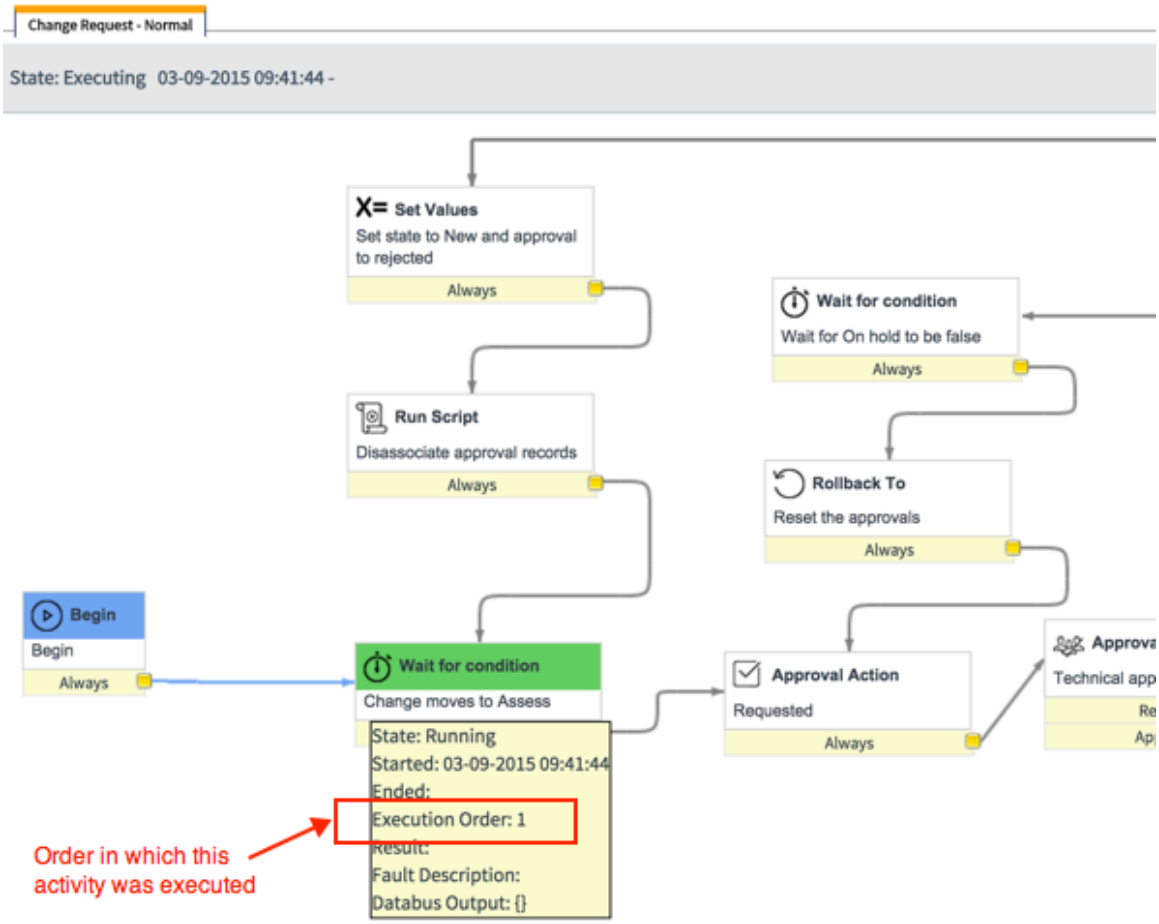
Execution order workflow



Cancel a workflow

Canceling a workflow stops the workflow from executing and sets the workflow context **State** to **Canceled**. To cancel an executing workflow, you can use the `cancelContext(context)` script. You can define an onCancel script to clean up unresolved workflow activities.

Before you begin

Role required: admin or workflow_admin

About this task

Canceling a workflow attempts to stop the workflow gracefully by injecting a cancel command into the workflow engine.

Procedure

1. Navigate to **All** > **Workflow** > **Active Contexts**.
2. Select a workflow context record.
3. Configure form layout to add **On-cancel script** field to form.
   For detailed information about configuring form layout, see Configuring the form layout.
4. Select the **Cancel** related link.
   A confirmation appears.

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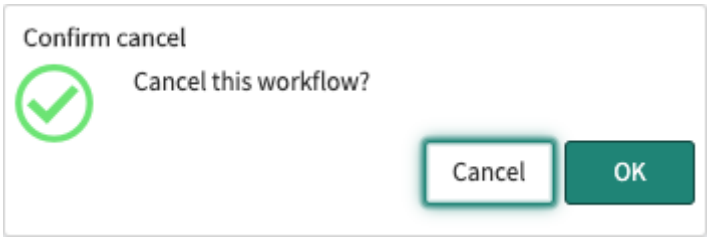
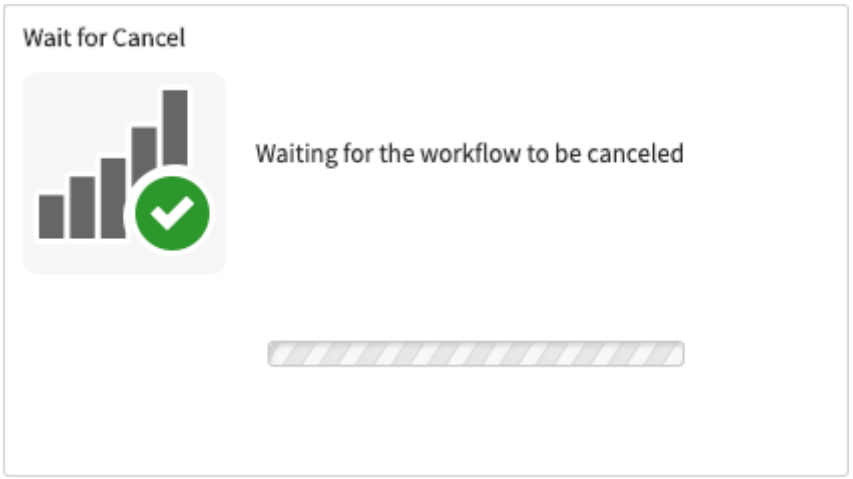
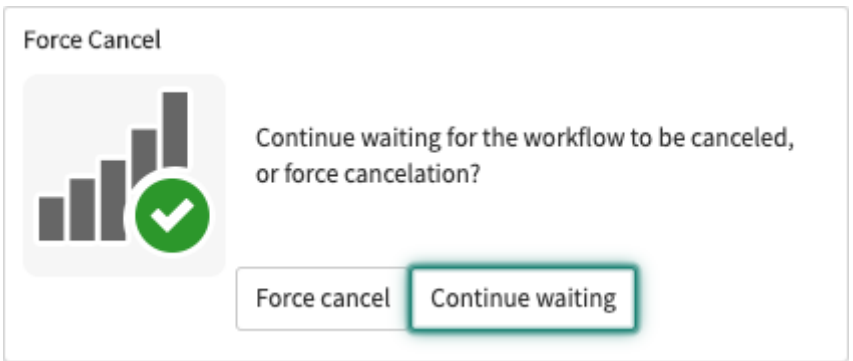


5. Click **OK**.
   The workflow engine attempts to cancel the workflow gracefully.



If the workflow does not respond to the cancel command, the Force Cancel option appears.



6. Click **Force cancel** to interrupt the thread the workflow is actively executing or click **Continue waiting** to continue waiting for the workflow to cancel gracefully.

> **Warning:**
> Whenever possible, allow a workflow to cancel gracefully. Forcing a workflow to cancel can leave related workflows and scripts in an unresolved state. You can use an on-cancel script to clean up unresolved artifacts from a cancelled workflow.

Cancel a workflow with the cancelContext(context) script

To cancel an executing workflow, you can use the `cancelContext(context)` script. This script can be useful in cases where a workflow must be canceled in response to an event or where a user must manually cancel a workflow.

Before you begin
Role required: admin

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About this task

For more information, see the Workflow - cancelContext(GlideRecord context) .

Define an on-cancel script

Canceling a workflow can leave records or scripts in an unresolved state. For example, canceling a service catalog workflow may leave catalog items in the requesting user's cart. An administrator can specify an On-cancel script that runs when the workflow transitions to the Canceled state. This script can notify users, log information, or resolve the state of any scripts run within a workflow activity. The sys_id of the workflow context is available in this script using the context_sys_id variable.

About this task

On-cancel scripts run asynchronously from the global scope. Your instance workload determines when the system schedules and runs the on-cancel script.

Important:
Since the system runs on-cancel scripts from the global scope, they cannot call or run scoped script includes.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Versions**.
2. Select a workflow version that you have checked out.
   Workflow versions that are not checked out are not editable.
3. Edit the **On-cancel script** field.
   You may need to configure the form to add this field.
4. Click **Update**.

Example:

This example script adds a comment to a Requested Item [sc_req_item] record indicating the workflow for that request has been canceled.

```
var grContext = new GlideRecord("wf_context");
grContext.get(context_sys_id);
var grReq = new GlideRecord("sc_req_item");

// The current record may not exist, make sure it exists before
 modifying it.
if (grReq.get(grContext.id)) {
    grReq.comments = "The workflow processing this item was
 Canceled. Contact your system administrator for further
 information.";
    grReq.update();
}
```

Scheduling a workflow

In addition to being run based on conditions, workflows can also be scheduled to perform at a particular time, similar to a scheduled job.

Scheduled workflows do not have a defined current record and do not run on specific records within a table. Due to this behavior, certain activities that depend on a current record, such as **Create Task** or **Catalog Task** are unavailable on scheduled workflows. If your workflow requires one of these activities, consider using a scheduled job that inserts a record to start the workflow instead of using a scheduled workflow.

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To schedule a workflow, navigate to **Workflow** > **Scheduled Workflows** and click **New**. Populate the following fields:

Field	Description
Name	A unique name for the scheduled workflow.
Workflow	Select an existing published workflow to be triggered at the specified date, time, or interval.
Active	If selected, the scheduled workflow will be triggered at the appropriate time.
Application	Specifies the type of application, such as Global.
Run	A choice list to determine when the workflow should be triggered. Options are: • **Daily:** At a particular hour every day. • **Weekly:** On a particular day of the week. • **Monthly:** On a particular day of the month • **Periodically:** After every set duration. • **Once:** At one specific date and time.
Time	For daily/weekly/monthly scheduled workflows, the time of day to run the workflow.
Day	For weekly scheduled workflow, the day of the week to run the workflow. For monthly scheduled workflows, the day of the month to run the workflow.
Repeat Interval	For periodical workflows, the interval between workflows, beginning from the **Starting** date and time.
Starting	For periodical workflows, the first date and time to run the workflow. For scheduled workflows run once, the date and time to run the workflow.

Related topics

Create a scheduled job

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Workflow movement with update sets

The system tracks workflows in update sets differently than other records because workflow information is stored across multiple tables.

Changes made to a workflow version are not added to the update set until the workflow is published, at which point the entire workflow is added into the update set. Update sets store workflows as a single Workflow [wf_workflow] record and only retain the latest version with the update type of Workflow.

For information about update sets, see System update sets.

Workflow update set migration use case - simple

Create a new workflow with no dependencies and then migrate the workflow in an update set.

1. User A selects Update Set A.
2. User A creates a new workflow called Workflow A.
3. User A publishes Workflow A.

   A customer update set record is added to Update Set A containing an XML payload, including the published Workflow A and all activity dependencies. The XML payload also contains the workflow input variables associated with the workflow.
4. User A completes Update Set A and migrates it to the production instance.
5. Update Set A commits successfully.
6. Workflow A works as expected.

Workflow update set migration use case - subflow dependency (success)

Successfully edit and migrate an existing workflow and its dependent subflow.

1. User A selects Update Set B.
2. User A checks out Workflow A.
3. User A adds a subflow called Workflow B to Workflow A.

   Assume that Workflow B was previously published and migrated to the production instance.
4. User A publishes Workflow A.

   A customer update set record is added to Update Set B containing an XML payload, including the published Workflow A and all activity dependencies. The XML payload also contains the workflow input variables associated with the workflow.
5. User A completes Update Set B and migrates it to the production instance.
6. Update Set B commits successfully.
7. Workflow A works as expected with Workflow B as a subflow.

Workflow update set migration use case - subflow dependency (failure)

Edit and migrate an existing workflow from a test instance to a production instance that fails to run on the production instance because of a missing dependent subflow.

1. User A selects Update Set C.
2. User A checks out Workflow A.

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3. User A adds a subflow called Workflow B to Workflow A.

   Assume that Workflow B was previously published, but has not been migrated to the production instance.

4. User A publishes Workflow A.

   A customer update set record is added to Update Set C containing an XML payload, including the published Workflow A and all activity dependencies. The XML payload also contains the workflow input variables associated with the workflow.

   Notably absent from Update Set C is the subflow called Workflow B. Workflow B was published before User A selected Update Set C.

5. User A completes Update Set C and migrates it to the production instance.
6. Update Set C commits with warnings.
7. Workflow A is invoked on the production instance with the following results:

   Workflow A fails the runtime validation check and is prevented from running on the production system. The system adds to the workflow context a workflow log entry detailing the cause of the failure, notably the absence of a dependent workflow.

   To learn more about the validation checks on workflow dependencies and update sets see #unique_3311.

Workflow update set migration use case - subflow dependency (risk)

Multiple users migrate a workflow from a test instance to a production instance without proper coordination. This use case can succeed, but only when each user understands the dependencies and properly migrates the dependent parts of the workflow to the new instance.

This example does not represent an update set failure, although update sets are most often blamed in this use case. Validation increases the visibility of workflow dependencies across multiple update sets and provides designers with better information. In most cases, the warnings do not prevent an action, but only identify risk. The designer is responsible for taking action on advice given in the validation checks.

1. User A selects Update Set C.
2. User A checks out Workflow A.
3. User A adds a subflow called Workflow B that returns a **User ID**.

   Note:
   Assume that Workflow B was previously published and migrated to the production instance.

4. User A uses the return value of Workflow B to generate approvals.
5. User B selects Update Set D.
6. User B checks out Workflow B (the subflow in Workflow A).
7. User B modifies the return value of the workflow by changing it from a **User ID** to a **String Message**.
8. User A publishes Workflow A.

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Note:
A dialog box displays warnings associated with Workflow A and encourages User A to validate the workflow before publishing.

9. User A cancels publishing and validates Workflow A.
10. User A is warned that Workflow B was modified by a user in a different update set.
11. User A ignores this warning and publishes Workflow A.

Note:
A customer update set record is added to Update Set C containing an XML payload, including the published Workflow A and all activity dependencies.The XML payload also contains the workflow input variables associated with the workflow.

12. User A completes Update Set C and migrates it to the production instance.
13. Workflow A is invoked on the production instance and runs successfully using the older version of Workflow B already on the system.
14. User B publishes Workflow B.

Note:
User B is not warned of the Update Set C dependency, because the update set is no longer In progress. However, User B is informed via a dialog box that there are warnings associated with the workflow version and is instructed to validate Workflow B. If User B cancels publication and validates the workflow, User B is warned that there are workflows that use Workflow B as a subflow. Knowing the return value was changed, User B should test those workflows as well. See #unique_3311 to understand the parameters of update set warnings.

15. User B finally publishes Workflow B.

Note:
A customer update set record is added to Update Set D containing an XML payload, including the published Workflow B and all activity dependencies.

16. User B completes Update Set D and migrates it to the production instance.
17. Update Set D commits without warnings.
18. Workflow A is invoked on the production instance and fails to run successfully, because the return value of Workflow B no longer generates a User ID.

Input variable movement

You can add input variables to existing workflows and add them to update sets.

When you submit the new variables, an entry is made into the current update set that reflects the addition of a variable to the Variables [var_dictionary] table. Unlike the workflow version that only writes to the update set when the workflow is published, the variables write individual update entries into the currently selected update set immediately upon submission.

Input variable movement use case - two input variables

An existing workflow already contains two input variables.

1. User A checks out the workflow.
2. User A adds two input variables.

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ServiceNow adds to the current update set one customer update record for each new variable.

The current workflow now has 4 input variables: the two that were present prior to check out and the two new ones.

3. User A publishes the workflow.

   There are now three related customer update records: two for new variables, and one for the published workflow. The XML payload of the new workflow version now includes all input variable database entries. So while the two original input variables do not have individual customer update records, all four variables are migrated to the local instance with the payload of the newly published workflow version.

4. Verify variables included in a specific workflow.
5. User A completes the update set.
6. Adding Input Variables - Success

   User A migrates and commits the update set to a local instance where the original workflow version had previously been committed.

   - The two existing input variables are already present because of the earlier version.
   - The system adds the two new input variables when the user commits the update set.
   - The system preserves the two legacy input variables on the instance receiving the update set. The update set does not overwrite these variables.
   - The new published workflow version uses all four variables.
   - The user tests the new workflow version and it runs as expected.

Verify variables included in a specific workflow

You can verify the variables that are included in a specific workflow.

Procedure

1. Navigate to **All** > **System Update Sets** > **Local Update Sets**.
2. Select the active update set.
3. Select the customer update entry for the workflow.
4. View the **XML Payload**.
5. Search for the name of one of the columns or search for var_dictionary.

   There is one var_dictionary entry for each input variable.

Input variable removal

Deleting workflow input variables, like insert and update actions, creates a customer update record in a user's current update set.

These deletions migrate to a new instance with the update set, regardless of whether the workflow that owns the input variables is published in the same update set. Plan carefully and use caution when editing a workflow and selecting update sets.

Input variable removal risk

An existing workflow already contains two input variables.

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1. The workflow was migrated to a production instance with the two variables.
2. On a development instance, User A selects Update Set A and checks out the workflow.
3. User A removes one input variable and all references to it in the workflow.

   The system enters into Update Set A one customer update record reflecting the deletion of the input variable. No record is added for the new workflow version which no longer depends on the input. This does not happen until the workflow is published.
4. User A continues working on other features in Update Set A that need to be moved to production.
5. User A completes Update Set A and migrates it to the production instance without publishing the workflow.

   The update set entry that deletes the workflow input variable now applies to the production instance. The prior version of the workflow is running on this instance and still references the missing variable.

Input variable removal solution

When editing workflows, particularly when deleting input variables, be sure to use a single update set for all variable editing and workflow publishing.

If necessary, merge the update set into a more general set targeted for deployment after the workflow is published. For information about update sets, see System update sets.

Note:
If a workflow version is already running on a production system and input variables are deleted from a newer version, those deletions could affect transactions already running against the earlier version. Use extreme caution when deleting workflow input variables and plan the migration carefully.

Input variable removal prevention

Prior to publishing a workflow version, the system validates the workflow model to assist the designer in planning for deployment.

This validation warns of critical errors that can prevent a workflow from running successfully, but also warns of dependencies and conflicts in update sets. See #unique_3311 for more details.

Avoiding duplicate workflows

Update sets manage the published state of all versions of a workflow prior to committing the workflow version on a local instance.

The last version of a workflow committed as an Insert or Update using an update set becomes the currently published version, regardless of the publishing sequence for the workflow versions.

Commit a workflow in an update set

Follow the steps in this page to commit a workflow in an update set.

Procedure

1. Workflow A - Version 1 is created and published in Update Set A.
2. Update Set A is completed and migrated to a local instance.
3. When the update set is committed, the system sets all prior versions of Workflow A to published = false.

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In the first migration, there are no prior versions.

4. Workflow A - Version 1 becomes the only published version of the workflow.

Update set migration example

It is not possible to have multiple published versions as a result of update set commits. However, this does not eliminate risk, and care should be taken when migrating update sets.

Consider this example:

1. Workflow A - Version 1 is migrated and committed to the production instance.
2. Update Set B is created.
3. Update Set C is created.
4. Workflow A - Version 2 is published in Update Set B.

   A customer update record is added to Update Set B with the Version 2 payload.

   A customer update record is added to Update Set B with the Version 1 workflow left unpublished.
5. Update Set B is completed.
6. Workflow A - Version 3 is published in Update Set C.

   A customer update record is added to Update Set C with the Version 3 payload.

   A customer update record is added to Update Set C with the Version 2 workflow left unpublished.
7. Update Set C is completed.
8. Update Set C is migrated and committed to the production instance.

   Workflow A - Version 1 is set to unpublished.

   Workflow A - Version 2 update is skipped since Update Set B, which contains Version 2, was never migrated.

   Workflow A - Version 3 is committed and becomes the only published version of the workflow.

Update set migration risk

Update Set B is migrated and committed to the production instance.

1. Workflow A - Version 3 is set to unpublished.
2. Workflow A - Version 1 remains unpublished.
3. Workflow A - Version 2 is committed and becomes the only published version of the workflow.

   The workflow has gone back a version, perhaps unintentionally. The regressed version becomes the currently published version.

Workflow timelines

The system provides a timeline view of history activities associated with a workflow context.

Timelines display a linear calendar of activities, such as tasks and approvals, defined by their start and end dates. Each activity on the timeline is represented by a span, which is displayed as a horizontal, colored bar. Each span has a label and a tooltip that contains additional information

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about the activity. The left pane displays all the activities in the context (or contexts) in an expandable hierarchy. You can change the timeline's perspective for a more granular view of the data.

Note:
Workflow timelines reflect context history only and are not real-time gauges of workflow activity.

Use a timeline

By default, the timeline displays all activities and transitions requested when first opened.

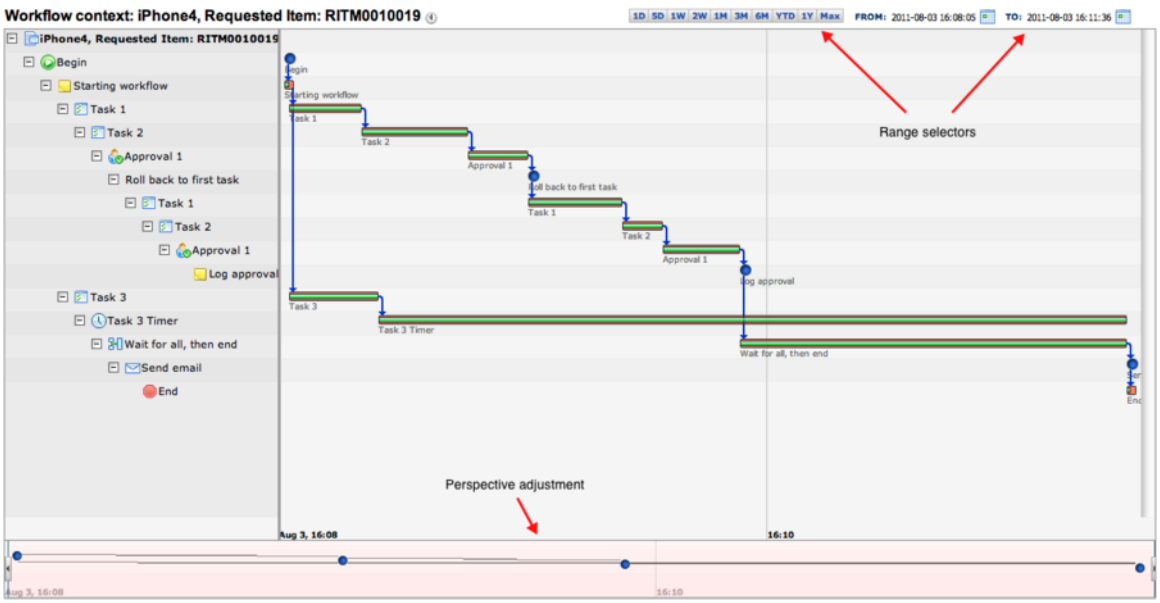
About this task

Collapse any part of the hierarchy in the activity pane and the timeline adjusts automatically. Date/time and duration controls enable you to scale the timeline to view all the elements at once. To display a timeline, click a UI action within a Workflow Context record.

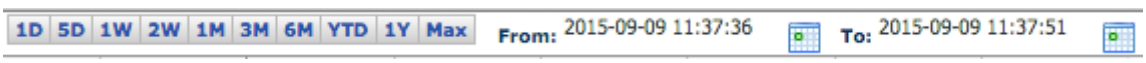
Procedure

1. Navigate to**All** > **Workflow** > **Live Workflows** > **Active Contexts**.
2. Select a context.
3. In **Related Links**, click **Show Timeline** to display the timeline for the entire context.

   The timeline opens with all activities expanded and the view set to **Max**, which displays the entire timeline at the width of the pane. The title of the timeline is in the form Workflow context: <context name>, Requested Item: <requested item number>.



4. Use the Range Selectors at the top of the timeline to change the perspective.



   The increments go from one day to one year. To limit the timeline to an increment between the start date of the first span and the end date of the last span, click **Max**.

5. Use the starting and ending calendar fields to select the timeline perspective.

   These fields control the same perspective as the slider at the bottom of the timeline.

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6. Use the pink slider at the bottom of the timeline to change the perspective.

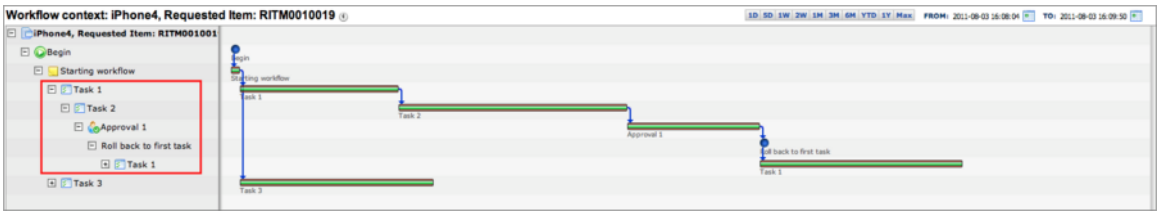
   a. Move the slider from right to left to view all the spans on a long timeline.

   b. Adjust the end points of the slider to make arbitrary changes to the magnification.

      A narrow slider zooms in on the spans and provides a more detailed view of complex timelines. A wide slider pulls the view out and makes more of the timeline visible on the screen.

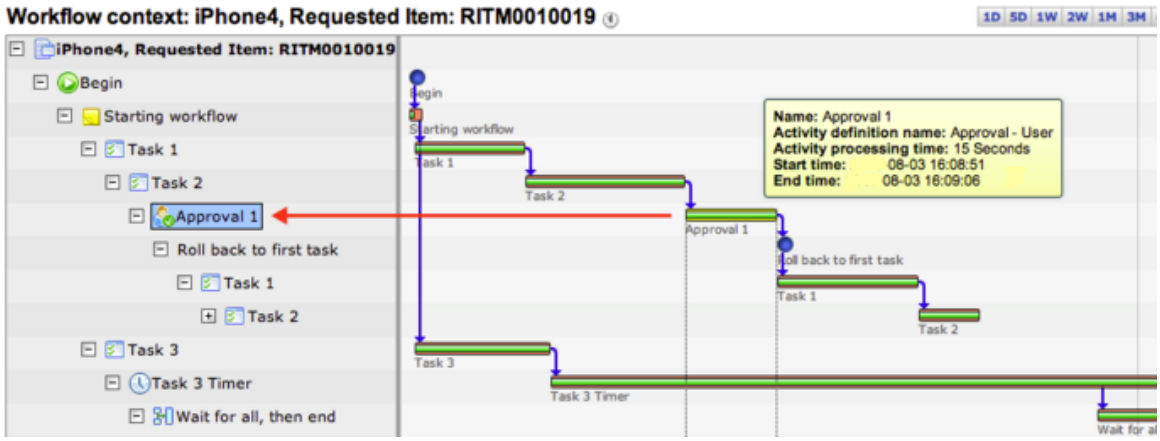
7. To focus the timeline view on selected activities, expand or collapse the activity tree.

   Spans not visible in the activity tree are not shown in the timeline pane.



8. Hover over an activity span to display a tooltip with information about the activity.

   This action highlights the activity in the activity pane.



9. Hover over the transition between two activities to highlight the activity and the predecessor activity in the activity pane.

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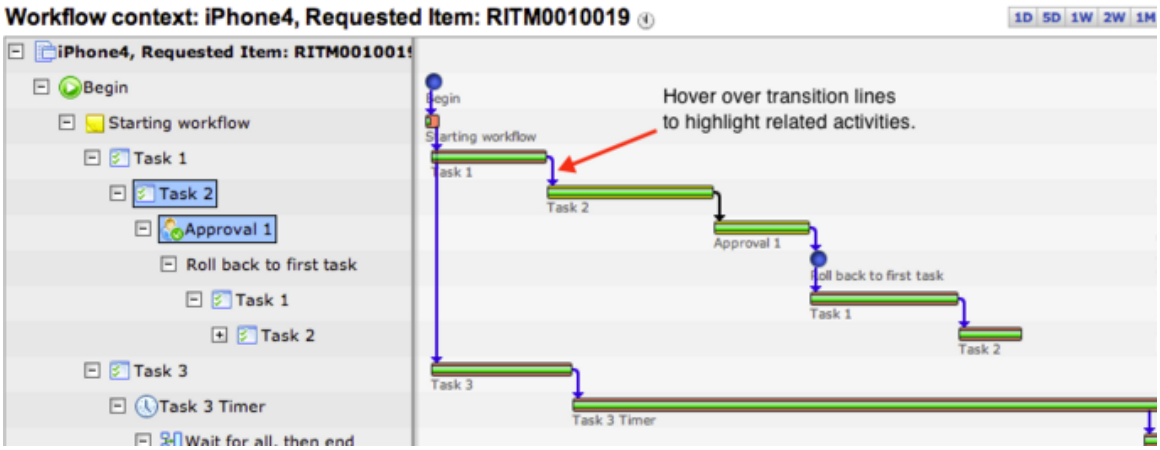
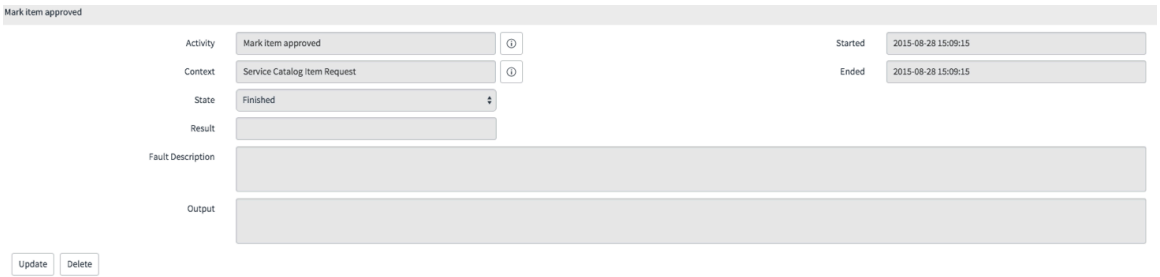


10. Double-click a span to display a history record for that activity.

    History records shows information such as the **State** and the starting and ending times.



Timeline for a selected activity

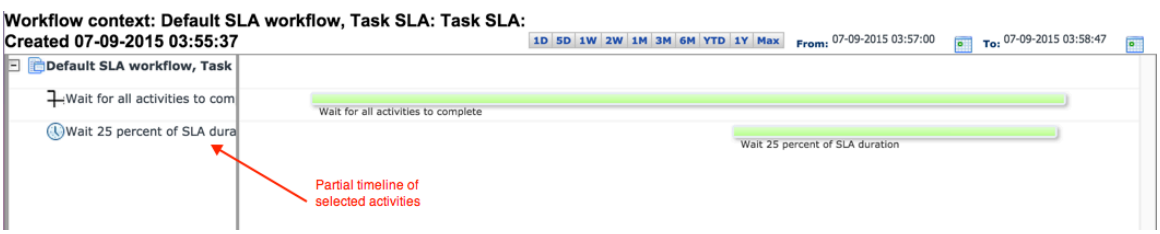
You can display a partial workflow timeline.

Procedure

1. Navigate to**All** > **Workflow** > **Live Workflows** > **Active Contexts**.
2. Open a Workflow Context record.
3. On the **Workflow Activity History** related list, select one or more individual activities.
4. Click **Show Timeline** from the action menu.

   The resulting view is a snapshot of the timeline, showing only the selected activities and their transitions, if any.

5. Collapse the tree to confine the view even further.



6. To view a timeline displaying activities from different contexts:
   You might use this feature to display a subflow's context with the parent workflow context.

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a. Navigate to **Workflow** > **Live Workflows** > **History**.

b. Select individual history items from the list.

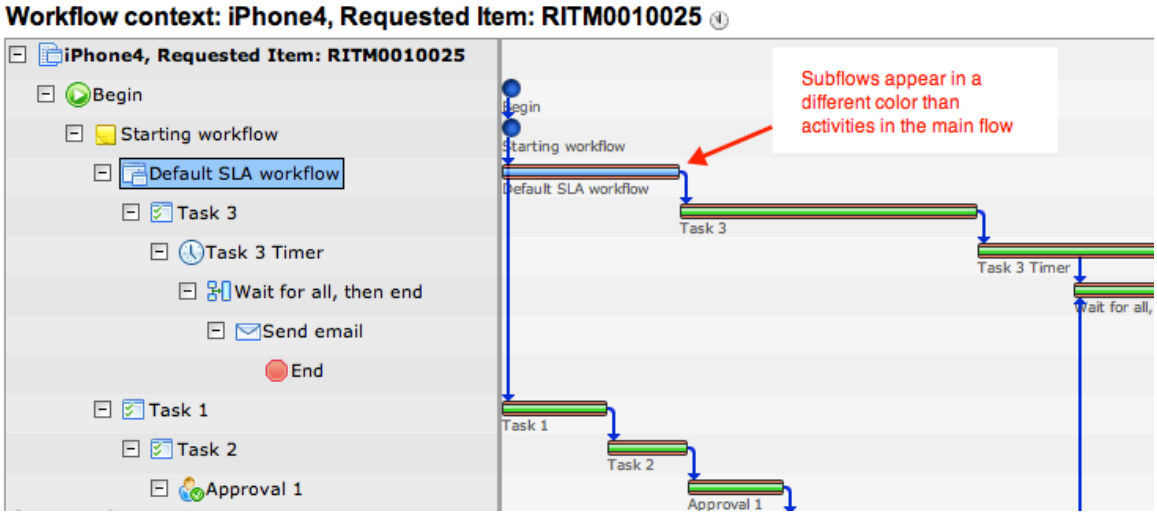
c. Select the **Show Timeline** option from the actions menu.

History items are arranged in a hierarchy in the activities pane under their contexts. The timeline title is **Multiple Contexts**. The timeline draws only the activities and relationships of the history items selected.

View subflows in a workflow timeline

In a workflow timeline, subflow spans appear as a different color than the activities of the main workflow.

Workflow timeline subflow



Workflow error handling

The personalized JavaScript that users create in workflow activity variables is vulnerable to run-time syntax errors. Available error information is available in a tooltip when you point to a workflow activity in an error state.

In the base system, workflow activities do not provide condition routing on the error state. As a result, the workflow progresses based on the state of the current record. For example, a workflow contains an **Approval - User** activity that uses an advanced script to add additional approvers. A syntax error in the script results in no approvers being added. Because a state of **no approvers** is a valid return, even without the syntax error, the approval activity is skipped and the workflow progresses along a positive path. However, this might not be a valid response for the workflow designer who does not want the workflow to progress along the positive path without approvers.

Workflow error handling detects and logs syntax errors and provides a state that the workflow designer can use to add error conditions to the workflow. Use error handling to locate syntax errors in advanced script fields for these workflow activities:

- Approval - User
- Approval - Group
- Catalog Task
- Create Task
- If

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- Run Script
- Notification

Available error information

This table shows which activities support error exits.

Available error information

Activity	Workflow log	Red error indicator	Activity state	Activity result	Fault description	Reroute on error
Approval - User Approval - Group	Yes	Yes	Error	Skipped	Yes	Yes
Catalog Task Create Task	Yes	No	Finished	none	No	No
If	Yes	Yes	Error	none	Yes	Yes
Run Script	No	Yes	Error	error	Yes	Yes
Notification	Yes	Yes	Error	error	Yes	Yes

Workflow error tracking features

Error handling provides visual cues within the workflow, such as error descriptions for activities in pop-ups, and detailed log records.

Banners

Look for an activity with a red banner, indicating that a syntax error has occurred in a script field. All activities that provide error handling, with the exception of **Catalog Task** and **Create Task**, display a red banner for this error.

Tooltips

Point to the activity displaying a red banner to view information about the error. A tooltip shows the **State** and **Result** of the activity and provides a brief **Fault Description** (except for task activities). Note that this approval continued as skipped despite the error given in the fault description. See Workflow error handling for the information available to each activity.

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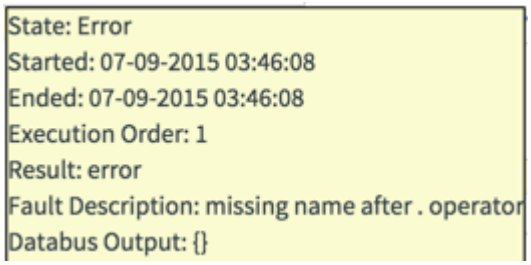


Execution order

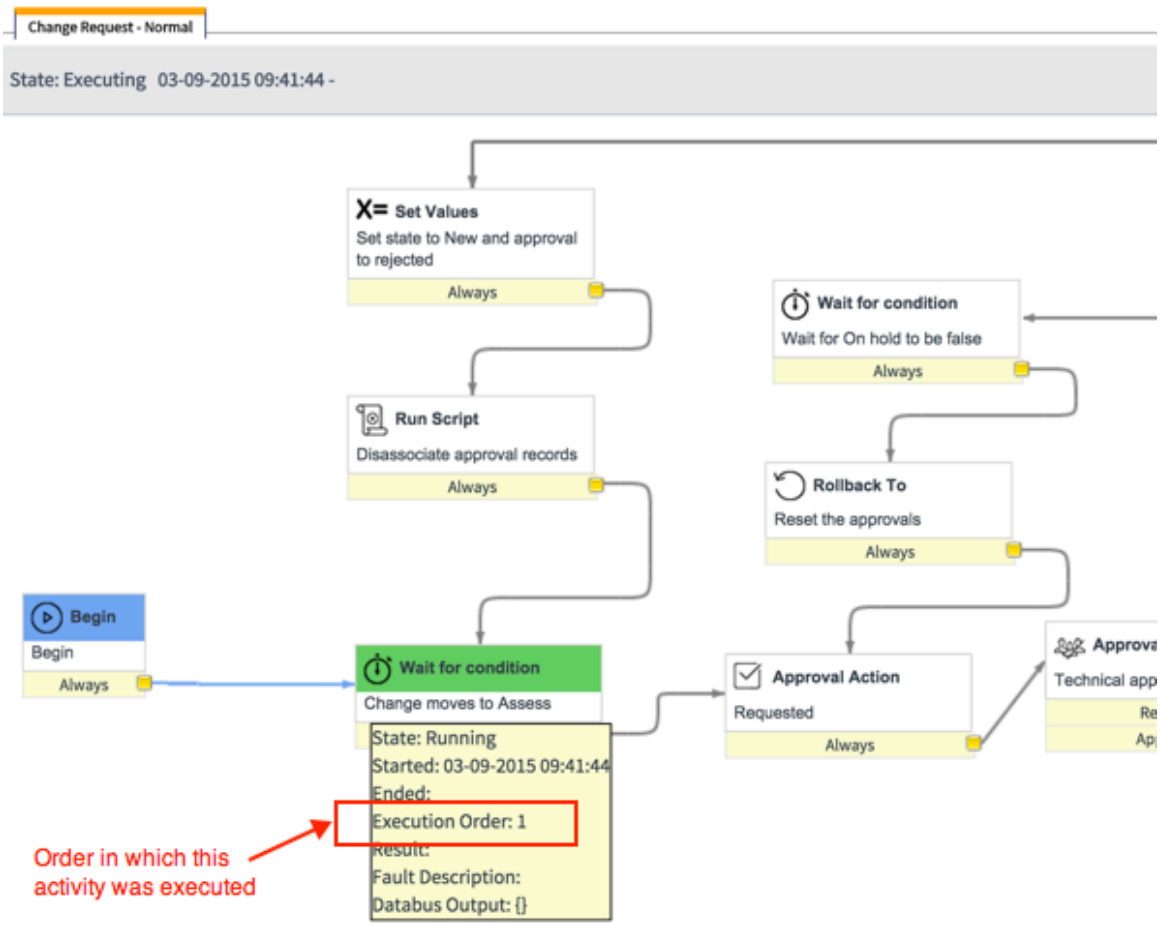
Tooltip text in the Workflow Context graphical view displays the execution order of individual activities, which assists in troubleshooting.

To view the order in which a workflow activity was executed:

1. Navigate to **Workflow** > **Live Workflows** > **Active Contexts** or **All Contexts**.
2. Open the context you want to examine.
3. Click **Show Workflow**.
4. Hover the cursor over a finished or executing activity.

   A tooltip appears showing error data, execution time, and the order in which that activity executed in the workflow. You can use this data to help troubleshoot activities in an error state.

Activity execution order



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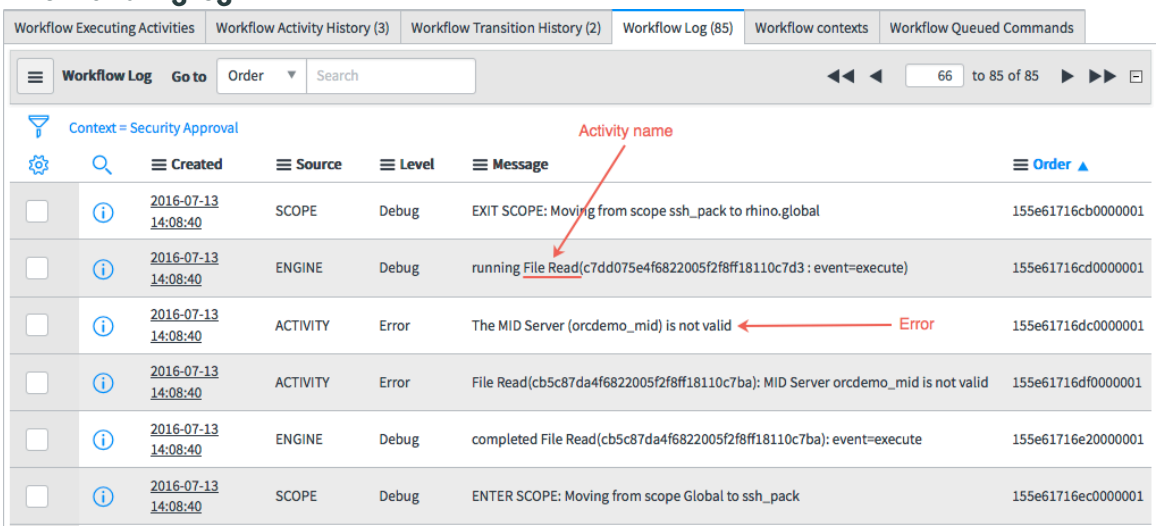
Workflow log

View the log in the Workflow Context form for more information about the syntax error in the activity. Since task activities do not display a red banner when a syntax error has occurred, you must view the log if you suspect the workflow has not run properly. Examine the error description in the log, and then inspect the script in the activity named in the log.

To view the activity by name, navigate to **Workflow** > **Administration** > **Properties** and enable the **Log workflow debug messages** property.

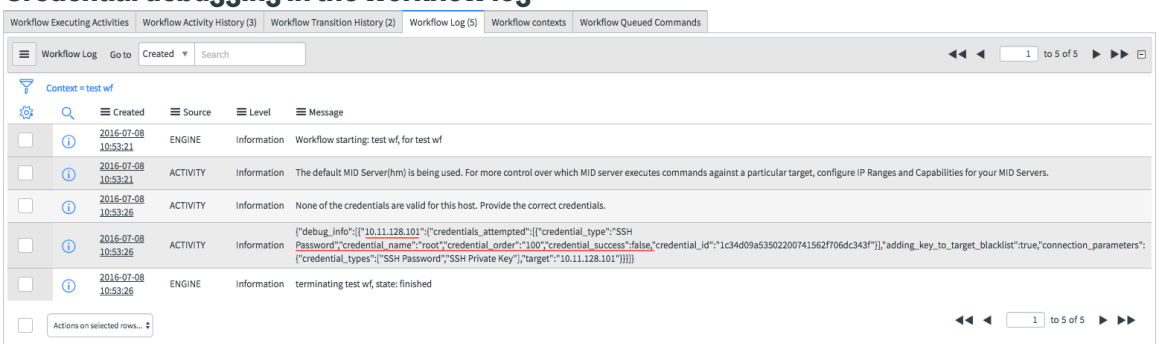
In this example, an SSH activity named File Read specifies an invalid MID Server.

Error handling log



If the credentials used by an activity in the workflow fail, and the activity cannot authenticate on the target, a message describing the failure appears in the **Workflow Log** related list. The message displays the target IP address and the credential details.

Credential debugging in the workflow log



Create an error condition exit

An administrator can reroute the workflow when a script error occurs by creating an error condition exit for specific activities within the workflow. This allows the workflow to process script errors in a predictable way and not create undesirable results.

Procedure

1. Open and check out a workflow.
2. Right-click in the top portion of the activity for which you want to create an error exit.
3. Select **Add condition** from the context menu.

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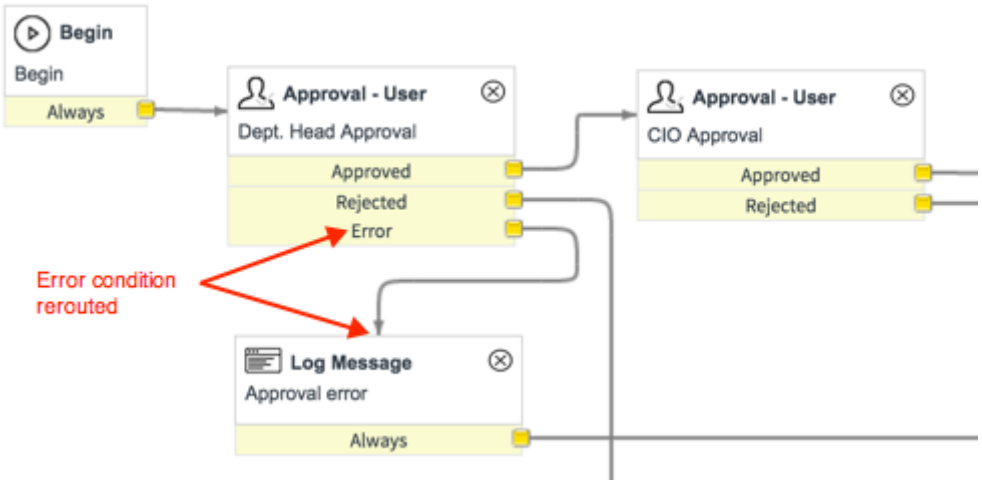
4. Add a condition exit with the following values:
   - Name: `Error`
   - Condition: `activity.state=='faulted'`
5. Click **Submit**.

   The **Error** exit appears on the activity.
6. Connect the **Error** exit to another activity for handling the error state, such as **Notification** or **Log Message**.



Reconfigure an approval condition

Approval activities react differently to script errors than the other activities.

About this task

Approval activity script errors can prevent an approval from being processed successfully. This, in turn, can cause the approval to complete as **Skipped**, which can appear to be an **Approved** state. To prevent this from happening, reconfigure the **Approved** exit as follows:

Procedure

1. Open an approval workflow and make sure it is checked out.
2. On an approval activity, double-click the **Approved** exit.
3. Add the following script to the **Condition** field:

   ```
   && activity.state != 'faulted'
   ```

   This prevents the activity from continuing down the normal path in an error state and ensures that **Skipped** or **Approved** is the desired state.
4. Click **Update**.

Workflow run time metrics

You can enable the collection of workflow run time metrics to determine whether workflows are performing as expected or consuming additional resources.

Outlying run times for a workflow are identified by comparing actual run times to an outlier range calculated with the outlier threshold and estimated run time defined in the workflow properties.

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You can monitor the results of these metrics on the Workflow Operations Dashboard and custom homepages with workflow gauges.

Important:

The functionality found in homepages, arranging information from your instance to tell a story about your data, is found in dashboards on new instances. On upgraded instances with Next Experience enabled, users can view existing homepages if they have a direct URL, but they can't create or edit them. Responsive dashboards and Analytics Center dashboards take over homepage functionality.

Use the Homepage deprecation help tool to convert the homepages on your instance to responsive dashboards.

For more information, see:

- Dashboards in the Analytics Center.
- Working with responsive dashboards.

Enable workflow run time metrics

Provide an estimated run time that can be compared to actual workflow run times.

About this task

For baseline workflows, you must also manually enable the collection of run time metrics. The system automatically enables the collection of run time metrics for new workflows.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. Open and check out the workflow.
3. In the title bar, click the menu icon and select **Properties**.
4. In the Workflow Properties dialog box, click the **Estimated Runtime** tab.
5. To enable the collection of run time metrics, check that the **Requires ERT** option is selected.
6. Open a configuration from the **Estimated Run Time** column.
7. In **Estimated Run Time**, enter an initial estimate for the workflow's run time.
   The system compares this initial estimate to actual run time results to create outlier reports. The system can automatically update this field in certain circumstances. Workflow designers can also manually update this field.
8. In the **Outlier Percentage Threshold for ERT** field, enter the percentage deviation from the estimated run time that identifies an outlier workflow run time.
   The system uses a default value of **20**.
9. Click **Update**.

Outlying workflow run times

Workflow run times are identified as outliers when they are longer or shorter than the outlier range that is computed for the workflow.

The outlier range is automatically computed with the **Estimated Run Time** and **Outlier Percentage Threshold for ERT** values in the workflow properties. These values are used in the following formulas.

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Formulas for computing workflow outlier ranges

Value computed	Computation used	Example
Outlier Value	**Estimated Run Time** * (**Outlier Percentage Threshold for ERT** / 100)	10 seconds * (20 / 100) 10 seconds * 0.2 = 2 seconds
Outlier Range	(**Estimated Run Time** - *`Outlier Value`*) to (**Estimated Run Time** + *`Outlier Value`*)	(10 seconds - 2 seconds) to (10 seconds + 2 seconds) = 8 to 12 seconds

When a workflow runs within the outlier range, its estimated run time is automatically updated.

If a workflow has an outlying run time, it appears in any outlier workflow gauges on the Workflow Operations Dashboard and custom home pages.

Workflow estimated run time updates

When a workflow runs within the outlier range, its estimated run time is automatically updated.

The estimated run time is updated with the cumulative moving average of the latest run time value in relation to previous run times. The computed value is rounded to the nearest second and stored as a GlideDateTime.

For example:

Data point	Latest value	Cumulative running average (CRA)	CRA after rounding to the nearest second
1	10 seconds	10 seconds	10 seconds
2	12 seconds	11 seconds	11 seconds
3	9 seconds	10.333 seconds	10 seconds

Note:
Because the system rounds to the nearest second, the calculation is less precise with short durations.

You can also manually update the estimated run time in the workflow properties.

Workflow pause utility

Workflow Pause Utility provides functionality you can use to pause or resume all workflow contexts, a subset of qualified workflow contexts, or individual workflow contexts. You designate the data and time of day at which the paused workflows should resume, and can manually resume individual workflows as needed.

Once activated, the Workflow Pause Utility plugin (com.glideapp.workflow.pause) updates several tables when you pause or resume workflows. Each table stores specific data related to each paused or resumed workflow.

wf_pause_request

Records every workflow pause request. The system automatically updates and inserts records in this table whenever you pause workflow contexts. It tracks user-

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specified resume time, whether the pause request is still active, and the total number of workflow activities that paused or resumed.

wf_pause_status

Records the status of each workflow context you pause. When you pause workflow contexts, the plugin waits until the current executing activity finishes, and pauses it before the next activity starts. It tracks the specific activity on which the workflow context was paused and whether it has resumed. If the workflow is paused, it tracks the time at which it is scheduled to resume.

wf_pause_group_request

Pauses the specific set of workflow contexts you designate using filtering in Group Pause Requests. You can manually pause all currently active workflows by clicking the **Pause All** check box.

wf_pause_snapshot

Before pausing and after resuming a workflow, the table records a snapshot of the current state of the workflow context. The table also records the state of the currently executing activity on the paused workflow context.

Use examples

When you take down an instance for maintenance, you can pause all or selected active workflow contexts, and then resume them after you complete the maintenance.

You have an integration workflow context that hits an internal service that is down for maintenance. You can pause all instances of that workflow context from progressing to the next activity, allowing time for the internal service to be restored. Then, the paused workflow contexts can be resumed.

Request workflow pause utility

You can request the Workflow Pause Utility plugin (com.glideapp.workflow.pause) if you have the admin role. This plugin may include demo data and activates related plugins if they are not already active.

Before you begin

Role required: admin

About this task

There are two ways to request a plugin:

- Access the Now Support Service Catalog directly by selecting **Automation Store** > **Service Catalog** > **Activate Plugin** on Now Support.
- Access the Now Support Service Catalog through the All Applications page on your instance by following these steps.

For additional details about requesting a plugin, see Requesting a Plugin from the Service Catalog [KB0751715] article in the Now Support Knowledge Base.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

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Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

4. Select **Submit**.
   After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

Pause and resume individual workflows

Pause individual workflow contexts. Specify the date and time of day at which the workflow context should resume.

Before you begin

Install and activate the Workflow Pause Utility plugin.

Role required: Workflow_admin or workflow_publisher, workflow_creator

About this task

When a workflow context is paused, the system saves basic information about the pause request, such as the resume date and time, in the wf_pause_request table. A workflow context automatically resumes at a specified date and time of day, but the paused workflow context can be manually resumed as needed.

Procedure

1. Navigate to **All** > **Workflow** > **Live Workflows** > **Active Contexts**.
2. Select the individual workflow context that you are pausing.
   Workflow Context appears.
3. In **Related Links**, click **Pause**.
   A **Workflow Pause Inputs** dialog appears.

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4. In the **Workflow Pause Inputs** dialog:

   a. Click the calendar icon ( ) to select the date, and enter the time of day (in hours, minutes, and seconds) at which the workflow should resume.
   You can select the current date or future date, but you must enter a time of day in the future. For example, to pause the workflow context at 13:30:00 (1:30 pm), select the date from the calendar, and then enter 13, 30, and 00 into the respective **Time:** fields.

   b. Click the green check mark icon ( ) when finished.
   The selected date and time of day appear in the **Resume At** field.

   c. Click **OK** to return to Workflow Contexts.
   The selected workflow is now paused. Use Workflow pause request to monitor its status.

5. Manually resume a currently paused workflow context:
   Paused workflows resume on the date and time of day specified in the **Resume At** field.

   a. Navigate to **Workflow** > **Live Workflows** > **Active Contexts**.

   b. Select the individual workflow context that you are pausing.
   Workflow Context appears.

   c. In **Related Links**, click **Resume**.

Pause and resume all or multiple workflows

Use Workflow Pause Group Requests to pause, or resume, groups of workflows, or all active workflows. If pausing a group of workflows, use filtering functions to select the workflows. If pausing all active workflows, select the Pause All check box to indicate that all currently active workflows should be paused.

Before you begin

Role required: Workflow_admin or workflow_publisher, workflow_creator
Install and activate the Workflow Pause Utility plugin.

Procedure

1. Navigate to **All** > **Workflow** > **Operations** > **Group Pause Requests**.
   Workflow Pause Group Requests appears and displays existing workflow pause group requests.
2. Click **New**.
   Workflow Pause Group Request appears, and assigns a workflow pause group request ID.
3. To pause all active workflows, select **Pause All**, then click **Update**. To pause a filtered group of active workflow contexts, skip this step.
   All currently active workflow contexts in the instance are paused until you resume them. Use Workflow pause request to monitor their status.
4. To pause a filtered group of active workflow contexts, use the **Filter** field, specify the conditions for the search, then click **Update**.
   Workflow Pause Group Requests appears, and displays the results of the workflow group search. It assigns a workflow pause group request ID and indicates if the group is active (true = paused) or inactive (not yet paused).
5. To update, resume or delete a specific workflow pause group request, select it.

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Workflow Pause Group Request appears, and displays the selected workflow pause group request.

6. If the selected workflow pause group request is active (paused), and you do not want to pause it, click **Do Not Pause Incoming Workflows**. If the selected workflow pause group request is inactive (not yet paused), click **Pause** to pause it.
7. For the paused workflow group request, use the **Resume At** field to specify the date and time of day at which the paused workflow contexts should resume.

   a. Click to select the date, and enter the time of day (in hours, minutes, and seconds) at which the workflow contexts should resume. You can select the current date or future date, but you must enter a time of day in the future.
   For example, to pause the workflow context group at 13:30:00 (1:30 pm), select the date from the calendar, and then enter 13, 30, and 00 into the respective **Time:** fields.

   b. Click when finished.

   c. The selected date and time of day appear in the **Resume At** field.

   d. Click **OK** to return to Workflow Pause Group Request.

8. Click **Submit**.
9. Paused workflow contexts automatically resume on the date and time of day specified in the **Resume At** field. To manually resume currently paused workflow contexts:

   a. Navigate to **Workflow Pause Group Requests**.

   b. Select the workflow pause group request to resume.
   Workflow Pause Group Request appears.

   c. Click **Resume**, and then click **Update**.

10. Workflow Group Pause Request also contains the following information fields.

Workflow group pause request form

Field	Description
Active	Indicates if workflow group is paused.
Completed Resume Activity Count	Number of resumed workflow context activities that are completed.
Filter	Standard filtering fields used to specify the conditions for selection of a group of workflow contexts.
Log	Activity work notes generated by the group pause request.
Not Transitioned Workflow Count	Number of workflow contexts that were not transitioned when the group pause request was placed. When a group pause request is placed, the affected workflow contexts are paused before start of the next activity.

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Field	Description
Resume Act Count	Number of workflow context activities resumed after the group pause completed.
Pause Act Count	Number of paused workflow context activities.
Requester Name	Name of the person requesting the workflow context pause.
Pause percentage	Total percentage of workflow contexts that are paused.
Resume Percentage	Total percentage of workflow contexts that have resumed.
Total Workflow Count	Total number of workflows matching the specified filter conditions that are being paused.
Paused Workflow Count	Number of current paused workflow contexts.

Monitor workflow pause requests

You can monitor the status of workflow pause requests using Workflow Pause Request.

Before you begin

Role required: Workflow_admin or workflow_publisher, workflow_creator
You must install and activate the Workflow Pause Utility plugin.

Procedure

1. Navigate to **All** > **Workflow** > **Operations** > **Pause Requests**.
   Workflow Pause Requests appears and displays existing workflow pause requests.
2. Select the workflow pause request.
   Workflow Pause Request appears, and displays the selected workflow pause request.

Workflow pause request fields

Field	Description
Req Number	Unique assigned pause request number.
Completed Resume Activity Count	Number of workflow context activities resumed after the pause completed.
Pause Active	Selected indicates the workflow context is currently paused. Cleared indicates it is not.
Transitioned During Pause	Number of workflow contexts that transitioned when the pause request was placed. When a pause request is placed, the affected workflow contexts are paused before start of the next activity.
Workflow Context	Reference number for the paused workflow context.
Log	Activity work notes generated by the group pause request.
Paused Act Count	Date and time of day (h:m:s) at which the paused workflow context is resuming.

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Field	Description
Requester Name	Name of the person who requested the workflow pause.
Resume Act Count	Number of workflow context activities resumed after the pause completed.
Resume At	Date and time of day (h:ms:s) at which the workflow contents are scheduled to resume.
Table	Related record table name.
Application	Application in which the workflow context is executing.
Exec Act Count	Number of activities executing when the workflow context was paused.
Group Pause Request	Reference number for the associated group pause request, if any. Appears only if pause request was the result of a group pause request.
Is Workflow Complete	Selected indicates the workflow context is complete. Cleared indicates it is not.
Is Workflow Stuck	Selected indicates the workflow context is stuck. Cleared indicates it is not.
State	Current state of the workflow context - Paused or Resumed.
Stuck Activities Count	The number of workflow context activities that are stuck.
Stuck Act Count To be subtracted for Pause Percentage	Writer to whom the documentation request is assigned.

Encrypted workflow scratchpad

The Encrypted Workflow Scratchpad plugin (com.snc.encrypted.scratchpad) provides encrypted scratchpad support for workflow context and workflow executing activities.

The platform supports encryption on most fields, and workflows can execute on tables with encrypted fields. Encrypted data is typically stored in the workflow scratch pad for workflows that execute using encrypted fields and must access this data after processing an approval, timer, or create task activity.

Data in the workflow scratchpad is not encrypted by default. The Workflow engine supports scratchpad encryption and executing activity records only when the Encrypted Workflow Scratchpad plugin is activated. Once activated, data stored in the wf_context and wf_executing scratchpads is protected by a private workflow engine encryption module, and is prevented from being stored in plain text.

Incompatibility with domain separation

The Encrypted Workflow Scratchpad plugin is incompatible with domain separation. Activating the Encrypted Workflow Scratchpad plugin on a domain separated instance can produce encryption errors when running some workflows. Consider using a Workflow Studio flow instead.

Request encrypted workflow scratchpad activation

Request activation of the Encrypted Workflow Scratchpad plugin (com.snc.encrypted.scratchpad) from ServiceNow personnel

Before you begin
Role required: admin

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The Encrypted Workflow Scratchpad plugin must be activated via a Customer Service and Support request. You should activate and thoroughly test the plugin in a non-production instance. Only after you satisfied with the results should you request activation in a production instance.

When requesting activation in a production instance, you should schedule a low transactional volume time to do so. Prior to its activation, first activate the Workflow Pause Utility (com.glideapp.workflow.pause), and then pause all active workflows. Refer to Workflow pause utility. After activation of the Encrypted Workflow Scratchpad plugin, resume all paused workflows.

About this task

There are two ways to request a plugin:

- Access the Now Support Service Catalog directly by selecting **Automation Store** > **Service Catalog** > **Activate Plugin** on Now Support.
- Access the Now Support Service Catalog through the All Applications page on your instance by following these steps.

For additional details about requesting a plugin, see Requesting a Plugin from the Service Catalog [KB0751715] article in the Now Support Knowledge Base.

Encrypted Workflow Scratchpad activates these related plugins if they are not already active.

Plugins for Encrypted Workflow Scratchpad

Plugin	Description
Encryption Support [com.glide.encryption]	Allows text fields and attached files to be encrypted.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.

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Field	Description
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

4. Select **Submit**.
   After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

What to do next

After plugin activation, resume all paused workflows. Refer to Pause and resume all or multiple workflows.

Related topics

List of plugins

Troubleshoot workflows

Troubleshooting tools for workflows enable administrators to isolate execution paths, compare contexts, and track incomplete activities.

Important:
As of the Zurich release, new customers no longer receive the legacy workflows created and published by ServiceNow, Inc.. All legacy workflow functionality has been replaced by Workflow Studio content. Only customers who upgraded from prior versions retain the ability to use and edit existing legacy workflows. While all customers retain the ability to create legacy workflows, you are strongly encouraged to instead use Workflow Studio to create process automation content. Only Workflow Studio will receive new features and enhancements.

The workflow timeline provides a visual representation of the workflow, including transitions and the elapsed time for each activity. A troubleshooting tool for highlighting execution paths helps users perform forensics on a workflow. The highlighting feature can group multiple execution paths in various colors and can isolate rollback processing. Use the workflow highlighter to isolate incomplete tasks and approvals. You can also enable a workflow performance timing feature to troubleshoot slow workflows.

Execution path troubleshooting in timelines

Use the controls in a workflow timeline to isolate specific execution paths or compare multiple execution paths over time.

Timelines show how the activities in the workflow progressed in relation to one another over time. Isolate execution paths and follow transition lines between subflows and the main flow. Processing times provide a view of the workflow that you cannot get from the workflow diagram. Tooltips give precise information about each activity, such as duration.

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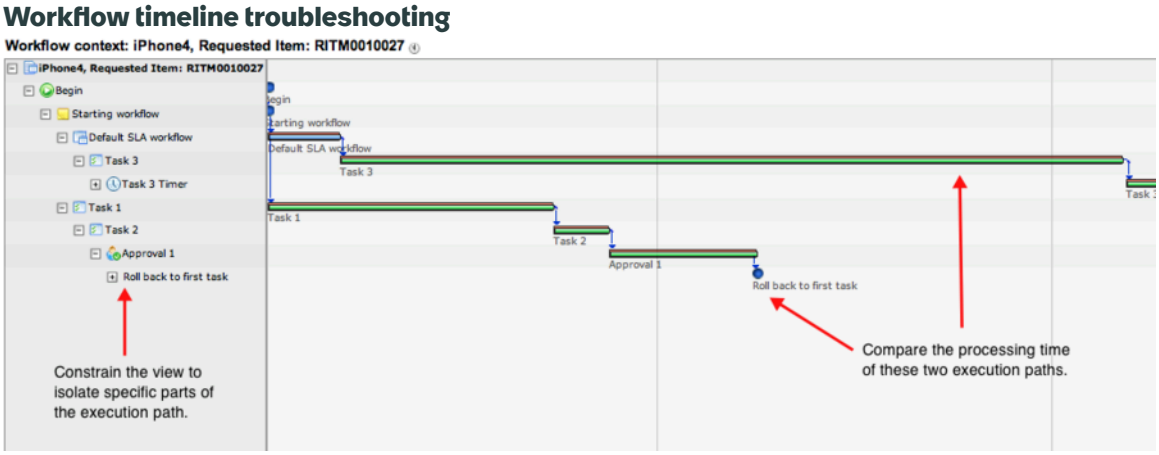


Execution history table

Highlight execution paths and rollbacks to locate activities that may have been left in an unresolved state.

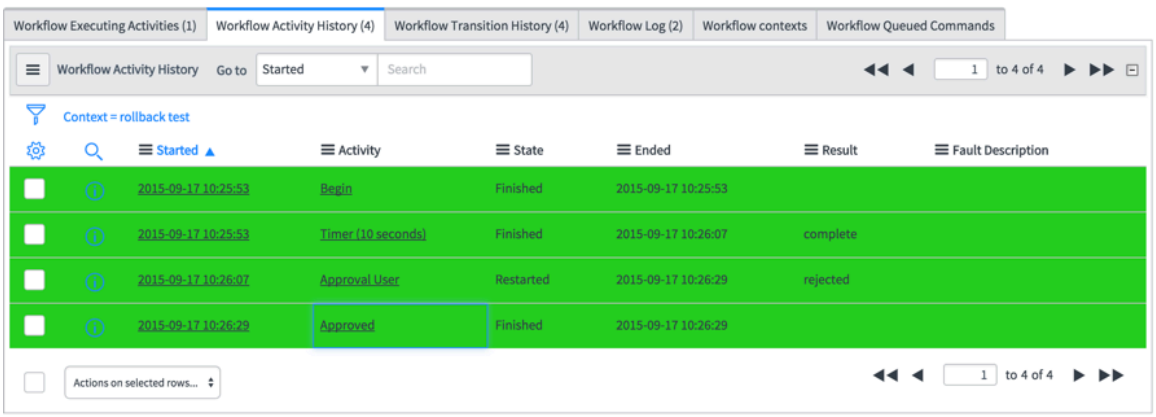
About this task

Rollbacks, cancels, and deletions during the execution of a workflow can prevent some activities from fully completing. Use highlighting in the execution history table to determine which activities in the workflow were left in an unresolved state.

Procedure

1. Run the workflow.
2. Navigate to **Workflow** > **All Contexts**.
3. Select a context to troubleshoot.
4. In the Workflow Context form, select the **Workflow Activity History** related list.
5. Right-click an activity and select **Workflow Debug** > **Toggle Execution Path Highlighting** from the context menu.

   All activities in that execution path are highlighted in a color selected by the platform. The debug path shows all activities that completed successfully during the workflow.



6. Right-click a rollback activity and select **Workflow Debug** > **Toggle Rollback Highlighting** from the context menu.

   The platform highlights the rollback path (restarted activities) in a different color. Each color represents a group of activities that were part of the same rollback execution. The highlighting

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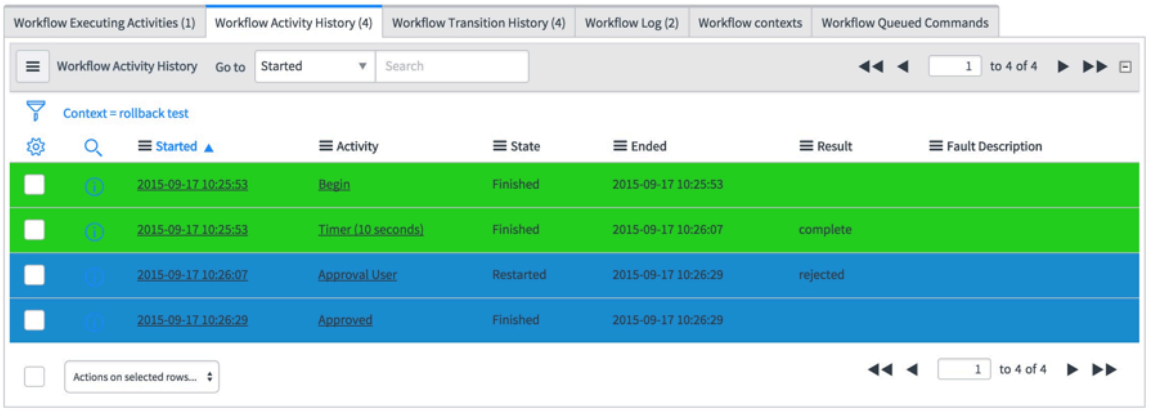
includes the activity that initiated the rollback. If you right-click an activity that was not part of a rollback, no rows are highlighted.

Note:
The rollback activity itself appears in both execution path and rollback highlighting.



7. To remove highlighting, right-click in the list and select an option to clear execution path or rollback highlighting.

   You can clear individual rollback paths or all rollback highlighting.

Use the Workflow Operations Dashboard

On the Workflow Operations Dashboard, view and add widgets to help you monitor workflows. Review the performance of workflows and determine which workflows must be improved.

Before you begin

Role required: workflow_admin
The different levels of access are:

- **View**: View the dashboard and refresh report widgets.
- **Customize**: Refresh, add, delete, and rearrange widgets.

About this task

Important:
As of the Zurich release, new customers no longer receive the legacy workflows created and published by ServiceNow, Inc.. All legacy workflow functionality has been replaced by Workflow Studio content. Only customers who upgraded from prior versions retain the ability to use and edit existing legacy workflows. While all customers retain the ability to create legacy workflows, you are strongly encouraged to instead use Workflow Studio to create process automation content. Only Workflow Studio will receive new features and enhancements.

On the Workflow Operations Dashboard, you can click widget elements to view the records they represent. You can also add new report widgets that are not displayed by default.

Procedure

1. View the Workflow Operations Dashboard by navigating to **Workflow** > **Operations** > **Workflow Operations Dashboard**.

   The default reports on the dashboard include:

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- Workflow contexts providing run time metrics
- Active workflows started during a specified time period
- Workflows run between yesterday and today
- Workflows by state for the current month
- Aged workflow contexts for the past month

2. Find and add more widgets by selecting the add content icon ( ) in the corner of the dashboard.

What to do next

If a workflow consistently appears as an outlier and there is no error causing the run time values, you can use its historical run time values to calculate a new estimated run time value. Then update the estimated run time in the workflow properties.

Workflow gauges

Multiple gauges are available to help you review the performance of workflows. You can add these gauges to the Workflow Operations Dashboard or custom homepages.

Important:

The functionality found in homepages, arranging information from your instance to tell a story about your data, is found in dashboards on new instances. On upgraded instances with Next Experience enabled, users can view existing homepages if they have a direct URL, but they can't create or edit them. Responsive dashboards and Analytics Center dashboards take over homepage functionality.

Use the Homepage deprecation help tool to convert the homepages on your instance to responsive dashboards.

For more information, see:

- Dashboards in the Analytics Center.
- Working with responsive dashboards.

Workflow gauges

Content	Description
ERT Dashboard Controls >	
Outlier Finished Workflows for ERT (Percentage Outlier)	Identifies workflows that finished, but did not finish within estimated runtime (ERT) values. Enter an outlier percentage to see workflows that ran outside the specified runtime range.
Outlier Long Running Workflows for ERT (Percentage Outlier)	Displays workflows running longer than the configured runtime threshold.
Workflow Dashboard >	
Workflows Without Current Record	Displays workflow contexts that do not have an associated current record.
Gauges > **Workflow Context**	

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Workflow gauges (continued)

Content	Description
Number of Active Workflows Started Hourly Over Time (Yesterday)	Displays the total number of running workflows per hour over a given time period. By default, it displays the number of workflows that ran per hour over the previous day (yesterday).
Outlier Finished Workflows Not Cumulated to ERT	Displays workflow contexts that are finished outside the estimated runtime outlier value and not cumulated to estimated run time value.
Running Workflow Contexts	Displays the total number of running workflows.
Successfully Finished Workflows Cumulated to ERT	Displays the total number of successfully completed workflows whose running duration is cumulated to the estimated run time value.
Workflows by State (This Month)	Displays the total number of workflows run in a month grouped by the current state.
Aged Workflow Contexts (Running Since Last Month)	Displays the total number of workflow contexts running for a given period of time by workflow name. By default, it displays the total number of workflow contexts running over the last month.
Workflows Run Between Yesterday and Today (by Table)	Displays workflows that have run in the last day grouped by table name.

Workflow performance timing

The workflow engine can generate detailed performance timing data that is useful for troubleshooting slow workflows.

Important:
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An administrator must enable this functionality.

When workflow performance timing is enabled, the workflow engine tracks key performance data, including various execution speed metrics. The Workflow Timing [wf_workflow_timing] table stores the data, with a record for each workflow context. The workflow timing record is updated when the workflow engine completes the workflow, waits for an activity to complete, or otherwise exits the workflow execution.

Workflow estimated run time properties

Administrators can enable the collection of workflow run time metrics by setting Estimated Run Time (ERT) properties.

Administrators can use ERT metrics to determine if workflows are running longer or shorter than expected and to identify errors in workflow processing. The system displays run time metrics on the Workflow Operations Dashboard.

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Enable workflow performance timing

Workflow performance timing is disabled by default. You can create a system property to enable it.

Before you begin

Role required: admin

Procedure

Add a system property with the following specifications.

Field	Value
Name	glide.workflow.show_timing
Type	true | false
Value	true

Workflow activities

Workflow activity properties reference

Important:
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Each activity performs a different task, such as running a script, sending notifications, or requesting approvals. Activities can succeed or fail, which can result in actions performed by other activities.

For information about configuring different types of activities, click an activity name in the list below or see Workflow activities reference.

Core activities provided in the base system

- Approval and rollback workflow activities
- Condition Workflow activities
- Notification workflow activity
- Notify workflow activities
- Workflows used as subflows
- Task workflow activities
- Timer workflow activities
- Utility workflow activities

Activities provided with Orchestration

The following activities are included with Orchestration.

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- Active Directory activity pack
- Orchestration activities
- PowerShell activities
- Puppet activities

Templates provided for creating custom activities

If Orchestration is active on your system, users with the proper roles can create custom activities using the ServiceNow Orchestration activity designer. For information about the templates Orchestration provides for creating custom activities that you can upload to the ServiceNow Store, see Activity designer components.

Workflow activities reference

Workflow activity reference, organized by category.

Each activity performs a different task, such as running a script, sending notifications, or requesting approvals.

Workflow runs activities as the user session that starts or advances them. Workflows started from record operations will run activities as the user session that performed the record operation. Workflows started from schedules or restarted from timers run activities as the System user. Workflows started from script calls run activities as the user session that started the script.

Approval and rollback activities

Approval and rollback activities generate and manage approvals. Not all workflows can include approval activities. For more information, read Approval and rollback workflow activities.

Note:
Approval activities run as the user whose actions match the approve or reject conditions the workflow was waiting for and advances the workflow.

Approval and rollback activities

Activity	Description
Approval Action workflow activity	The **Approval Action** activity performs an approval action on the current task.
Approval Coordinator workflow activity	The **Approval Coordinator** activity creates an approval whose outcome depends on the outcome of one or more child activities, including one or more **Approval - User**, **Approval - Group**, and/or **Manual Approval** activities.
Approval - Group workflow activity	The **Approval - Group** activity creates approval records for each member of a specified group.
Approval - User workflow activity	The **Approval - User** activity creates one or more individual user approvals.
Generate workflow activity	The **Generate** activity immediately creates task or approval records from any task or approval activities placed after the **Generate** activity in the workflow path. These pre-generated tasks and approvals start when the task and approval activities are reached during flow execution. This allows a task to have a set of associated pre-generated

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Approval and rollback activities (continued)

Activity	Description
	sequential tasks or approvals, but still require them to be completed in order.
Manual Approvals workflow activity	The **Manual Approvals** activity watches and manages any approvals that users add manually outside of the workflow process. This activity only selects approvals that are in the Not requested state.
Rollback To workflow activity	The **Rollback To** activity transitions directly to the activity specified by the outgoing transition line arrow.

Condition activities

Condition activities provide conditional branching and logical operation functionality for workflows.

Note:
Condition activities run as the user whose actions match the conditions the workflow was waiting for and advances the workflow.

Condition activities

Activity	Description
If workflow activity	The **If** activity checks a condition or script to determine if a **Yes** or **No** transition should be taken.
Switch workflow activity	The **Switch** activity checks if the value of a passed field or variable is equivalent to one of several case values.
Wait for condition workflow activity	The **Wait for condition** activity causes the workflow to wait at this activity until the current record matches the specified condition.
Wait for WF Event workflow activity	The **Wait for WF Event** activity causes the workflow to wait at this activity until the specified event is fired.

Notify activities

Notify workflow activities manage calls and SMS messages in Notify.

Notify activities

Activity	Description
Forward call workflow activity	The **Forward Call** activity forwards a Notify call to an E.164-compliant phone number.
Input workflow activity	The **Input** activity creates a phone menu by presenting a list of options on a Notify call.
Hangup workflow activity	The **Hangup** activity disconnects an active Notify phone call.
Play workflow activity	The **Play** activity plays a sound file on a Notify call.
Record workflow activity	The **Record** workflow activity records audio from a user on a Notify call.

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Notify activities (continued)

Activity	Description
Reject workflow	The **Reject** workflow activity rejects an incoming Notify call.
Say workflow activity	The **say** workflow activity allows you to play a message, using text to speech, on a Notify call.
Forward to notify client workflow activity	The **forward to notify client** workflow activity connects a phone call to a Notify WebRTC client.
Call workflow activity	The **Call** activity makes outbound phone calls using a Notify workflow. This workflow activity can be added to any table.
Join conference call workflow activity	The **Join Conference Call** activity connects an incoming or outgoing call to a Notify conference call.
Send SMS workflow activity	The **send SMS** workflow activity to send short text messages using Notify to users' phones. This workflow activity can be added to any table.
Queue workflow activity	The **Queue** activity places an active Notify call in a queue.

Notification activities

Notification workflow activities notify users of events that occur during the workflow.

Notification activities

Activity	Description
Create Event workflow activity	The **Create Event** activity adds an event to the event queue, but does not immediately fire the event.
Notification workflow activity	The **Notification** activity sends an email or SMS message to specified users or groups.

Subflow activities

Subflow activities run and manage workflows from a parent workflow.

Subflow activities

Activity	Description
Parallel Flow Launcher workflow activity	The **Parallel Flow Launcher** activity launches multiple subflows in parallel.

Task activities

Task activities create and modify workflow tasks.

Note:
Task activities run as the user whose actions complete the task the workflow was waiting for and advances the workflow.

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Task activities

Activity	Description
Add Worknote workflow activity	The **Add Worknote** activity adds text to the *Worknotes* field of the current incident record.
Attachment Note workflow activity	The **Attachment Note** activity adds an attachment to the current record.
Catalog Task workflow activity	The **Catalog Task** activity creates a service catalog task record.
Create Task workflow activity	The **Create Task** activity generates a record on any of the tables that extend Task [task].

Timer activities

Timer activities pause workflows for set periods of time.

Note:
Timer activities run as the System user because the system scheduler advances the workflow.

Timer activities

Activity	Description
SLA Percentage Timer workflow activity	The **SLA Percentage Timer** activity pauses the workflow for a duration equal to a percentage of an SLA.
Timer workflow activity	The **Timer** activity pauses the workflow for a specified period of time.

Utility activities

Utility activities provide controls over the path of the workflow, and other useful tools.

Utility activities

Activity	Description
Branch workflow activity	The **Branch** activity splits the workflow into multiple transition paths from a single activity.
Join workflow activity	The **Join** activity unites multiple execution paths into one transition.
Lock workflow activity	The **Lock** activity prevents other instances of this workflow from continuing past this activity until the lock is released.
Log Message workflow activity	The **Log Message** activity writes a message to the workflow log.
Log Trace Message workflow activity	The **Log Trace Message** activity writes a trace message to the workflow log.
REST Message legacy workflow activity	The legacy **REST Message** activity enables an administrator to override the REST endpoint or supply the variables configured in the REST Message module.

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Utility activities (continued)

Activity	Description
Return Value workflow activity	The **Return Value** activity returns a value to a parent workflow, when run from a subflow.
Run Script workflow activity	The **Run Script** activity runs the specified script in the scope of the workflow version.
Set Values workflow activity	The **Set Values** activity sets values on the current record when the workflow quiesces or ends.
SOAP Message legacy workflow activity	The legacy **SOAP Message** activity uses SOAP messages defined in the System Web Services plugin and can call the messages using a MID Server.
Turnstile workflow activity	The **Turnstile** activity limits how many times a workflow can pass through the same point.
Unlock workflow activity	The **Unlock** activity releases a lock that was previously placed by the **Lock** activity.

Activities provided with Orchestration

The following activities are included with Orchestration.

- Active Directory activity pack
- Orchestration activities
- PowerShell activities
- Puppet activities

Templates provided for creating custom activities

If Orchestration is active on your system, users with the proper roles can create custom activities using the ServiceNow Orchestration activity designer. For information about the templates Orchestration provides for creating custom activities that you can upload to the ServiceNow Store, see Orchestration custom activity templates.

Approval and rollback workflow activities

Approval and rollback activities generate and manage approvals.

Approval and rollback activities are not available in some workflows.

- With two exceptions, approval and rollback activities are only available when the workflow runs on a table that extends Task. The exceptions are the **Approval - User** and **Approval Action** activities, which are available globally.
- Approval and rollback activities are available only if approval engines are turned off for the table on which the workflow runs. If approval engines are enabled for the table, approval activities appear greyed out and cannot be selected. To learn more about how workflow and approval engines interact, read Approval workflow activities and approval engines.

Approval Action workflow activity

The **Approval Action** activity performs an approval action on the current task.

Use this activity to mark the current task record as approved or rejected.

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Note:
When an **Approval Action** activity is used to mark a task approved, the activity marks all pending approvals as **No Longer Required**. This activity behaves differently from **Set Values** or **Run Script** when used to set the **Approval** field's value.

Results

The result value of the activity is the final approval disposition selected by the approver. The result value can be **Approved** or **Rejected**. A workflow designer can assign a result value using the `activity.result` variable from within a script field of the activity.

Input variables

Input variables determine the initial behavior of the activity.

Approval Action activity input variables

Field	Description
Action	The action to perform on the task. Options are: • Mark task approved • Mark task rejected • Mark task requested • Disregard pending approvals: the system sets approval records to **no longer required** and marks the activity as **approved**.

Conditions

The conditions determine which transition runs after this activity.

Note:
Approval activities run as the user whose actions match the approve or reject conditions the workflow was waiting for and advances the workflow.

Approval Action activity conditions

Condition	Description
Always	The event or condition that causes the approval to move to the next workflow step.
Error	The event or condition that generates an error.
Skipped	The event or condition that allows a skipped approval.

States

The activity state tells the workflow engine what to do with the activity.

Approval Action activity states

State	Description
Executing	The workflow engine starts the `execute` function of the activity.

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Approval Action activity states (continued)

State	Description
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Approval Coordinator workflow activity

The **Approval Coordinator** activity creates an approval whose outcome depends on the outcome of one or more child activities, including one or more **Approval - User**, **Approval - Group**, and/or **Manual Approval** activities.

Note:
This activity is only available when the workflow runs on a table that extends Task.

To create an **Approval Coordinator** activity, first drag the activity onto the workflow canvas, causing the activity form to display. On the activity form, fill in the appropriate fields, then click **Submit**.

After you click **Submit**, the activity appears on the workflow canvas. From there, specify the child activities by clicking the links that appear on the body of the activity.

When the **Approval Coordinator** activity completes, all pending approvals that were created by any of the **Approval Coordinator** approval activities are immediately set to **No Longer Required**. If a single user is called as an approver twice by the same workflow, such as when a single user is both a product approver and an executive approver, any approvals for that user after the first are skipped.

Results

The result value of the **Approval Coordinator** activity depends on the approval actions taken by the approvers and the approval conditions specified in the **Wait for** field. Possible result values are:

- Approved
- Rejected
- Deleted
- Cancelled

Input variables

Input variables determine the initial behavior of the activity.

Approval Coordinator activity input variables

Field	Description
Wait for	Indicate what to wait for to indicate that the approval activity is approved or rejected. Options are:

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Approval Coordinator activity input variables (continued)

Field	Description
	• **Any child activity to be approved:** Any child activity (User, Group, or Manual Approval) that completes with a result of **approved** causes the **Approval Coordinator** activity to complete with a result of **approved**. • **All child activities to be approved:** All child activities of the **Approval Coordinator** activity must complete with a a result of **approved** to cause the **Approval Coordinator** activity to complete with a result of **approved**. • **The first approval or rejection from any child activity:** The first child activity that completes with a result of **approved** or **rejected** causes the **Approval Coordinator** activity to complete with the same result. • **Condition based on script:**Call a script to determine how to manage an approval or rejection.
When a rejection occurs Only appears if **Wait for** is set to **All child activities to be approved** or **Any child activity to be approved**.	Specify what the coordinator should do when it sees a rejection from any one of the child activities. Options are: • **Reject the approval:** Immediately complete the **Approval Coordinator** activity with a result of **rejected**. • **Wait for other responses before deciding:** Wait until we get other responses from other child activities before making an approval or rejection decision. This allows users to change their minds until a decision is made. In addition, if **Wait for** is set to **Any child activity to approve** then a single child activity completion with a result of **approved** will cause the **Approval Coordinator** activity to complete with a result of **approved** even if other child activities have completed with a result of **rejected**.

Approval script
 	
Only appears if **Wait for** is set to **Condition based on script**.
	If the **Wait for** variable is set to **Condition based on script** this script is called to determine how to handle an approval or rejection. The script needs to set the variable *answer* to , approved or rejected to indicate the overall approval status for this approval. When called, the following variable is available to the script:
	`counts.total = total number of child approval activities that are part of this approval`
	`counts.approved = # of child approval activities that approved so far`
	`counts.rejected = # of child approval activities that rejected so far`
	`counts.requested = # of child approval activities that are pending approval`

Conditions

The conditions determine which transition runs after this activity.

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Note:
Approval activities run as the user whose actions match the approve or reject conditions the workflow was waiting for and advances the workflow.

Approval Coordinator activity conditions

Condition	Description
Approved	The users from the groups have approved the request based on the **Wait for** rules.
Rejected	The users from the groups have rejected the request based on the **Wait for** rules.

States

The activity state tells the workflow engine what to do with the activity.

Approval Coordinator activity states

State	Description
Executing	The workflow engine starts the *execute* function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Approval - Group workflow activity

The **Approval - Group** activity creates approval records for each member of a specified group.

Note:
This activity is only available when the workflow runs on a table that extends Task.

The group approval is approved or rejected based on the user approvals, according to the logic specified in the **Wait For** field.

Results

The workflow designer can assign a result value using activity.result from within a script field of the activity. By default, the result value is the final approval disposition. This disposition depends on the approval actions take by the approvers and the approval conditions specified in the **Wait for** or **When Anyone Rejects** fields. Possible result values are:

- Approved
- Rejected
- Deleted
- Cancelled

Input variables

Input variables determine the initial behavior of the activity.

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Approval - Group activity input variables

Field	Description
Approval - Group When Specify when this activity generates a group approval record.	
Condition	Conditions which, if met, cause the group approval to be generated. If the conditions are not met, the approval is skipped.
Approval - Group Approvers Specify the groups whose approval will be requested.	
Groups	The groups whose approval will be requested. To edit this field, click the lock icon. To select specific groups by name, use the lookup list. To select groups from field values on the current record at runtime, click the tree icon. Each member of the group will be assigned an individual approval record. If no group is selected, the activity automatically sets the approval to **Approved**.
Approval - Group Condition Specify how the activity decides to approve or reject the group approval, based on the responses from individual members of the group.	
Wait for	A choice between different approval logics to determine which individual approvals or rejections result in approval or rejection of the activity's approval. Options are: • **An approval from each group:** Any user from each group can approve and the first approval from each group causes the activity to complete with a result of **approved** (see below for how a rejection is handled). • **An approval from any group:** Any user from any group can approve and the first approval from any group causes the activity to complete with a result of **approved**. • **An approval from everyone from all groups:** All users from all groups must approve to cause the activity to complete with a result of **approved** (see below for how a rejection is handled). • **First response from each group:** The first approval or rejection from any user in each group is used to indicate the state of the group approval (see below for how a rejection is handled). Indicate what happens when any user rejects their approval request. Options are: • **Reject the approval:** Immediately complete the activity with a result of **rejected**.

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Approval - Group activity input variables (continued)

Field	Description
	• **First response from any group:** The first approval or rejection from any user in any group causes the activity to complete with a result of **approved** or **rejected**. • **Condition based on script:** Each time a user approves or rejects, the **Approval script** is called to determine if the activity should complete.

Approval script
 	
Only appears when **Wait for** is set to `Condition based on script`.
	If the **Wait for** variable is set to **Condition based on script** this script is called to determine how to handle an approval or rejection. The script needs to set the variable *answer* to approved or rejected to indicate the overall status for this approval.
	
	This script is responsible for setting the approval state for each group that is part of this approval activity before returning the overall approval state for all of the groups.
	
	When called, the following variables are available to the script for all the groups that are part of this approval activity:
	
	`counts.total = total number of groups that are part of this approval`
	`counts.approved = # of groups that approved so far`
	`counts.rejected = # of groups that rejected so far`
	`counts.requested = # of groups that are pending approval`
	`counts.not_requested = # of groups that are not pending approval`
	`counts.not_required = # of groups that approval is not required`
	
	And for each group:
	
	`groups[group_id].total = total number of users that are part of this group's approval`
	`groups[group_id].approved = # of users that approved so far`
	`groups[group_id].rejected = # of users that rejected so far`
	`groups[group_id].requested = # of users that are pending approval`
	
	`groups[group_id].not_requested = # of users that are not pending approval`
	
	`groups[group_id].not_required = # of users that approval is not required`
	
	`groups[group_id].approvalIDs[state] = array of user ids that are at the specified approval state`
	
	Note: Iterate the groups using:

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Approval - Group activity input variables (continued)

Field	Description

	``for (var id in groups) {
	var group = groups[id];
	... group.total ...
	}```
	
	Note: Get group object using the following code (to get things like the group name being iterated on):
	
	``var objGroup = fncGetGroupObj(id);
	var strGroupName = objGroup.name;
	
	function fncGetGroupObj(sidGroupApproval)
	{
	var objGroupApproval = new GlideRecord('sysapproval_group');
	
	objGroupApproval.get(sidGroupApproval);
	
	var objGroup = new GlideRecord('sys_user_group');
	
	objGroup.get(objGroupApproval.assignment_group.sys_id);
	
	return objGroup;
	}```
	
	Approval scripts also allow computations. For example, if only half of the approvals are required:
	
	``if (counts.approved/counts.total > .49) {
	answer = 'approved';
	}
	else if (counts.rejected/counts.total > .50) {
	answer = 'rejected';
	}```

When anyone rejects	A choice between different approval logics to determine which individual rejections result in rejection of the activity's approval. Options are: • **Reject the approval:** Immediately complete the activity with a result of **rejected**. • **Wait for other responses before deciding:** Wait until we get other responses before making an approval or rejection decision. This allows users to change their mind until a decision is made.

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Approval - Group activity input variables (continued)

Field	Description
	Note: If **Wait for** is set to **Anyone to approve**, then a single approval causes the activity to complete with a result of **approved**, even if one or more users reject.
Approval - Group Schedule Specify how workflow calculates the approval record's expected start date and due date. Once you've made a selection for 'Due date based on', and 'Schedule based on', the appropriate fields will display.	
Due date based on	Select how workflow determines the task's duration, due date, and schedule. • **A user specified duration:** The duration is based on a user specified value. • **A relative duration:** The duration is calculated from a relative duration (such as End of Next Business Day). • **A date/time or duration field:** The duration is based on the value of a field on the current record. • **Script:** The duration is returned by a script.
Duration Only appears when **Due date based on** is set to `A user specified duration`	The specific number of days and hours.
Relative duration Only appears when **Due date based on** is set to `A relative duration`	The general number and length of business days.
Due date field Only appears when **Due date based on** is set to `A date/time or duration field`	The date/time or duration field.
Due date script Only appears when **Due date based on** is set to `Script`	The script that sets 'answer' to the number of seconds for the duration.

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Approval - Group activity input variables (continued)

Field	Description
Schedule based on	The basic schedule the timer uses to count working hours. If a schedule is specified, the duration will only be considered for times that are specified on the schedule. For example, if the duration is 2 hours and the workflow begins at 4:00pm on a schedule that is 8am - 5pm, then it ends at 9:00am the next day. The options are: • **This workflow's schedule:** The schedule uses workflow context date, time, and an optional **Time zone based on** value. • **A specific schedule:** The schedule uses a pre-defined **Schedule** and an optional **Time zone based on** value. • **A schedule field:** The schedule uses a value from a table and an optional **Time zone based on** value.
Schedule Only appears when **Schedule based on** is set to `A specific schedule`	The predefined **Schedule** from a list.
Schedule field Only appears when **Schedule based on** is set to `A schedule field`.	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.
Time zone based on	The time zone for calculating the duration. The time zone may be based on: • **No time zone:** Default. Workflow uses the GMT time zone. • **A specific time zone:** A specific **Time zone** that you choose from a choice list. • **A time zone field:** A **Time zone field** to track time duration from a field on the form.
Time zone Only appears when **Time zone based on** is set to `A specific time zone` .	Select the time zone you want from the choice list.
Time zone field Only appears when **Time zone based on** is set to	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.

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Approval - Group activity input variables (continued)

Field	Description
`A time zone field.`	
Approval - Advanced If desired, write a script for determining additional users to request approvals from.	
Advanced	Select this check box to write a script for determining additional users to request approvals from. Use the **Additional groups script** to customize group approvals.

Additional groups script	If the **Advanced** check box is selected, this script is called to determine any additional group approvals to be created. The script needs to set the variable *`answer`* to a comma-separated list of group ids or an array of group ids to add as approver groups. For example:
	`answer = [];`
	`answer.push('id1');`
	`answer.push('id2');`

Conditions

The following conditions determine which transition runs after this activity.

Note:
Approval activities run as the user whose actions match the approve or reject conditions the workflow was waiting for and advances the workflow.

Approval - Group activity conditions

Condition	Description
Approved	The users from the groups have approved the request based on the **Wait for** rules.
Rejected	The users from the groups have rejected the request based on the **Wait for** rules.
Error	The event or condition that generates an error.
Skipped	The event or condition that allows a skipped approval.

States

The activity state tells the workflow engine what to do with the activity.

Approval - Group activity states

State	Description
Executing	The workflow engine starts the *`execute`* function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.

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Approval - Group activity states (continued)

State	Description
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Approval - User workflow activity

The **Approval - User** activity creates one or more individual user approvals.

Results

The result value is the final approval disposition. This disposition depends on the approval actions take by the approvers and the approval conditions specified in the **Wait for** or **When Anyone Rejects** fields. Possible result values are:

- Approved
- Rejected
- Deleted
- Cancelled

Input variables

Approval - User activity input variables

Field	Description
Approval - User When Specify when this activity generates a user approval record.	
Condition	Conditions which, if met, cause the individual approval to be generated. If the conditions are not met, the approval is skipped.
Approval - User Approvers Specify the users whose approval will be requested.	
Users	The users for the approval. Use the tree icon to select user reference fields from the current record to create approvals, such as `${assigned_to}`. If no user is selected, the activity automatically sets the approval to **Approved**. **Note:** Workflow only manages approval records generated by the Approval User activity. After starting the workflow, newly added approvals do not affect the workflow context.
Groups	Groups whose members should also receive approvals. Note that this is different than the **Approval - Group** activity, which creates a group approval in addition to the individual approvals. The tree icon can be used to select group reference fields from the current record to create approvals, such as `${assignment_group}`.
Approval - User Condition	

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Approval - User activity input variables (continued)

Field	Description
Specify how the activity decides to approve or reject the approval, based on the responses from individual approvers.	
Wait for	A choice between different approval logics to determine which individual approvals result in approval of the activity's approval. Options are: • **Anyone to approve:** Any user can approve and the first approval causes the activity to complete with a result of **approved**. • **Everyone to approve:** All users must approve (see below for how a rejection is handled). • **First response from anyone:** The first approval or rejection from any user causes the activity to complete. • **Condition based on script:** Each time a user approves or rejects, the **Approval script** is called to determine if the activity should complete.
When anyone rejects	A choice between different approval logics to determine which individual rejections result in rejection of the activity's approval. Options are: • **Reject the approval:** Immediately complete the activity with a result of **rejected**. • **Wait for other responses before deciding:** Wait until we get other responses before making an approval or rejection decision. This allows users to change their mind until a decision is made. **Note:** Note that if **Wait for** is set to **Anyone to approve** then a single approval will cause the activity to complete with a result of **approved** even if one or more users reject.
Approval Column	A string field for the name of the approval field on the table the workflow is running on. The default value is **approval**, which is the field on the Task table. **Note:** Use the field's name, not its label. If using any custom approval column fields and approval column journals, use Set Value activities in the workflow to set the custom Approval column fields.
Approval Journal Column	
Approval Script	If the **Wait for** variable is set to **Condition based on script** this script is called to determine how to handle an approval or rejection. The script needs to set the variable *answer* to approved or rejected to indicate the approval status for this approval. When called, the following information is available:

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Approval - User activity input variables (continued)

Field	Description

	`counts.total = total number of users that are part of this approval`
	`counts.approved = # of users that approved so far`
	`counts.rejected = # of users that rejected so far`
	`counts.requested = # of users that are pending approval`
	`counts.not_requested = # of users that are not pending approval`
	`counts.not_required = # of users that approval is not required`

Approval - User Schedule Specify how workflow calculates the approval record's expected start date and due date. Once you've made a selection for 'Due date based on', and 'Schedule based on', the appropriate fields will display.	
Due date based on	Select how workflow determines the task's duration, due date, and schedule. • **A user specified duration:** The duration is based on a user specified value. • **A relative duration:** The duration is calculated from a relative duration (such as End of Next Business Day). • **A date/time or duration field:** The duration is based on the value of a field on the current record. • **Script:** The duration is returned by a script.
Duration Only appears when **Due date based on** is set to `A user specified duration`	The specific number of days and hours.
Relative duration Only appears when **Due date based on** is set to `A relative duration`	The general number and length of business days.
Due date field Only appears when **Due date based on** is set to `A date/time`	The date/time or duration field.

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Approval - User activity input variables (continued)

Field	Description
`or duration field`	
Due date script Only appears when **Due date based on** is set to `Script`	The script that sets 'answer' to the number of seconds for the duration.
Schedule based on	The basic schedule the timer uses to count working hours. If a schedule is specified, the duration will only be considered for times that are specified on the schedule. For example, if the duration is 2 hours and the workflow begins at 4:00pm on a schedule that is 8am - 5pm, then it ends at 9:00am the next day. The options are: • **This workflow's schedule:** The schedule uses workflow context date, time, and an optional **Time zone based on** value. • **A specific schedule:** The schedule uses a pre-defined **Schedule** and an optional **Time zone based on** value. • **A schedule field:** The schedule uses a value from a table and an optional **Time zone based on** value.
Schedule Only appears when **Schedule based on** is set to `A specific schedule`	The predefined **Schedule** from a list.
Schedule field Only appears when **Schedule based on** is set to `A schedule field`.	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.
Time zone based on	The time zone for calculating the duration. The time zone may be based on: • **No time zone:** Default. Workflow uses the GMT time zone. • **A specific time zone:** A specific **Time zone** that you choose from a choice list. • **A time zone field:** A **Time zone field** to track time duration from a field on the form.
Time zone Only appears when **Time zone based on** is set to `A`	Select the time zone you want from the choice list.

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Approval - User activity input variables (continued)

Field	Description
`specific time zone` .	
Time zone field Only appears when **Time zone based on** is set to `A time zone field.`	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.
Approval - Advanced If desired, write a script for determining additional users to request approvals from.	
Advanced	Select this check box to write a script for determining additional users to request approvals from.

Additional approvers script	If the **Advanced** check box is selected, this script is called to determine any additional user approvals to be created. The script needs to set the variable *`answer`* to a comma-separated list of user ids and group ids or an array of user and group ids to add as approvers. For example:
	`answer = [];`
	`answer.push('id1');`
	`answer.push('id2');`

Conditions

The following conditions determine which transition runs after this activity.

Note:
Approval activities run as the user whose actions match the approve or reject conditions the workflow was waiting for and advances the workflow.

Approval - User activity conditions

Condition	Description
Approved	The users approved the request based on the **Wait for** rules.
Rejected	The users rejected the request based on the **Wait for** rules.
Error	The event or condition that generates an error.
Skipped	The event or condition that allows a skipped approval.

States

The activity state tells the workflow engine what to do with the activity.

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Approval - User activity states

State	Description
Executing	The workflow engine starts the `execute` function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Generate workflow activity

The **Generate** activity immediately creates task or approval records from any task or approval activities placed after the **Generate** activity in the workflow path. These pre-generated tasks and approvals start when the task and approval activities are reached during flow execution. This allows a task to have a set of associated pre-generated sequential tasks or approvals, but still require them to be completed in order.

Note:
This activity is only available when the workflow runs on a table that extends Task.

By default, the workflow does not create any tasks or approvals until it reaches them in the workflow.

The **Generate** activity follows all transitions through the workflow to each activity. For each activity:

- If it is a task activity, creates the task and sets:
  - The **State** to **Pending**
  - The **Expected Start Date**
  - The **Due Date**

  Note:
  Task activities run as the user whose actions complete the task the workflow was waiting for and advances the workflow.

- If it is an approval activity, creates the approvals and sets:
  - The approval **State** to **Not Requested**
  - The **Expected Start Date**
  - The **Due Date**

  Note:
  Approval activities run as the user whose actions match the approve or reject conditions the workflow was waiting for and advances the workflow.

Expected start dates and due dates are calculated based on the **Expected Duration** of all of the tasks and approvals between the **Generate** activity and the activity being updated. In the case of a branched path (between a **Branch** and **Join** activity), the longer duration will be used for any post-branch activities.

The **Generate** activity can be used more than once, and any tasks or approvals will be refreshed with updated information. This is useful in situations where the list of approvers or other

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important information is still editable while the workflow is in process and it may be necessary to update or correct the generated approvals or tasks.

To exclude a set of activities from the **Generate** activity, select the **Skip during generate** check box on any condition and its transitions will not be followed during the generate process. By default, the following conditions have the **Skip during generate** check box selected:

- **Rejected** (for any of the approval activities)
- **No** condition of **If** activity
- **Continue** condition of **Turnstile** activity
- **Incomplete** condition of **Join** activity

Input variables

Input variables determine the initial behavior of the activity.

Generate activity input variables

Field	Description
Generate approvals	If selected, approvals are created when running the **Generate** activity. If cleared, the approvals are used to compute their estimated duration, but no approvals are created.
Generate tasks	If selected, tasks are created when running the **Generate** activity. If cleared, the tasks are used to compute their estimated duration, but no tasks are created.

States

The activity state tells the workflow engine what to do with the activity.

Generate activity states

State	Description
Executing	The activity is executing.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.

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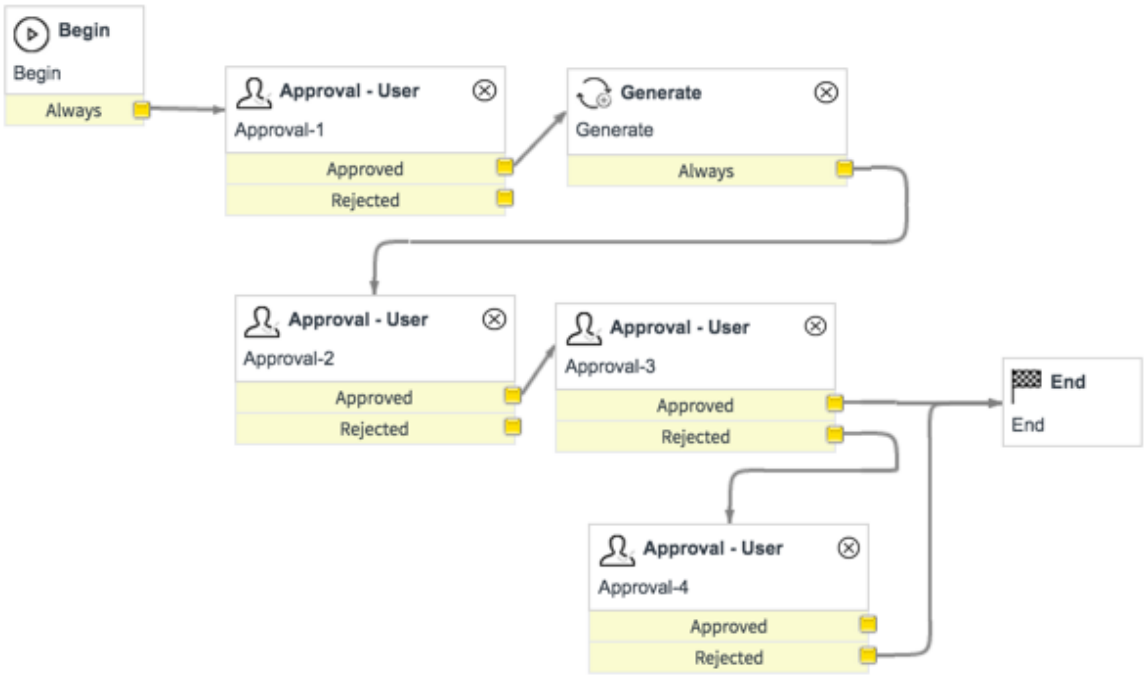
Example

Generate workflow



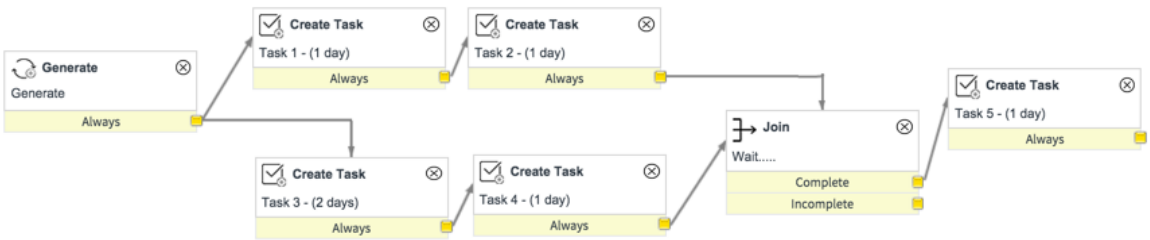
In this example, the following approvals are generated:

- Approval-2
- Approval-3

Approval-4 is skipped since the **Rejected** condition of Approval-3 has **Skip during generate** selected.

Here is an example of using the **Generate** activity that describes the expected start and due dates:

Generate workflow start and due date



In this example, if the **Generate** activity is run on Jan 1, 2016, the following expected start dates and due dates would be set for the generated tasks.

Task	Expected Start Date	Reason	Due Date
Task 1 (1 day)	Jan. 1, 2016		Jan. 2, 2016
Task 2 (1 day)	Jan. 2, 2016	Task 1 is 1 day	Jan. 3, 2016
Task 3 (2 days)	Jan. 1, 2016		Jan. 3, 2016
Task 4 (1 day)	Jan. 3, 2016	Task 3 is 2 days	Jan. 4, 2016

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Task	Expected Start Date	Reason	Due Date
Task 5 (1 day)	Jan. 4, 2016	Task 4 ends the latest before the Join	Jan. 5, 2016

Notice that Task 5 starts on Jan. 4, 2016 since the longest path (based on due dates) to the **Join** is Task 3/Task 4.

Manual Approvals workflow activity

The **Manual Approvals** activity watches and manages any approvals that users add manually outside of the workflow process. This activity only selects approvals that are in the Not requested state.

Note:
This activity is only available when the workflow runs on a table that extends Task.

If there are no pending manual approvals when this activity executes, the activity immediately completes with a result of **approved**. This activity does not create approval records. Use this activity to pause the workflow when a user adds a manual approval to a record with an associated workflow, and it is in the Not requested state. The workflow waits for the approval to be closed before proceeding.

Results

The workflow designer can assign a result value using `activity.result` from within a script field of the activity. By default, the result value of the activity is the final approval disposition determined by the approval actions take by the approvers. Possible result values are:

- Approved
- Rejected
- Deleted
- Cancelled
- Error

Input variables

Input variables determine the initial behavior of the activity.

Manual Approvals activity input variables

Field	Description
Wait for	Indicate what to wait for to indicate that the approval activity is approved or rejected. Options are: • **Any manual user or group approval:** Any user can approve and the first approval causes the activity to complete with a result of **approved**. • **All manual user or group approvals:** All users must approve (see below for how a rejection is handled). • **The first response from any manual approval:** The first approval or rejection from any user causes the activity to complete.
When anyone rejects	Indicate what happens when any user rejects their approval request. Options are:

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Manual Approvals activity input variables (continued)

Field	Description
	• **Reject the approval:** Immediately complete the activity with a result of **rejected**. • **Wait for other responses before deciding:** Wait until we get other responses before making an approval or rejection decision. This allows users to change their mind until a decision is made. In addition, if **Wait for** is set to **Anyone to approve** then a single approval will cause the activity to complete with a result of **approved** even if one or more users reject.

Conditions

The conditions determine which transition runs after this activity.

Note:
Approval activities run as the user whose actions match the approve or reject conditions the workflow was waiting for and advances the workflow.

Manual Approvals activity conditions

Condition	Description
Approved	The users from the groups have approved the request based on the **Wait for** rules.
Rejected	The users from the groups have rejected the request based on the **Wait for** rules.

States

The activity state tells the workflow engine what to do with the activity.

Manual Approvals activity states

State	Description
Executing	The workflow engine starts the `execute` function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Rollback To workflow activity

The **Rollback To** activity transitions directly to the activity specified by the outgoing transition line arrow.

Note:
This activity is only available when the workflow runs on a table that extends Task.

Rollback To determines which activities to reset based on the actual workflow sequence (transition line attachments) of activities between itself and the transitioned to activity, not the execution order. **Rollback To** then marks all the approvals that have transitioned between the

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rollback and the transitioned to activity as **Not Yet Requested** and the tasks as either **Open** or **Pending**.

Use the **Rollback To** activity for all workflows in which multiple rollbacks are required. **Rollback To** has no variables.

Conditions

The conditions determine which transition runs after this activity.

Rollback To activity conditions

Condition	Description
Always	The event or condition that causes the approval to revert to the previous workflow step.
Error	The event or condition that generates an error.
Skipped	The event or condition that allows a skipped approval.

States

The activity state tells the workflow engine what to do with the activity.

Rollback To activity states

State	Description
Executing	The workflow engine starts the `execute` function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Rollback To behavior

The **Rollback To** activity transitions directly to the activity specified by the transition line arrow.

Use the **Rollback To** activity for all workflows that use multiple or nested rollbacks. **Rollback To** resets the targeted task (the direct transition) to **Open**. All tasks that have executed between the **Rollback To** activity and the targeted task (rolled back task) are set to **Pending**.

(0) Begin

(1) Log Message

(2) Task 1

(3) Task 3

(4) Task 2

(5) Timer

(6) Approval 1

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(7) Roll back to first task

(8) Task 1

(9) Task 2

(10) Approval 1

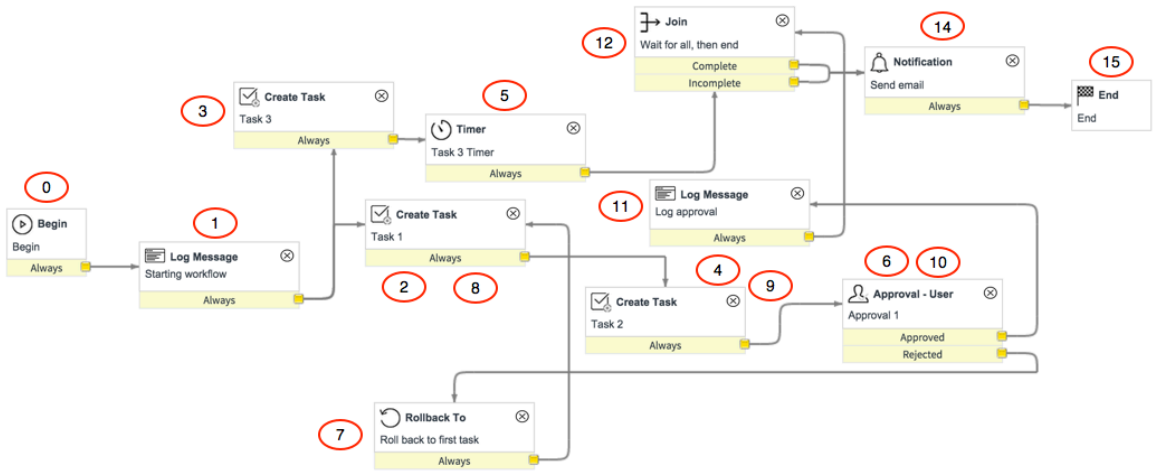
(11) Log approval

(12) Join

(14) Send email

(15) End

Rollback to workflow



Transition history

The state of (3) Task 3 does not change, since this activity does not directly transition from the rollback target activity. To see what activities were rolled back, select the **Workflow Transition History** related list and look at the **Rolled back** column.

The **Rollback To** activity (7) updates the following activities:

(8) Task 1: reset to **Open**

(9) Task 2: reset to **Pending**

(10) Approval 1: reset to **Not Yet Requested**

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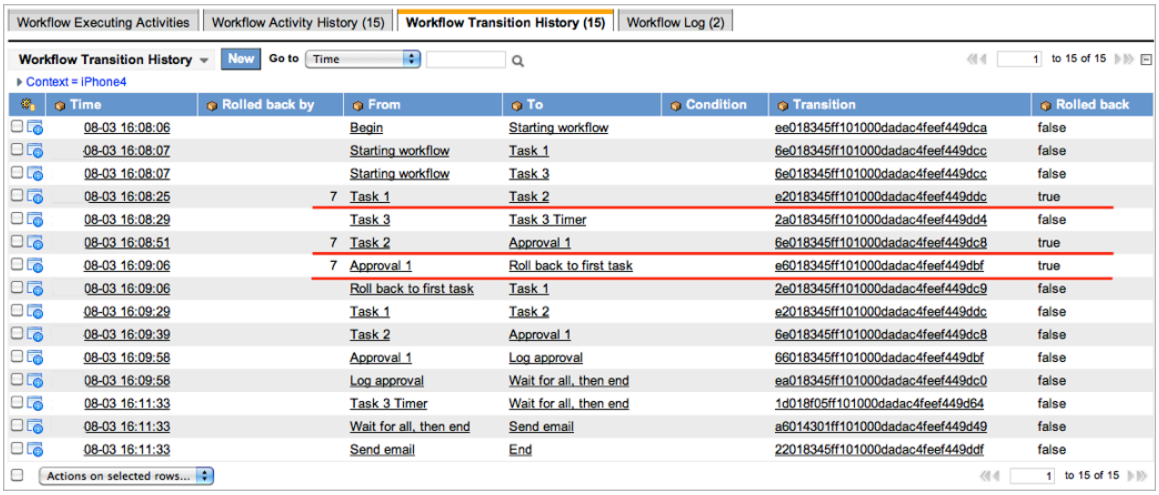
Rollback To workflow transition



Workflow Executing Activities | Workflow Activity History (15) | **Workflow Transition History (15)** | Workflow Log (2)

Workflow Transition History — New — Go to Time — 1 to 15 of 15

Context = iPhone4

Time	Rolled back by	From	To	Condition	Transition	Rolled back
08-03 16:08:06		Begin	Starting workflow		ee018345ff101000dadac4feef449dca	false
08-03 16:08:07		Starting workflow	Task 1		6e018345ff101000dadac4feef449dcc	false
08-03 16:08:07		Starting workflow	Task 3		6e018345ff101000dadac4feef449dcc	false
08-03 16:08:25	7	Task 1	Task 2		e2018345ff101000dadac4feef449ddc	true
08-03 16:08:29		Task 3	Task 3 Timer		2a018345ff101000dadac4feef449dd4	false
08-03 16:08:51	7	Task 2	Approval 1		6e018345ff101000dadac4feef449dc8	true
08-03 16:09:06	7	Approval 1	Roll back to first task		e6018345ff101000dadac4feef449dbf	true
08-03 16:09:06		Roll back to first task	Task 1		2e018345ff101000dadac4feef449dc9	false
08-03 16:09:29		Task 1	Task 2		e2018345ff101000dadac4feef449ddc	false
08-03 16:09:39		Task 2	Approval 1		6e018345ff101000dadac4feef449dc8	false
08-03 16:09:58		Approval 1	Log approval		66018345ff101000dadac4feef449dbf	false
08-03 16:09:58		Log approval	Wait for all, then end		ea018345ff101000dadac4feef449dc0	false
08-03 16:11:33		Task 3 Timer	Wait for all, then end		1d018f05ff101000dadac4feef449d64	false
08-03 16:11:33		Wait for all, then end	Send email		a6014301ff101000dadac4feef449d49	false
08-03 16:11:33		Send email	End		22018345ff101000dadac4feef449ddf	false

Actions on selected rows... — 1 to 15 of 15

Rollback To activity

When conditions in a workflow trigger a **Rollback To** activity, the workflow moves processing backward to a specified activity in the workflow and resets certain activities that have already executed back to their original state. This is useful when handling an unexpected failure or as part of a programmed logical flow.

When an activity is reset during a workflow rollback, the following happens:

- Approvals are reset to **Not Requested**.
- Tasks are reset to either **Open** or **Pending**. A rollback workflow path cannot create new tasks.

Activities that perform external system operations, such as deleting a file or sending an email, are not rolled back. Only approval and task activity states are reset.

A workflow can contain a single rollback, multiple rollbacks, or nested rollbacks in more complex workflows. The **Rollback To** activity resets activities based on the actual workflow sequence (transition line attachments) of activities between itself and the transitioned to activity, rather than using the execution order to determine where processing should restart.

Condition Workflow activities

Condition activities provide conditional branching and logical operation functionality for workflows.

If workflow activity

The **If** activity checks a condition or script to determine if a **Yes** or **No** transition should be taken.

If the workflow creator specifies both the **Condition** and the **Advanced** script, both must evaluate successfully for activity to take the **Yes** transition.

Results

The workflow designer can assign a result value using activity.result from within the **Script** field on the activity record. By default, the result value of the activity is the final result of the condition or script specified. Possible result values are:

- Yes
- No

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Input variables

The following variables determine the behavior of the activity.

Note:
Condition activities run as the user whose actions match the conditions the workflow was waiting for and advances the workflow.

If activity input variables

Field	Description
Condition	If specified and the current record matches the condition, the **Yes** transition is taken.
Advanced and Script	To specify a script, select the **Advanced** check box. You may then enter a script that is evaluated. If your script sets the variable answer to `yes`, then the **Yes** transition is taken. Otherwise, the **No** transition is taken.

Conditions

The following conditions determine which transition comes after the activity.

If activity conditions

Condition	
Yes	Taken when the condition, if specified, matches and the **Advanced** script, if specified, returns yes.
No	Taken when either the condition does not match or the **Advanced** script, if specified, returns no.

States

The activity state tells the workflow engine what to do with the activity.

If activity states

State	Description
Executing	The workflow engine knows to start the *`onExecute`* function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activty, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Switch workflow activity

The **Switch** activity checks if the value of a passed field or variable is equivalent to one of several case values.

The switch activity behavior is similar to a switch statement in Java.

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When creating a switch activity, select a **Variable** or **Field** to check against activity conditions for a matching field value. When the value passed in this variable or field matches the value defined in the **Condition** field of the activity condition, the workflow progresses through that activity condition.

Note:
Condition activities run as the user whose actions match the conditions the workflow was waiting for and advances the workflow.

Results

The variable or field selected in the **Variable** or **Field** activity variable determines the possible result values.

Input variables

The following variables determine the behavior of the activity.

Switch activity input variables

Field	Description
Type	Select **Variable** or **Field** as the type of value to check against available conditions. This selection sets the label and available options for the other field.
Variable or Field	Select the source of the value compared against the switch activity conditions. The field label and available options depend on the **Type** selection. • **Variable:** select any service catalog variable. • **Field:** select any field from the **Table** defined in the workflow properties.

States

The activity state tells the workflow engine what to do with the activity.

Switch activity states

State	Description
Executing	The workflow engine knows to start the `onExecute` function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Example

You can create a switch activity that sets different field values on an incident based on the Assignment group of the incident record.

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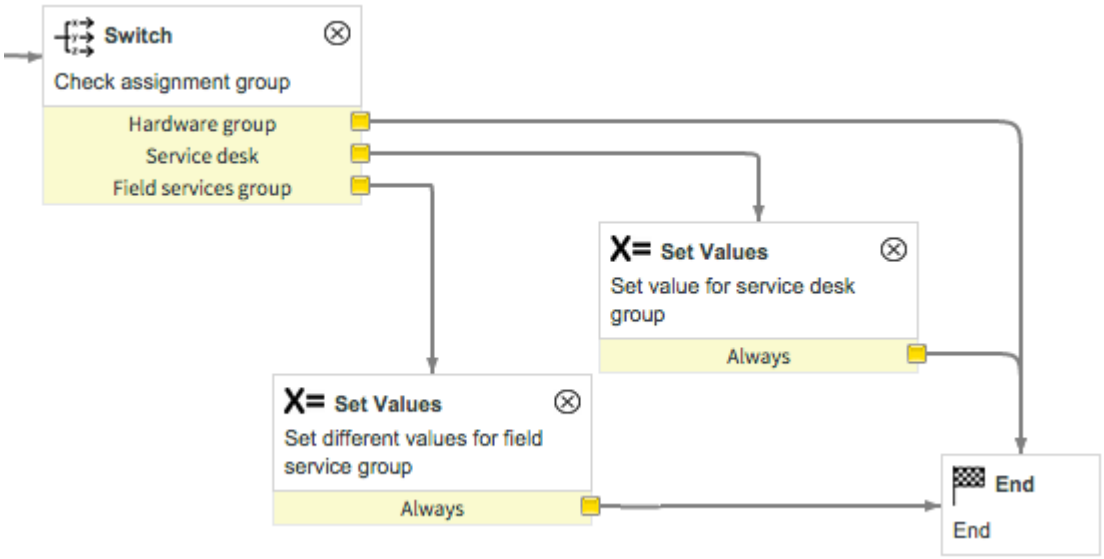
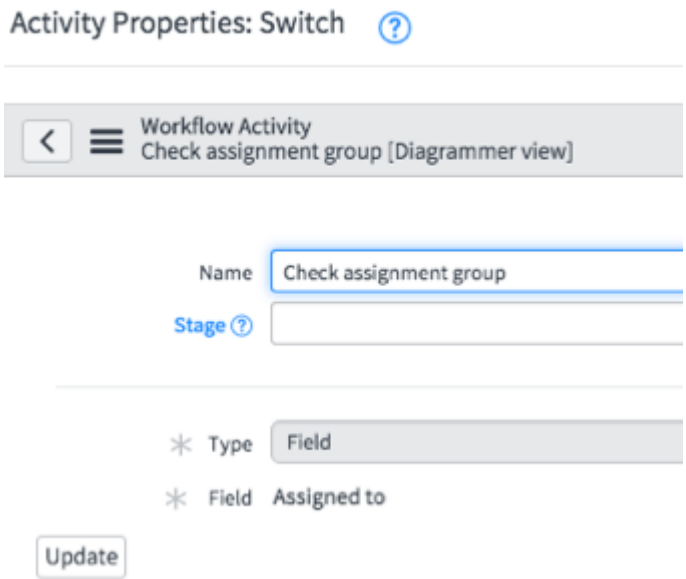
Switch activity example



The **Field** selected is the incident **Assigned to** field.

Switch activity Field



If the value of the **Assigned to** field of the workflow-triggering incident is **Service Desk** or **Field Services**, the workflow populates values on the incident record before continuing. If the **Assigned to** value is **Hardware**, the workflow continues without populating any field values.

Condition type (Standard, Else, or Error) is used. For more information, see Manage workflow activity conditions.

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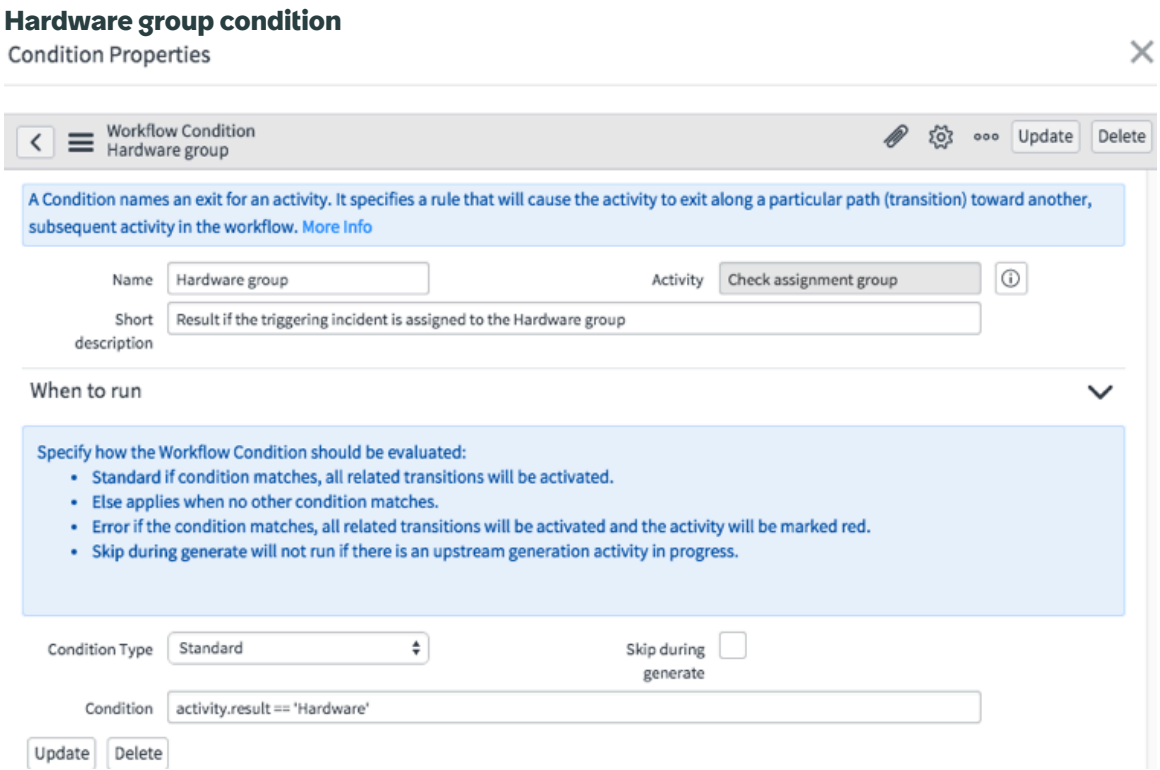

Wait for condition workflow activity

The **Wait for condition** activity causes the workflow to wait at this activity until the current record matches the specified condition.

The workflow evaluates the **Wait for condition** activity each time the current record is updated. Use this activity to pause a workflow indefinitely until a particular criteria is met by a record update. To pause a workflow for a timed duration see Timer workflow activities.

For workflow to consider the condition met, all conditions specified – whether in the builder or in a script – must be true.

Note:
A **Wait for condition activity** should only be used to wait for an external event such as a record update, and not one from a workflow setting a value. If you have a workflow setting a value and want to wait for that same field to be seen as 'changed,' try inserting a one-second timer.

Results

The workflow designer can assign a result value using `activity.result` from within a script field of the activity. The activity transitions when the result value is true.

Input variables

The following variables determine the behavior of the activity.

Note:
Condition activities run as the user whose actions match the conditions the workflow was waiting for and advances the workflow.

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Wait for condition activity input variables

Field	Description
Condition	The workflow is paused at this activity until this condition matches the current record.
Condition script	If specified, the workflow is paused at this activity until this script sets the *answer* variable to true.
Enable Timeout	Option to limit the amount of time that the workflow waits for the activity to be completed before continuing. **Note:** Use the **Enable timeout** option to prevent this activity from continuing to run. If the condition to continue is never met, a timeout value specifies when the system skips the Wait for Condition activity and goes to the next item in the workflow. You must set a Duration value to enable a timeout. You can also select a Schedule if you want to compute the duration end date based on a specific work schedule.
Duration	Amount of time that the workflow waits before continuing when the **Enable timeout** option is selected. Enter the time to wait in hours, minutes, and seconds. If you leave this field empty, the workflow does not wait.

States

The activity state tells the workflow engine what to do with the activity.

Wait for condition activity states

State	Description
Executing	The workflow engine knows to start the *onExecute* function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activty, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Wait for WF Event workflow activity

The **Wait for WF Event** activity causes the workflow to wait at this activity until the specified event is fired.

Use this activity to wait for another activity to fire an event. Events from other activities are fired in a script using the workflow.fireEvent('eventName') API call.

Results

The workflow designer can assign a result value using `activity.result` from within a script field of the activity. This activity transitions when the specified event fires.

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Input variables

The following variables determine the behavior of the activity.

Note:
Condition activities run as the user whose actions match the conditions the workflow was waiting for and advances the workflow.

Wait For WF Event activity input variables

Field	Description
Wait for Event	An event name to trigger the workflow.

States

The activity state tells the workflow engine what to do with the activity.

Wait For WF Event activity states

State	Description
Executing	The workflow engine knows to start the `onExecute` function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Workflow notification activities

Notification workflow activities notify users of events that occur during the workflow.

Create Event workflow activity

The **Create Event** activity adds an event to the event queue, but does not immediately fire the event.

The event processor typically processes the event within one minute. This activity triggers any business rules or email notifications that would normally be triggered by the event.

For more information about creating and using system events, see System Events.

Results

Finished: the activity added the event to the event queue.

Input variables

Create Event activity input variables

Field	Description
Event name	The name of the event to create. From the Event Name lookup list, select the event to add to the queue. If the event requires parameters, specify them in the Parameter script field.

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Create Event activity input variables (continued)

Field	Description
Parameter 1	The first parameter of the event. **Note:** If this parameter is a string value, it must be within quotes (" ").
Parameter 2	The second event parameter. **Note:** If this parameter is a string value, it must be within quotes (" ").

Notification workflow activity

The **Notification** activity sends an email or SMS message to specified users or groups.

Input variables

Update the recipients list or delete the activity from the flow if you want to stop the notifications.

Notification activity input variables

Field	Description
Addressees	
To	The users who will be recipients of the email.
To (groups)	The members of the groups that will be recipients of the email.
Advanced	If selected, the script in the **To (script)** field is called to specify additional recipients of the email.
To (script)	If **Advanced** is selected, this script is called and should set the variable `answer` to a comma-separated list of user or group sys_ids that you want to add as recipients of the email.
Message	
Subject	The subject line of the email.
Message	The email body that is sent. To include the value of a field in the message body, place the cursor at the point in the text where you want the field's value inserted. Then click the + icon next to **Fields** and select the field you want.

States

The activity state tells the workflow engine what to do with the activity.

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Notification activity states

Field	Description
Executing	The workflow engine knows to start the `run` function of the activity.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.

Timer workflow activities

Timer activities pause workflows for set periods of time.

Related topics

Use multiple timer activities in one workflow

SLA Percentage Timer workflow activity

The **SLA Percentage Timer** activity pauses the workflow for a duration equal to a percentage of an SLA.

A workflow must run on the Task SLA table to use this activity.

Note:
Timer activities run as the System user because the system scheduler advances the workflow.

Results

SLA Percentage Timer activity results

Result	Description
Complete	The activity successfully reached the specified duration
Cancelled	The activity or workflow was canceled before the timer reached the specified duration

Input variables

Input variables determine the initial behavior of the activity.

SLA Percentage Timer activity input variables

Field	Description
Percentage	The duration to pause the workflow for, as a percentage of the current SLA

States

The activity state tells the workflow engine what to do with the activity.

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SLA Percentage Timer states

State	Description
Executing	The activity is in this state very briefly while initializing, after which it immediately changes to **Waiting**.
Waiting	The workflow engine waits until the SLA reaches the specified percentage. The engine then transitions the workflow to the next activity.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Timer workflow activity

The **Timer** activity pauses the workflow for a specified period of time.

This duration can be an absolute time value or a relative value based on a defined Creating and using schedules. It is best to adjust the **Duration** so the workflow can progress in a timely manner. To pause a workflow indefinitely until a condition is met, see wait for condition.

Note:
Timer activities run as the System user because the system scheduler advances the workflow.

Results

Timer activity results

Result	Description
Complete	The activity successfully reached the specified duration.
Cancelled	The activity or workflow was canceled before the timer reached the specified duration.

Input variables

Input variables determine the initial behavior of the activity.

Timer activity input variables

Field	Description
Timer Information	
Timer based on	How the timer duration is computed. The options are: • **A user specified duration:** The duration is based on the **Duration** fields, such as days and hours. • **A relative duration:** The duration is based on the **Relative duration** (such as End of Next Business Day) and **Wait** fields.

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Timer activity input variables (continued)

Field	Description
	• **A date/time or duration field:** The duration is based on the **Field** value and the **Wait** field. • **Script:** The duration is based on a script that returns the number of seconds.
Duration Appears only when **Timer based on** is **A user specified duration**.	The specific number of days and hours to wait before proceeding to the next activity in the workflow.
Relative duration Appears only when **Timer based on** is **A relative duration**	The general number and length of business days to wait before progressing to the next workflow activity. .
Wait Appears only when **Timer based on** is **A relative duration** or **A date/time or duration field**.	An additional timer adjustment when **Timer based on** is **A relative duration** or **A date/time or duration field**. The options are: • **The full duration:** No modification of the calculated duration. • **A % of the duration:** The duration is adjusted by multiplying the number of seconds by the (**Percentage** / 100). • **Some time before:** The duration is shortened by the **Time before** days and hours. • **Some time after:** The duration is lengthened by the **Time after** days and hours.
Percentage Appears only when **Timer based on** is **A relative duration** or **A date/time or duration field**.	The **Wait** percentage value when **Timer based on** is **A relative duration** or **A date/time or duration field**.
Time before Appears only when **Timer based on** is **A relative duration** or **A date/time or duration field** and **Wait** is **Some time before**.	The modifier time value when **Wait** is **Some time before**.
Time after Appears only when **Timer based on** is **A relative duration** or **A date/time or duration**	The modifier time value when **Wait** is **Some time after**.

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Timer activity input variables (continued)

Field	Description
field and **Wait** is **Some time after**.	
Field Appears only when **Timer based on** is **A date/time or duration field**.	The date/time or duration field that contains the elapsed wait-time before moving to the next workflow activity.
Script Appears only when **Timer based on** is **Script**	The script that sets 'answer' to the number of seconds for the duration.
Timer Schedule	
Schedule based on	The basic schedule the timer uses to count working hours. If a schedule is specified, the duration will only be considered for times that are specified on the schedule. For example, if the duration is 2 hours and the workflow begins at 4:00pm on a schedule that is 8am - 5pm, then it ends at 9:00am the next day. The options are: • **This workflow's schedule:** The schedule uses workflow context date, time, and an optional **Time zone based on** value. • **A specific schedule:** The schedule uses a pre-defined **Schedule** and an optional **Time zone based on** value. • **A schedule field:** The schedule uses a value from a table and an optional **Time zone based on** value.
Schedule Appears only when **Schedule based on** is **A specific schedule**.	The pre-defined **Schedule** from a list.
Schedule field Appears only when **Schedule based on** is **A schedule field**.	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.
Timer Time Zone	
Time zone based on	The time zone for calculating the duration. The time zone may be based on: • **No time zone:** Default. Workflow uses the GMT time zone. • **A specific time zone:** A predefined **Time zone**. • **A time zone field:** A **Time zone field** to track time duration from a field on the form.

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Timer activity input variables (continued)

Field	Description
Time zone Appears only when **Time zone based on** is **A specific time zone**.	The predefined time zone.
Time zone field Appears only when **Time zone based on** is **A time zone field**.	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.

States

The activity state tells the workflow engine what to do with the activity.

Timer activity states

State	Description
Executing	The **Timer** activity is in this state very briefly while initializing, after which it immediately changes to **Waiting**.
Waiting	The workflow engine waits until the timer reaches the specified duration. The engine then transitions the workflow to the next activity.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Example

You can use a **Timer** activity to pause the workflow until the end of the business day.

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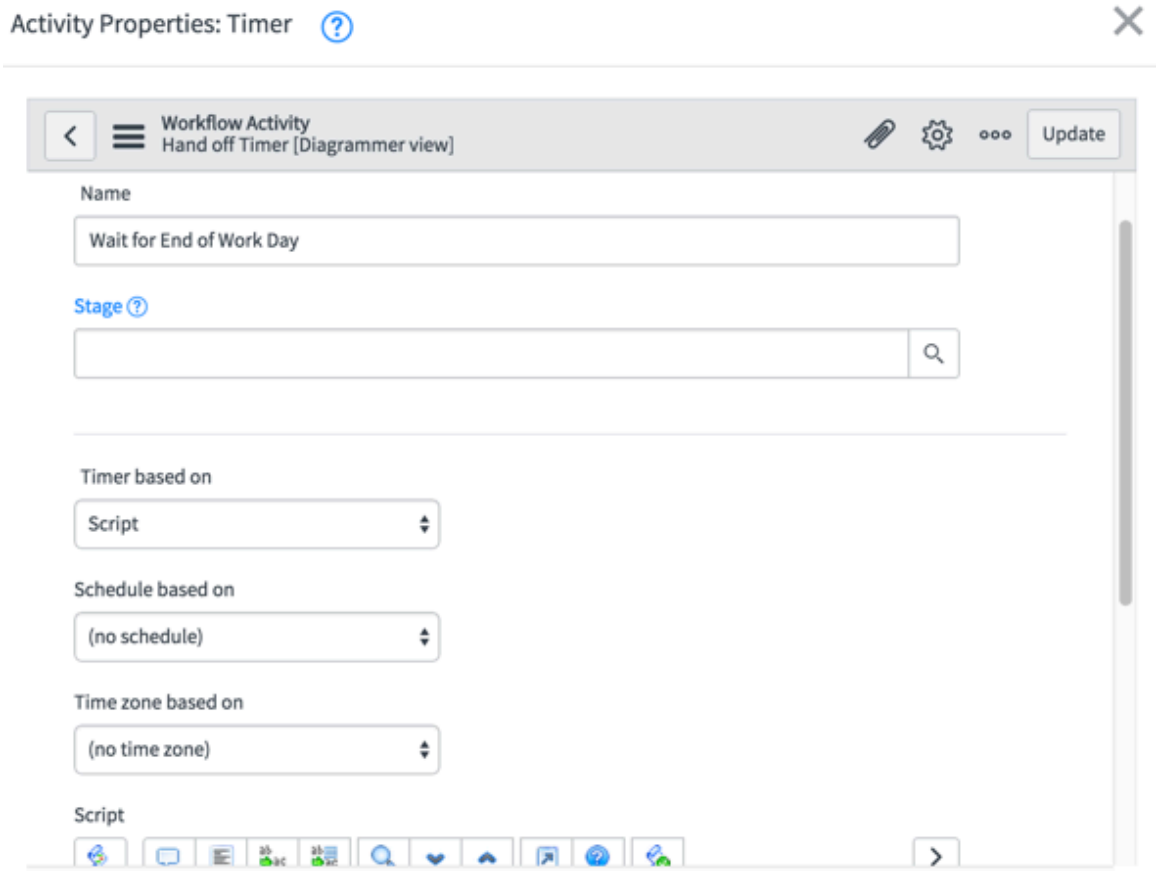
Timer example



In this example, the script evaluates the time between the *now* variable and the *eod* variable. The *eod* variable is defined, in 24 hour time, as 4:00 PM. The script then sets the *answer* variable to the difference between these variables, in seconds, and logs a message.

```
// get now and calc end of day (4:00pm)

var now =new Date();

var eod =new Date();
eod.setHours(16);
eod.setMinutes(0);
eod.setSeconds(0);

answer =(eod.getTime()- now.getTime())/1000;

workflow.debug('Timer will fire @: '+ eod +'  '+(answer/60)+'
 minutes from now');
```

Task workflow activities

Task activities create and modify workflow tasks.

Task activities are only available when the workflow runs on a table that extends Task.

Add Worknote workflow activity

The **Add Worknote** activity adds text to the *Worknotes* field of the current incident record.

A workflow must run on the Incident table to use this activity.

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Note:
Task activities run as the user whose actions complete the task the workflow was waiting for and advances the workflow.

Input variables

Add Worknote activity input variables

Field	Description
Work Note	The text to add to the incident record.

Attachment Note workflow activity

The **Attachment Note** activity adds an attachment to the current record.

Note:
This activity is only available when the workflow runs on a table that extends Task.

This activity allows the use of irregular HTML tags to reference attachments, specifically the `[code]` tag. Entries in a journal field that use irregular HTML do not work if the *`glide.ui.allow_deep_html_validation`* property is true. This property is set to false by default.

Note:
Task activities run as the user whose actions complete the task the workflow was waiting for and advances the workflow.

Results

Finished: the activity added the attachment to the record.

Input variables

The following variables determine the behavior of the activity.

Attachment Note activity input variables

Field	Description
General	
Field	When this activity runs, it makes a note on the current record that a file has been attached. Specify the field on the current record in which you want this note to appear. The options are: • **none** (defaults to Work Notes) • **Additional Comments** • **Work notes**
Attachment note information	
Attachment Name	When this activity runs, it creates a .txt file with the name you specify in this field.
Attachment Data	The content of the .txt file attachment. It can be in plain text or use variables to extract specific data from a table.

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Catalog Task workflow activity

The **Catalog Task** activity creates a service catalog task record.

Note:
This activity is only available when the workflow runs on a table that extends Task.

A user must complete the catalog task. This activity is available only for workflows running on the Catalog Request Item [sc_req_item] table.

Note:
Task activities run as the user whose actions complete the task the workflow was waiting for and advances the workflow.

Results

You can assign a result value using `activity.result` from within a script field of the activity. The final **State** value of the catalog task record determines the result value for the **Create Task** activity. Possible result values are:

- Closed complete
- Closed incomplete
- Closed skipped
- Deleted
- Cancelled

Input fields

The values you enter in the following fields determine the behavior of the activity.

Catalog task activity information

Field	Description
Catalog Task Activity Settings The following fields specify the behavior of the Catalog Task Activity.	
Task Table	The table on which this activity runs. In most cases, leave set to the default value: [sc_req_item].
Priority	The value you want assigned to the **Priority** field for the new task.
Wait for completion	If selected, the workflow activity waits for the task to complete before continuing. If cleared, the task is created but the workflow proceeds.
Catalog Task Record Settings The following fields specify the field values that this activity sets for the catalog task it creates.	
Task value from	Specify how you want to populate fields on the new task. • **Fields:** a predefined set of fields including **Fulfillment group**, **Assigned to**, **Short description** and **Instructions**. • **Template:** an existing template for the selected task table. • **Values:** values that you specify using a Set Values widget.

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Catalog task activity information (continued)

Field	Description
	After you select a value for **Task value from**, additional fields specific to that value appear on the form.
Fulfillment group Only appears when **Task value from** is set to `Fields`	The group that is responsible for completing the task. Populates the **Assignment group** field on the new task.
Assigned to Only appears when **Task value from** is set to `Fields`	The user who is responsible for completing the task. Populates the **Assignment to** field on the new task.
Short description Only appears when **Task value from** is set to `Fields`	A short description for the task. Populates the **Short description** field on the new task.
Instructions Only appears when **Task value from** is set to `Fields`	The task instructions for the user to complete prior to closing the task. Populates the **Description** field on the new task.
Template Only appears when **Task value from** is set to `Template`.	The values in the task will be populated from the values in the template you select.
SetValues Only appears when **Task value from** is set to `Values`.	Select any field on the task record to a value you specify here.
Advanced	Check **Advanced** if you want to use a script to assign values on the catalog task. When you check **Advanced,** a text box appears where you can enter your script.
Advanced Script Only appears when the **Advanced** field is checked.	Set additional values for the task in this script. This script is run after the task values are set using the **Fields**, **Template** or **Values** you have specified. Use the variable *`task`* when setting additional values, for example: `task.short_description = current.short_description;`
Catalog Task Variables	
Variables on Task Form	Specify optional catalog variables to include on the Catalog task form. The variables you select here will be displayed in a field called **Variable**

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Catalog task activity information (continued)

Field	Description
	Editor. If you select no variables here, the **Variable Editor** field in the Catalog Task form will not be visible.
Catalog Task Schedule	
Due date based on	Select how workflow determines the task's duration, due date, and schedule. • **A user specified duration:** The duration is based on a user specified value. • **A relative duration:** The duration is calculated from a relative duration (such as End of Next Business Day). • **A date/time or duration field:** The duration is based on the value of a field on the current record. • **Script:** The duration is returned by a script.
Duration Only appears when **Due date based on** is set to `A user specified duration`	The specific number of days and hours.
Relative duration Only appears when **Due date based on** is set to `A relative duration`	The general number and length of business days.
Due date field Only appears when **Due date based on** is set to `A date/time or duration field`	The date/time or duration field.
Due date script Only appears when **Due date based on** is set to `Script`	The script that sets 'answer' to the number of seconds for the duration.
Schedule based on	The basic schedule the timer uses to count working hours. If a schedule is specified, the duration will only be considered for times that are specified on the schedule. For example, if the duration is 2 hours and the workflow begins at 4:00pm on a schedule that is 8am - 5pm, then it ends at 9:00am the next day. The options are:

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Catalog task activity information (continued)

Field	Description
	• **This workflow's schedule:** The schedule uses workflow context date, time, and an optional **Time zone based on** value. • **A specific schedule:** The schedule uses a pre-defined **Schedule** and an optional **Time zone based on** value. • **A schedule field:** The schedule uses a value from a table and an optional **Time zone based on** value.
Schedule Only appears when **Schedule based on** is set to `A specific schedule`	The predefined **Schedule** from a list.
Schedule field Only appears when **Schedule based on** is set to `A schedule field`.	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.
Time zone based on	The time zone for calculating the duration. The time zone may be based on: • **No time zone:** Default. Workflow uses the GMT time zone. • **A specific time zone:** A specific **Time zone** that you choose from a choice list. • **A time zone field:** A **Time zone field** to track time duration from a field on the form.
Time zone Only appears when **Time zone based on** is set to `A specific time zone` .	Select the time zone you want from the choice list.
Time zone field Only appears when **Time zone based on** is set to `A time zone field`.	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.

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States

The activity state tells the workflow engine what to do with the activity.

Catalog Task activity states

State	Description
Executing	The workflow engine knows to start the `onExecute` function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Create Task workflow activity

The **Create Task** activity generates a record on any of the tables that extend Task [task].

Note:
This activity is only available when the workflow runs on a table that extends Task.

If the **Wait for completion** check box is selected, the workflow context waits for a user action on the task, such as Complete or Incomplete, and then progresses based on the user action.

Note:
Task activities run as the user whose actions complete the task the workflow was waiting for and advances the workflow.

Results

You can assign a result value using `activity.result` from within a script field of the activity. By default, the final **State** value of the task record determines the result value for the **Create Task** activity. Possible result values are:

- Closed complete
- Closed incomplete
- Closed skipped
- Deleted
- Cancelled

Input variables

The following variables determine the behavior of the activity.

Create Task activity input variables

Field	Description
Create Task Activity Settings The following fields specify the behavior of the Create Task Activity.	

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Create Task activity input variables (continued)

Field	Description
Task type	The type of task to create. Select from the corresponding task table for the workflow.
Priority	The default priority assigned to the task. If you also set the Task priority in the **Task values from** section, the Task value overrides the default priority.
Wait for completion	If selected, the workflow activity waits for the task to complete before continuing. If cleared, the task is created but the workflow proceeds.
Create Task Record Settings The following fields specify the field values that this activity sets for the task it creates.	
Task values from	The values used to create the task may either come from: • **Fields:** a predefined set of fields including **Fulfillment group**, **Assigned to**, **Short description** and **Instructions**. • **Template:** an existing template for the selected task table. • **Values:** values that you specify using a Set Values widget. **Note:** Any Task priority you set here overrides the default priority set by the **Priority** field.
Fulfillment group Only appears when **Task value from** is set to `Fields`	The group that is responsible for completing the task. Populates the **Assignment group** field on the new task.
Assigned to Only appears when **Task value from** is set to `Fields`	The user who is responsible for completing the task. Populates the **Assignment to** field on the new task.
Short description Only appears when **Task value from** is set to `Fields`	A short description for the task. Populates the **Short description** field on the new task.
Instructions Only appears when **Task value from** is set to `Fields`	The task instructions for the user to complete prior to closing the task. Populates the **Description** field on the new task.
Task template Only appears when **Task values from** is set to **Template**.	A template that is used to fill in values for the task.

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Create Task activity input variables (continued)

Field	Description
Set values Only appears when **Task values from** is set to **Values**.	A widget that is used to specify values for any fields of the task.
Advanced	
Advanced	Check **Advanced** if you want to use a script to assign values on the catalog task. When you check **Advanced,** a text box appears where you can enter your script.
Advanced Script Only appears when the **Advanced** field is checked.	Set additional values for the task in this script. This script is run after the task values are set using the **Fields**, **Template** or **Values** you have specified. Use the variable *task* when setting additional values, for example: `task.short_description = current.short_description;`
Task Schedule	
Due date based on	Select how workflow determines the task's duration, due date, and schedule. • **A user specified duration:** The duration is based on a user specified value. • **A relative duration:** The duration is calculated from a relative duration (such as End of Next Business Day). • **A date/time or duration field:** The duration is based on the value of a field on the current record. • **Script:** The duration is returned by a script.
Duration Only appears when **Due date based on** is set to `A user specified duration`	The specific number of days and hours.
Relative duration Only appears when **Due date based on** is set to `A relative duration`	The general number and length of business days.
Due date field Only appears when **Due date**	The date/time or duration field.

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Create Task activity input variables (continued)

Field	Description
based on is set to `A date/time or duration field`	
Due date script Only appears when **Due date based on** is set to `Script`	The script that sets 'answer' to the number of seconds for the duration.
Schedule based on	The basic schedule the timer uses to count working hours. If a schedule is specified, the duration will only be considered for times that are specified on the schedule. For example, if the duration is 2 hours and the workflow begins at 4:00pm on a schedule that is 8am - 5pm, then it ends at 9:00am the next day. The options are: • **This workflow's schedule:** The schedule uses workflow context date, time, and an optional **Time zone based on** value. • **A specific schedule:** The schedule uses a pre-defined **Schedule** and an optional **Time zone based on** value. • **A schedule field:** The schedule uses a value from a table and an optional **Time zone based on** value.
Schedule Only appears when **Schedule based on** is set to `A specific schedule`	The predefined **Schedule** from a list.
Schedule field Only appears when **Schedule based on** is set to `A schedule field`.	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.
Time zone based on	The time zone for calculating the duration. The time zone may be based on: • **No time zone:** Default. Workflow uses the GMT time zone. • **A specific time zone:** A specific **Time zone** that you choose from a choice list. • **A time zone field:** A **Time zone field** to track time duration from a field on the form.
Time zone	Select the time zone you want from the choice list.

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Create Task activity input variables (continued)

Field	Description
Only appears when **Time zone based on** is set to `A specific time zone` .	
Time zone field Only appears when **Time zone based on** is set to `A time zone field.`	A date and time or duration field for the schedule, that is associated with the table. Valid fields appear in blue on the Select the element from a tree dialog.

States

The activity state tells the workflow engine what to do with the activity.

Create Task activity states

State	Description
Executing	The workflow engine knows to start the `onExecute` function of the activity.
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is fired.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Utility workflow activities

Utility activities provide controls over the path of the workflow, and other useful tools.

Branch workflow activity

The **Branch** activity splits the workflow into multiple transition paths from a single activity.

To add a transition path, drag the **Branch** activity onto the canvas. When the Branch activity properties form displays, click **Submit** to add the activity to the canvas. Once the activity is on the canvas, right click in the activity body, then click **Add Condition**.

All transitions from this activity execute concurrently. This activity provides a single **Always** condition. You can draw any number of transitions from this condition. Using this activity is equivalent to drawing multiple transitions from a single condition of another activity.

Branching can affect the behavior of rollback activities. See Rollback To activity for more information.

Join workflow activity

The **Join** activity unites multiple execution paths into one transition.

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Use this activity to cause a workflow to wait for all activities in multiple paths to finish before continuing. If multiple concurrent workflow paths meet without a **Join** activity, any subsequent activities execute twice.

To add Join to the canvas, click **Submit**. On the canvas, connect incoming transitions from each activity you want to act as a predecessor to the Join activity. Then connect outgoing transitions to the two exit conditions: Complete and Incomplete.

Results

Provide an Incomplete transition out of a **Join** whenever it is possible for any predecessor activities to follow a transition path that does not lead to the **Join** activity.

Join activity results

Result	Description
Complete	**Join** exits along the Complete path when the system has determined that all predecessor activities have completed and transitioned to the **Join**.
Incomplete	**Join** exits along the Incomplete path when the system determines that at least one predecessor activity completed but transitioned along a path that bypassed the **Join** activity.

Lock workflow activity

The **Lock** activity prevents other instances of this workflow from continuing past this activity until the lock is released.

Several instances of the same workflow may run concurrently. For example, if a workflow triggers when a record is added to a particular table. That workflow triggers multiple times if multiple records are added one after the other, once by each record insertion. You can use the lock activity to ensure that this instance of the workflow has finished one or more activities before any other instance of the workflow can proceed.

A workflow can explicitly release a lock with the **Unlock** activity. The lock may also be released when the **Max duration** is reached.

When an instance of the workflow reaches the **Lock** activity, it attempts to obtain a lock using the key specified in the lock activity. If another instance has already obtained the lock and has not yet released it, this lock attempt fails. The instance continues trying to obtain the lock until **Max attempts** has been reached.

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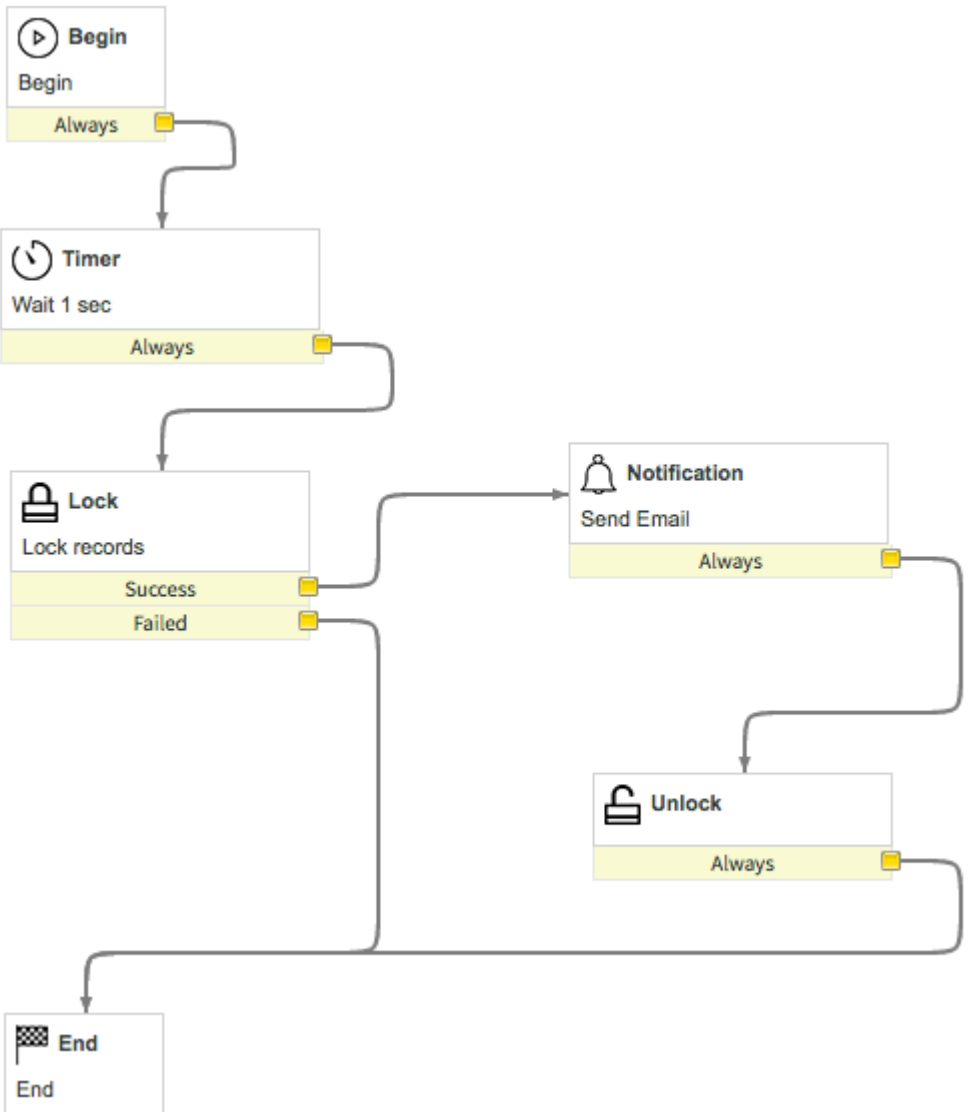
Note:

We recommend placing a one-second timer activity before the lock activity. This helps prevent a rare condition in which the lock activity may not be able to distinguish one workflow instance from another. This condition can occur because the entity owning the lock is not the specific workflow instance, but rather the code-execution thread in which that instance is running. In most cases, each workflow instance runs on a different thread. Adding a timer activity ensures that this is the case.

Example of Lock Activity Preceded by Timer Activity



Since a **Lock** activity can only temporarily prevent processing of other workflow instances, do not add activities that cause the workflow to wait between a **Lock** and **Unlock** activity block. This may cause the **Unlock** activity to be unable to acquire the lock to release it and instead take 60 seconds to complete. Restricted wait activities include:

- Approval activities
- Task activities
- Timer activities
- Wait for condition activity

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- Wait for WF Event activity
- MID server activities such as a PowerShell script

Results

Lock activity results

Result	Description
Success	The activity successfully obtained a lock. This instance of the workflow can proceed past this point, but other instances cannot proceed until the lock is released.
Failure	After attempting to obtain the lock **Max attempts** times, the activity could not obtain the lock.

Input variables

Input variables determine the initial behavior of the activity.

Lock activity input variables

Field	Description
Key	A unique mutex key. The Unlock activity activity uses this key to release the lock.
Duration	
Max. duration	The maximum time the lock persists. The lock is released after it reaches this duration. Releasing a lock this way is equivalent to running the **Unlock** activity.
Lock attempts Specify how the activity behaves if the lock attempt is denied. If the final lock attempt fails, the activity state is set to 'timeout' and the activity result is set to 'failed'.	
Max. attempts	Specify the maximum number of times the activity may attempt to obtain the lock.
Delay between attempts	The amount of time required after a failed lock attempt before another lock attempt is allowed.

States

The activity state tells the workflow engine what to do with the activity.

Lock activity states

State	Description
Waiting	The workflow engine is waiting to obtain a lock.
Finished	The activity successfully obtained the lock.
Timeout	The activity could not obtain a lock within the number of attempts specified by the **Max. attempts** input variable.

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Log Message workflow activity

The **Log Message** activity writes a message to the workflow log.

Use this activity to add entries to the workflow's log for debugging or tracing purposes.

Input variables

Input variables determine the initial behavior of the activity.

Log Message activity input variables

Field	Description
Message	The message to log. This variable can be a string or a JavaScript expression that evaluates to a string.

Log Trace Message workflow activity

The **Log Trace Message** activity writes a trace message to the workflow log.

The trace message includes the activity name, the event that invoked the workflow, and the table of the current record. There are no variables or conditions. To log other data, use the Log Message workflow activity activity.

REST Message legacy workflow activity

The legacy **REST Message** activity enables an administrator to override the REST endpoint or supply the variables configured in the REST Message module.

This activity is deprecated in the Zurich release and no longer shows up in the Workflow canvas for new workflow development. New workflows should use the Orchestration REST Activity templates instead.

Existing workflows using it will continue to work as designed. To edit this activity in an existing workflow, you must re-activate the activity.

The **REST Message** activity executes a dead link REST function (POST, PUT, GET, or DELETE) on an endpoint using values defined in the function record.

Note:
If you want to use a MID Server to send the REST message, the MID Server must be accessible by the instance and configured to use SSH.

Input variables

REST Message activity input variables

Field	Description
Rest Message	
REST Message	Name of the Create a REST message to run. This is a reference field to the REST Message [sys_rest_message] table (**System Web Services** > **Outbound** > **REST Message**).
REST Message Function	Function to call that is defined in a REST message function. This is a reference field to the HTTP Method [sys_rest_message_fn] table (**System Web Services** > **Outbound** > **REST Message**).

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REST Message activity input variables (continued)

Field	Description
	Available functions are **put**, **post**, **get**, or **delete**. You can edit functions in the **HTTP Methods** related list in each REST Message record.
REST Endpoint	REST endpoint to use instead of the **Endpoint** defined in the HTTP Method record. Leave this field blank to use the defined endpoint in the REST Message Function record.
Rest Message Variables	
Variables	Values to use for Variable substitution in outbound REST messages defined in the HTTP Method record. Use the following format for the string: `name1=value1, name2=value2, . . .` For example, use `name=${nameValue}, id=${idValue}` where *name* and *id* are function variables. If either the variable name or value contains a comma or equal sign, escape those characters with a backslash.
Rest Message MID Server	
Use MID Server	Check this box if you want to use a MID Server to send the REST message. A MID Server might be necessary to reach an endpoint within a firewall or a subnetwork that is not visible from the instance. If this check box is selected, but no MID Server is defined in the **MID Server** field, the workflow automatically attempts to find a MID Server based on IP range and the REST capability.
MID Server	Name of the MID Server to use. This field is available when **Use MID Server** is selected. The workflow ignores this parameter if the *use_midserver* parameter is disabled.
Rest Message Script	
Sensor Script	The script to execute after the request has been made and a response has been received. You can access the full response body from the *activity.output* variable.

Return Value workflow activity

The **Return Value** activity returns a value to a parent workflow, when run from a subflow.

This activity has no variables or conditions. For more information, see Workflows used as subflows.

Use this activity within a subflow to store data that the parent flow can access. The **Return Value** activity adds the data from the subflow's *value* variable to the parent workflow's scratchpad.

Scratchpad entries

The activity uses the workflow scratchpad to read and write persistent values.

Return Value activity scratchpad entries

Variable	Description
value	The activity writes the value from the subflow *value* variable to the parent scratchpad. The parent workflow activity that runs the subflow includes a *Map*

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Return Value activity scratchpad entries (continued)

Variable	Description
	return value to variable that defines where the parent workflow stores the returned data. This data can be scalar, a stringifiable JavaScript object, or an expression that evaluates to a stringifiable JavaScript object.

Related topics

Workflow scratchpad variables

Using variables in a workflow

Run Script workflow activity

The **Run Script** activity runs the specified script in the scope of the workflow version.

Note:
All changes to `current` are automatically updated. There is no need to call `current.update()`

Input variables

Input variables determine the initial behavior of the activity.

Run Script activity input variables

Field	Description
Script	Script to execute.

Set Values workflow activity

The **Set Values** activity sets values on the current record when the workflow quiesces or ends.

Input Fields

The values you enter in the following fields determine the behavior of the activity.

Set Values Activity Input Fields

Field	Description
Set these values	From the list on the left, select the field on the current record whose value you want to set when the workflow quiesces or ends. In the user-input field to the right, select or enter the value to which you want that field set. **Note:** Avoid setting the same fields from different **Set Value** activities. The workflow only sets the value specified by the last **Set Values** activity run before quiescing or ending.

Note:
Using the **Set Values** activity to set the **Approval** field on a task does not cancel pending approvals. To approve a task in a workflow, use the **Approval Action** activity instead.

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SOAP Message legacy workflow activity

The legacy **SOAP Message** activity uses SOAP messages defined in the System Web Services plugin and can call the messages using a MID Server.

This activity is deprecated in the Zurich release and no longer shows up in the Workflow canvas for new workflow development. New workflows should use the Orchestration SOAP Activity templates instead.

Existing workflows using it will continue to work as designed. To edit this activity in an existing workflow, you must re-activate the activity.

Input variables

SOAP Message activity input variables

Field	Parameter	Description
SOAP Message	soap_message	The SOAP Message defined under the System Web Services plugin's Outbound SOAP Message [sys_soap_message] table. (**System Web Services** > **Outbound** > **SOAP Message**)
SOAP Message Function	soap_message_function	The function to call that is defined in the SOAP Message. Functions are listed in the **SOAP Message Functions** related list in each SOAP Message record.
SOAP Endpoint	soap_endpoint	Endpoint to use instead of the **SOAP endpoint** value in the SOAP Message Function record. Leave this field blank to use the defined endpoint in the SOAP Message Function record.
Variables	variables	Variables to substitute into the SOAP **Envelope** defined in the SOAP Message Function record. Use this format for the string: `name1=value1, name2=value2, . . .` If either the name or value contains a comma or equal sign, escape these characters with a backslash.
Use MID Server	use_midserver	Check box for using a MID Server to send the SOAP message. A MID Server might be necessary to reach an endpoint within a firewall or a sub-network that is not visible from the instance. If this check box is selected (true), but no MID Server is defined in the **MID Server** field, Workflow automatically attempts to find a MID Server.
MID Server	midserver	Name of the MID Server to use. This field appears when you select the **Use MID Server** check box. The workflow ignores this parameter if the *`use_midserver`* parameter is disabled.
Sensor Script	sensor_script	The script to execute after the request has been made and a response has been received. You can access the full XML response body from the *`activity.output`* object.

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Turnstile workflow activity

The **Turnstile** activity limits how many times a workflow can pass through the same point.

Use this activity to prevent infinite loops. This activity is useful alongside the Rollback To workflow activity activity.

Results

You can assign a result value using the `activity.result` variable from within a script field of the activity. By default, the activity script evaluates if the activity should continue to iterate or stop.

Turnstile activity results

Result	Description
Continue	The **Allowed iterations** value is greater than the number of times the workflow accessed this activity.
Cancel	The workflow accessed this activity more times than the **Allowed iterations** value.

Input variables

Input variables determine the initial behavior of the activity.

Turnstile activity input variables

Field	Description
Allowed iterations	Number of times the workflow can pass through this activity before the turnstile ends the loop.

Conditions

The conditions determine which transition comes after this activity.

Turnstile activity conditions

Field	Description
Continue	If the workflow has returned to this point an amount of times less than the allowed iteration.
Cancel	If the workflow has returned to this point an amount of times more than the allowed iteration.

States

The activity state tells the workflow engine what to do with the activity.

Turnstile activity states

State	Description
Executing	The workflow engine knows to start the `onExecute` function of the activity.

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Turnstile activity states (continued)

State	Description
Waiting	The workflow engine ignores the activity until a specific event to restart the activity is triggered.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activity, was canceled.
Error	A JavaScript error occurred. Review the logs for error details.

Unlock workflow activity

The **Unlock** activity releases a lock that was previously placed by the **Lock** activity.

To release a lock, specify the same lock key that was specified in the **Lock** activity. If the **Lock** activity had a **Duration** specified, and that duration has already passed, the lock will already be released.

Input variables

Input variables determine the initial behavior of the activity.

Unlock activity input variables

Field	Description
Lock key	The Mutex key that releases the lock. This key must match the key specified by a **Lock** activity. For more information, see Lock activity.

States

The activity state tells the workflow engine what to do with the activity.

Unlock activity states

State	Description
Finished	The activity successfully released the lock.

Subflow activities in workflow

Subflow activities run and manage workflows from a parent workflow.

The Parallel Flow Launchersubflow activity is available.

Parallel Flow Launcher workflow activity

The **Parallel Flow Launcher** activity launches multiple subflows in parallel.

Workflows running in parallel execute simultaneously and may complete in any order. The activity can launch a single subflow or multiple subflows as needed. You can manage the input values and values returned for each subflow.

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Note:
The Parallel Flow Launcher activity waits until all subflows are completed before proceeding. If any subflow does not finish, the activity waits indefinitely.

Do not launch a large number of subflows with the Parallel Flow Launcher activity. If overused, this activity can overburden the instance. For launching very large numbers of subflows, consider putting the Parallel Flow Launcher inside a loop controlled by a turnstile or other conditional activity and having it do batches.

Activity variables

Activity variables determine the initial behavior of the activity.

Parallel Flow Launcher activity input variables

Field	Description
Parallel Flow Launcher configuration	
Name	A unique name for the activity.
Stage	The stage to display when the workflow reaches the activity.
Inputs	Inputs to the subflows to run. Specify an array of name: value pairs for each input defined in the workflow being launched. The name and data type of each input variable entered must match those used by the subflow that this activity launches. For a detailed example, see Parallel Flow Launcher Example.
Parallel Flow Launcher selection	
Workflow	The workflow to run.
Advanced	Check **Advanced**, to enter a script that uses a WorkflowCoordinator object to manage the subflows. When you check Advanced, a text box appears where you can enter a script that specifies a unique workflow for each set of input variables. See WorkflowCoordinator object for more information.
Parallel Flow Launcher iteration Specify parameters to tune the performance of batched workflows.	
Count	If not specified by an input set, **Count** determines the number of subflows executed in parallel from this activity. If the **Advanced** option is not selected, ensure that this field is populated with a valid number.
Max flows	The maximum number of workflows this activity can launch. If this value is a positive integer, it overrides the max parameter used in the WorkflowCoordinator constructor.
Max simultaneous	The maximum number of parallel workflows this activity can run at one time. If this value is a positive integer, it overrides the poolsize parameter used in the WorkflowCoordinator constructor.
Parallel Flow Launcher Process	
Process flow complete	To specify a script that runs after each subflow completes, check **Process flow complete**. If you check this field, a text box labelled **Flow complete** appears, where you can enter the script to run.
Flow complete	The script that runs each time a subflow finishes. This field is available when the **Process flow complete** option is selected.

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Parallel Flow Launcher activity input variables (continued)

Field	Description
	The same script functions and variables available in other workflow scripts, such as those in the Run Script activity, are available here. For more information, see Completed subflow values in scripts. The variable "flow" is available to this script. It is an object that contains the following information about the flow that is finishing: **flow.output (String)**: The value that the subflow returns to the parent if it executed a Return Value activity before ending. **flow.index (Number)**: The zero-relative index of the subflow that finished. **flow.contextId (String)**: The sys_id of the workflow context for the completed subflow. **flow.inputs (Object)**: The inputs that were passed to the subflow when its context was created and started. **flow.status (String)**: The final state of the context. This corresponds to the **state** column in the subflow context record, which has possible values of **executing**, **finished**, **cancelled**, or **faulted**. (Since the flow is completed, it cannot be **executing** at this point.)
Parallel Flow Launcher Split	

Process finished	To specify a script that runs after all subflows have finished, check **Process finished**. If you check this field, a text box labelled **Finished Script**appears where you can enter the script to run. The 'coordinator' variable is made available to this script and is an object that allows access to any of the finished subflows using the getFlow(index) method. For example:
	
	`for (var i = 0; i < coordinator.getNumFlows(); i++)`
	`writeFlowResultsToTable( i, coordinator.getFlow(i) );`

Finished script	The script that runs after all subflows launched by the activity are complete. You can use variables that contain completed flow information in this script.
	
	The 'coordinator' variable is made available to this script and is an object that allows access to any of the finished subflows using the getFlow(index) method. For example:
	
	`for (var i = 0; i < coordinator.getNumFlows(); i++)`
	`writeFlowResultsToTable( i, coordinator.getFlow(i) );`
	
	This field is available when **Process finished** is selected.

States

The activity state tells the workflow engine what to do with the activity. To view an activity's state, point to the activity. A pop-up window shows the **State** and **Result** of the activity. If the activity is in an error state, the pop-up window provides a brief **Fault Description**.

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Parallel Flow Launcher activity states

State	Description
Waiting	The activity is waiting for all subflows to finish. All subflows have started and some may have finished.
Finished	The activity successfully completed all of the subflows.
Error	The activity encountered an error.

WorkflowCoordinator object

A WorkflowCoordinator object specifies which subflows to run and the input variables to pass to those subflows.

When using a WorkflowCoordinator object, you can create a **Parallel Flow Launcher** activity that launches multiple subflows. When using the activity without a WorkflowCoordinator object, you can only launch a single subflow multiple times. Use one of the following methods to specify a WorkflowCoordinator object for the activity when the **Advanced** activity input variable is selected.

- Reference a workflow scratchpad variable that contains an existing WorkflowCoordinator object. To save a WorkflowCoordinator object to the scratchpad, call the *`save(variableName)`* function on the WorkflowCoordinator object. You can reference the object using the value passed in the *`variableName`* parameter. For example, you can create a WorkflowCoordinator object in a **Run Script** activity, save the object using `<object>.save('coord')`, and then call this object by entering `coord` in the **Workflow** activity variable of a subsequent **Parallel Flow Launcher** activity.
- Define the WorkflowCoordinator within the **Workflow** activity variable. Add the `javascript:` identifier at the beginning of the script. The Parallel Flow Launcher example shows how to use a WorkflowCoordinator object in this way.
- Create a factory class to define the WorkflowCoordinator object. The system does not provide a factory class for WorkflowCoordinator by default.

Completed subflow values in scripts

The **Parallel Flow Launcher** activity exposes additional variables you can use in scripts.

Additional variables

Variable	Description
coordinator	The WorkflowCoordinator used when running the subflows. You can use this variable in the **Finished script** to perform any final operations. Additionally, you can use the WorkflowCoordinator in a later workflow activity by passing the activity name or sys_id to the *`WorkflowCoordinator.load('<Activity>')`* function. For example, to load the WorkflowCoordinator object from a **Parallel Flow Launcher** activity called **Launch Subflows**, enter `var coord = WorkflowCoordinator.load('Launch Subflows');` in a later activity.
flow	The subflow launched by the activity that completed most recently. You can use this variable in the **Flow complete** script to perform any post-processing operations on each subflow. To get a complete subflow from a coordinator object, use `var flow = coord.getFlow(I);` where I is the numeric index of the subflow based on the order it was launched. These values are available from the completed subflow:

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Additional variables (continued)

Variable	Description
	• index: the numerical index of this subflow based on the order it was launched • workflow: the sys_id or name, depending on which you passed to the WorkflowCoordinator constructor, of the workflow used for this subflow • inputs: any input values provided to the launched subflow • status: status of the subflow context • output: the value returned by the subflow • contextId: the sys_id of the workflow context for the subflow

Parallel Flow Launcher example

This example shows how to use the **Parallel Flow Launcher**activity with an array of input values and with a WorkflowCoordinator object.

Sample workflow

This example shows a SQL-based web server with four application nodes. A single subflow runs to provision the database, and multiple parallel subflows each configure an application node. Finally, a separate set of parallel subflows configures the nodes to use a load balancer and sets up the server DNS.

Parallel flow launcher business case

Provision the application nodes

The first **Parallel Flow Launcher**activity launches the **Provision Node** subflow four times. The activity passes a unique IP address to each subflow from an array in the **Inputs** variable. The scripts defined in the **Flow complete** and **Finished script** variables write log messages regarding the status of the subflows.

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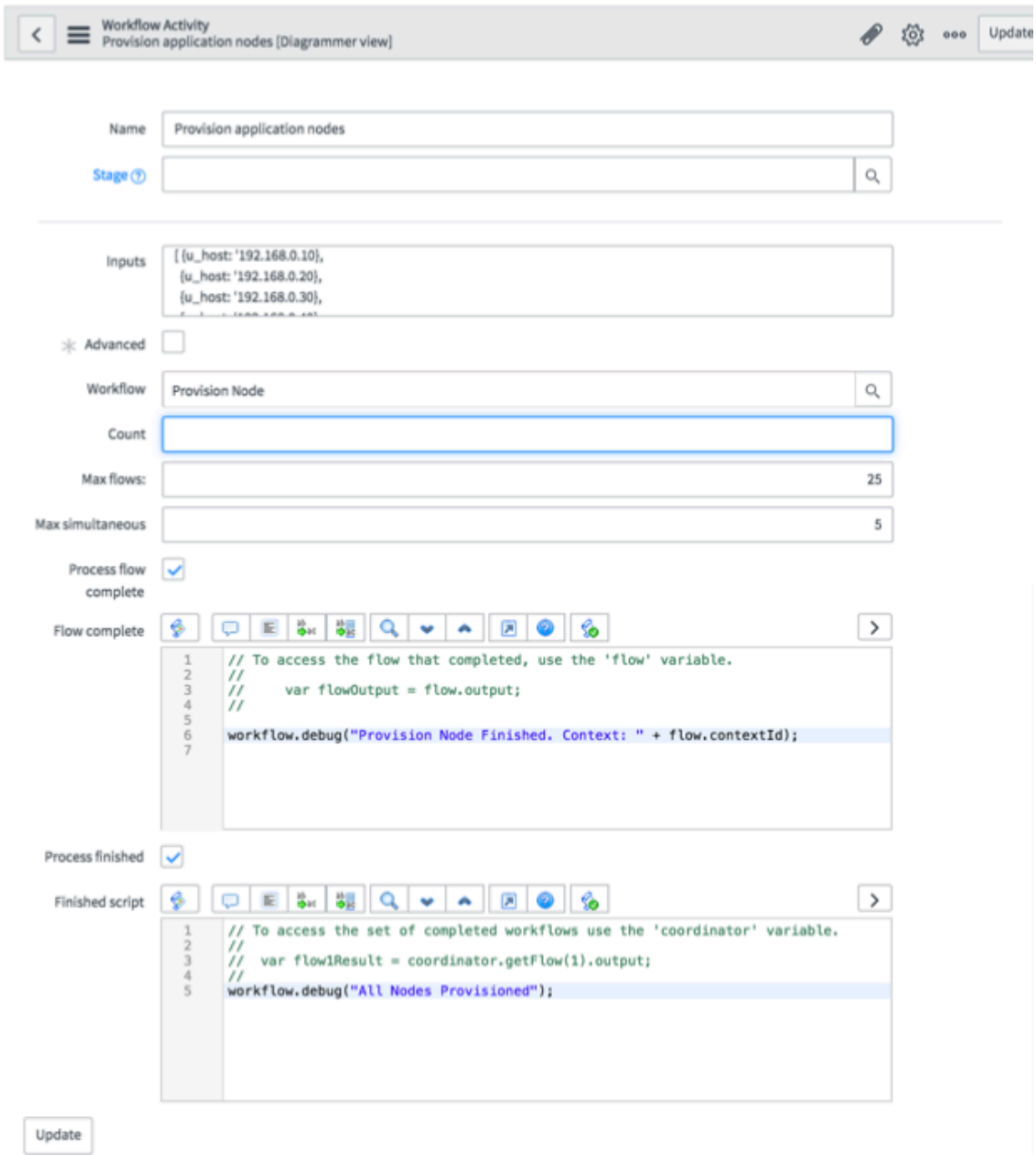
Parallel flow launcher activity properties
Activity Properties: Parallel Flow Launcher



Add nodes to the load balancer

The second **Parallel Flow Launcher** activity uses WorkflowCoordinator objects to specify which subflows to run. The `coordinator` variable stores the completed flow information from the previous **Provision Nodes** activity. The script then retrieves the IP address and port for each node that was provisioned. The `coord2` WorkflowCoordinator object runs the Add Node to Load Balancer subflow once for each node, using the retrieved IP address and port information as input variables. Finally, the `coord2` WorkflowCoordinator object runs the **SetupDNS** subflow once to configure the load balancer.

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Specifying which subflows to run

```
javascript:
var coordinator = WorkflowCoordinator.load('Provision Nodes');
var coord2 = new WorkflowCoordinator({
    workflow: 'Add Node to Load Balancer'
});

for (var i = 0; i < coordinator.getNumFlows(); i++) {
    var ip = coordinator.getInput(i).ip;
    var port = coordinator.getOutput(i);
    coord2.add( {
        ip: ip,
        port: port
    } );
}
var loadBalancerIP = '10.0.20.10';
coord2.add( {ip: loadBalancerIP, hostname:'www.snow1.net'}, 'SetupDNS');

coord2;
```

View workflow activity descriptions

Tooltips are available for workflow activities to help you understand how to use each activity.

Before you begin

Role required: admin

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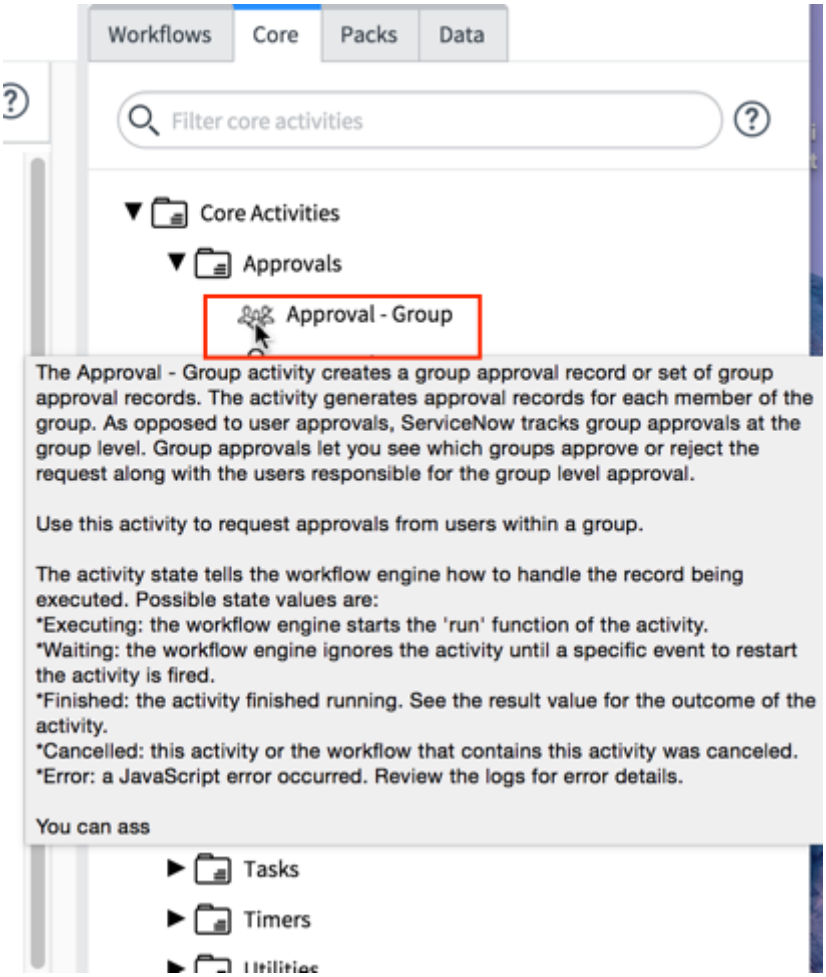
About this task

Procedure

1. To view an activity description in the Workflow Editor, point to the icon for the activity in the palette.



2. To modify activity descriptions, navigate to **Workflow** > **Administration** > **Activity Definitions** and edit the **Description** field.

> **Note:**
> To view more information about an activity, double-click the activity on the canvas and then click the help icon in the title bar of the Activity Properties window.

Elements in workflow activity definitions

Each activity can specify a number of elements that control the behavior of the activity or are controlled by the activity.

Not all activities specify all possible elements. See Workflow activities for links to the activities provided by default. Each activity description includes a detailed explanation of the specific elements offered by that activity.

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Workflow activity elements

Element	Description
Results	The possible **activity.results** value. The activity result usually determines which condition the activity transitions through.
Scratchpad entries	Scratchpad variables the activity depends on to run, or variables the activity writes to the scratchpad.
Input variables	Values that control the behavior of the activity. Fields to set these values appear on the Activity Properties form when a new activity is added to a workflow. See Activity variables for more information.
Conditions	Determines which transition the activity follows after completing. See Manage workflow activity conditions for more information.
States	Determines how the workflow handles the record being executed.

Add an activity to a workflow

Available activities are displayed in the **Core**, **Packs**, and **Custom** tabs in the Workflow Editor palette.

Before you begin

Role required: admin

Procedure

1. In the Workflow Editor, check out a workflow.
2. To add a workflow activity, drag it from the **Core**, **Packs**, or **Custom** tab to the canvas and drop it on a transition line in the workflow body.

   The transition turns blue when it is connected to the new activity. The designer adds the activity to the flow at that point and displays the property form for the new activity.

   If an activity is greyed out, approval engines are enabled for the table on which the workflow runs. To use the activity, turn approval engines off for the table.

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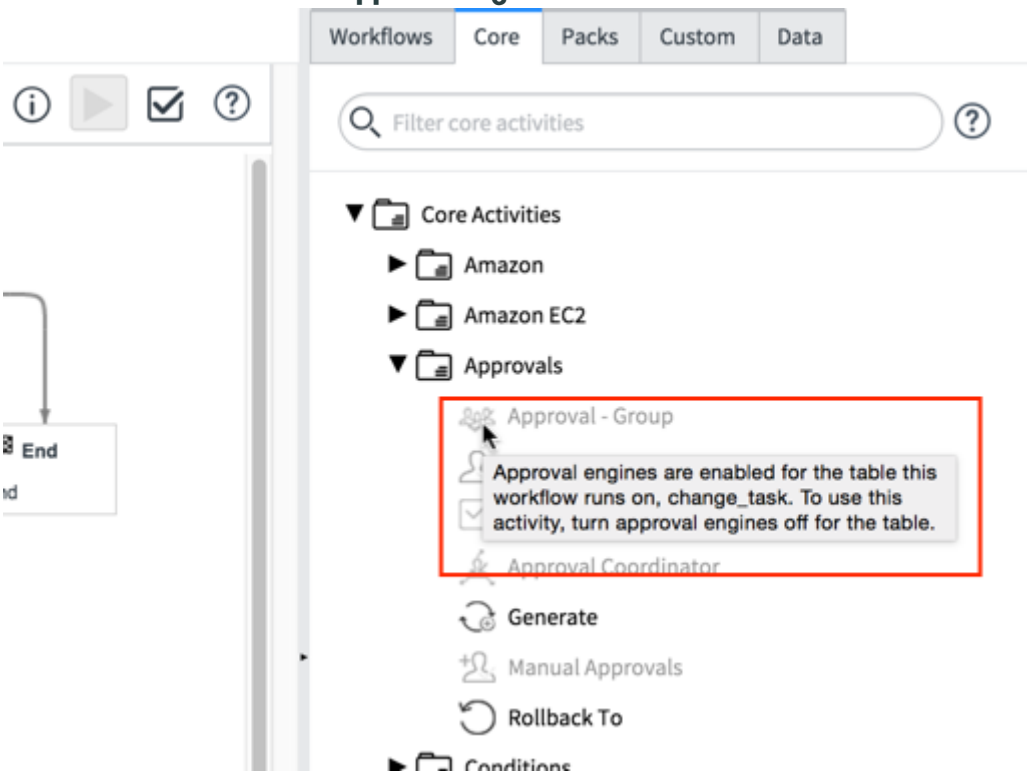
Unavailable activities and approval engines



3. Create any additional conditions needed for the activity and ensure that all exits are connected.
4. Run the workflow validation tool prior to publishing to detect missing or disconnected transitions that can cause a workflow to hang.

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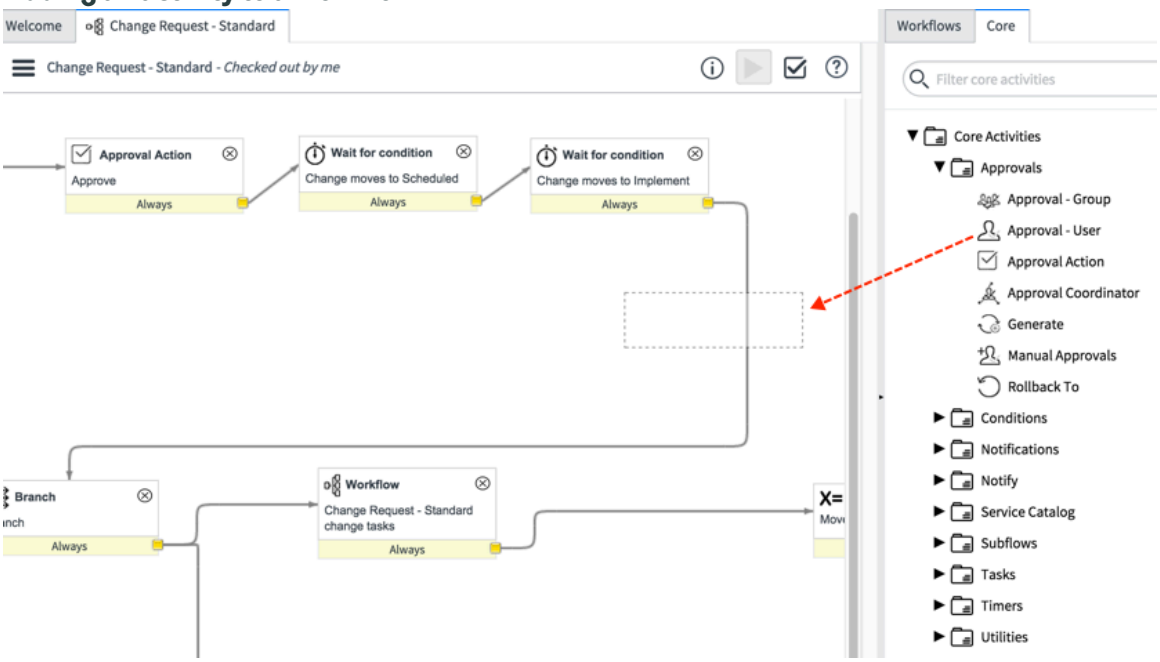
Note:
All activity descriptions have a **Table** value. If this value is **Global**, the activity is available for use with any workflow regardless of the table selected in the workflow properties. Activities that identify a specific table appear in the palette only if the table configured for the workflow matches or extends the table identified in the activity.

Adding an activity to a workflow



Duplicate a workflow activity

You can duplicate an activity used in a workflow, including all the configured properties.

Procedure

1. Right-click the activity and select **Copy Activity** from the context menu.

   The system automatically duplicates the activity, but does not create transitions.
2. Double-click the copy and configure the properties appropriately.
3. Drag the activity to a location in the workflow.
4. Add transitions.

Manage transitions between workflow activities

Transitions define the processing path of the workflow, depending on conditions defined in each activity.

Before you begin
Role required: admin

About this task
All conditions in an activity must have a transition and all transitions must have a connection to another activity or to the **End** activity.

Note:

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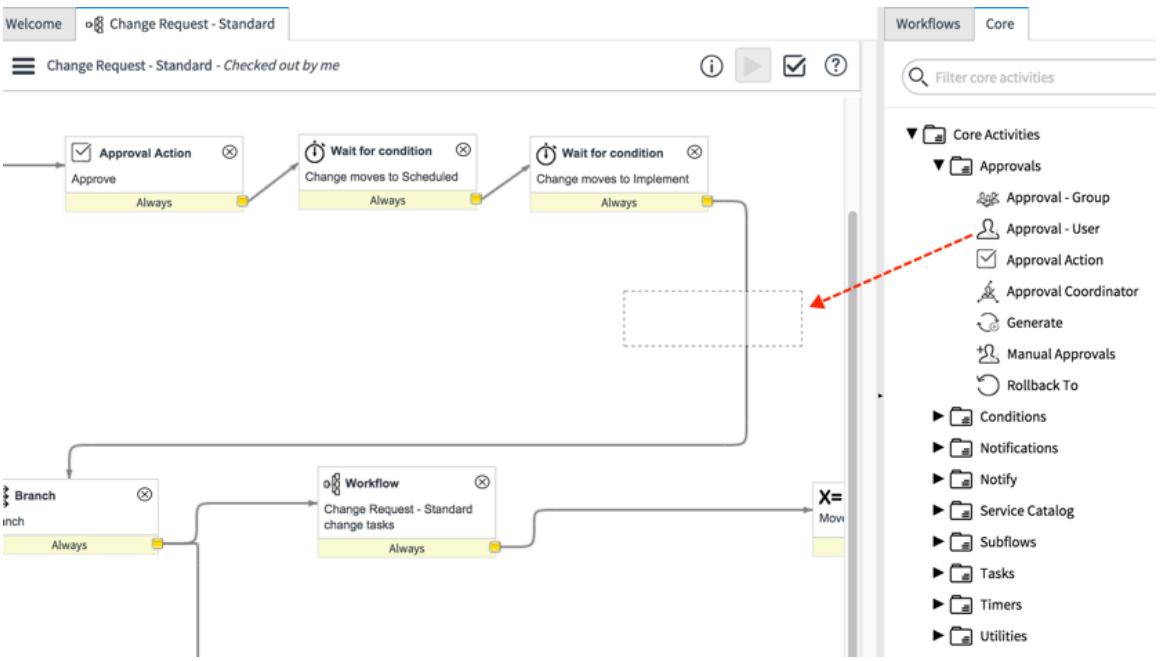
Run the workflow validation tool prior to publishing to detect missing or disconnected transitions that could cause a workflow to hang.

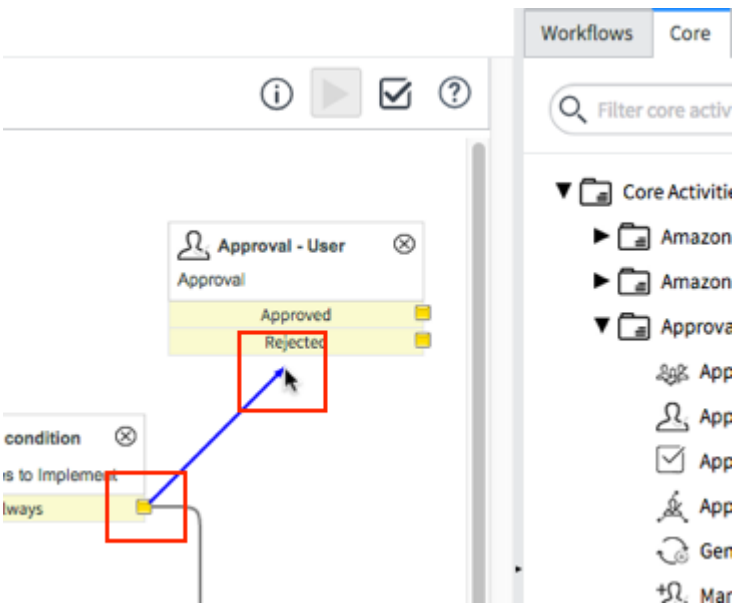
Procedure

1. Add transitions to the workflow using either of these methods:

- Drag and drop an activity directly onto a transition line to connect it to the adjacent activities. The transition line turns blue when the connection is made. The system updates the transitions automatically to reflect the new sequence.



- Drag the activity to an open area in the canvas and create the transitions manually. Click the yellow square on the right side of the activity condition and drag a connector to the next task.



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2. You can draw multiple transitions from the same activity condition if the activity executes concurrently.
3. To remove a transition, click to highlight it, and then press **Delete**.

Custom activity transitions

Controls on the **Approval - User** activity enable an administrator to add additional workflow transitions to the activity other than the default transitions of **Approved** or **Rejected**.

Transitions defined using this method do not become a permanent feature of the **Approval - User** activity. After a new transition is configured, that transition must be applied manually to subsequent instances of the activity, where desired.

Manage workflow activity conditions

Activities contain default conditions that determine which transitions are followed.

Before you begin

Role required: admin

About this task

For example, the **Approval - User** activity has two conditions, **Approved** and **Rejected**.

Example of activity conditions

You can use a JavaScript condition check to create custom conditions on Core workflow activities. Custom activities do not support this feature.

Procedure

1. Right-click the activity and select **Add Condition** from the context menu.
2. In the New Workflow Condition dialog box, fill in the fields as appropriate (see table).

New Workflow Conditions form

Field	Description
Name	The label that is displayed on the workflow.
Activity	Name of the activity for which this condition is submitted. This value is populated automatically by the system.
Short description	Brief description of this condition.
Condition	A JavaScript condition check. The following variables are available: ○ **current**: Current record that the workflow is running against. ○ **activity.result**: Result value set by the activity upon completion.

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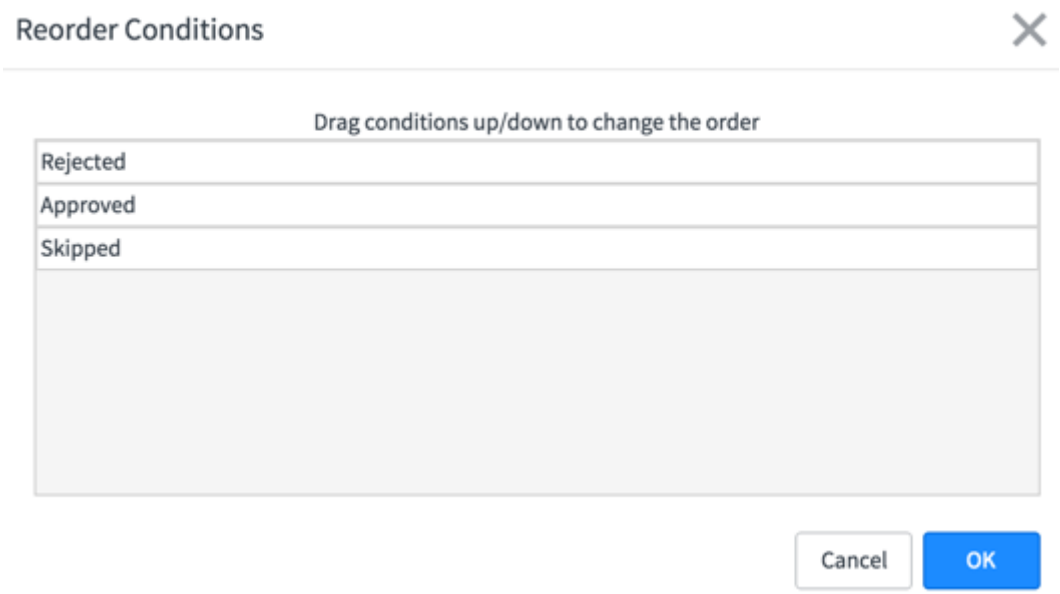
Field	Description
	○ **activity**: Workflow Executing Activity (wf_executing) record. Used for advanced condition checks. ○ **activity.vars**: Variables associated with the Workflow Executing Activity record. Used for advanced condition checks.
Skip during generate	If selected, the **Generate** activity does not follow this transition to generate approvals or tasks.

3. Click **Submit**.
4. To change the order in which conditions appear on the workflow activity, right-click the activity and select **Reorder Conditions**.

   A dialog box appears, with a list of the available conditions.

List of conditions in the current activity



5. Drag the conditions to a new position in the list.
6. Click **OK**.

Activity result value

The `result` value specified by an activity controls the condition through which the activity transitions.

Use the `result` value as part of the **Condition** field in the activity. For example, if the **Condition** field of an **Approval - User** activity contains `activity.result == 'rejected'`, the activity transitions through that condition when a rejection is received from the approver. Result values are set in the **Script** field of the activity definition.

Edit the workflow activity properties form

Customize which workflow variables appear on an activity properties form and how the variables are arranged on the form.

Before you begin

Role required: admin

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Procedure

1. Navigate to **Workflow** > **Administration** > **Activity Definitions**.
2. Scroll to the activity that you want to work with and click the activity name.
3. On the Workflow Activity Definition form, click the **Edit Variables Layout** related link.
4. On the Form Design page for the Activity Properties form, add and remove activity variables. The activity variables appear as separate items that you can rearrange on the form.

   For more details on using the form design interface, see Using the form designer.

Using workflow approval activities and rolling back workflows

When you work with approvals, you need to understand how approval activities interact with approval engines, how to correct a skipped approval workflow activity, and how rollbacks work.

Related topics

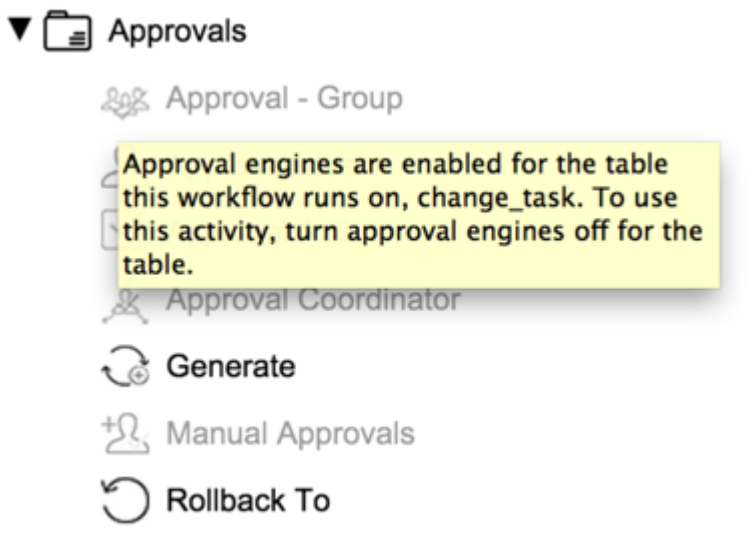
Rollback To workflow activity

Approval workflow activities and approval engines

Approvals can be managed by approval activities or approval engines, but not both. Approval activities can be used if approval engines are not turned on for the table associated with the workflow.

Approvals can be managed by approval activities or approval engines, but not both. Trying to use both can cause a range of issues. Approval activites are not available (greyed out) in the palette if approval engines are used on the specified table. If you hover over a greyed out approval activity in the palette, a comment with more information is provided. For more information about approvals and approval engines, see Classic approvals.

Unavailable approval activities



To turn approval engines off for the table, navigate to the **System Properties > Approval Engines** and change the setting for the table to **Turn engines off.**

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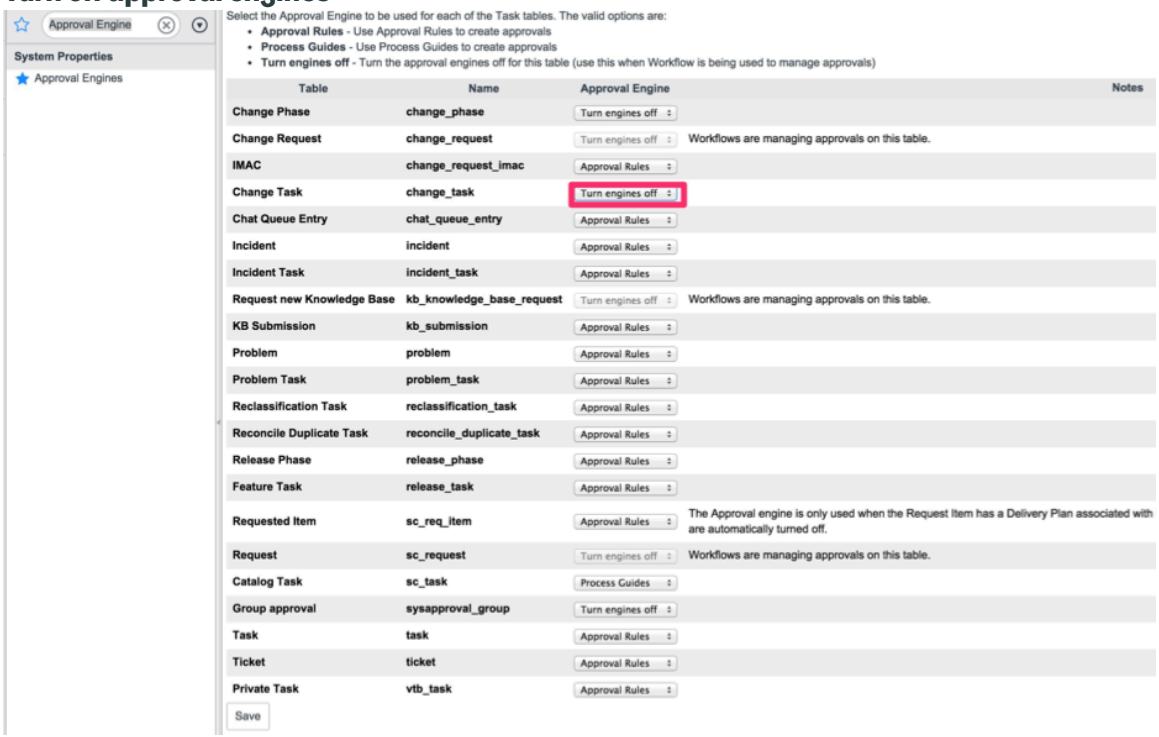
Turn off approval engines



Related topics

Approval and rollback workflow activities

Classic approvals

Correct a skipped workflow approval activity

While a workflow is in an active context, an approval activity can skip to the next activity.

Before you begin

Role required: admin

About this task

An approval activity might skip for the following reasons:

- The approval user or group is missing or invalid (for example, sys_id).
- The approval user or group became inactive after the approval record was created.
- The activity is a Dot-walking to data in related tables field, such as `current.opened_by.department.manager`, and it has a missing or invalid approval user or group.
- The business rule on the table that is associated with the workflow is invalid.

To correct a missed approval activity:

Procedure

1. Navigate to **All** > **Workflow** > **Live Workflows** > **All Contexts**.
2. Click the date and time in the **Started** column for the workflow that is incorrectly processing approval activities.
3. In **Related Links**, click **Show Workflow**.
4. Review the portion of the workflow that executed, and then do one or more of the following:

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- Verify that after approval, the workflow progressed to the next activity. If a workflow failed to progress, check the business rules. For more information, see Debugging business rules.
- Point to each processed approval activity to find activities where the **State** is **Finished** and **Result** is **Skipped**.

5. Navigate to **Workflow** > **Workflow Editor** and open the workflow.
6. Double-click the skipped approval activity.
7. Click **Users** or **Groups**.
8. Assign an active user or group for the approval activity. For more information, see Workflow error handling.

Using variables in Notify workflow activities

Certain Notify workflow activities support variable substitution for reading text to callers.

Certain Notify workflow activities allow you to use variables, such as those from the workflow scratchpad, to determine the activity behavior. Each activity supports a maximum of 20 variables. The following activities allow variable substitution:

Activity	Notes
Say	Supports variable substition in the **Text** field only.
Input	Supports variable substition in the **Text** field only.
Play	Supports variable substitution in the **URL** field only.
Forward call	Supports variable substitution in the **Phone number** field only.

Scratchpad variables

You can call variables from the workflow scratchpad or the activity scratchpad using the syntax ${variable_name}. You do not need to include either workflow.scratchpad or activity.scratchpad before the variable name. For example, to use the variable `activity.scratchpad.langCode = 'en-US'`, call ${langCode} within the activity. If the scratchpad does not contain the specified variable, the variable evaluates to an empty value.

You can get values from objects on the scratchpad using the format ${object.value}. For example, you can get the name of a user object, such as `workflow.scratchpad.user = {name:'john.smith'}` by calling ${user.name}.

The digit variable

The **Input** activity exposes the ${digit} variable. Use this variable in each condition presented by the activity. The number read to the user is determined automatically by each condition. The caller can press that number to cause the activity to transition through that condition.

Use multiple timer activities in one workflow

Workflow timer activities store data independently of each other in an activity-specific scratchpad.

Previously, all timer activities in a workflow accessed a single, shared scratchpad, which could lead to conflicts when adding multiple timer activities to one workflow.

Timer scratchpads entries hold these values:

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- workflow.scratchpad.endTime
- workflow.scratchpad.realStartTime
- workflow.scratchpad.retroactiveSecsLeft

Related topics

Timer workflow activities

Publish a custom workflow activity

When a user creates a custom activity and saves or submits it, that activity appears in the **Custom** and **Packs** tabs of the designer palette, but is only visible to the user who created it.

When configuration is complete, the user clicks **Publish**, which makes the activity accessible to other users on the instance with the workflow_admin or activity_creator role. Published activities are available for upload to the ServiceNow Store, can be added to workflows, and can be edited by any user with the proper roles.

To edit a published activity, click **Checkout**. When an activity is checked out by a user, only that user can modify it. The fields of a checked out activity are read-only for all other users. When the checked out activity has been modified successfully, the user publishes it again. The system adds a new version of this activity to the Custom tab in the Workflow Editor palette.

Note:
Activities you create and publish are only visible in the *Packs* tab if they were created in the current application scope.

Locked versions

Problems can arise if an activity version is checked out by a user and not checked back in, for example, when the user is sick or leaves the company. An activity in this state cannot be checked out for update.

A user with the admin role can return a locked activity to a published state. The administrator opens the locked activity from the **Custom** tab of the Workflow Editor, selects the checked-out version, and selects **Force Checkout**, and then **Publish**.

Workflow activity pinning

Workflow administrators can pin a custom activity to prevent the system from automatically updating that activity when a new version is downloaded from the ServiceNow Store.

You can pin or unpin individual activities or set pinning within workflow properties that controls the versions used for all the activities in that workflow. This can result in two workflows using different versions of the same activity.

Note:
Activity pinning and unpinning applies to the custom activities downloaded from the ServiceNow Store only, and does not apply to newly published activity definitions made locally on your instance. To make use of these locally updated custom activities, you must check out your workflow and manually add the activities.

RaptorDB

RaptorDB, the new ServiceNow database, optimizes ServiceNow AI Platform workloads, enabling your organization to support more users, workflows, and data on a single platform.

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https://player.vimeo.com/video/1075474494?h=8fecf1b432&badge=0&autopause=0&player_id=0&app_id=58479

RaptorDB will underpin ServiceNow AI Platform core services, applications, and data.

Note:
The roll-out of RaptorDB is not tied to your organization's upgrade to Zurich. Please speak with your account team for more information.

Benefits

With RaptorDB, your organization gets the benefits of database features owned and maintained by ServiceNow, as well as optimized for ServiceNow applications and workloads. This enables your organization to confidently grow your use of the ServiceNow AI Platform over time.

RaptorDB Professional unlocks additional functionality and higher performance, allowing your organization to do even more with ServiceNow.

RaptorDB Standard and RaptorDB Professional

RaptorDB Standard is the target state default primary database, built to provide improved scale and performance capabilities for ServiceNow AI Platform workloads and queries.

If your organization is looking to drive ultra-scale and high performance to support ServiceNow AI Platform generative AI and machine-scale data use cases, user growth, applications, workloads, and analytics, you may wish to leverage RaptorDB Professional. RaptorDB Professional is a licensed database; for more information, contact your account team.

RaptorDB Standard and RaptorDB Professional feature comparison

Feature	RaptorDB Standard	RaptorDB Professional
Optimized for ServiceNow workloads	Yes	Yes
Improved response time	Yes	Yes
Ultra-scale performance and scalability	No	Yes
Enhanced analytics with built-in column store	No	Yes
Advanced instance topology support	No	Yes
Support for self-hosted environments	No	Yes, starting in Zurich

ATF Test Generator and Cloud Runner

ATF Test Generator and Cloud Runner is a tool that enables you to leverage ServiceNow's ability to intelligently generate regression tests for a specific instance.

ATF Test Generator and Cloud Runner overview

The test generator intelligently creates tests by analyzing instance behavior and workflows. The ATF Test Generator integrates with the existing ATF framework providing you with a seamless user experience. You also have the option to execute these tests using ServiceNow's Cloud Runner which runs ATF tests on a headless browser hosted by ServiceNow.

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Note:
Check that your instance is using an ADCv2 load balancer. For more information, see the ADCv2 Migration knowledge article. If your instance is not using the ADCv2 load balancer, contact Now Support. Notice that mTLS is activated automatically and causes a rolling restart of the application nodes. See KB1639216 for more information.

Get started

Explore Learn about ATF Test Generator and Cloud Runner	**Configure** Set up the cloud user	**Operate** Generate the tests
Use Execute the test using Cloud Runner	**Reference** Learn about miscellaneous information about the app	

Starting Yokohama, ATF Test Generator and Cloud Runner is now available in Government Community Cloud (GCC), ServiceNow Protected Platform European Union (SPP EU), and ServiceNow Protected Platform Australia (SPP AU). It is not available in ServiceNow Protected Platform Singapore (SPP SP), National Security Cloud (NSC), on prem and in some regulated markets.

Troubleshoot and get help

- Ask or answer questions about ATF Test Generator and Cloud Runner in the ServiceNow Community
- Search the Known Error Portal for known error articles

Exploring ATF Test Generator and Cloud Runner

Use the ATF Test Generator and Cloud Runner application to generate tests depending on the instance behavior and workflows. You can also execute the generated tests using the Cloud Runner option.

ATF Test Generator and Cloud Runner overview

These are the main modules in the application.

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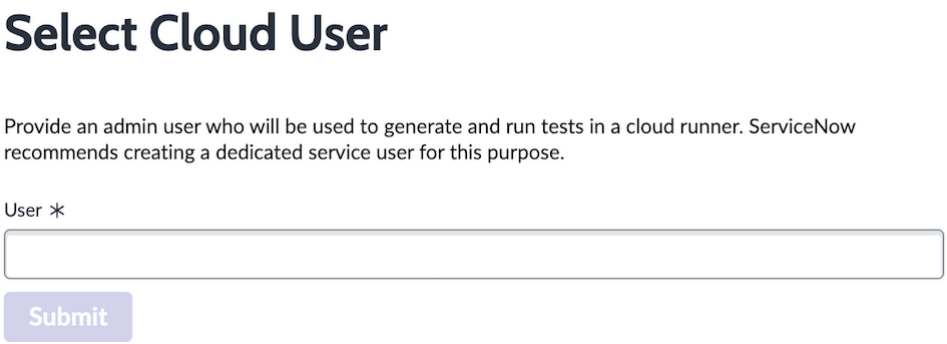
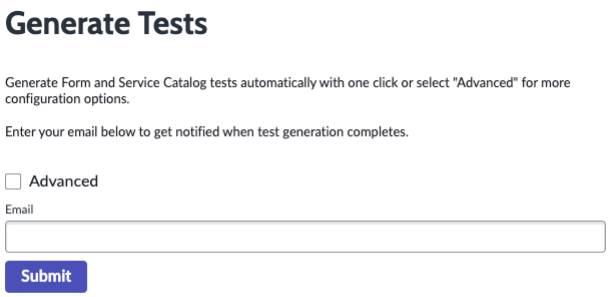
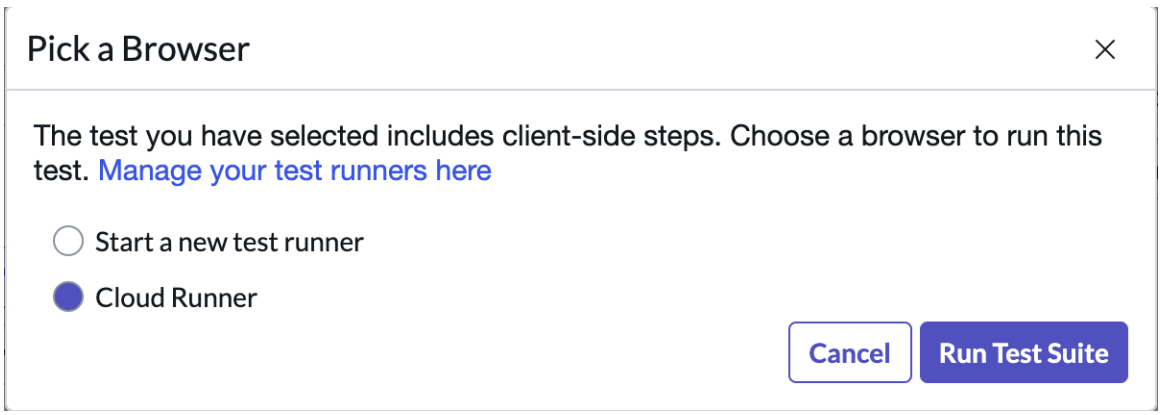
- Select Cloud User: Setting up credentials for cloud runner user.



- Generate tests: Auto-generating tests and test suites to be executed on cloud runner.



- Executing tests: Executing the generated tests using the Cloud Runner option.



Note:
This dialog box is visible when you try executing an ATF test or suite.

ATF Test Generator and Cloud Runner users

ATF Test Generator and Cloud Runner has the following users.

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Users	Description
System Administrator [admin]	The System Administrator user is required to access and use the ATF Test Generator and Cloud Runner store application.

ATF Test Generator and Cloud Runner benefits

Benefit	Feature	Users
Set up cloud user to generate and run tests	Set up cloud user	System administrator
Generate test automatically using ATF Test Generator and Cloud Runner	Generating the tests	System administrator
Execute the tests using the Cloud Runner browser option	Executing the tests using Cloud Runner	System administrator
Schedule tests and test suites execution and nightly runs	Scheduling test execution	System administrator
Review the log entries in the BOQ form to debug errors during the execution of the test suites	Log entries in the BOQ form	System administrator

What to explore next

To learn more about using Log Export Service, see:

- Configuring ATF Test Generator and Cloud Runner
- Operating ATF Test Generator and Cloud Runner
- Using ATF Test Generator and Cloud Runner
- ATF Test Generator and Cloud Runner reference

Configuring ATF Test Generator and Cloud Runner

Configure the ATF Test Generator and Cloud Runner store application by setting up the cloud user.

Set up cloud user

Set the credentials for the cloud user to be able to generate and run tests. This is a one time setup after the admin user installs the application.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Automated Test Framework (ATF)** > **Administration** > **Select Cloud User**.

   Note:
   The **Select Cloud User** module is visible only to the admins. Even an ATF test admin can't access the **Select Cloud User** module.

2. Select an admin user from the list.

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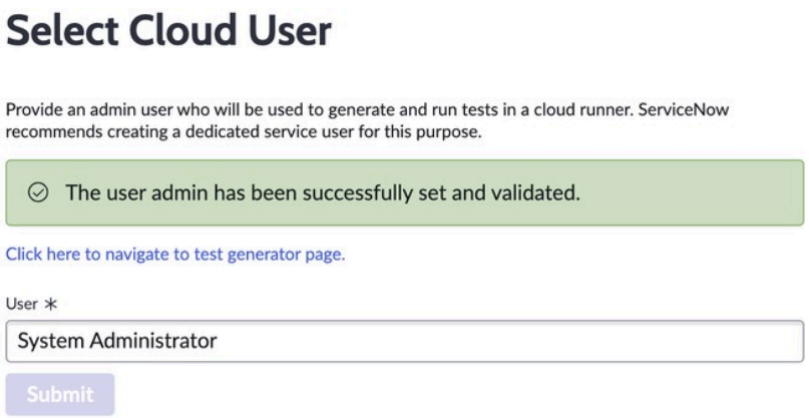
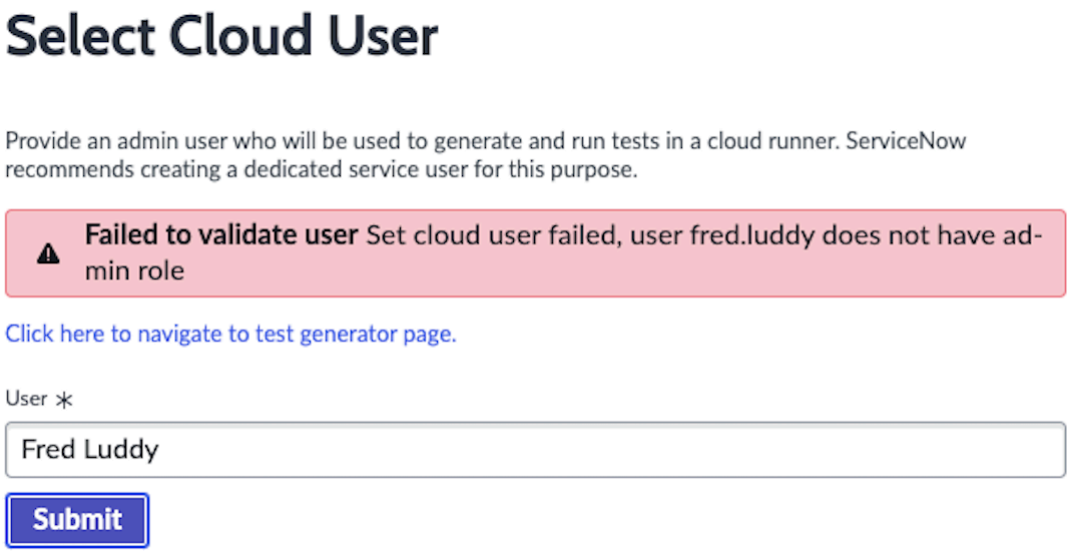
Note:
Even if you are an admin, it is recommended to select a dedicated admin user.

3. Click **Submit**.

If the admin user is selected successfully, the following message shows up:



If the selected user is not an admin, an error message shows up. The following message is an example of one of the possible error messages. The error messages vary depending on the reason of the error.



The selection of a cloud user can fail for the following reasons:

- User wasn't found
- User is inactive
- User is locked out
- User needs a password reset
- User doesn't have an admin role

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- User has read-only access
- User has web services only access

Note:
Selecting an admin user might take some time because it tries spinning a cloud browser and then log in to the selected user.

Operating ATF Test Generator and Cloud Runner

Operate the ATF Test Generator and Cloud Runner store application by generating tests automatically.

Generating the tests

Generate tests automatically by leveraging ServiceNow Test Generation and Cloud Runner application. You can also run these tests with the click of a button.

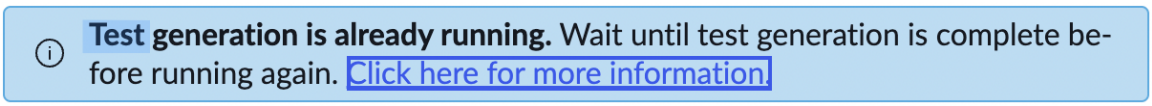
Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Automated Test Framework (ATF)** > **Administration** > **Test Generator**.
   If you are on the **Select Cloud User** module and have setup the admin user, click **Click here to navigate to test generator page**.

   Note:
   The **Generate Tests** module is visible only to the admins. Even an ATF test admin can't access the **Select Cloud User** module.

   If you already have a test generation running, you will see the following message.

   Note:
   You can't start more than one test generation process simultaneously, but it will queue up for later execution.

2. **Optional:** If you want to see the currently running test and the queue, navigate to **Automated Test Framework (ATF)** > **Administration** > **Browser Orchestration Queue**.
   The Browser Orchestration Queues list shows up.

   Note:
   You can see the progress and state of each of the test generation and test run in the list.

3. Select one of the two ways to generate tests.

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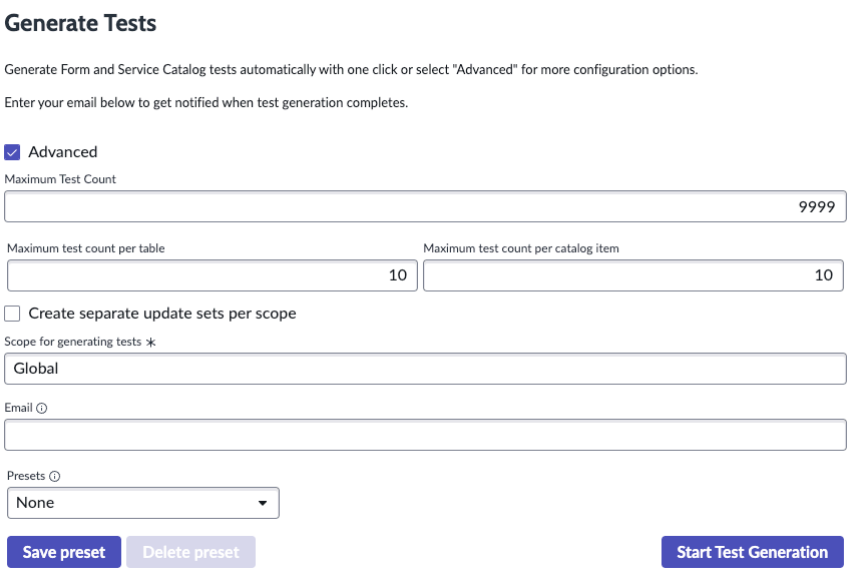

- Not selecting **Advanced**: Generates tests on every table by default
- Selecting **Advanced**: Option to specify a specific table to generate tests
  - Maximum Test Count: Upper bound on the number of generated tests.
  - Maximum test count per table: Upper bound on the test count for each table
  - Maximum test count per catalog item: Maximum number of generated tests per service catalog item, defaulting to maximum 10. You can modify the number of generated tests per service catalog item
  - Create separate update sets per scope: Option to create a separate update set for each scope
  - Scope for generating tests: Ability to have the tables in separate update sets for different scopes. For example, the generator gathers information about the scope of the tables and then saves the tests in a separate update set for each scope

    Note:
    This field is visible only if the **Create separate update sets per scope** field is not selected. You can then select the scope for the generated tests. The default scope is Global.

  - Email: Email address of the user to receive notifications about test generation summary
  - Presets: Number of user-control generated tests per service catalog item. The maximum default number is 10.

Note:
Since the test generation process is time consuming, check your provided email address regularly to receive the notification about the test generation.

4. **Optional:** Select **Save preset** to implement the preset filter conditions.
   You can also delete a preset by selecting **Delete preset**. All admins who can access the **Generate Tests** module can view the update on the **Presets** field.

   Note:
   You can't delete the default **None** preset. Some example presets have been provided which can be edited.

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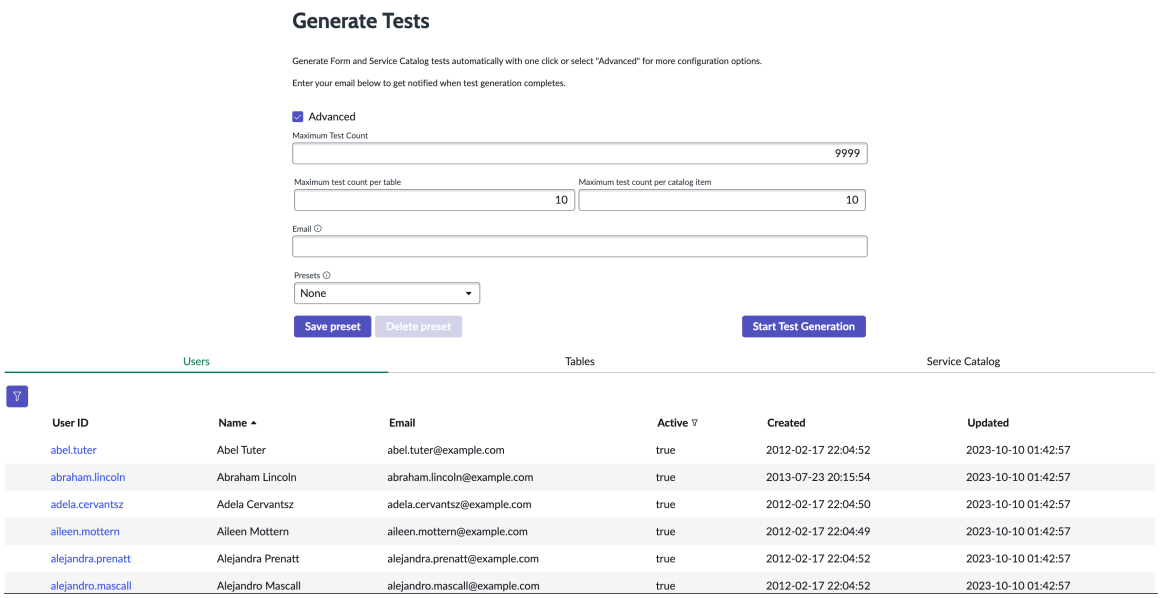
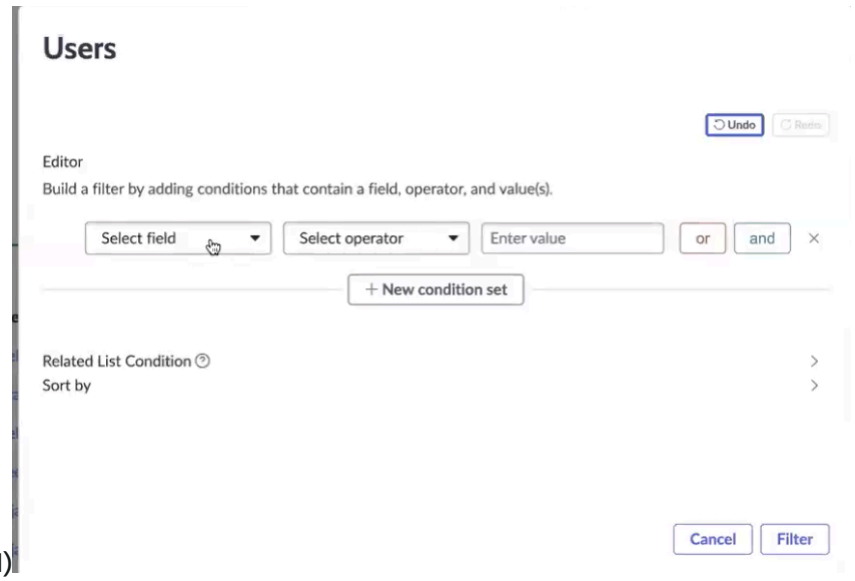


Depending on the query created by the preset values, the following tabs return certain data.

- Users
- Tables
- Service Catalog

Note:
You can create new condition sets to filter the required information in tabs.



(Optional)

5. Select **Start Test Generation**.
   The Test Generation Started page shows up.

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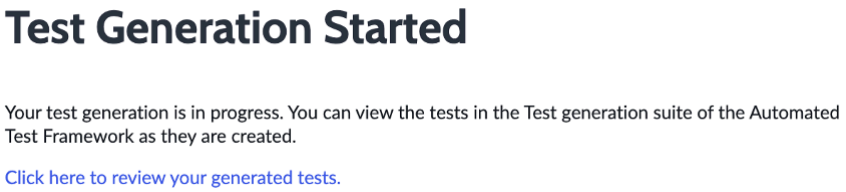
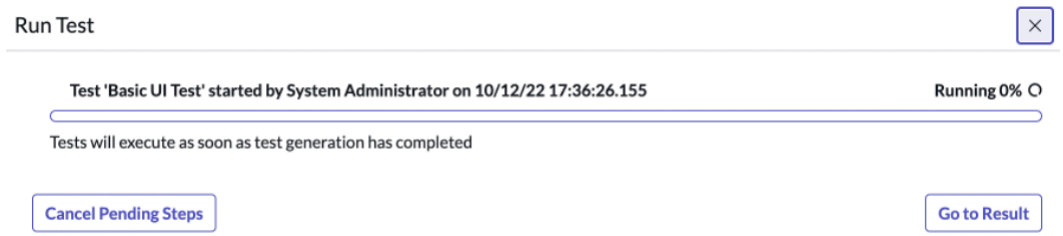
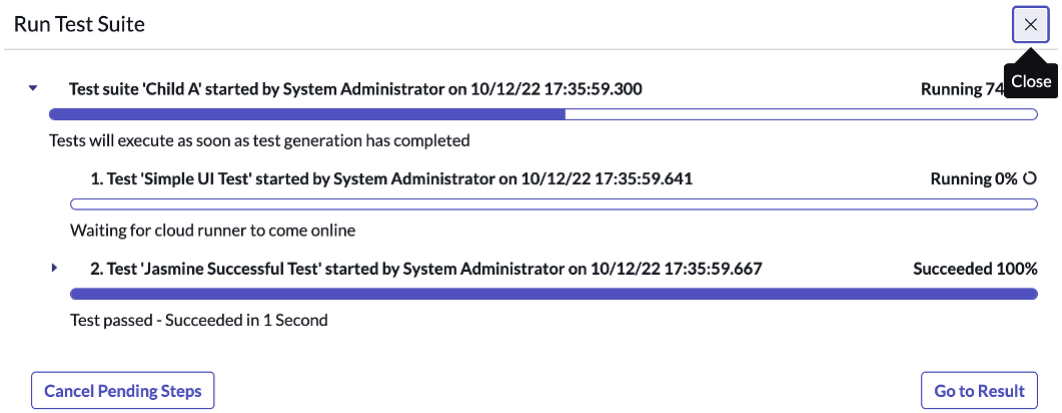


If you run a test or a suite when the test generation is in progress, one of the following messages shows up.

- For test run



- For suite run



6. Go to Suites to see the generated tests.
   A list of test suites shows up.

> **Note:**
> The tests start appearing as they are being generated. It is recommended not to run the generated tests or test suite when the test generation is still in progress.

7. Select the **ATF Generated Suite** suite.

> **Note:**
> It supports only the basic forms and server test steps.
>
> You can now set the `sn_atf_tg.generation.create_separate_update_set` property to False if you don't want an updated suite every time you run a test generation. The updated records created during tests generation are captured in the suite the user currently has selected. Its default value is set to True and it generates an updated suite after every test generation.

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A list of tests within the selected suite shows up. Only the successful tests show up in this suite.

8. **Optional:** Select the generated suite and scroll down to the Tests related list, if you want to view the generated automated tests using either Record Producer or Service Catalog. From the automated tests created, you can view all the users who have used that record or incident. Although the tests steps here are similar to the other test steps, the initial validation is done for the fields on the form. Also, for every mandatory field, a value is set based on the sample data. It also validates after every mandatory step. Once you submit, it does a final record validation.

Tests generation for flow and flow logic

Use the ATF Test Generator and Cloud Runner store application to auto-generate tests that drive a ServiceNow flow for Service Catalog.

Service Catalog

By default, the ATF Test Generator and Cloud Runner store app supports the auto-generation of the tests and test steps for flows and flow logics for Service Catalog.

There are three sys properties that the process of generating tests for flows for Service Catalog is dependent on:

- sn_atf_tg.enable_flow_generation: if set to true, only the flow generation steps are generated. The default value is true
- sn_atf_tg.unsupported_flow: It doesn't generate steps for the mentioned flow sys id. You can mention multiple flow names separated by commas
- sn_atf_tg.unsupported_flow_logic: It doesn't generate steps for the mentioned flow logic. You can mention multiple flow logic names separated by commas

Note:
If a Service Catalog item contains a flow or a flow logic, generate the test steps for flows after the record validation and record query steps are performed. A flow or a flow logic can have multiple tests and test steps.

All steps are server-side steps and the flow starts with a log message and ends with a log message. The logs are added before any actions to inform you of the actions that are followed in the flow.

Other trigger types

Apart from Service Catalog, the following are the trigger types supported by ATF Test Generator and Cloud Runner store app.

- Created: The flow steps begin after the initial set of record validation steps when submitting the form. It starts with a log message that contains the flow name and ends with a log message indicating the flow status.
- Updated: If the type is updated, the flow steps will occur at the end, following the record validation steps.
- Created or Updated: Depending on the type, the flow steps are generated either in the middle or at the end.

Note:
For Service Catalog, only one flow is tied to a catalog item. But for the other trigger types, you can have multiple flows tied to a trigger type.

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Using ATF Test Generator and Cloud Runner

Use the ATF Test Generator and Cloud Runner store application to execute the generated tests using the Cloud Runner option. You can also schedule test execution and nightly runs to completely automate test execution.

Executing the tests using Cloud Runner

Execute the generated tests suite using the Cloud Runner browser option.

Before you begin

Note:
ATF test data will temporarily be in the browser session which are stored in our ServiceNow data center. Test data will be removed after all test executions have been completed.

Role required: admin

Procedure

1. Navigate to **All** > **Automated Test Framework (ATF)** > **Suites** > **ATF Generated Suite**.

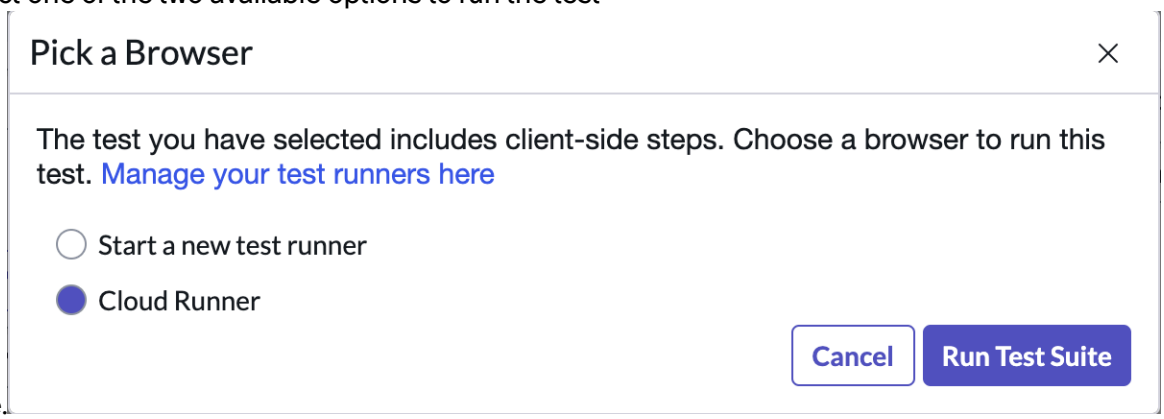
   Note:
   You can also execute an individual test. Navigate to **All** > **Automated Test Framework (ATF)** > **Tests**.

2. Select **Run Test Suite** to execute the selected suite.

   Note:
   You can also execute an individual test using the cloud runner browser option.

   The Pick a Browser dialog box shows up.

3. Select one of the two available options to run the test suite.



   - Start a new test runner: Runs the test by starting a new tab
   - Cloud Runner: Runs the test in the cloud

   Note:
   As an admin user, you can hide the Cloud Runner option on the Pick a browser dialog box by setting the atf_cloud_runner.radio_visible to false. The property is set to true by default.

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Note:
If you run a test suite using the cloud runner, all the tests within the suite run in parallel. See Parallel testing using Cloud Runner for more information. The order in which the tests in a suite run is random. The parallel suites ignore the execution order and ignore abort on failure.

4. Select **Run Test Suite** on the dialog box after selecting the browser.

Note:
The number of cloud runners that can be used simultaneously is two by default. You also have the option of buying five more cloud runners.

The execution of the tests continues at the background even if you close the progress bar.

5. **Optional:** Select **Go to Result** if you want to review the tests execution results.

Parallel testing using Cloud Runner

Parallel testing using the Cloud Runner involves execution of tests within a suite in parallel.

Parallel testing of the tests within a single suite starts as soon as you run the suite. When you run a suite using the Cloud Runner, all the tests within the suite run in parallel ignoring the execution order and abort on failure. Parallel testing using Cloud Runner is different from parallel testing without Cloud Runner.

Note:
Parallel testing without Cloud Runner involves running of more than 1 suites in parallel.

Scheduling test execution

Use schedules and nightly runs to execute tests and test suites in ServiceNow's cloud infrastructure allowing you to fully automate ATF test executions.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Automated Test Framework (ATF)** > **Schedules**.
The Suite Schedules page shows up.
2. Select **New** to create a new schedule run.
The Suite Schedule record shows up.
3. On the form, fill in the fields.

Fields	Description
Name	Name of the schedule run.
Active	Option to activate the scheduled run.
Application	Application that has the schedule run.
Run	Frequency at which the scheduled run should execute
Time	Exact time at which the test run has been scheduled to execute

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Fields	Description
Run in cloud	Option to execute the scheduled run on cloud runner. The default value is True for new schedules. **Note:** The value is False for any existing schedule runs.

4. Select **Save**.
5. **Optional:** Add any child tests if needed.

   Note:
   If you change the browser name for the child test, it will still run on the cloud runner.

6. Select **Execute Now** to execute the suite.

ATF Test Generator and Cloud Runner reference

Reference information for the ATF Test Generator and Cloud Runner.

Log entries in the BOQ form

Debug errors or track any critical transactions during the execution of the test suites, setting up the Cloud Runner or generating the tests by viewing the log entries in the BOQ form.

You can now view important log entries in the BOQ form. When you go to the BOQ table, you will see the list of jobs. On entering one of the jobs, you will see some specific job log entries.

The following are some of the examples for log entries in the BOQ form for test execution.

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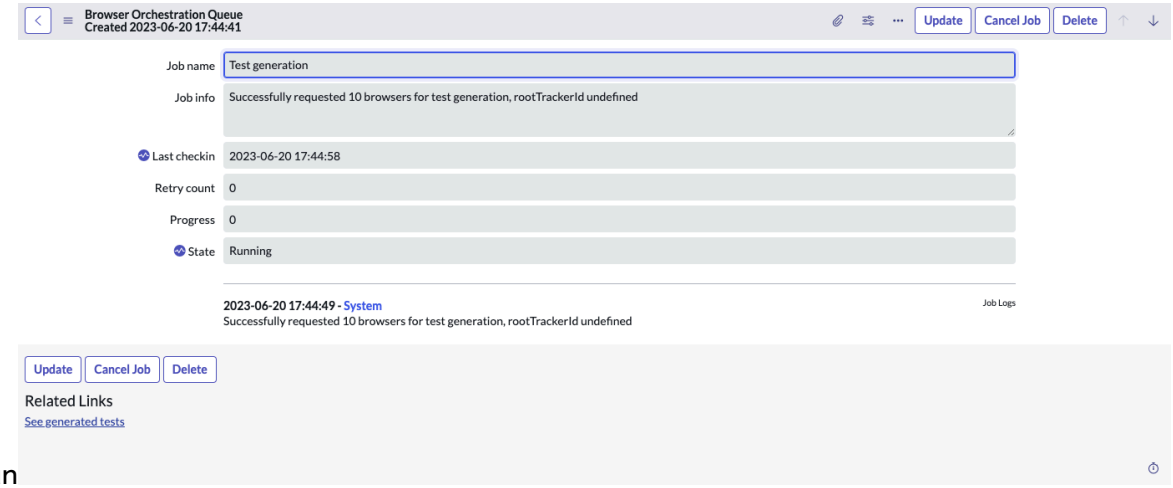
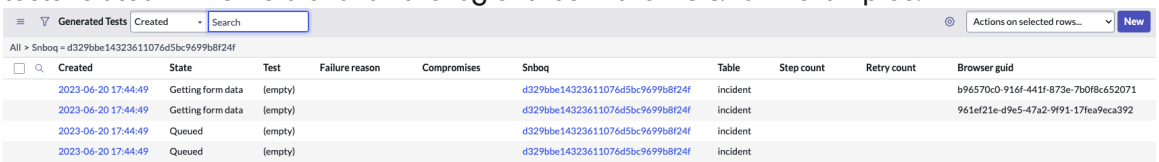
- Successful test

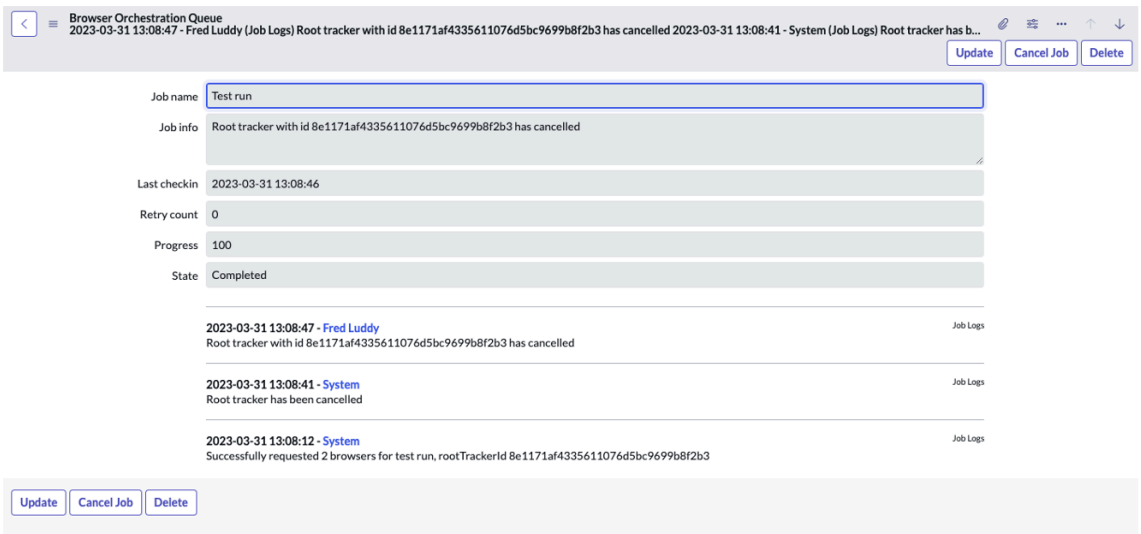


run

Note:
Select See generated tests related link to view the automated tests. The list of generated tests shows up and is not editable. You can also view the state and the reasons of failure of the tests on the list. The See generated tests related link is visible for all the log entries in the BOQ form examples.



- Test run got cancelled by user via root



tracker

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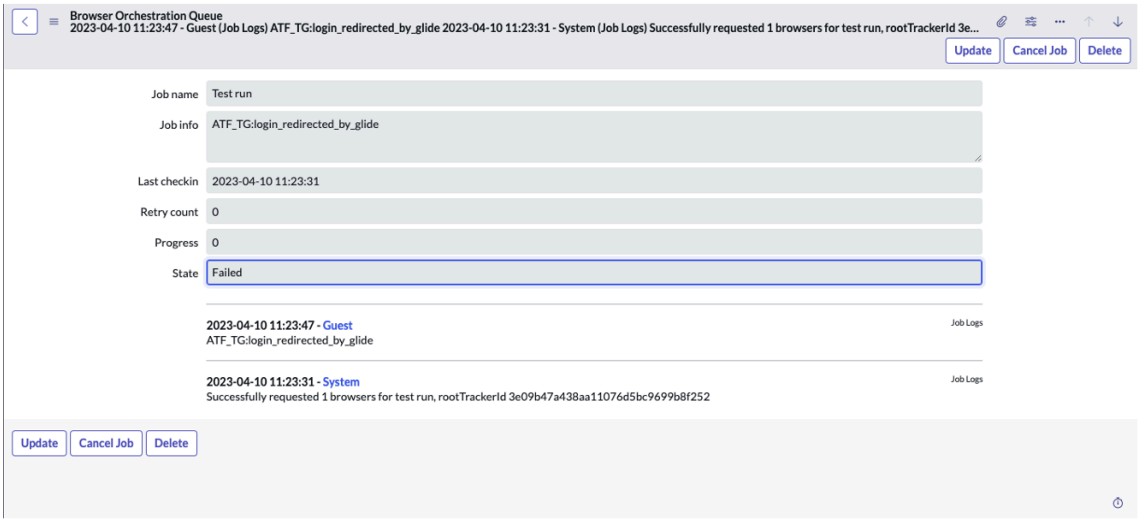
- If BOQ and BOS can be reached on an instance, but login is redirected.



Note:
This might happen when the ADCv2 load balancer of the instance is misconfigured and you have a customization that redirects traffic via a client side script.

(the ADCv2 load balancer of the instance is misconfigured, the customer has a customization that redirects traffic via a client side script, etc...)

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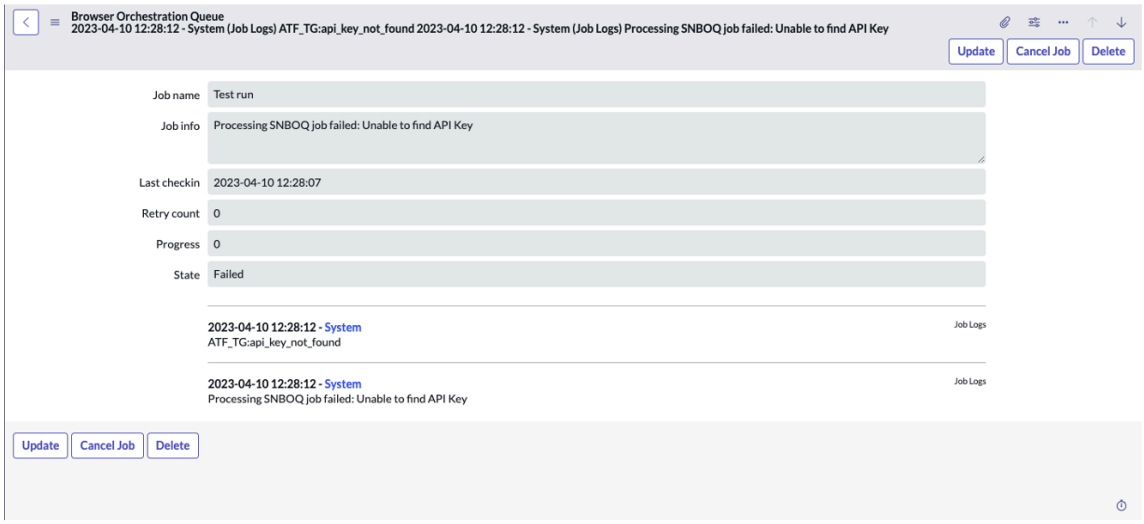
- If you have deleted an API key before the job is sent to BOS/ BOQ



- If the BOS is unable to login to an instance due to some client side script, API key being deleted after request has been sent to BOS/BOQ, etc.

ATF Test Generator and Cloud Runner roles

ATF Test Generator and Cloud Runner is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

System Administrator [admin]

The admin role is required to access and use the ATF Test Generator and Cloud Runner store application.

Contains Roles

Note:
The modules in the store application is only visible to the admins. Even an ATF test admin can't access them. It is recommended to select a dedicated admin user.

List of roles contained within the role.

None.

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Groups

List of groups this role is assigned to by default.

None.

Special considerations

Note:
Avoid granting an admin role when more specialized roles are available.

It is recommended to select a dedicated admin user who meets the following conditions:

- is not Locked out
- is Active
- is not Web services access only
- is not an Internal Integration User

HTTP Response Headers

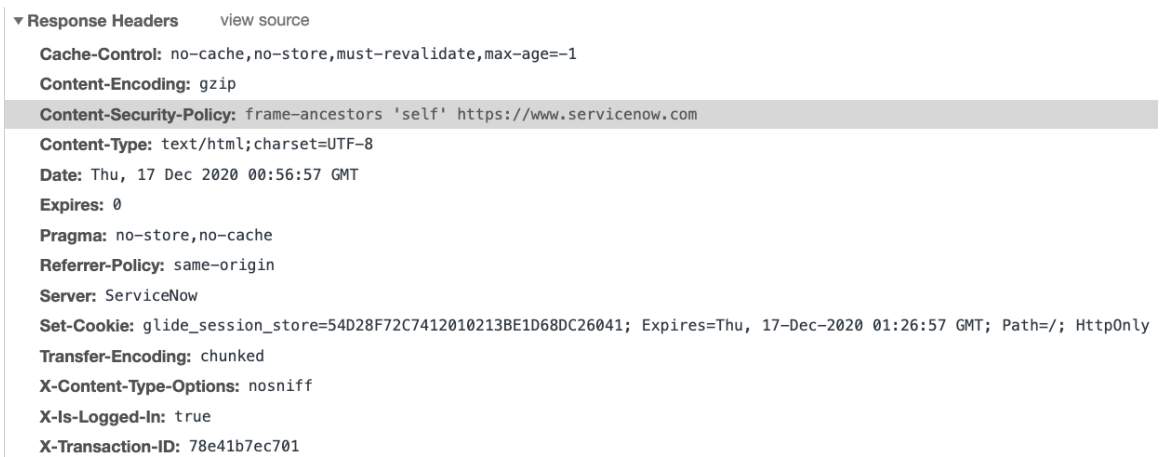
A response header is a simple name-value pair used in an HTTP response to provide additional information about page content or how the client should process it.

You can configure HTTP response headers for all, or specific types of pages, which include Service Portal, UI Page, or UX applications. The ability to configure and pass response headers enables special handling of the page content by a client, most typically a browser.

To learn more about what an HTTP header is, and about configuring the name-value pair for specific HTTP response headers, see:https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers

When configuring response headers, you must look at the definition for the HTTP header to determine how the client would handle the page content.

- For example, you configure an HTTP header for a specific page or all the pages with a Content-Security-Policy: frame-ancestors 'self' https://www.servicenow.com.
- When you invoke the page in a browser such as Chrome, you can review it in the Response Headers section of Chrome Developer Tools.



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To learn more about how browsers handle a page with frame-ancestors, see https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers/Content-Security-Policy/frame-ancestors.

Warning:
When using URLs with custom name-value pairs, proceed with caution because there is a potential security risk when doing so. The signed security amendment to the ServiceNow AI Platform contract has implied security. You may potentially or accidentally override it when you use custom name-value pairs in the resulting URLs.

- If you want to entirely disable HTTP response header configuration functions, set the *glide.http.headers_config.enabled* property to **false**.
- Once you set it to false, ServiceNow AI Platform does not use any of the header configurations you defined in the sys_response_header table.

Special handling of the Content-Security-Policy: frame-ancestor header

Normally, the ServiceNow AI Platform automatically includes the X-Frame-Options: SAMEORIGIN header.

- It supports use of this header in all types of browsers, based on the setting of the *glide.set_x_frame_options* global property, which is enabled by default.
- When you configure a page with a Content-Security-Policy: frame-ancestor 'self' URL1 URL2 header, the ServiceNow AI Platform does not automatically include the X-Frame-Options: SAMEORIGIN header. Excluding it prevents the browser from being confused, because Content-Security-Policy: frame-ancestor 'self' already has a similar effect.

Special handling of Content-Security-Policy: frame-ancestor header for Internet Explorer

Using the Content-Security-Policy: frame-ancestor 'self' URL1 URL2 header enables you to configure multiple URL sources to include the page from within an iFrame rendered from a third-party site. However, Internet Explorer does not support this type of header.

- Instead, the Internet Explorer only supports the X-Frame-Options: ALLOW-FROM URL (ALLOW-FROM) directive in this header, although the restriction is for a single host URL.
- If you configure the frame-ancestor 'self' URL1 URL2 header, and Internet Explorer is in use, the ServiceNow AI Platform automatically uses the X-Frame-Options: ALLOW-FROM URL (ALLOW-FROM) header instead.

If the Internet Explorer request includes the referrer URL header:

- It attempts to match it with the host URLs (full or wildcard http://*.example.com type URL format only) configured in the Content-Security-Policy: frame-ancestor 'self' URL1 URL2 header.
- If there is a match, include the matched URL as X-Frame-Options: ALLOW-FROM URL1.
- If there is no referrer header, it uses the first non-wildcard based host URLs configured in the Content-Security-Policy: frame-ancestor 'self' URL1 URL2 header.

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Note:
When configuring URLs, do not include a forward slash at the end of the URL.

- This example of an incorrect configuration that may not work properly with this special handling:
  - Name: Content-Security-Policy
  - Value: frame-ancestors 'self' https://microsoft.com/
- Use this correct syntax instead:
  - Name: Content-Security-Policy
  - Value: frame-ancestors 'self' https://microsoft.com

Related topics

Control request and response content type

Cache-Control HTTP header value

Content-Security-Policy: frame-ancestor 'self' URL1 URL2

X-Frame-Options: SAMEORIGIN

X-Frame-Options: ALLOW-FROM URL

Configure HTTP response headers

Configure standard name-value pairs for HTTP response headers. You designate if the configuration applies to all pages, or to specific types (Service Portal, UI Page, or UX application record).

Before you begin

Role required: An elevated access security_admin role is required to configure an **All Pages** type header. An admin role is required to configure a **Specific Type** header.

Procedure

1. In the Navigator pane, type `sys_response_header.list`.
2. Click **New**.
3. Fill in the fields on the form.

HTTP Response Header

Field	Description
Active	Check box that designates that this HTTP response header configuration is active.
Application	Application scope for this record.
Applies to	Type of record the HTTP response header configuration applies to. **Specific Type** HTTP response header configuration is for the specific type and record you select in the **Type** and **Record** fields. **All Pages**

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Field	Description
	HTTP response header configuration is for all pages and record types. **Note:** Only users with an elevated access privilege security_admin role can configure HTTP response headers for the All Pages type header.
Type	Type of record the HTTP response header configuration applies to. **Service Portal [sp_portal]** Records related to the Service Portal. **UI Page [sys_ui_page]** Standard UI pages in the ServiceNow AI Platform. **UX Application [sys_ux_page_registry]** Standard UX applications in the ServiceNow AI Platform.
Record	Specific record the HTTP response header configuration applies to. To select a record: **a.** Click the Search ( ) icon to access the Select the document form. **b.** In the **Table name** field, the default is the type you selected in the **Type** field. Do not change it. **c.** In the **Document** field, select the record from the table. For example, if you selected **Service Portal [sp_portal]**, you select a specific Service Portal-related record in that table. **d.** Click **OK**. You can only access this field if you selected **Specific Type** in the **Applies to** field.
Name	Name you want to assign to the name-value pair for the HTTP response header.
Value	Value you want to assign to the name-value pair for the HTTP response header.

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Field	Description
Description	Detailed description for the HTTP response header.

4. Click **Submit**.

HTTP header configuration for advanced users

The HTTP response header table (sys_response_header) in the List view contains two additional columns - **Add by** and **Order**.

Column	Description
Order	Adds a default integer order value to a header configuration regardless of the type of header (**All Pages** or a **Specific page**). • When a specific page request takes place, both of the header types are interleaved based on the **Order**. • The net headers, regardless of the type, are sorted first, based on the **Order** and added to the response based on the ordered header list.
Add By	Contains the following values: **Append** (Default value) This option is relevant when multiple headers with the same name are configured. In this case, they are both added to the HTTP response header. **Overwrite** This option is relevant when the same header (a header with the same name) is attempting to add twice in the ordered header list (see **Order** description). The header with the higher order and with an **Overwrite** selection in **Add By** overwrites the same header trying to be set with a lower order.

You may have situations where a couple of similar **All Pages** type header configurations could overwrite a **Specific Type** type header configuration. An example of a **Specific Type** configuration would be one for a specific UI page. You can remedy this situation by adjusting the **Add by** and **Order** columns, as in the following examples.

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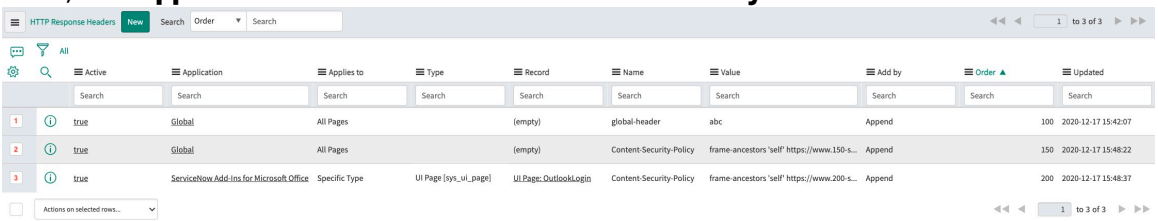
Append example

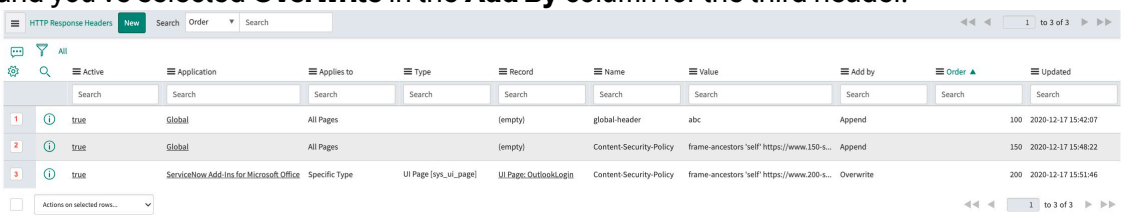
The ServiceNow AI Platform is trying to set headers in the following order, and **Append** is the default value for each in the **Add By** column.



In this example, the second (Header 2) and third (Header 3) response header configurations have the same name (Content-Security-Policy). In this case, Header 3 is appended to Header 2. If a request is made for a specific page you configured with a Header 3 response, the net HTTP response headers are both Header 2 and Header 3.

Overwrite

The ServiceNow AI Platform is trying to set headers in the following order, and you've selected **Overwrite** in the **Add By** column for the third header.



In this example, the second (Header 2) and third (Header 3) response header configurations have the same name (Content-Security-Policy). In this case, Header 3 overwrites Header 2. If a request is made for a specific page you configured with a Header 3 response, the net HTTP response header is only Header 3.

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Response templates

Resolve cases or support issues faster and more efficiently with response templates. Response templates (formerly known as templated snippets) are reusable messages that can be copied to case or task forms to provide quick and consistent messages to users, or to display standard chat response messages to requesters in Agent Chat.

Note:
Response templates are available only for existing records.

Assign response template roles

The following roles are installed when you activate the response templates plugin.

Response template role	Description
Response template administrator [sn_templated_snip.template_snippet_admin]	Grants access to scoped administration of the response templates feature.
Response template writer [sn_templated_snip.template_snippet_writer]	Grants access to create, read, update, and delete (CRUD) response template content.
Response template reader [sn_templated_snip.template_snippet_reader]	Grants access to read response template content.
System Administrator [admin]	Response template administrator [sn_templated_snip.template_snippet_admin]

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Response template role	Description
	Note: Admin inherits this role by default. When the Templated Responses [com.sn_templated_snip] plugin is activated without activating related HR applications, you can still use response templates. • Admin can reassign this role to other users. • Admin can also remove the Contained Role [sys_user_role_contains] table so Admin users do not inherit this role by default. Or: 1. Enter **sys_store_app_list.do** in the Filter navigator search bar of an instance, or **https://YOUR_INSTANCE/sys_store_app_list.do** from a web browser. 2. Search for and select **Templated Snippets**. 3. Scroll down to **Related Links**. 4. Click **Remove from the role contained by admin**.

Before you begin using response templates, you must assign these roles to the appropriate roles, groups, or users in your application.

- To assign a role to another role, see Add a role to an existing role.
- To assign a role to a group, see Assign a role to a group.
- To assign a role to a user, see Assign a role to a user.

For example,

- In the HR Service Delivery application, users with the HR administrator role are assigned the response template administrator role, users with the HR manager role are assigned the response template writer role, and users with the HR case writer role are assigned the response template reader role.
- In the Customer Service Management application, users with the customer service manager role (sn_customerservice_manager) inherit the response template writer role. Users with the customer service agent role (sn_customerservice_agent) inherit the response template reader role and can access response templates assigned to all groups to which they belong.

How to use response templates

Users with the response template writer [sn_templated_snip.template_snippet_writer] role can create response templates. Each template is associated with a table that is an extension of the Task [task] or Interaction [interaction] table. Response templates include a short name for specifying a shortcut that can be used to identify the message. For chat response templates used in Agent Workspace, agents use the slash command with a short name to present the standard message during a chat. You can also configure the template to

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- Include variables pulled from a table
- Specify a condition builder to specify the conditions that must be met for the template to be available for use, such as for a specific HR service

For more information, see Create or modify a response template.

Users with the response template reader [sn_templated_snip.template_snippet_reader] role can then copy response template content and use it in their responses to users when working on case or task forms that meet the specified conditions. For example, a response template for payroll discrepancy cases enables HR agents to use a standardized message when responding to that case type. See Copy a response template to an HR case for an HR-specific example.

Example: Response template to escalate payroll discrepancy cases

You are part of an enterprise HR organization using the HR Service Delivery application. You want your HR agents to respond to and, when necessary, escalate payroll discrepancy cases quickly and consistently. Create a response template so that HR agents have a reusable message to use when responding to employees about that case type.

One of your HR managers with the response template writer role is responsible for creating the template to escalate payroll discrepancy cases. The template is associated with the HR Payroll Case [sn_hr_core_case_payroll] table, and a condition filters on cases that match the appropriate HR service called Payroll Discrepancy. In the template body, the response text appears with variables, such as the subject person name in the salutation.

HR case writers with the response template reader role can copy the response template content and use it in their responses to employees when working on cases. Response templates provide a faster and efficient way to resolve cases.

Activation information

To use response templates in your application, you must activate response templates. For information on what components are installed with the feature, see Components installed with response templates.

Activate response templates

You can activate response templates (formerly known as templated snippets) [com.sn_templated_snip] if you have the admin role. This plugin includes demo data and activates related plugins if they are not already active.

Before you begin
Role required: admin

Note:
If you are using Agent Chat, the Agent Chat (com.glide.interaction.awa) plugin automatically activates response templates.

About this task
Response templates activate these related plugins if they are not already active.

Plugins for response templates

Plugin	Description
Scoped Application Restricted Caller Access	Allows scoped applications to restrict access to public tables and script includes.

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Plugins for response templates (continued)

Plugin	Description
[com.glide.scope.access.restricted_caller]	

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the plugin using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note:
   When domain separation and delegated Admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Related topics

List of plugins (Madrid)

Components installed with response templates

Several types of components are installed with activation of the Templated Responses (com.sn_templated_snip) plugin, including tables and user roles.

Note:
The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available for this feature.

Roles installed

By default, the following HR roles contain the following response template roles.

Note:
The Templated Responses [com.sn_templated_snip] plugin activates the sn_templated_snip.min_admin_count system property [sys_properties.list]. This property prevents you from deleting your only Response Template admin user by requiring a minimum number (default is two) of active users with this role.

Roles installed with response templates

Role title [name]	Description	Contains roles
Response templates administrator	Grants access to	sn_templated_snip.template_snippet_writer

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Roles installed with response templates (continued)

Role title [name]	Description	Contains roles
[sn_templated_snip.template_snippet_admin]	scoped administration of the response templates feature.	
Response templates writer [sn_templated_snip.template_snippet_writer]	Grants access to create, read, update, and delete (CRUD) response template content.	sn_templated_snip.template_snippet_reader
Response templates reader [sn_templated_snip.template_snippet_reader]	Grants access to read response template content.	None

You can assign these roles to the appropriate roles, groups, or users in your application.

- To assign a role to another role, see Add a role to an existing role.
- To assign a role to a group, see Assign a role to a group.
- To assign a role to a user, see Assign a role to a user.

For further information on user administration and how to manage users, see User administration.

Tables installed

Tables installed with response templates

Table	Description
Response Template [sn_templated_snip_note_template]	Stores response template information. Response templates are reusable messages that can be copied to case or task forms. Response templates provide quick and consistent messages to users, or display standard chat response messages to requesters in Agent Chat.
M2M Response Template to Channel [m2m_response_template_to_channel]	Maps channels to response templates.
Response Template Channel [sn_templated_snip_channel]	Stores information about response template channels.

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Tables installed with response templates (continued)

Table	Description
Note Template for Table [sn_m2m_note_template_for_table]	Maps notes to response templates.

For further information on table administration and how to manage data, see Table administration.

Create or modify a response template

Create or modify a response template (formerly known as a templated snippet) to define a reusable message that can be copied to case or task forms or used in Agent Chat sessions to provide quick and consistent messages to users.

Before you begin

Role required: sn_templated_snip.template_snippet_writer

About this task

Each response template is associated with a table that is an extension of the Task [task] table or, if using Agent Workspace, the Interaction [interaction] table. The template can be configured to include variables pulled from that table. You can also use a condition builder to specify the conditions that a case must meet for the template to be available for use, such as for a specific HR service or for chat. For chat response templates, you specify a short name (shortcut) that is used with the slash command as a quick way to present the response message to a user.

Procedure

1. Navigate to **All** > **System Definition** > **Response template configuration**.
2. Select **New** to create a response template.
   Or, select an existing response template to modify from the list.
3. Fill in the fields on the form.

Response template form

Field	Description
Name	Name of the response template.
Short Name	Short description that identifies the response template when using chat in Agent Workspace. Use the short name with a quick command (/) to show the text from the template body of the response template while in chat. This feature provides a fast and consistent way to populate text while in chat. For example, the short name `gm` identifies the chat response template for a Good Morning greeting. Enter **/gm** in a chat window to show the text from this response template.
Table	Name of the table that the response template is associated with.

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Field	Description
	If you are creating a response template for Agent Workspace chat, the associated table is the Interaction [interaction] table. For other response templates, the table must be an extension of the Task [task] table. **Note:** Creating custom COE tables do not allow you to add the Copy to Clipboard UI action. Users can still use the copy and paste function.
Condition	Conditions that determine when the response template is available for use. When defining conditions like case sensitivity or null values, see API GlideFilter - Scoped, Global. **Note:** The conditions available depend on the table you select. For chat response templates, specify the condition: **[Type] [is] [Chat]**
Application	The application that created the response template.
Group visibility	Indicates what groups have access to the response template. Adding groups filters who can view the response template. **Note:** Leaving this field empty makes the response template available to all groups.
Language	Language in which you want the response template to be translated. **Note:** Translation feature is available only when the required language plugins are installed on the instance.
Template body	Text of the response template providing instructions to the agent on how to respond to a specific case or task. You can reference field values by selecting variables from the variables list based on the table you select.

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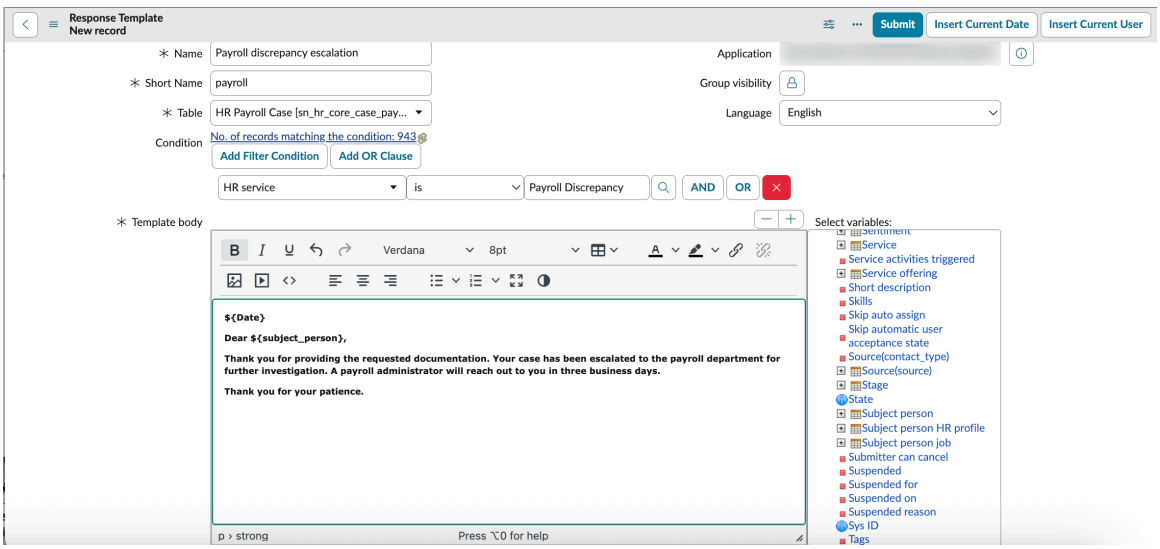
Field	Description
	You can manually enter custom variable references: ○ Current user: `${current_user}` ○ Current date: `${Date}` Or, place your mouse where you want the custom variable reference to appear and select the **Insert Current User** or **Insert Current Date** buttons. **Note:** Response templates do not support rich text.
Select variables	Variables you can add to the template body. For example, if you choose the HR Case (sn_hr_core_case) table, you can select the Subject person variable to appear in the Template body and it will replace the variable with the actual name of the subject person when the response template is used. **Note:** The variables available depend on the table you select.

Example

The following GIF shows an example of an HR manager in the HR Service Delivery application creating a response template to escalate payroll discrepancy cases. The template is associated with the HR Payroll Case [sn_hr_core_case_payroll] table, and a condition is set to filter on cases that match the Payroll Discrepancy HR service. The template text is pasted into the body, and then a variable for the subject person is added to the salutation.



4. Click **Submit** or **Update**.

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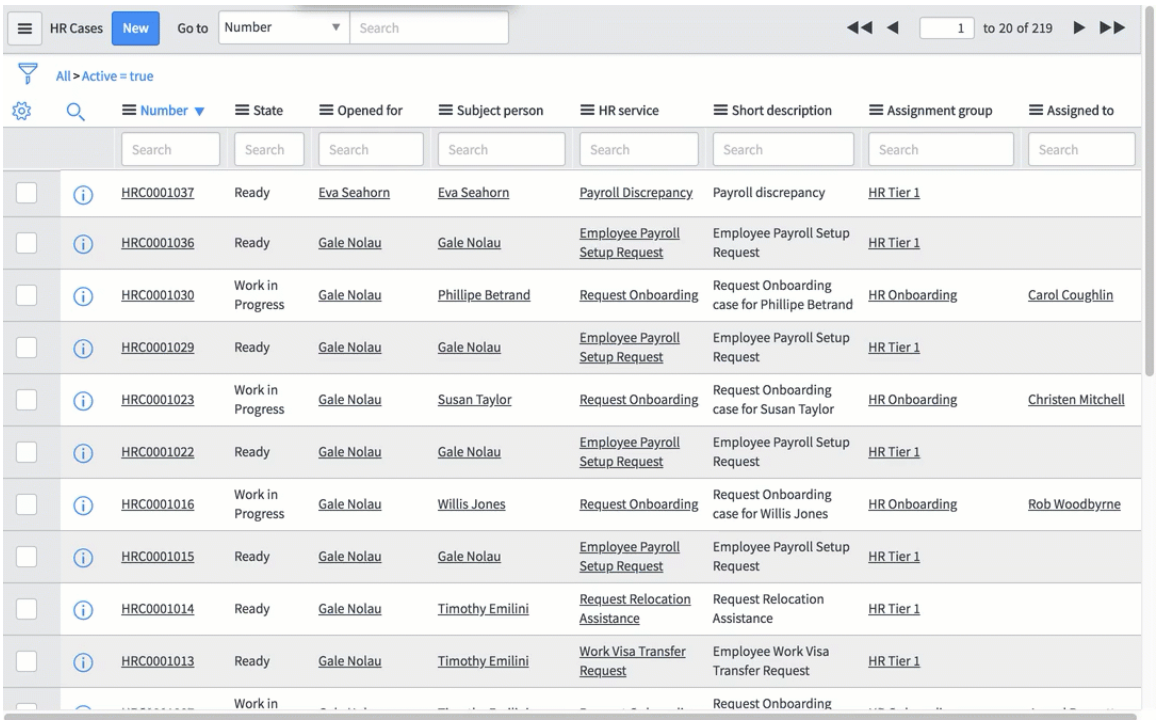
Channels limit the response template to only the channels you add. If you leave this blank, the response template is available to no channels. This feature allows you to have different messages for chats, emails, or form. For more information, see Create a response template channel.
The Channels related list appears.

What to do next

You can copy response template content to any field on a form that meets the specified conditions.

The following GIF shows an example of an HR case writer in the HR Service Delivery application opening a payroll discrepancy case and copying a payroll discrepancy escalation template to the comments field in the HR case form for the employee to read.



Policy as Code Engine (PaCE)

You can administrate the full life cycle of policies using PaCE in applications by searching, reviewing, and updating existing policies, and creating policies as required. Policies in the applications are powered by PaCE.

Understanding PaCE

PaCE enables you to manage, administer, and audit policies from a centralized location.

A PaCE policy is a set of pre-defined rules and logic that determines the desired behavior of an application or a service. When invoked, the rules in the policy are applied on the provided input, and a decision is reached. This decision-making is the main function of PaCE and helps determine if a policy is compliant or non-compliant. The decision is then relayed to the software calling service or application, so that it can act on it to enforce a desired behavior.

PaCE provides the following capabilities:

- Full life cycle management of policies
- Policy reuse

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- Audit and compliance
- Testing and validation of policies
- Central automation of compliance and regulatory processes

PaCE can be used to:

- Identify posture drifts from a desired state in the current application.
- Make decisions (compliant or non-compliant) based on a change in the application or service and enforce the decision to prevent a drift.
- Automate execution of policies and eliminate dependency on humans.
- Standardize policies so that they can be shared and reused within a service and across services.
- Increase change velocity while including guardrails with automated workflows to provide preventive controls.
- Collect evidence and proof of compliance for audit purposes. This feature can be used by internal auditors to automate the process of collecting evidence for governance and risk requirements.
- Provide business context to PaCE policies by using control objectives to connect PaCE with the Integrated Risk Management and Policy and Compliance Management workspace.

PaCE enables policy developers to view and understand an existing policy, make and assess changes, and decide if a policy can be used as a baseline for another policy. They can also use PaCE before debugging to understand how the policy should work and why it is not working as expected.

PaCE provides a centralized platform for storing, managing, and using policies. By using PaCE, policies can be:

- Well documented and all the requirements clearly defined.
- Reused across the organization.
- Tracked and new versions can be created when a policy is changed.
- Tested and validated before deployment.

Policies are also containers for all the elements that make up a policy. These elements include meta-data related to the policy, the policy versions (including policy scripts and inputs), mapping information, and policy execution history.

You can define any number of policies within PaCE.

Key user personas and roles

This section describes different user personas and roles in PaCE. These personas are defined with the application where PaCE is being used.

All roles except the super administrator role must be assigned to a calling service or application where PaCE is being used. The assigned calling service defines the scope for the user role.

Role	High-level Permissions	Persona
sn_pace.execution_reader	A read-only user with view-only access. This user can	Policy user, internal auditor.

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Role	High-level Permissions	Persona
	view policies, categories, and executions.	
sn_pace.code_reader	Can review PaCE versions, policy code, and run tests.	Internal auditor
sn_pace.code_editor	This user has all the sn_pace_code_reader permissions plus the ability to create PaCE policy versions.	Policy developer
sn_pace.policy_reader	This user has all the sn_pace_code_reader permissions plus the ability to review policy details and mapping information.	Policy user, internal auditor
sn_pace.policy_editor	This user has all the sn_pace_policy_reader and sn_pace.code_editor permissions plus the ability to create policies and mappings.	Policy developer
sn_pace.mapping_admin	This user can map policies and edit config parameters for policy mappings.	Mapping admin
sn_pace.admin	This user has the permissions of all the other roles plus the ability to create categories, policies, mappings, and code.	Policy admin
sn_pace.super_admin	This user has all the sn_pace.admin role permissions across all calling services.	Not applicable
Maint role	Internal user who can create default content.	Not applicable

PaCE administration life cycle

This checklist lists the tasks involved in administering PaCE policies.

Task	Description
Set up and install PaCE.	PaCE is installed as part of the application you want to create policies in.
Create a policy.	See Create a PaCE policy.
Create a new policy version	See: • Create a new variable for a policy version (if required). • Define mappings for a PaCE policy. • Edit a PaCE policy script
Test a policy version	Use the Test Playground for PaCE policies

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Task	Description
Publish a new policy version	See Publish a PaCE policy version.
Activate a published policy	See Activate or deactivate a PaCE policy.
Use the policy.	See Execute policies.

Install PaCE

Install PaCE.

PaCE is automatically bundled with the application you want to use PaCE with. PaCE is automatically installed in the following applications:

- DevOps Config
- Digital Product Release (DPR)
- Cloud Account Management (CAM)
- SecOps Software Bill of Materials (SBOM)
- Social Benefits Playbook

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

Administer PaCE policies

Use PaCE to manage the life cycle of a policy and create, update, review, and execute policies.

In addition, you can:

- Evaluate any changes to ensure they meet your organization's policy management requirements.
- Create a policy, modify policy information, copy a policy and its version to a new policy.
- Create a new policy version by copying an existing policy version and modifying it.
- View and define mapping information for any policy.
- Review executed policy activity and execution history for policies and policy versions.
- Use tags and categories to manage your policies more efficiently.

Note:
You can create any number of policies, which can be updated, activated, or deactivated as required.

Manage PaCE policies

You can define and manage your PaCE policies in a single management console.

Policies are containers for all the elements that make up a policy. These elements include metadata related to the policy, the policy versions (including policy scripts and inputs), mapping information, and policy execution history.

You can easily create policies, and search and review existing policies. In addition, you can:

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- Assess and implement changes to each policy.
- Determine if a policy should be used as the template for another policy.
- Understand why a policy may not be working as expected.

You can create any number of policies, which can be updated as required.

View existing PaCE policies

You can view a list of all PaCE policies created by you and other policy administrators. The PaCE management console is your gateway to viewing and updating policies, and managing policy versions.

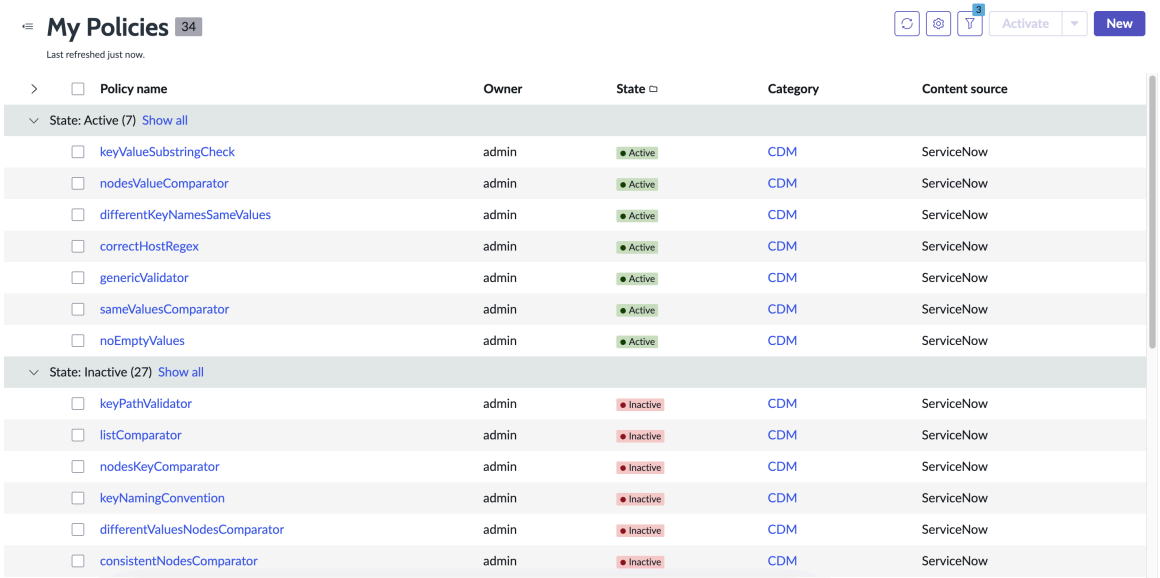
Before you begin

Role required: sn_pace.execution_reader

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

Note:
To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**. These policies are viewable to all logged in users.



On this page, you can do the following:

- Create a PaCE policy
- Edit a PaCE policy
- Delete a PaCE policy

The My Policies list displays the following columns.

Column	Description
Policy name	The name of the policy as defined by the user.
Owner	The owner of the policy.

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Column	Description
State	The current state of the policy: ○ Active: The policy is **Active** and can be used. For details on how to activate a policy, see Activate or deactivate a PaCE policy ○ Inactive: The policy is **Inactive**, and must be activated before it can be used. **Note:** Each policy can only have one Current (published) policy version. Only policies that have a Current version can be activated. See Manage PaCE policy versions for details.
Category	The category assigned to the policy. Only one category can be assigned to a policy. See Managing categories in PaCE for details
Content source	The source used to create the policy: ○ User: This policy was created or copied by a user. ○ ServiceNow: This policy was shipped as part of the PaCE content pack.

2. **Optional:** Use the ServiceNow AI Platform filter controls to filter the displayed list.
3. To view the details of a policy, click the required row in the **Policy Name** column.

Note:
Alternatively, click the information icon to see a quick glance view of the policy.

Create a PaCE policy

Create a PaCE policy to determine if changes to a software service or application comply with a set of pre-defined rules.

Before you begin
Role required: sn_pace.policy_editor

About this task
After you create a PaCE policy, a decision is then made about these changes, and if they are compliant, non-compliant, or compliant-exception according to these pre-defined rules. The policy must be mapped correctly to the relevant object (table and document ID) to invoke the policy when any changes are made to the object.

Note:
Policies are only used if they have active mapping records, and if there was a request to validate an object (tables and document IDs) mapped to the policy. For further information, see Map PaCE policies.

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Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click **New**.
   The New policy page appears.
3. Select the New blank policy tile or an existing policy template, then **Create**.
   Templates can be filtered by most used, alphabetically, state, and type. By default, inactive templates are hidden.
4. In the Create New Policy form, fill in the fields.

Create New Policy form

Field	Description
Policy name	The policy name. **Note:** The policy name must be unique, and is used as the identifier of the policy.
Document type	Select a document type for the table of items for the policy to be applied to.
Category	Categories enable you to group and manage policies more efficiently. See Managing categories in PaCE for details.
Calling service	The name of the calling service the policy was created in.
Description	Additional details for this policy.
Comments	Comments about the policy.

Note:
You can add additional comments in the Compose text box, that will show up in the Activity stream.

5. Click **Save**.

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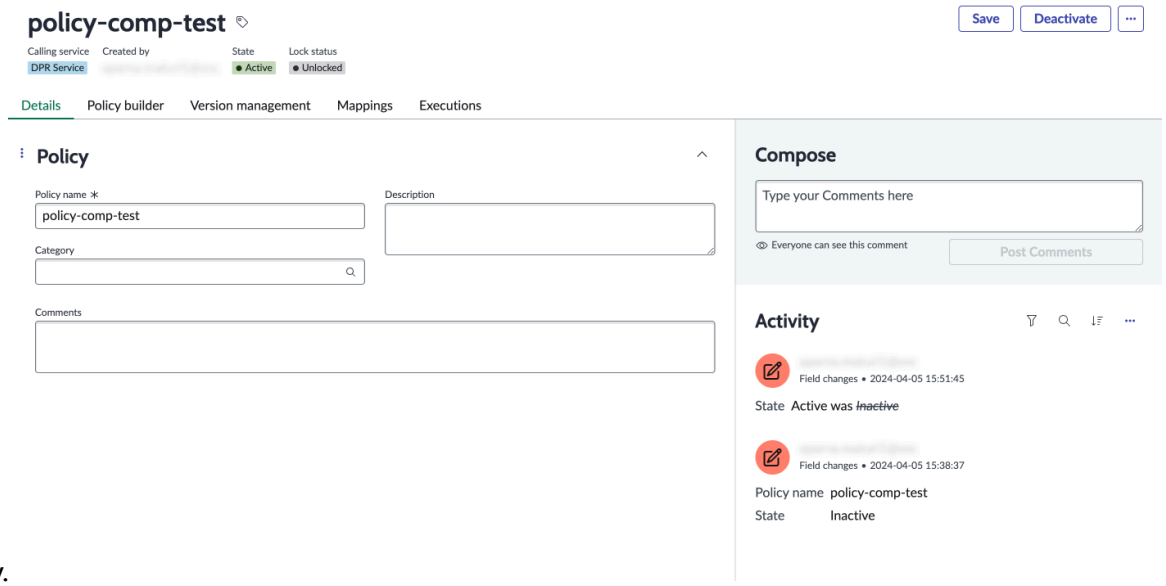
The form is refreshed to display the newly created



policy.

6. **Optional:** Add tags by selecting the tag icon alongside the policy name to add tags. For more information about defining tags, Add tags to PaCE policies.

Result

The newly created policy contains the following tabs.

Tab name	Description
Details	The details of the policy including the policy name, category, date on which it was created, and a description is displayed.
Policy builder	When you create a policy, by default a draft policy version is created. Each policy version contains version meta-data, a policy script, and variable input definitions, which you can modify according to your requirements. Click the **Policy builder** tab to view the Policy builder page. You can: • Edit a policy version. **Note:** You can edit a policy version only if it is a Draft state. • View version details • Create a new version • Switch from low-code to the code editor • Save the policy as a template • Compare versions • Duplicate policy versions

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Tab name	Description
	For more details, see Manage PaCE policy versions. **Note:** You must publish the (See Publish a PaCE policy version) policy version to make it **Current** before it can be used.
Version management	The Version management tab lists out the previous versions of the policy. You can also create a new version of the policy.
Mappings	The Mappings tab enables you to define the object (table and document ID) to which the policy is to be mapped. For more information, see Map PaCE policies.
Executions	The Executions tab enables you to review the execution activity for the policy.

What to do next
You can perform the following actions:

- Delete a policy that is in an inactive state. See Delete a PaCE policy.
- Duplicate or create a copy of an existing policy.
- Write and test custom PaCE policies. See How to write and test custom PaCE policies.

Activate or deactivate a PaCE policy

You can activate or deactivate any PaCE policy. Only activated policies can validate object (tables and document IDs) changes. Deactivated policies are not executed, even if the policy is mapped. Deactivating a policy enables you to place the policy into a maintenance-like mode.

Before you begin
Role required: sn_pace.policy_editor

About this task
You can deactivate or activate any policy at any time.

For activated policies:

- The policy must include a Current (published) version. For more information, see Manage PaCE policy versions.
- The policy is auto-validated when you activate it (if the policy has mapping inputs defined). Validation verifies the validity of mapping inputs, and checks that all required inputs were set. For more information, see the Validate mapping inputs section.

Deactivating a policy enables you to place the policy into a maintenance-like mode. You can make changes, safe in the knowledge that no one is using the policy. While deactivated, the policy mappings are kept, but the policy cannot be executed. After you are done with any changes, you can reactivate the policy and any existing mappings are reused.

Note:
The activation or deactivation of a policy is audited for tracking purposes. This audit information is included in the standard ServiceNow AI Platform auditing records.

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Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Select the check box next to the policy that you want to activate or deactivate.

   Note:
   To activate a policy, its current state must be Inactive. To deactivate a policy, its current state must be Active. You can select multiple policies, as required.

3. Activate or deactivate the selected policy.

What to do next

If you did not publish your policies, you can publish multiple policies. Select the check box next to the Policy names that you want to publish or select the **Select All** box next to the Policy name list. Select the **Activate** drop-down menu then **Publish latest**.

Note:
This only works with content-based policies and not user-based policies.

Duplicate a PaCE policy

Create a duplicate of an existing policy.

Before you begin

Role required: sn_pace.policy_editor

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** link for the policy that you want to duplicate.
3. In the Details page, click the **More Actions** icon and select **Duplicate**.
4. In the Duplicate Policy window, select the version of the policy you want to copy and click **Duplicate**.
   A new policy with the same parameters as the selected policy is created in an **Inactive** state. You must publish a version of the new policy before you can activate it.

Edit a PaCE policy

You can update any existing PaCE policies, whether they are activated or deactivated.

Before you begin

Role required: sn_pace.policy_editor

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Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the information icon located to the left of the policy name to see a quick glance view of the policy.
   The policy details display to the right of the My Policies list and can be edited. You can also review the **Activity** stream to see a list of all changes made to the policy. This list can be filtered as required.
3. Edit the relevant details for the selected policy, and click **Save**.
4. Click the **Policy name** link on the All Policies page to update existing versions or add a new version.
5. Click the **Policy builder** tab, create a copy of the version in which you want to make changes, and make the relevant changes in the new version.
   You can select different versions of the policy in the Version drop-down menu. For more information about creating and managing versions, see Manage PaCE policy versions.

   Note:
   You can't update API Variables and Config Parameters for an existing policy version that is Current (published) or archived. To modify a Current version, create a copy of that version, as described in the Create a copy of a policy version section.

6. Select the overflow menu icon and choose from the following options:
   - Version details
   - Create a new version
   - Switch to code editor
   - Save as Template
   - Compare versions
   - Duplicate
   - Delete
7. When you're finished, click **Publish**.
8. Click the **Mappings** tab and make the relevant changes.
   For more information about defining caller and mapping inputs, see Map PaCE policies.

Delete a PaCE policy

You can delete a PaCE policy at any time. All related versions for that policy are also deleted. However, for auditing reasons you cannot delete policies that were or are currently in use.

Before you begin
Role required: sn_pace.policy_editor

About this task
Policies and their related versions can be deleted. However, policies that are in use, or were used can't be deleted, including:

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- Policies that are mapped to an object.
- Policies that were activated and executed in Standard mode. These policies, and their policy versions, include execution data critical for auditing purposes, and therefore cannot be deleted.
- Policies that have a version in either **Current** or **Archived** state.

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** link for the policy that you want to delete.

   Note:
   You can only delete individual policies. However, you can select multiple policies to activate or deactivate. For further information, see the Activate or deactivate a policy section.

3. In the displayed policy form, click **Delete**.
4. Click **Delete** to confirm.
   The policy versions that are to be deleted are displayed.

Map PaCE policies

For a policy to be invoked correctly, it must be mapped to an object (table or document ID). The defined mapping settings are automatically verified when the policy is invoked.

Mapping a policy to an object enables you to verify updates on that object, whenever a change in the provided inputs occurs.

Define mappings for a PaCE policy

You can map a policy to any number of objects. When you map a policy, validate the inputs, and execute the policy, a compliant, non-compliant, or compliant-exception decision is returned.

Before you begin

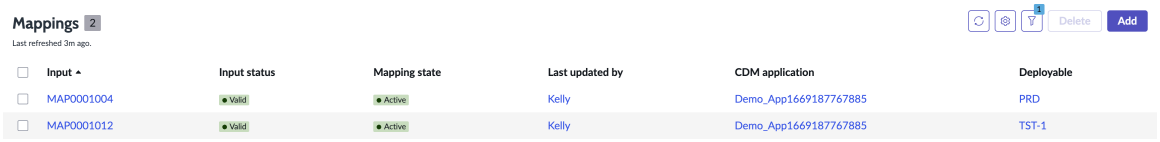
Role required: sn_pace.mapping_admin

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** link for the policy that you want to update.
3. Click the **Mappings** tab.
   If there are any existing mappings for the selected policy, they are displayed.



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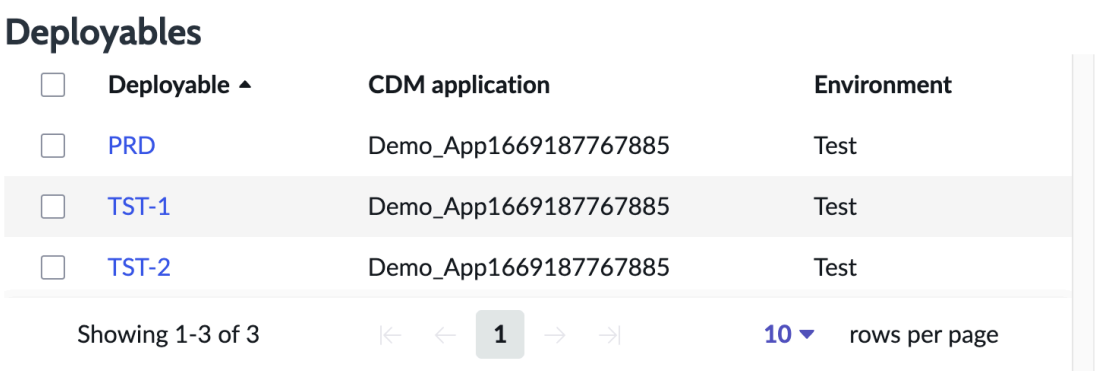
4. To add a new mapping input, click **Add**.
   Any objects that are available for mapping are displayed.



5. Select the check box to the left of each object that you want to map the policy to, and click **Map Policy**.
   The new mapping input is added to the list of policy mappings. In addition, an alert message indicates whether the mapping is valid and active. For information about editing existing mapping inputs, see Edit mapping inputs.

Edit mapping inputs

You can edit the mapping settings that map a policy to an object.

Before you begin

Role required: sn_pace.mapping_admin

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** link for the policy that you want to update.
3. Click the **Mappings** tab, and click the Mapping ID link in the Input field.
4. Click the mapping input that you want to update.

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In the displayed mapping input form, edit the details as required, and click **Save**.

PaCE Static and Dynamic Mapping

Static Mapping enables you to map a set of policies to a record or object such as an incident or deployable. Dynamic Mapping enables you to map a set of policies on a dynamic set of records or objects such as a set of incidents or a set of deployables.

Static Mappings

Static Mapping enables you to map multiple policies that you want to validate against a specific deployable or incident. For example, if you need to map a policy to multiple deployables, you'll need to map it multiple times to each deployable.

Dynamic Mappings

Dynamic Mapping enables you to map multiple policies that you want to validate against specified conditions. You can configure the conditions set to a specific table, each condition can return multiple records or objects. The condition is applied at a runtime where the set of policies will be mapped to the set of returned records by the condition. Multiple conditions can be defined in the condition fields in the Conditions tab.

Map PaCE policies using Static Mapping

Use Static Mapping to map multiple PaCE policies against a record such as a change request.

Before you begin

Role required: sn_pace.mapping_admin

Procedure

1. Navigate to **Mappings** > **Static Mappings**.
2. Select **Add**.
3. Select a document type in the **Document Type** field.

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4. Select a policy in the **Policy** field or you can select the Search icon to view and select multiple policies, then select **Map**.
5. When you're finished, select **Done**.

Result
The map will show up in the Static Mappings list. You can delete a map on the list by selecting the box next to the Input, then select **Delete**.

Map PaCE policies using Dynamic Mapping

Use Dynamic Mapping to map multiple PaCE policies against specified conditions.

Before you begin
If you don't have a condition created, do the following steps.

1. Navigate to **Mappings** > **Conditions**.
2. Select **New**.
3. Fill in the **Short description** and **Table** field, then add the conditions of the deployables you want to map.
4. Select **Run** to preview the existing deployables that will be mapped in the condition.

> **Note:**
> The results are capped at 10,000 records.

5. Select **Save** or **Continue to mapping** to navigate to the Dynamic Mapping page.

> **Note:**
> When you select **Continue to mapping**, the condition is pre-selected based on the condition you created, additionally you can edit or delete the condition by selecting the short description.

Role required: sn_pace.mapping_admin

Procedure
1. Navigate to **Mappings** > **Dynamic Mappings**.
2. Select **Add**.
3. Select a document type in the **Document Type** field, then a condition in the **Condition** field.
4. Select a policy in the **Policy** field or you can select the Search icon to view and select multiple policies, then select **Map**.
5. When you're finished, select **Done**.

Result
The map will show up in the Dynamic Mappings list. You can delete a map on the list by selecting the box next to the Input, then select **Delete**.

Request an exception for Dynamic Mapping

Request an exception on policies that are dynamically mapped to conditions.

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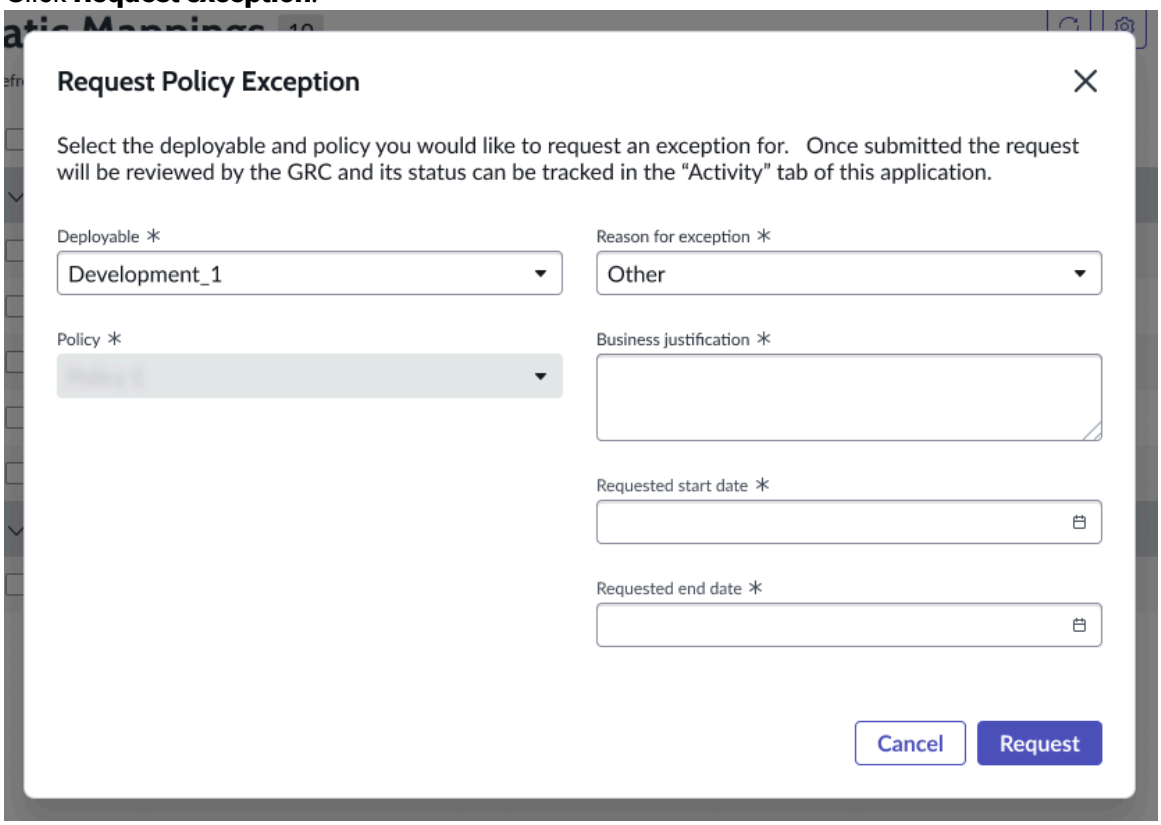
Before you begin

You need to have the Governance, Risk, and Compliance (GRC) application installed to have the Request Exception button to show up on the mappings list. If you don't have the GRC application, see the Download a GRC application from the ServiceNow Store for the first time topic.

Role required: sn_pace.admin

Procedure

1. Navigate to > **Mappings** > **Dynamic Mappings**.
2. Select the check box of the mapped policy you want to request an exception for.
3. Click **Request exception**.



4. In the Request policy exception form, fill in the fields.

Request policy exception

Field	Description
Deployable	Select the name of the deployable you want to request an exception for. **Note:** The list of deployables is not filtered and all possible deployables will be available to be selected without filtering based on the dynamic mapping condition.
Reason for exception	Select a reason type why the exception is being requested.

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Field	Description
Policy	Name of the policy.
Business justification	Explanation why the exception is being requested.
Requested start date	Select the date when this exception is submitted.
Requested end date	Select a date when you want this exception to be approved by.

5. Click **Request**.

Create a PaCE policy template

Create PaCE templates for the PaCE policy forms that you use frequently.

Before you begin

Role required: sn_pace.code_editor

Procedure

1. Navigate to **Templates** > **All Templates**.
2. Select **New**.
3. In the Create New Template form, fill in the fields.

Create New Template form

Field	Description
Name	Name of the policy template.
Document type	Select a document type for the table of items for the template to be applied to.
Template type	Template type organized by category. Template types enable you to select a category, if you have multiple types of policy templates. You can create a template type by following these steps: **a.** Navigate to **Templates** > **Template Type**. **b.** Select **New**. **c.** Fill in the **Name** and **Description** field. **d.** Select **Save**. The type can be selected from the **Template type** field.
Description	Additional details for this template.
Is low code	Select this check box if the policy template will be written in low-code.

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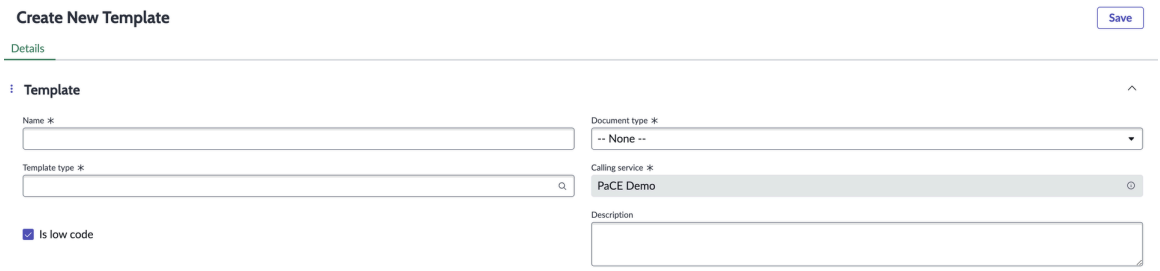
Field	Description
	Note: You can switch to the code editor from low-code when you create the conditions, but you'll be unable to switch back to low-code.



4. Select **Save**.
   By default, when you create a template it's inactive and it will be filtered out on the New policy page. You can select the inactive filter box on the New policy page to see the inactive template.
5. Select the **Template Builder** tab and fill in the conditions in the Policy logic section, then **Save**.
   For more information about the parameters and condition fields, see the Passing parameters to PaCE policies and Policy logic condition fields topic.

What to do next

Before you activate your template, you can create a policy to test the template.

1. Navigate to **Policies** > **My Policies**.
2. Select **New**.
3. Select **Preview** on the template that you created to see if the information is correct.
4. Select **Save**.
5. Select the template that you want to create a policy with, then **Create**.
6. Fill in the fields, then select **Save**.
7. Select the new draft of the policy and select the **Test Playground** tab to test the policy.
8. When you're finished, navigate back to **Templates** > **All Templates**. Select the template that you tested, then **Activate**.

If you make any updates to a template, it won't affect previous policies that you created using the template.

Manage PaCE policy versions

PaCE policy versions contain the actual policy script, as well as API Variable and Config Parameter definitions used for validating policies. Each policy can have many versions, each of which can be easily managed.

You can create a new policy version, search and review existing versions, and test changes to the policy script before it is deployed in a production environment. You can also compare policy versions, copy a policy, and modify it as required.

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Note:
To activate a policy, a policy version must be created, and published to be in the **Current** state.

PaCE policy version states

A PaCE policy version can be in one of four states: Draft, Current, Archived, and Now-Content. The policy version state also defines the version numbering.

Only one policy version in each policy can be Current at any one time. There is no limit to the number of Draft or Archived policy versions.

Policy version states

State	Description
Draft	When a version is created, its initial state is Draft. The new Draft version can be saved as a Draft for later use, or published to become the Current version. The draft versions cannot be used until they are published.
Current	Draft versions can be published to Current, which means the former draft version becomes the default published version used for policy execution. **Note:** When publishing the version, if mapping exists, verification is performed to confirm that all required inputs for mapping inputs were provided. If you update the mapping inputs, you must update the inputs in the Mapping screen. If you updated caller inputs, you must update the PaCE API call to ensure that the policy is executed.
Archived	A published Current version becomes Archived when a different version is published. Only Current versions can be Archived. If necessary, you can also republish an Archived version. **Note:** When a version is published, it becomes the Current version irrespective of its previous states.
Ready	The Ready state is assigned to optional policies available when an application content pack is installed. These policies cannot be modified. If you want to modify a policy, create a copy and make the required changes.

Policy version numbering

There are three identifiers for each version: Version name, Version, and Revision number. These identifiers are shown as three separate columns in the **Versions** tab.

Identifier	Description
Version name	For Draft versions, the version name uses Draft-V{Revision number}. For Current (published) or Archived versions, V{Version} is used for the name.
Version	The Version number is assigned only when you publish a version. The number is automatically created according to the existing version number. For the first Current (published) version, the number is 1.0 and for subsequent current versions, the number increases by +1.0. For example, 2.0, 3.0, 4.0, and so on.

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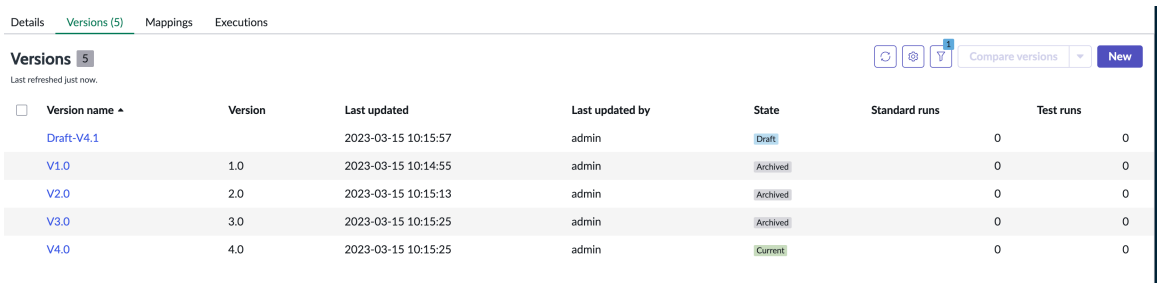
Identifier	Description
	Current versions that have been Archived retain the original version number. Draft versions are not assigned a version number.
Revision number	The Revision number is derived from the version that it was created from. If an empty new policy is created, the initial draft version is assigned 0.1. Each subsequent draft version is assigned 0.2, 0.3, 0.4, and so on. If the version was created from a published (Current or Archived) version, it inherits the Version number. For example, you can create a draft version from the Current (published) version 2.0. The draft version is assigned the revision number 2.1.

The following image illustrates the different states and their version numbering.



As shown in the preceding image, the first draft policy version created was automatically assigned the Revision number 0.1. Each subsequent draft is assigned V0.2, V0.3, and so on. Draft version 0.2 (as indicated in the Revision number column) was published and became the Current version, with the Version name of V1.0.

A draft version of this Current version was created, with the Revision number 1.1. That draft was published to become the Current version and was assigned the Revision number 1.1. The previously Current version is now Archived, but retains the Revision number 0.2.

Create new PaCE policy versions

You can create new versions for any of your existing policies.

After you have created a policy, a draft policy version is automatically created. This policy version contains the actual policy script, and may also contain mapping inputs and caller input definitions.

You can create a policy version from scratch, using low-code, or copy an existing policy version and use that as the basis for a new version. The version can include input definitions for mapping or caller variables. These parameters are used with the logic of the policy to determine whether the policy is in compliance.

For example, for a travel expense policy you can create several policy versions. Each version can include different mapping inputs, for example, limiting the different types of expenses. In one version, the breakfast expense limit could be $25, and the dinner expense limit could be $50. Each time the policy (and the relevant Current version) is invoked, the various expenses are validated by the policy to ensure they are in compliance.

Create a PaCE policy version

Create a version from scratch at any time for any of your existing PaCE policies.

Before you begin

Role required: sn_pace.code_editor

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About this task

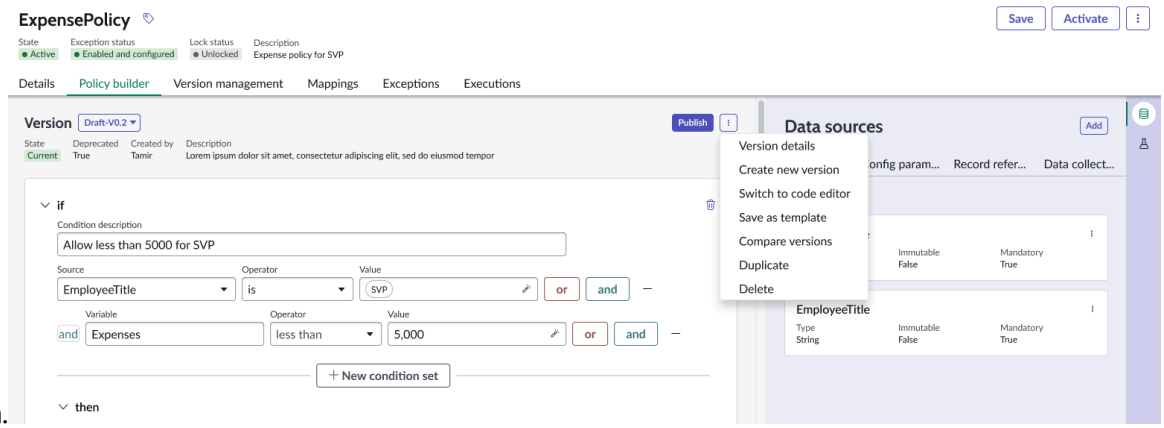
Note:
Your administrator may have pre-configured policy versions that contain default caller and mapping inputs. You may not be able to edit these input variables, but you can add new inputs, as required.

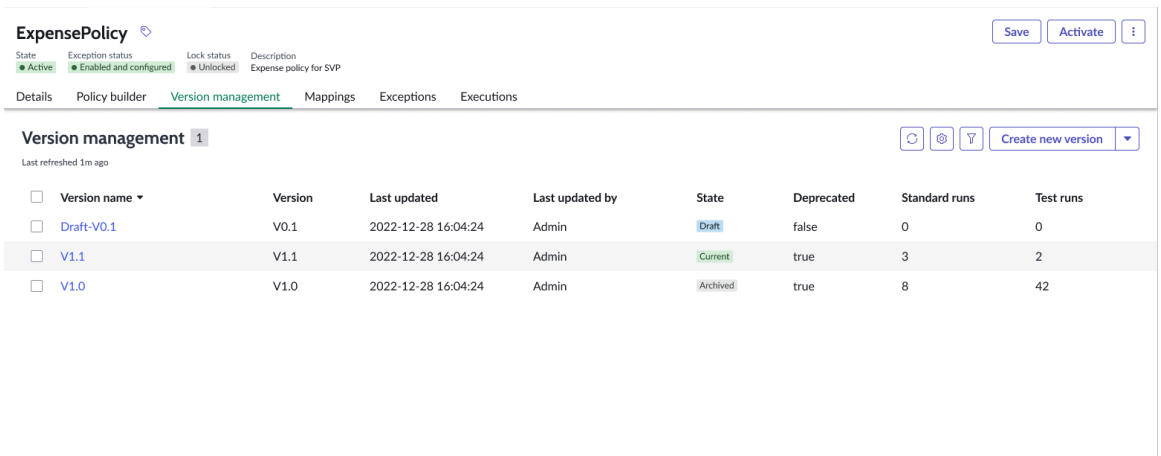
Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the policy name for the policy that you want to add a new version to.
3. You can create a new version two different ways:
   - Select the **Policy builder** tab, then the Overflow menu icon
   - Select the **Version management** tab then **Create new version**.
4. Select **Create new version**.





5. Select the New blank version tile or an existing policy template, then **Create**.
   Templates can be filtered by most used, alphabetically, state, and type. By default, inactive templates are hidden.
6. Clear the **Is low code** check box.
7. **Optional:** In the Create New Policy Version form, add a description in the **Description** field.

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Note:
The **Description** field is the only editable field in the form. The version and revision numbering cannot be modified and are automatically assigned.

8. Click **Save**.

What to do next

The policy version is saved and the version is assigned a number according to policy numbering. You can:

- Define API Variables, Config Parameters, and Record References.

  See Passing parameters to PaCE policies.

- Modify the policy script.

  See Edit a PaCE policy script.

- Test your policy version to ensure it is compliant.

  See Use the Test Playground for PaCE policies for details.

- Publish the policy version.

  See Publish a PaCE policy version.

- Review execution activity for the version.

  See Review executed policy activity.

- Delete the version.

  See Delete a PaCE policy version.

Create a PaCE policy version using low-code

Create a policy version using low-code for any of your existing PaCE policies.

Before you begin

Role required: sn_pace.code_editor

About this task

The low-code function enables you to write policies using simple UI elements by defining conditions for the policy to determine if it's compliant or non-compliant. If the **Is low code** check box is selected when you create a policy version, the **Policy Builder** and **Test Playground** tabs will automatically have the Policy logic page set to low-code.

You can switch to the Policy Script to create a policy using JavaScript by selecting the **Switch to code editor** button, but you'll be unable to switch back to low-code. For more information on how to write PaCE policies using JavaScript, see How to write and test PaCE policies.

Note:
Policy Builder works best in Google Chrome and Firefox.

Procedure

1. Navigate to **Policies** > **My Policies**.
2. Select the policy name for the policy that you want to add a new version to.

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3. In the Policy Details page, select the **Versions** tab.
4. Select **New**.
   The New version page appears.
5. Select the New blank version tile or an existing policy template, then **Create**.
   Templates can be filtered by most used, alphabetically, state, and type. By default, inactive templates are hidden.
6. Fill in the **Description** field.

> **Note:**
> By default, the **Is low code** check box is automatically selected.

7. Select **Save**.

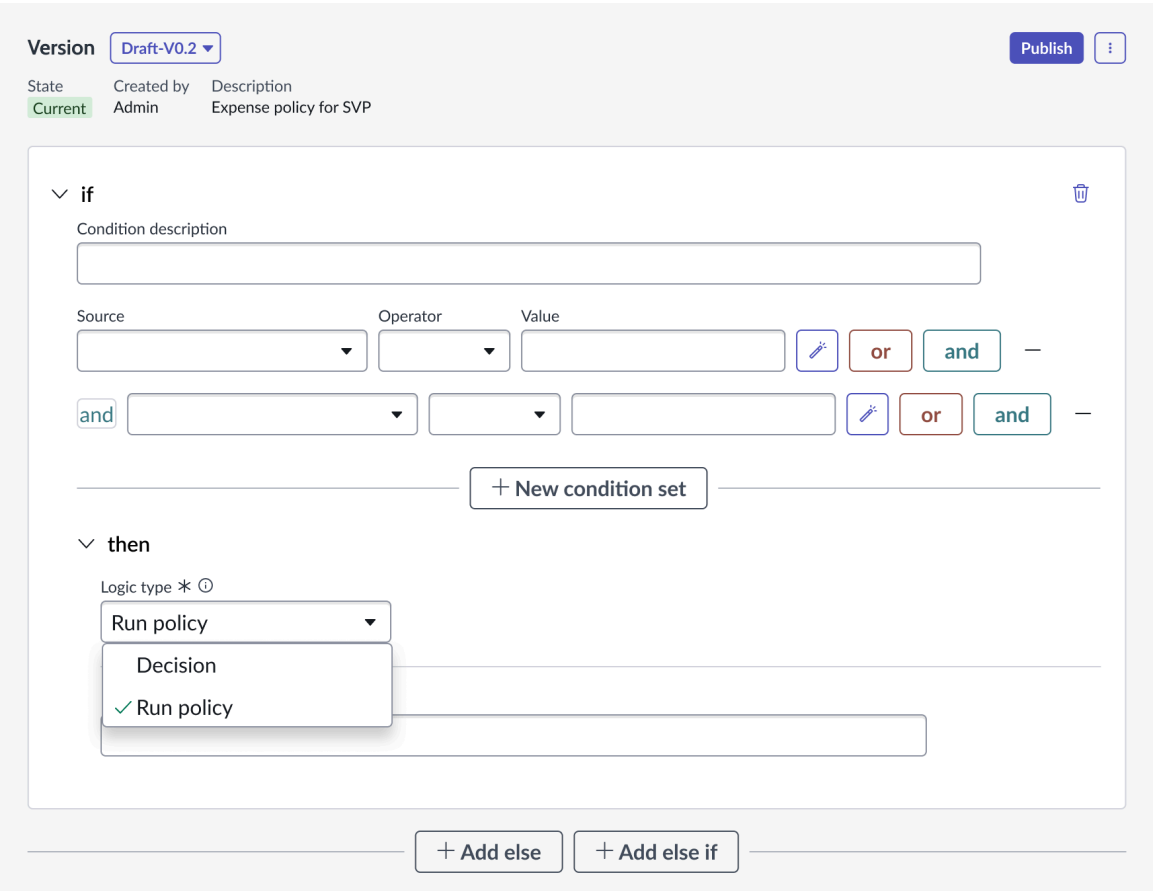
Result

The policy version is saved with an assigned number according to the policy numbering and will enable you to set the conditions using low-code.

Policy logic condition fields

Policy logic is a set of conditions that is used for determining whether a policy is compliant or non-compliant. You can use the condition builder to specify conditions for the policy.

Policy logic page



Select the **or** and **and** button to add multiple rules in the condition set. Select the minus icon — to delete a condition.

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You can add a condition set by selecting the **New condition set** button.

If and else if statement fields

Field	Description
Condition description	Description of the field.
Source	Variable of the source for the condition.
Operator	List of operators to filter the source for the condition. The list changes depending on the source selected.
Value	Value to enter text. Select the Data picker icon to concatenate multiple text strings with multiple data pills to select a variable for the log. **Note:** If your Source is choice, the Data pill picker icon is inactive.

The **else if** statement enables you to specify a new condition if the first condition is false. The **else** statement enables you to specify a new condition if it does not apply to the **if** statement.

You can add a dependent condition by selecting **or** or **and** next to the condition.

Then and else statement fields

Field	Description
Logic type	Select the logic type of the policy: • Decision: Determines if the policy is **Compliant** or **Non-compliant**. • Run policy: For nested policies, the parent policy will return the decision of the child policy that has been selected in the builder. **Note:** PaCE supports nesting policies for decision-making and up to two levels are supported, a child and a grandchild.
Log level	Level of the log.
Log message	Log message field to enter text or select the Data picker icon to concatenate multiple text strings with multiple data pills to select a variable for the log.
Output type	Output type of the log. You can select the plus icon to add multiple output types or the minus icon to delete the output type.

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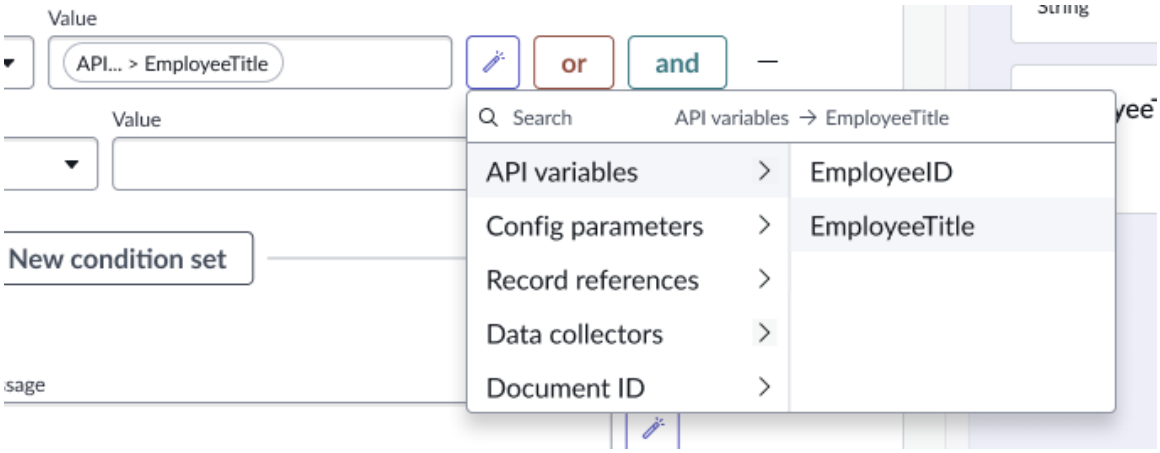
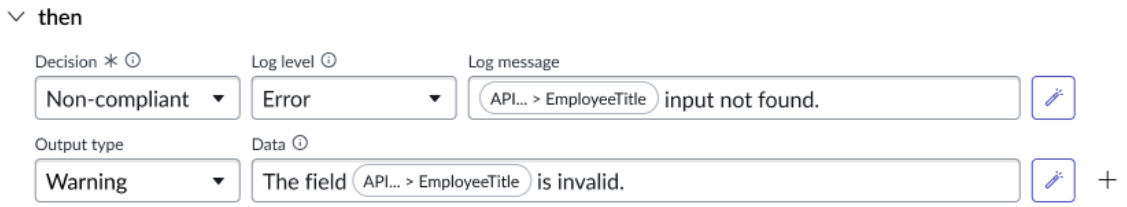
Then and else statement fields (continued)

Field	Description
Data	Data field to enter text. Select the Data picker icon to concatenate multiple text strings with multiple data pills to select a variable for the log.

The following images show you are able to use the data pill picker to concatenate data in the fields:





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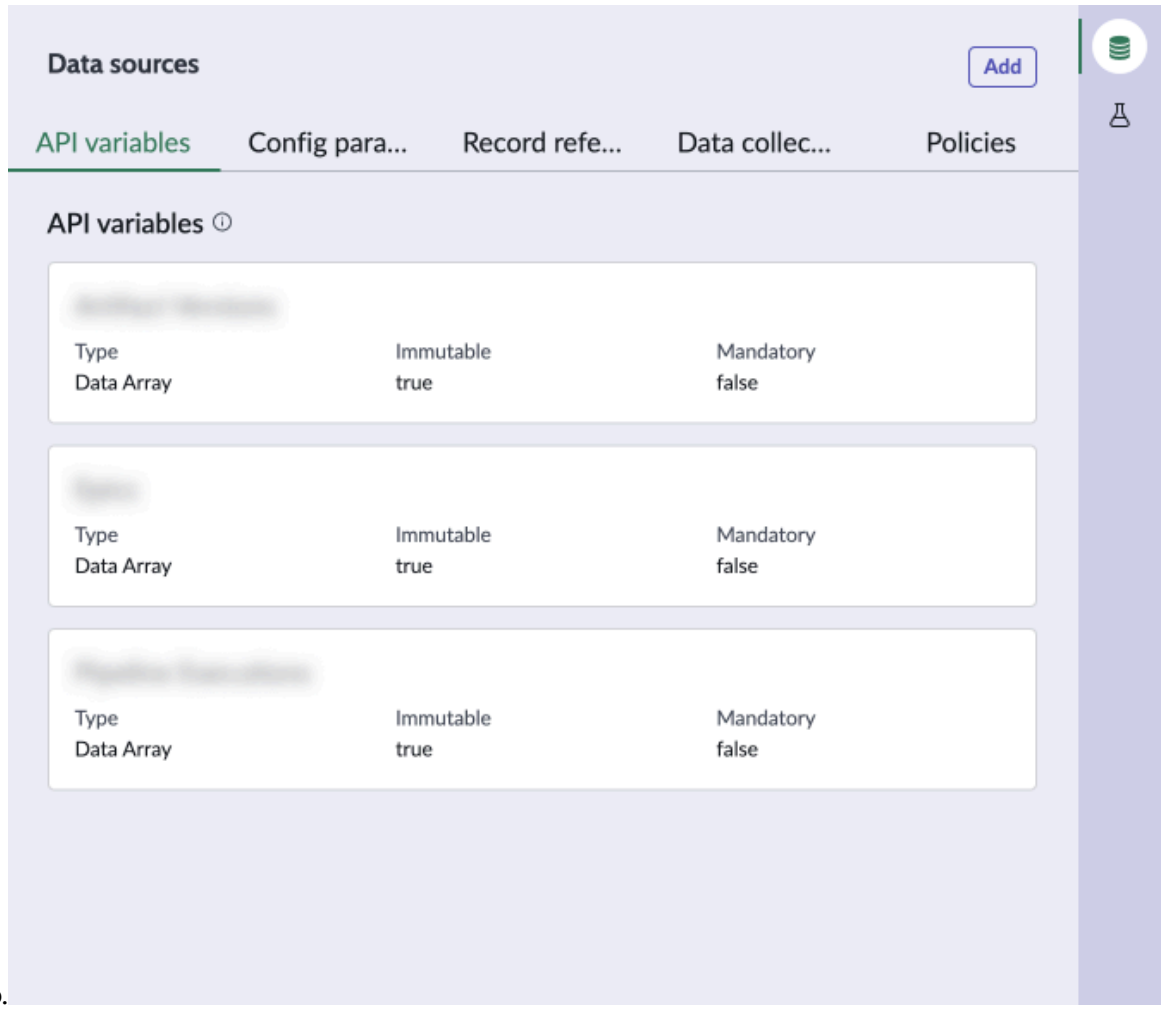
You can see a list of the data sources under the Data source



tab.

You can calculate fields using numeric operators and use these variables to calculate the desired value in a policy logic.

Note:
This only supports numeric fields.

Calculated fields

Operator	Description
Plus (+)	Add variables and constants. For example, "Var1 + Var2..."
Minus (-)	Subtract variables and constants. For example, "Var1 - Var2..."
Multiplication (*)	Multiple variables and constants. For example, "Var1 * Var2..."
Division (/)	Divide variables and constants. For example, "Var1 / Var2..."
Parentheses ()	Use parentheses to support the order of operators.
calc[]	Use the brackets to evaluate an expression.

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You can mix and match between the operators. For example, "Var1 +Var2*Var3 / Var4".

Create a copy of a PaCE policy version

You can create a copy of an existing policy version. All the settings and mappings from the existing version are copied over to the new one.

Before you begin
Role required: sn_pace.code_editor

About this task
When you create a new policy version from an existing one, the input definitions and the policy script from the original version are copied to the new version. The version is assigned a number according to policy numbering.

Note:
The new policy version is initially created as a draft, with a revision number based on the original policy version. For further details about version states and numbering, see PaCE policy version states.

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the name of the policy for which a version is to be created.
3. In the Policy Details page, click the **Versions** tab.
4. Click the **Version name** link of the policy version that you want to copy.
5. Click **Create New Draft**.
   A new copy of this policy version is created.
6. Enter a description for the new version and click **Save**.

Duplicate PaCE policy versions

You can create a duplicate policy from a policy version or multiple versions from two or more policy versions. If you want to use a locked policy, you must first create a duplicate version and then modify the policy version as required.

Duplicate a single policy version

To create a duplicate policy from a policy version, follow these steps:

1. Navigate to **All Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Select the name of the policy that you want to duplicate.
3. In the Policy Details page, click the **Versions** tab and select the version you want to duplicate.
4. Click the **More Actions** icon and select **Duplicate**.
5. Select an option in the **Duplicate version** form.

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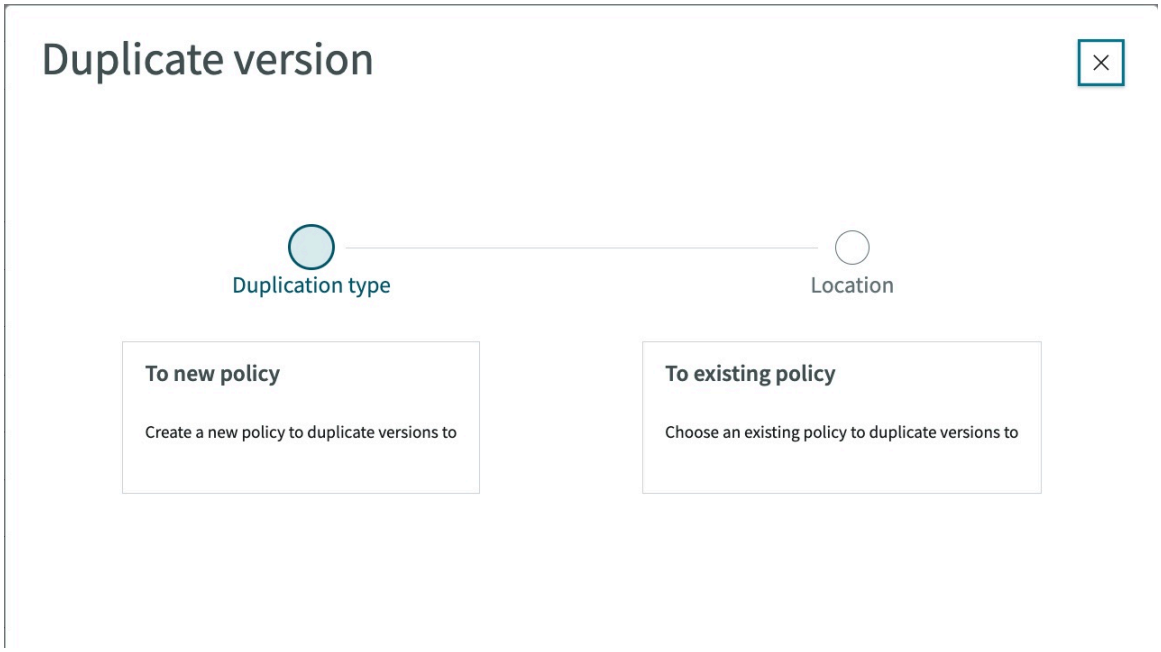

- To new policy:
  a. Select this option to create a duplicate policy from this version.
  b. Enter the policy name, category, and description.
  c. Click **Duplicate**.

     The newly created policy is a duplicate copy and contains the same parameters and mappings of the selected policy version.
- To existing policy:
  a. Select this option to create a duplicate version for an existing policy.
  b. In the Duplicate Version form, select the policy to which the version is to be duplicated.
  c. Click **Duplicate**.

     The newly created duplicate version is displayed in the Versions page of the selected policy.

Duplicate multiple policy versions

1. Navigate to **All Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.
2. Select the name of the policy that you want to duplicate.
3. In the Policy Details page, click the **Versions** tab.
4. Select the policies that you want to duplicate and from the drop-down list, select **Duplicate versions**.
5. Select an option in the **Duplicate version** form and follow the remaining steps as listed in Duplicate a single policy version.

Edit a PaCE policy script

Edit the PaCE policy script to apply any changes to the policy logic.

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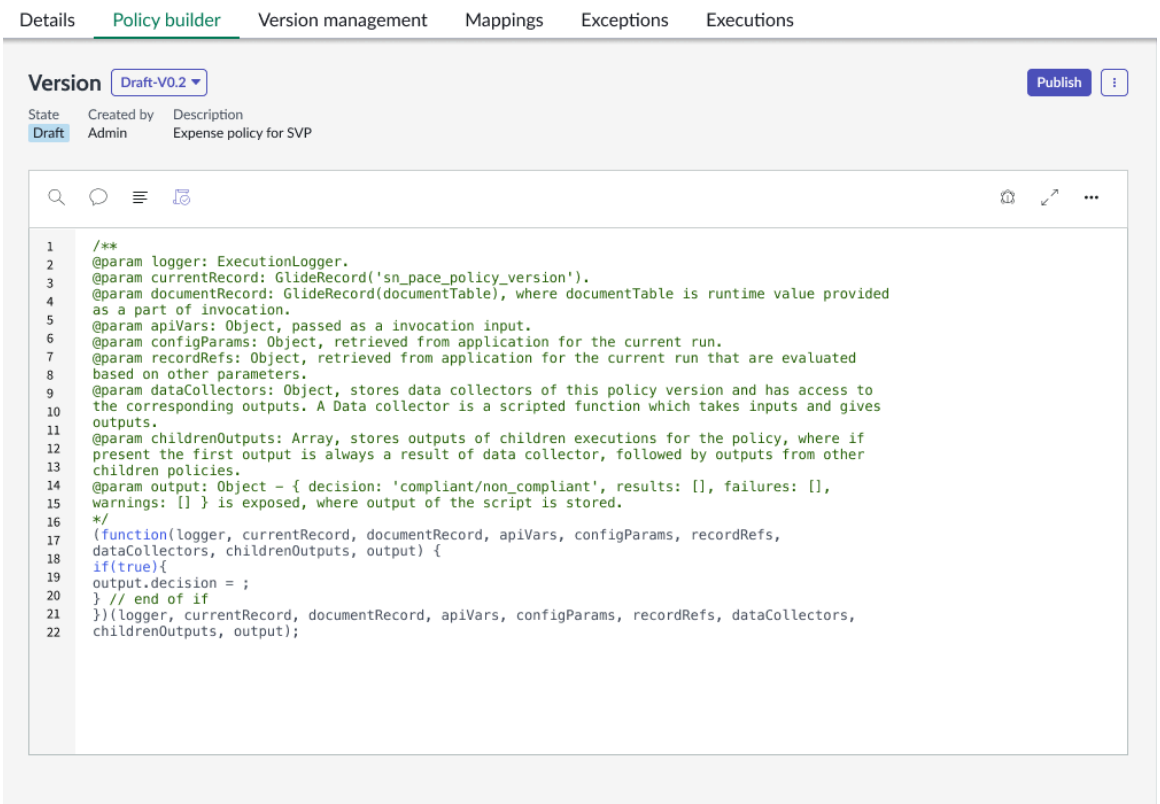
Before you begin
Role required: sn_pace.code_editor

About this task
Important:
For further information about testing your policy script, see Use the Test Playground for PaCE policies.

Procedure
1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Select the policy for which you want to update the script.
3. In the Details form of the relevant policy, click the **Versions** tab and select the version you want to edit.
4. In the policy version page, click the **Policy builder** tab.
   The following image shows a sample policy script.



   Note:
   The script is editable for policy versions in Draft state only. For policy versions in Current or Archived state, the script is read-only.

5. Apply any changes to the policy script, as required.
6. Click **Save**.

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Publish a PaCE policy version

You can publish a policy version at any time. When the policy is published, a compliant, non-compliant, or compliant-exception decision is made for objects (tables or document IDs) mapped to the policy.

Before you begin

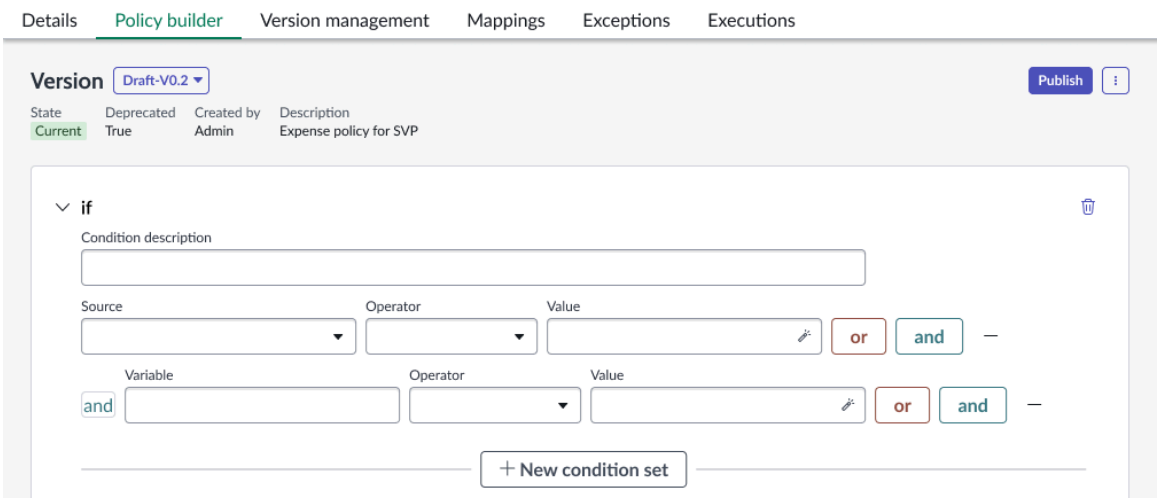
Role required: sn_pace.code_editor

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

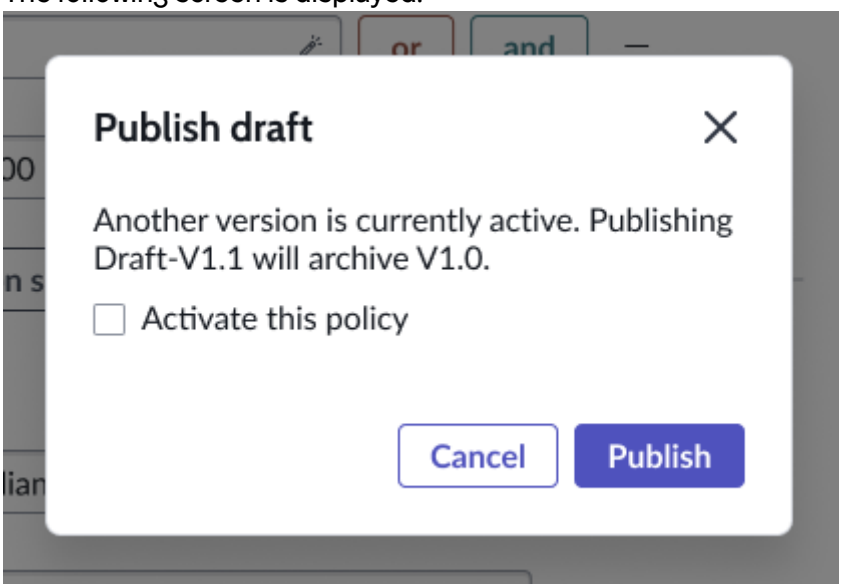
> **Note:**
> To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the policy name for the policy that includes the version you want to publish.
3. In the Details page, click the **Policy builder** tab.



Typically you would publish a Draft policy, but you can also republish an Archived version.

4. Click **Publish**.
The following screen is displayed.



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5. Select the **Activate this policy** check box to activate the policy when it is published.
6. In the displayed confirmation message, click **Publish**.

   The policy version becomes the Current version and is used the next time the policy is invoked.

> **Note:**
> If the policy has an existing mapping to document IDs, when you publish a new version it verifies that all mandatory inputs for mapping inputs are provided. If you changed a mapping input, it must be updated. If you changed a caller input, you must update the PaCE API call to ensure that the policy is executed. If there is no mapping associated with the policy, or the policy is in an Inactive state, the mapping inputs are not verified.

Edit a draft PaCE policy version

You can edit a Draft PaCE policy version at any time. The Draft version can be published to become the Current version. You can also create multiple different Draft versions from different Archived versions.

Before you begin
Role required: sn_pace.code_editor

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

> **Note:**
> To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** for the policy that includes the version you want to edit.
3. In the Policy Details page, click the **Versions** tab.
4. Click the **Version name** that you want to edit.
5. Edit the information and inputs in the **Details** and **Policy Builder** tabs.
6. Perform one of the following actions.

Edit a current or archived PaCE policy version

To edit a Current (published) or Archived PaCE policy version, you must create a copy of that version, which can then be updated as required.

Before you begin
Role required: sn_pace.code_editor

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

> **Note:**
> To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** for the policy that includes the version you want to edit.
3. In the Policy Details page, click the **Versions** tab.

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4. Click the **Version name** that you want to edit.
   As you can't update a policy version that is Current (published) or Archived, the displayed fields are read-only.
5. Click **Create New Version**.
   In the Version page, define the details of the new version. For further information, see the Create a new version of a policy section. In addition, you can create multiple Draft versions from an Archived or Current (published) version and work on them in parallel.

Compare PaCE policy versions

You can compare two versions of a PaCE policy, whatever their state. Any differences between the two selected versions are highlighted for quick analysis.

Before you begin

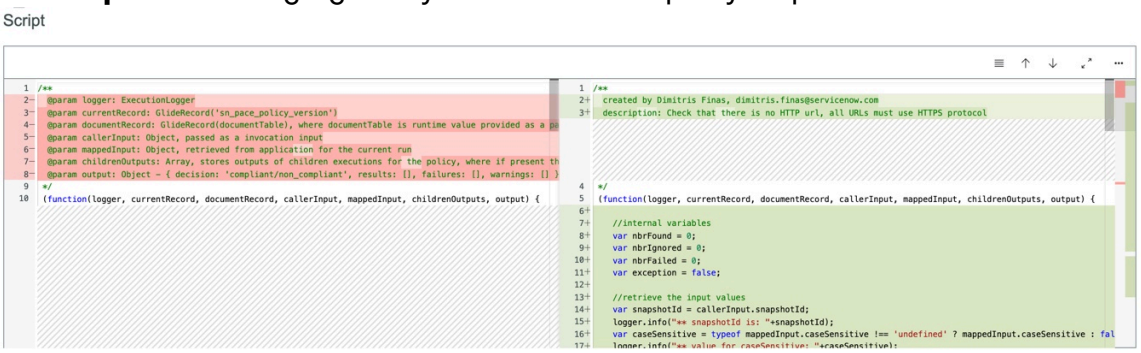
Role required: sn_pace.code_editor

Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** for the policy that includes the versions you want to compare.
3. In the Policy Details page, click the **Versions** tab.
4. Select the relevant two versions to compare, and click **Compare**.
   The **Compare Versions** tab displays several container sections that highlight any differences between the two versions.
   - The **Details** container highlights differences between the details of the two versions. For example, differences between the state, version name and numbering, and the number of test or standard runs.
   - The **Script** container highlights any differences in the policy script of the two versions.

   - The **Mapping Inputs** container also lists any differences between the two versions.
5. To make any changes based on your analysis of the two compared versions, return to the **Versions** tab, select the relevant version, and modify and test as required.

Delete a PaCE policy version

You can delete a policy version at any time. However, only versions that have never been published can be deleted. Published versions are stored for auditing purposes.

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Before you begin
Role required: sn_pace.code_editor

About this task
- Policy versions in Draft state can be deleted. When a version is deleted, all defined caller/mapping inputs and policy metadata associated with the version are also deleted.
- Policy versions that cannot be deleted include:
  - Policy versions in Current or Archived state.
  - Policy versions that have been executed in a Standard run.

Procedure
1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the **Policy name** for the policy that includes the version you want to delete.
3. In the Policy Details page, click the **Versions** tab.
4. Select the relevant version, click **Delete** and **OK** to confirm.

Passing parameters to PaCE policies

Parameters can be passed to a PaCE policy to validate updates to an object (tables and document IDs). These variables apply to authoring in both low-code or JavaScript. Policy versions include three types of parameter inputs: API Variables, Config Parameters, and Record References.

API Variables

Previously known as Caller Inputs, the API Variables is passed to the PaCE API at the time of invocation by a developer. The API Variable is a variable that enables you to pass the value to the policy whenever the policy is invoked. Specify a value for this API Variable when calling the API, otherwise the policy is not executed and no decision is reached. In the code editor, the variable name is `apiVars`.

For each PaCE policy, there is only one pre-defined API Variable called **SnapshotId**. This API Variable is Immutable and cannot be modified or deleted. You cannot define any additional API Variables for a policy.

Config Parameters

Previously known as Mapped Inputs, the Config Parameters can be passed when mapping policies to an object (tables and document IDs). When you define a Config Parameter, you are creating a parameter that enables you to pass values to the policy whenever the policy is mapped. If you define mandatory inputs, you must specify values for these inputs when mapping the policy. If the inputs you define are not mandatory, the policy is not executed (the status is set to inactive) and no decision is reached. In the code editor, the variable name is `configParams`.

For example, for a travel expenses policy you can add variables to define the limits of different types of expenses. The limits are specified when mapping the policy, and set the limits on the expense when the policy is invoked on this object. The breakfast expense limit for one group of employees could be $25, and for a different group of employees the limit could be $50. Each

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time the policy is invoked, the expenses are validated by the policy according to the limits specified in the mapping.

Record References

Record references define queries to extract data from any ServiceNow® tables and use the data to configure the policy logic. This feature enables you to retrieve additional data that may be required while defining the policy. You can define a query to perform aggregate functions for a record reference. In the code editor, the variable name is `recordRefs`.

Data Collectors

The data collectors function collects input process data from ServiceNow or an external data source to provide an output. The output can be used in the policy logic to make a decision. You can define and manage data collectors by creating, editing, updating, and activating them to your policy builder.

Data collectors can be accessed by using the `dataCollectors` object in JavaScript.

Note:
Auto-completion lists all possible outputs and data collectors that are available to use.

While editing a policy in low-code, an output of the configured data collectors is available under the drop-down menu.

Create a new variable for a policy version

Create an API Variable, Config Parameter, or Record Reference for the policy version in the Define Variables section of the Policy Builder.

Before you begin

If you want to create a variable that will apply to all of your policies, then do the following:

1. Go to the Variable Definition section on the main page.
2. Select the variable section that you want to create.
3. Select **Add**.

When you save the variable, it will show up in the Define Variables section on the Policy Builder of the policy.

Role required: sn_pace.code_editor

Procedure

1. In the **Policy builder** tab, select the version of the policy you want to add a new variable to, then the Data sources icon .
2. Select the variable tab that you want to create a variable from then select **Add**.

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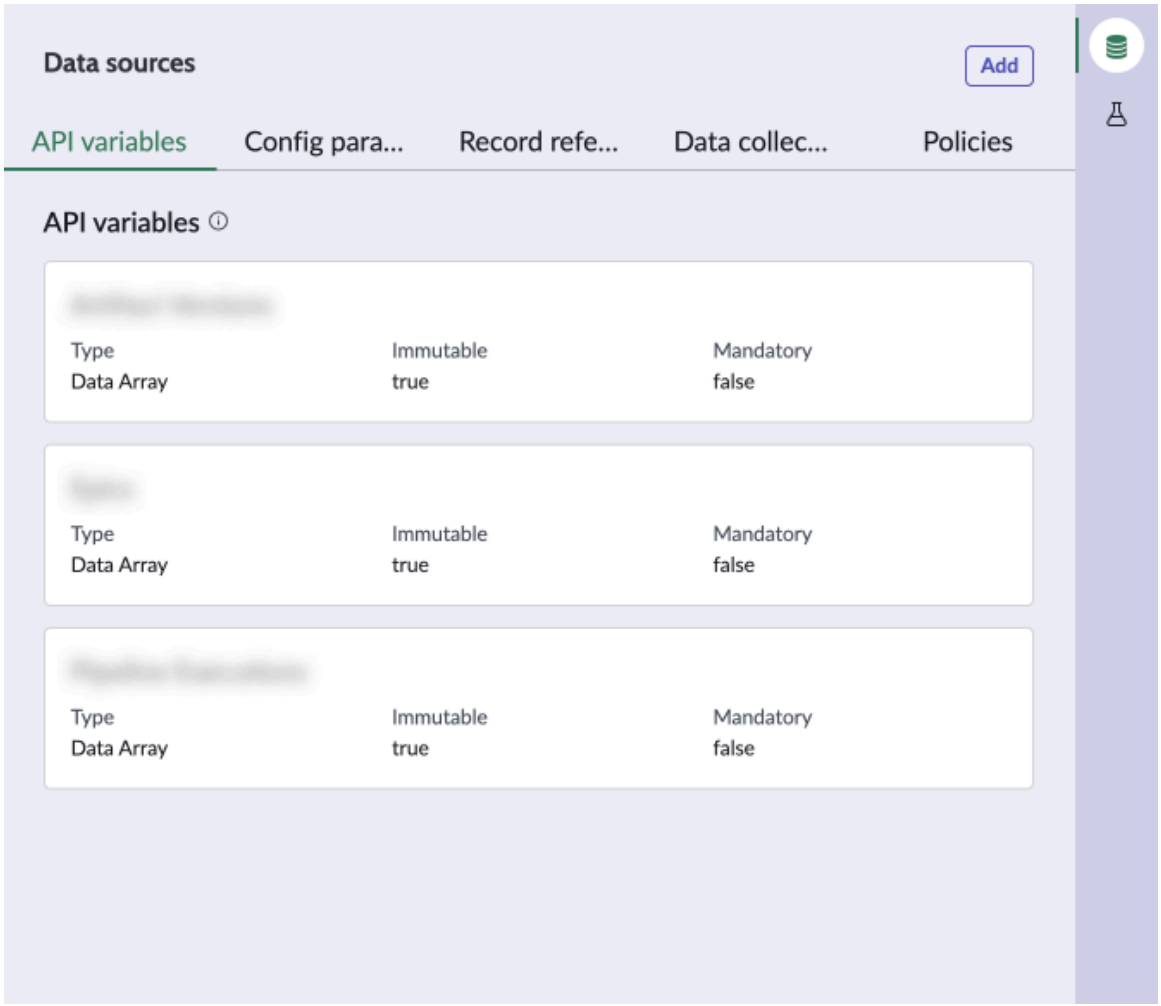

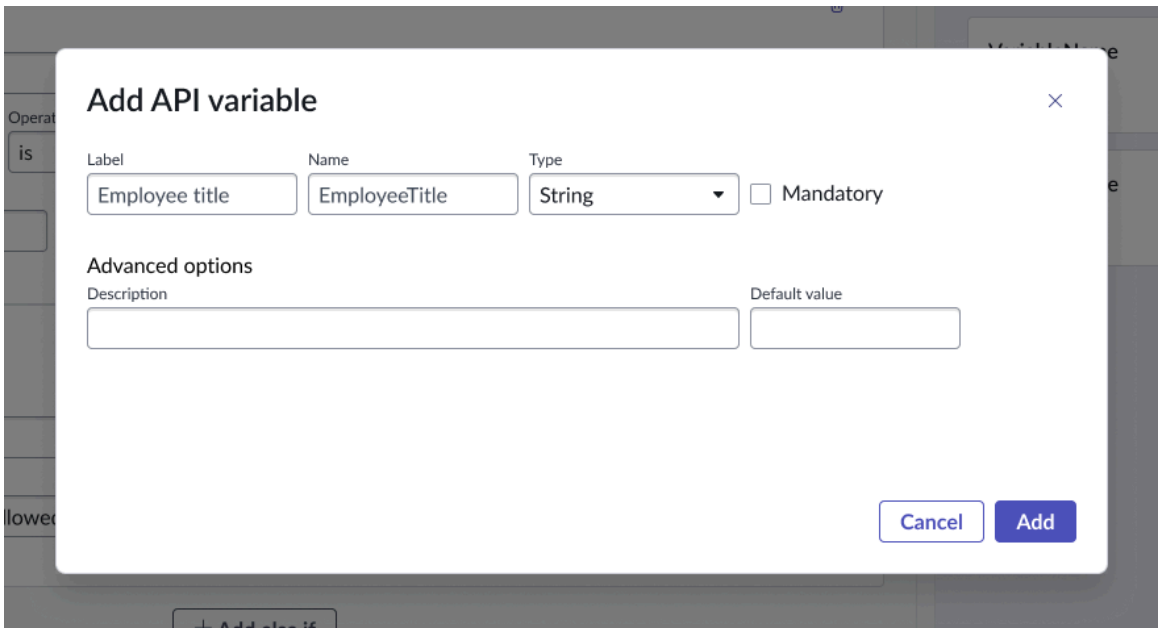

A pop-up window appears titled with the variable you want to create.

3. On the form, fill in the fields as needed.

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Create a new variable form

Field	Description
Label	Label name of the variable.
Name	Name of the variable.
Type	Drop-down list of input types: ○ Basic Date/Time ○ Basic Time ○ Choice ○ Data Array ○ Data Object ○ Decimal ○ Email ○ Integer ○ IP Address ○ JSON ○ Other Date ○ Reference ○ String ○ Sys ID (GUID) ○ True/False Depending on the input you choose, the Advanced Options provides different fields for some inputs. For more information, see the Data type descriptions topic. **Note:** The list only shows the most common used data types.
Mandatory	Option to make this variable mandatory. When the variable is mandatory, a value must be provided when mapping the policy. Otherwise the policy can't be executed.
Description	Description of the variable. **Note:** When you add a description for a Config Parameter variable, it will show up under the tool tip icon ⓘ in the Test Parameters tab.
Default Value	Default value for the variable.

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Field	Description
	Note: When you create a record reference, select a reference in the Table field, this field enables you to select a dependent document from the reference.
Function (Optional)	Functions to aggregate your condition. Choices are as follows: ○ Average: Average value of the condition. ○ Count: Count of the number of non-null values. ○ Maximum: Largest or maximum value. ○ Minimum: Minimum value. ○ Standard deviation: Population of standard deviation. ○ Sum: Sum of all values. **Note:** This field will only show up in the Record Reference variable form with the qualifier condition fields.
Match criteria	A match criteria for your record reference. Choices are as follows. ○ Select first match ○ Error on multiple When you create a Record Reference, it will query multiple answers. The match criteria enables you to filter out the match by selecting the first match or return an error if there are multiple answers. **Note:** This field will only show up in the Record Reference variable form with the qualifier condition fields. For more information about condition fields, see Policy logic condition fields.

4. Select **Save**.

Result

You can add your variables into the Policy Builder as needed. Additionally, you can delete a variable by selecting it and selecting the **Delete** button.

Data type descriptions

The following is a list of the most common data types for creating a variable.

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Data types

Data type	Description
Basic Date/Time	Day and time of day, which can be selected with a calendar widget.
Basic Time	Specific time.
Choice	Script that returns an array of choices that will be displayed for selection in a drop-down menu. If you select the **Multi select** check box, then multiple options can be selected from the drop-down. If it's unselected, then only one option can be selected.
Data Array	Data Array structure represented as a String.
Data Object	The Data Object input enables you to select the plus icon to add a new property to the data object or the minus icon to delete it. Additionally, you can select the Star icon that will search for a name if you don't know the structure of the JSON format property. A JSON path and match criteria field will appear and enable you to search for a key in the JSON structure.
Decimal	Number with up to two digits after the decimal points.
Email	Email represented as a String.
Integer	Number with zero decimal points.
IP Address	Variable character field that stores IPv4 and IPv6 addresses.
JSON	JavaScript Object Notation represented as a String.
Other Date	Date, which can be selected with a calendar widget.
Reference	Query that displays records from another table. The data type includes a match criteria field and qualifier conditions that you can set.
String	For 255 characters or less, the string field is a single-line text field.
Sys ID (GUID)	Field that contains a unique identifier for each record.
True/False	Boolean field that appears as a one-digit integer.

Create a data collector for a policy version

Create a data collector for a policy version in the Define Variables section of the Policy Builder.

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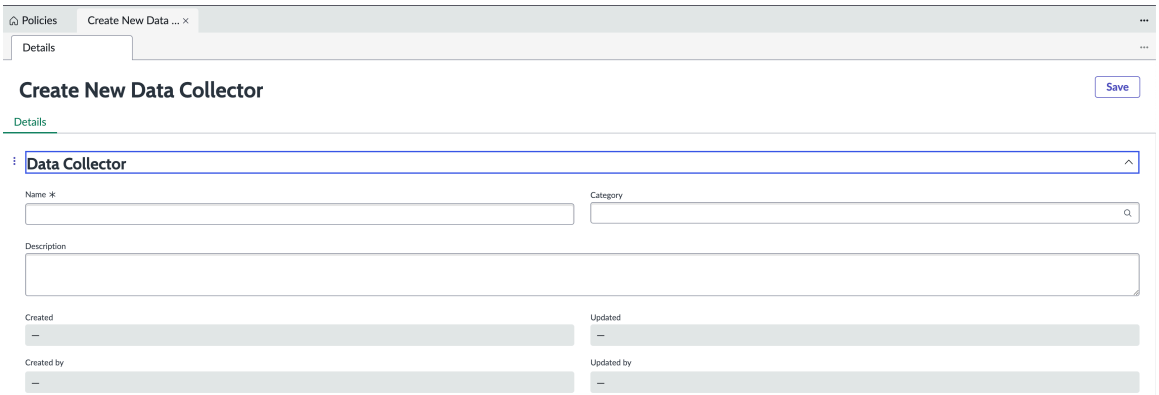
Before you begin

Role required: sn_pace.code_editor

Procedure

1. Navigate to **All** > **Variable Definition** > **Data Collectors**.
2. Select



New.

3. On the form, fill in the fields as needed.

Create New Data Collector

Field	Description
Name	Name of the data collector.
Category	Category of the data collector. See Managing categories in PaCE for details.
Description	Additional details of the data collector.
Created	Date and time when the data collector was created.
Created by	Name of the user who created the data collector.
Updated	Date and time when the data collector was updated.
Updated by	Name of the user who updated the data collector.

4. Click **Save**.

What to do next

- Activate and build data collectors
- Test a data collector for a policy version
- Add data collectors to a policy version

Structure of a data collector

This section describes the structure of a PaCE data collector.

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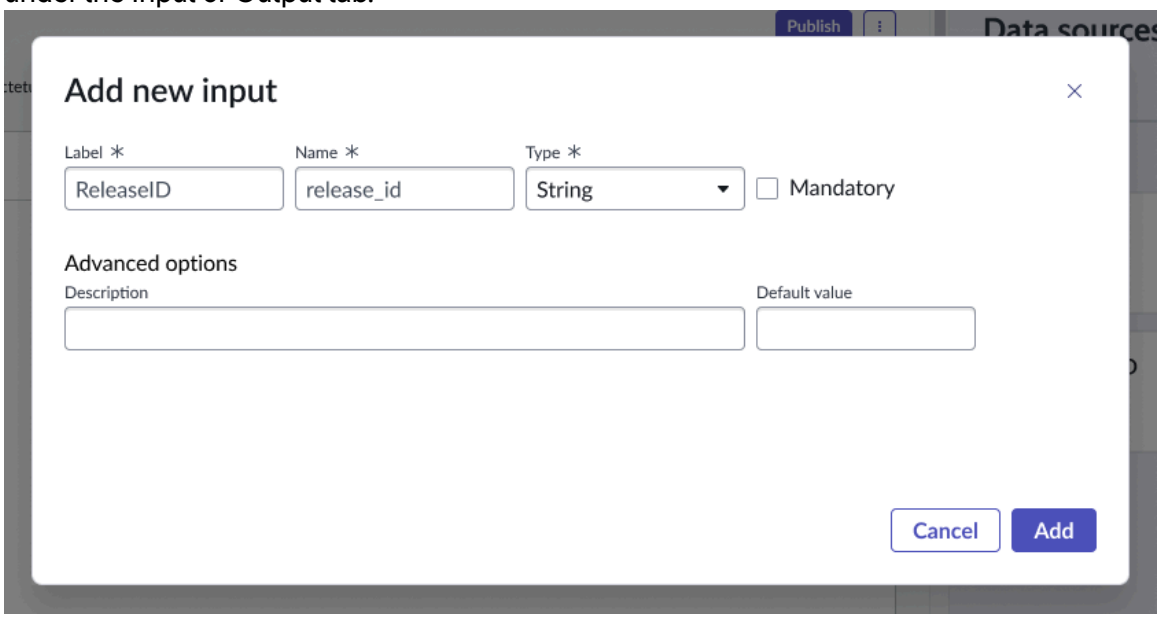
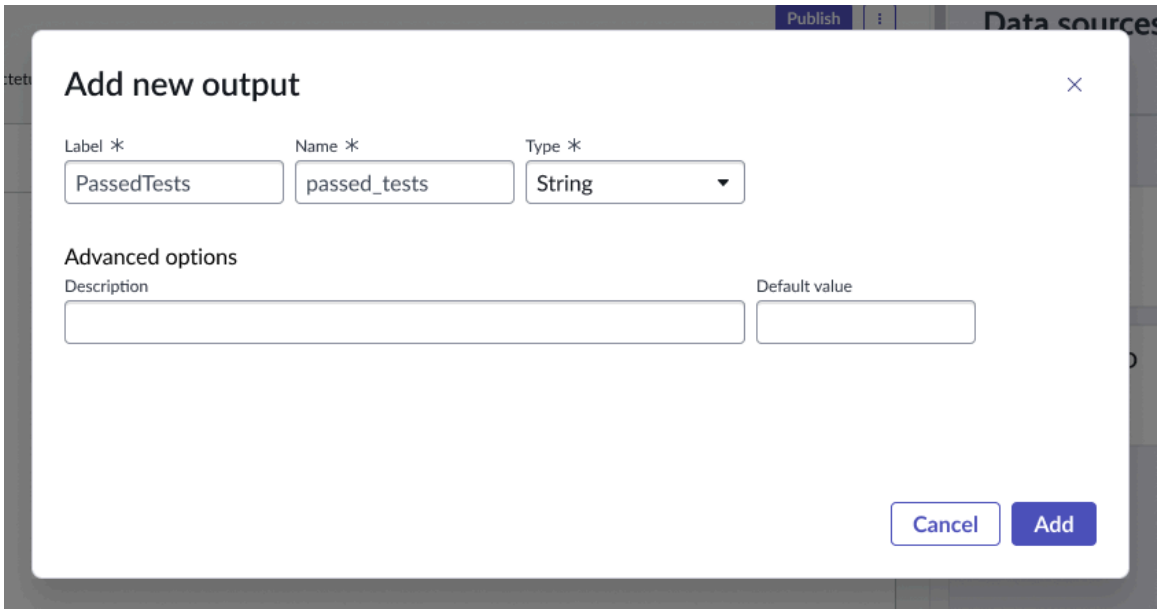
When you create a data collector, you can add inputs and outputs in the Javascript code. In the Data sources tab, select **Add** to create the inputs and outputs you want to add to your data collector. The following images show the pop-up window that will show up when you select **Add** under the Input or Output tab.





To debug the data collector script, select the Debugger script icon . For more information, see Script Debugger API.

The following table lists the data collector function parameters and how they can be used in the script.

Variable name	Description
Input	Inputs are used as parameters that help collect the correct data to be used in the policy.
Output	The parameter is used to pass the output of the data collector. Outputs are used to specify

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Variable name	Description
	output variables that can be used in the policy logic.

Refer to the Data type descriptions topic to see a list of the supported data types for the inputs and outputs.

Activate and build data collectors

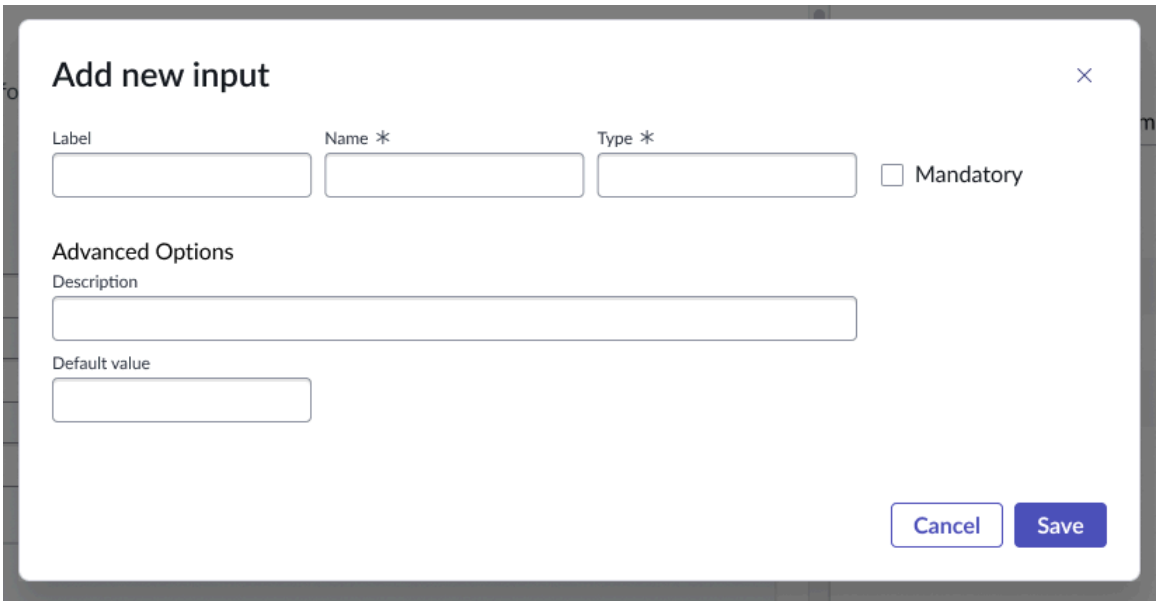
Activate and build data collectors to add to a policy.

Before you begin

Role required: sn_pace.code_editor

Procedure

1. Select the **Versions** tab, then the data collector draft name.
2. Select the **Build** tab.
3. In the Data sources section, select the variable tab you want to define.
   a. Click **Add**.



   b. On the Add new input form, fill in the fields.

Add new input

Field	Description
Label	(Optional) Label of the input or output.
Name	Enter a name of the input or output.
Type	Select the type of the input or output.
Mandatory	Select this check box if the input is mandatory.
Description	Description of the input or output.
Default value	Specify a default value.

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Note:
Inputs are used as parameters that help collect the correct data to be used in the policy. Outputs are used to specify output variables that can be used in the policy logic.

c. Click **Save**.

d. Repeat the steps to create the inputs and outputs as needed.

4. Enter your inputs or outputs and write your code in the Data collector script, as needed.
5. **Optional:** Add an exception error in your data collector by entering the following script: `throw new PaCEExecutionError`.
   When you execute the policy with the data collector exception, the error message will appear under the Output tab in the Execution errors section.
6. Click **Save**.
7. When you're finished, select **Publish**.
8. In the Publish draft window, select the **Activate this data collector** check box, then **Publish**.

Note:
When the data collector has been activated, you will be unable to make changes to the inputs or outputs.

Test a data collector for a policy version

Test a data collector for a policy version in the Test Playground.

Before you begin

Make sure you created a data collector in the policy. For more information, see Create a data collector for a policy version.

Role required: sn_pace.code_editor

Procedure

1. Navigate to **All** > **Variable Definition** > **Data Collectors**.
2. Select the data collector you want to test.
3. Select the **Versions** tab, then the data collector name.
4. Select the **Build** tab.
5. In the contextual sidebar, select the Test playground icon .
6. Add the parameters in the inputs you want to test in the data collector, then select **Run test**.
   The results will appear in the Output tab.
7. In the Publish draft window, select the **Activate this data collector** check box, then **Publish**.

Add data collectors to a policy version

After testing the activated data collectors, add them to a policy in the Policy Builder.

Before you begin

Role required: sn_pace.code_editor

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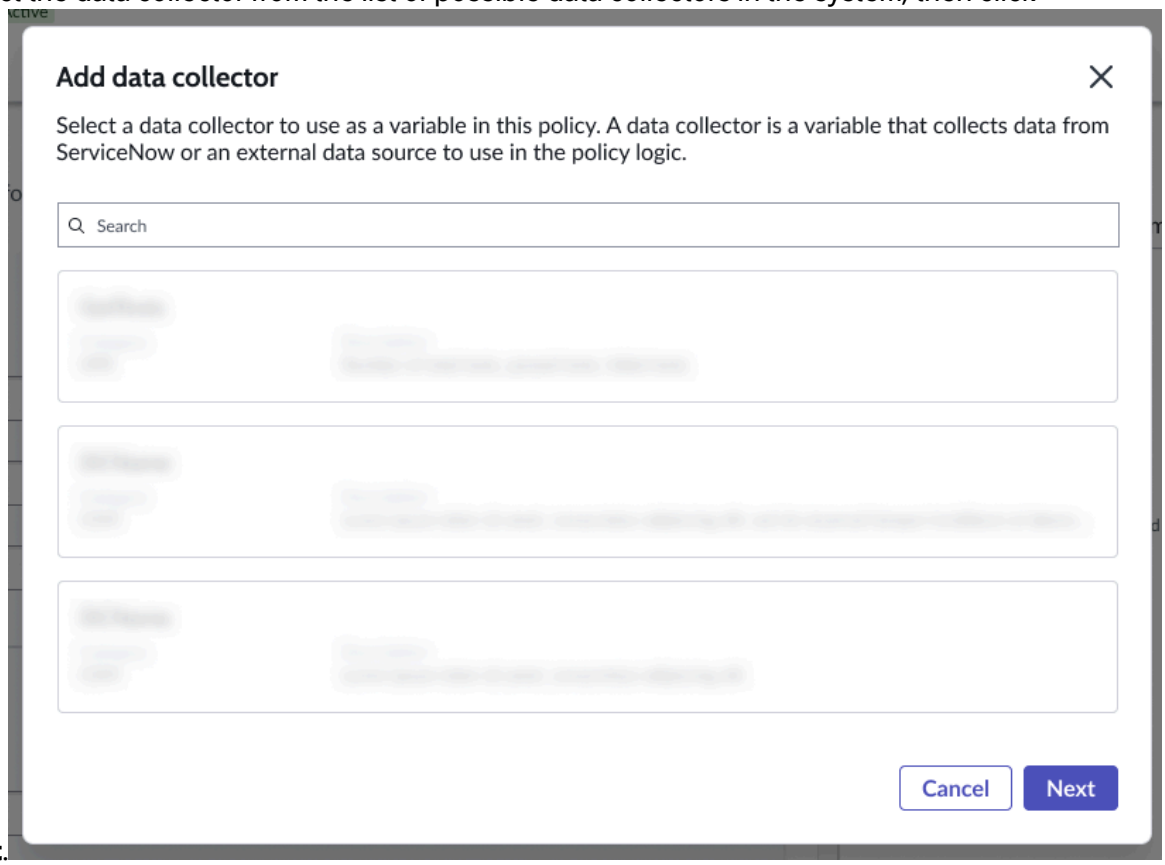
Procedure

1. In the Policy Builder tab, select the version of the policy you want to add the new data collector to, then the Data sources icon .
2. Select the data collector from the list of possible data collectors in the system, then click **Next**.



3. In the Add data collector page in the Details tab, give the data collector a label and variable name.

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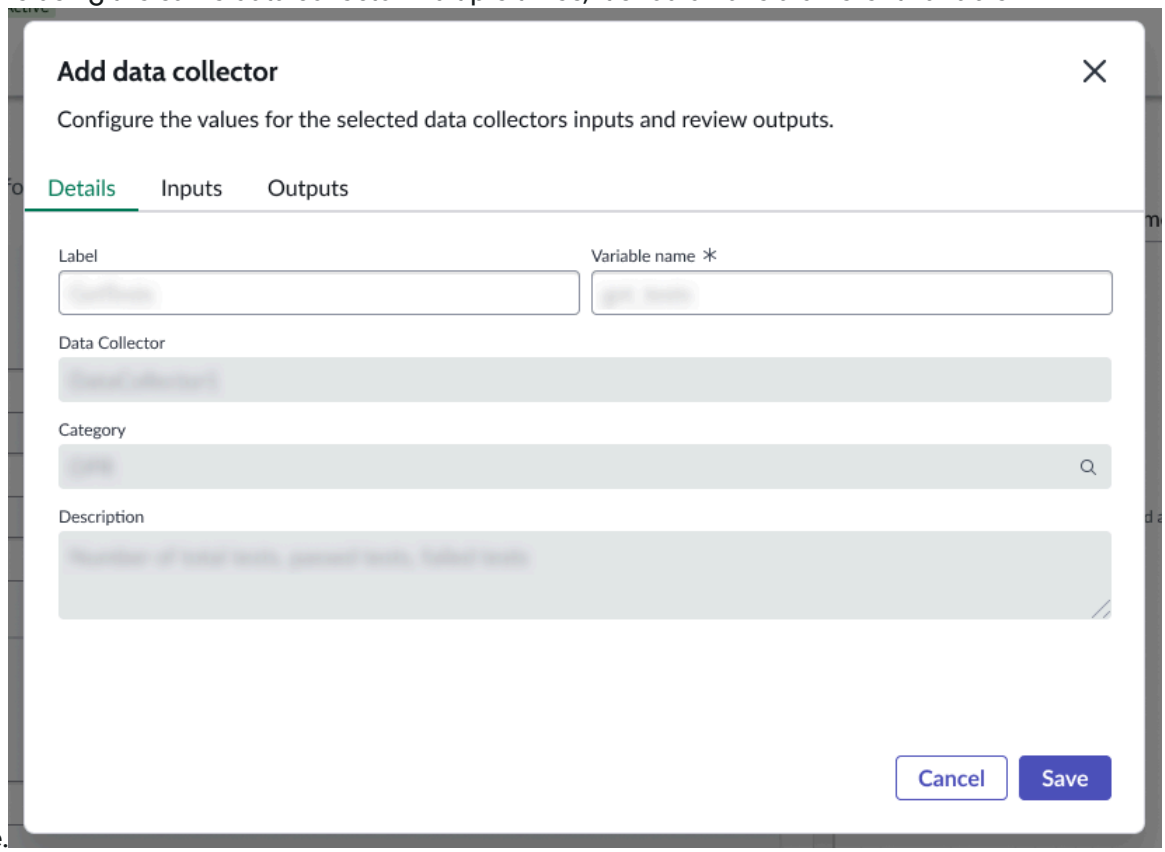
Note:
If you're using the same data collector multiple times, it should have a different variable name.



4. Provide inputs to complete the configuration of the data collector in the Input tab.

Note:
The input can be user-specified or selected from the data picker icon.

5. Click **Save**.
After the data collector is added and configured, you can access the data collector in the script editor using the data picker in low-code. Additionally, you can delete a data collector by selecting it and selecting the **Delete** button

Add nested policies in a policy

Add existing policies to a policy's conditions to define the order a policy's execution and the conditions is executed.

Before you begin

Note:
You must create a policy before adding it to another policy. For more information, see Create a PaCE policy.

You can add a policy multiple times with different names and parameters. The policies must be configured and mapped to a document, and API variables and Config parameters may be required and mapped to be configured. For more information on how to add variables, see Create a new variable for a policy version.

Role required: sn_pace.code_editor

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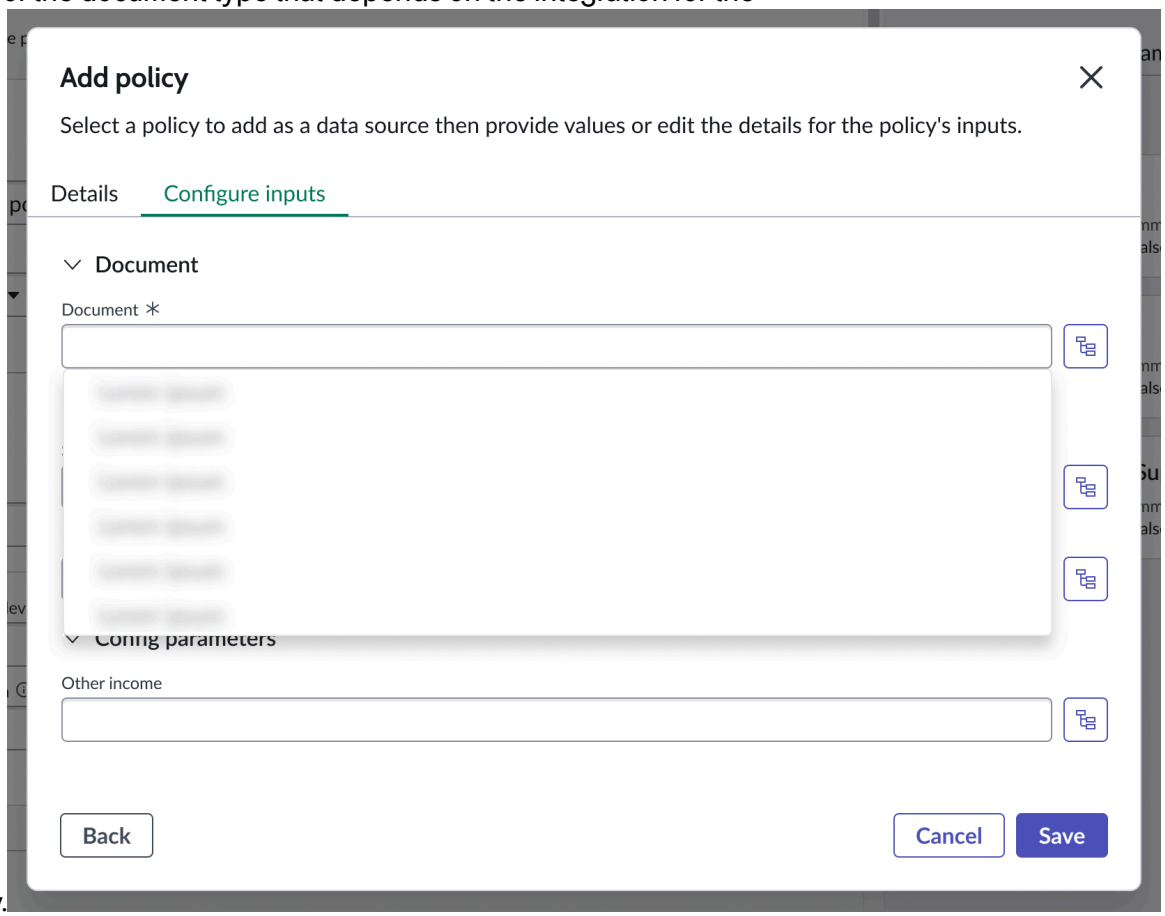
Procedure

1. Navigate to **Policies** > **My Policies**.
2. Select the policy you want to nest the policies in.
3. In the **Data sources** section, select the **Policies** tab.
4. Select **Add**.
5. In the Add policy window, search and select the policy you want to add as a data source, then select **Next**.
6. On the Details tab, enter the **Label** field and **Variable name** field and other configuration inputs as needed for the policy.
7. In the Configure Inputs tab, under the Document section, select the value of the document type that depends on the integration for the policy.



8. Pick a variable to pass for in the API variable and Config parameter sections you created in the beginning of this task.

Note:
You can specify the value in the fields as needed.

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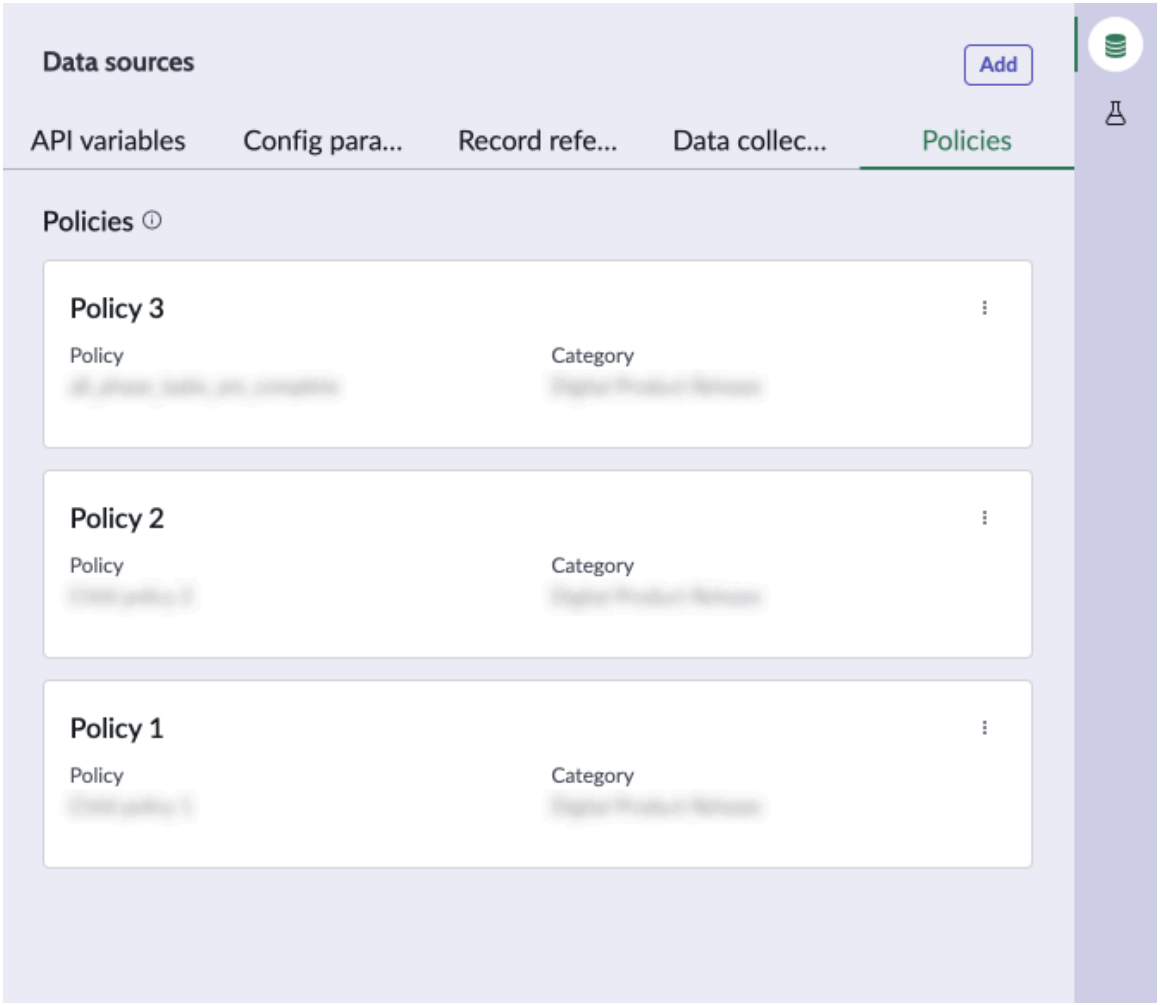
9. Select **Save**.



Result
The policies now appear on the Policies tab and can be added in the condition section or the Then section of the Policy builder. For more information on how to add the policies in the builder, see Policy logic condition fields.

Use the Test Playground for PaCE policies

The Test Playground enables you to test updates to a PaCE policy at any time, without the need to test or evaluate them in a Production environment.

You can update API Variables, Config Parameters, and Record References, and modify the policy script. After completing your changes, evaluate the updates in the Test Playground and review the execution output to ensure that the policy is compliant. Use the Test Playground to fine-tune your policy administration. Updates to a policy can be made on-the-fly, and tested in real time in a test environment. In addition, use the Test Playground to:

- Set execution parameters.
- Set and modify variables.
- Edit the policy script and policy logic.
- Use previously evaluated variables from a previous evaluation run.
- Review the execution output and the decision of compliance (compliant or non-compliant).
- Review a log of executions.

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Test updates to a PaCE policy version

Use the Test Playground to test updates to a PaCE policy script. You can evaluate changes to the policy script in real time, enabling you to determine if the changes that are applied render the policy compliant or non-compliant.

Before you begin

Role required: sn_pace.admin

About this task

The Test Playground enables you to apply changes to the policy script, and see the impact of those changes in real time. After the changes have been evaluated, save the script to ensure that the changes are implemented when the policy is next invoked.

Procedure

1. In the **Policy builder** tab, select the Test playground icon in the right-hand menu.
2. In the Test parameters tab, fill in the forms as needed.

Test options fields

Field	Description
Document	The document that you want to test the policy version with. **Note:** This field will change depending on which application PaCE is being used.
Log level	Level of the log.
Timeout	Timeout to determine the execution threshold of the test.
Execution log	Execution tag for the policy version.
Verbose	Option to make the test display in a verbose format.

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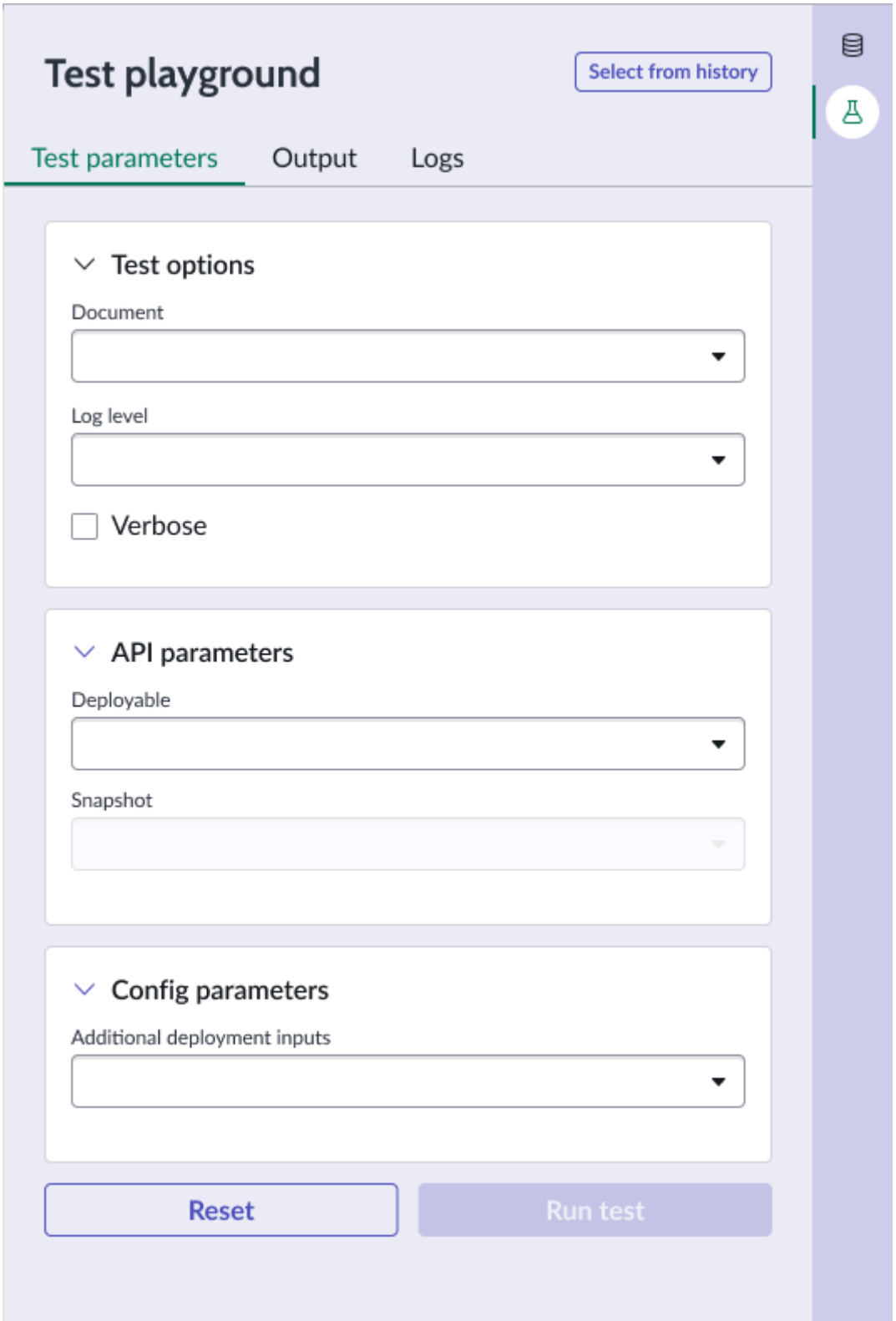

3. Under the **API parameters** and **Config parameters** tabs, select the variables you want to test with the policy version.
4. When you are done modifying your policy script, click **Run Test**.
   A decision is reached regarding the compliance or non-compliance of the policy, based on the changes you made to the script. In the Test Parameters section, either **Compliant** or **Non-compliant** is displayed, along with additional output on any warnings or failures, and how long the evaluation took.

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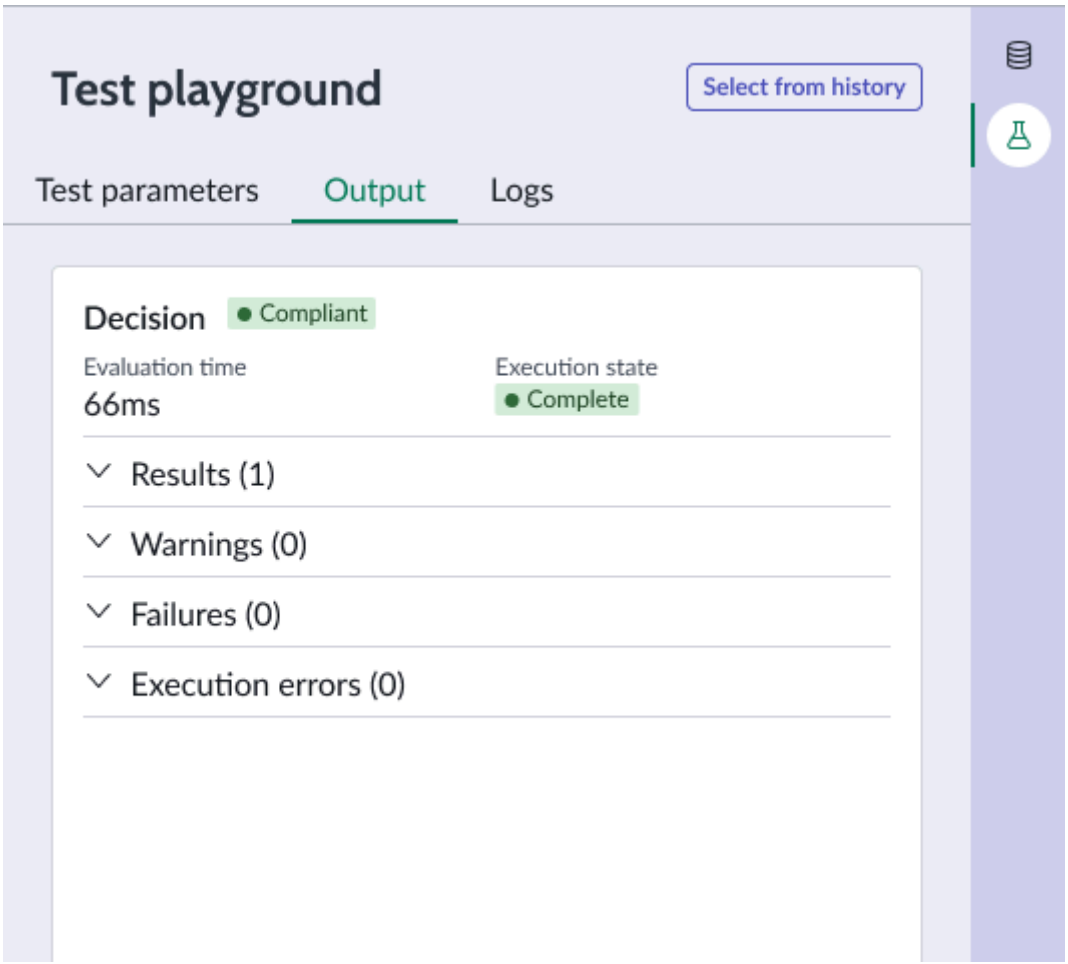
Note:
A decision with Compliant with exception will not work with a custom decision.



Review execution output and decision

After evaluating any changes made to the PaCE policy script, you can review the execution output and compliance decision reached. You can review this output immediately after evaluating any policy script changes.

Before you begin

Role required: sn_pace.execution_reader

Procedure

1. In the **Policy builder** tab, click the policy version you want to evaluate.
2. Select the Test playground icon .
3. After modifying the policy script according to your requirements, click **Run Test**
   The **Output** tab is displayed automatically, and shows the output and the decision reached.

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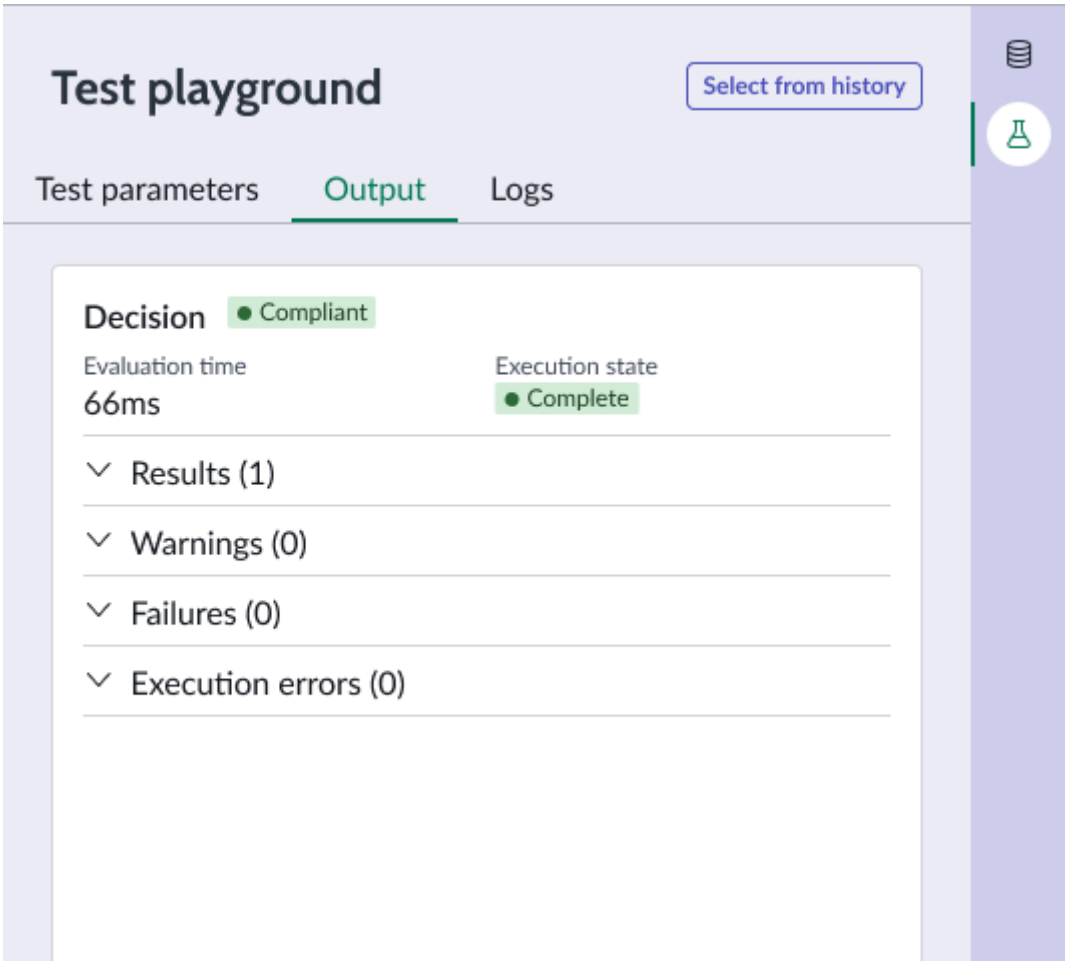

4. Review the execution output in the **Output** tab:

Output tab section	Description
Compliance decision	The decision can be: ○ **Compliant**: The changes you applied to the policy script are compliant with the policy logic. When you click **Save Script**, the changes are saved, and the changes implemented the next time the policy is invoked. ○ **Non-compliant**: The changes you applied to the policy script are not compliant with the policy logic. ○ **Compliant-exception**: In this case, if a policy exception has been approved, any policies that are non-compliant are set to the compliant-exception state. ○ **Name of a custom decision**: In this case, the decision is pre-defined by the admin for decisions other than complaint or non-complaint. **Note:** There could be multiple custom decisions depending on the type of application you're integrating with PaCE.
Warnings/ Failures	Lists the number of warnings or failures generated during the execution.
Evaluation time	Shows how long the evaluation took, in milliseconds.

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Output tab section	Description
Execution output	Shows the execution output in JSON format. You can integrate this output with other applications and services and present it in your required format.
Custom	Shows the custom output of the custom decision. **Note:** This tab will only show up if you are testing a custom decision.

If required, modify the policy script to resolve any issues that arose during the evaluation. You can also review policy execution logs for further analysis.

Review execution log

After evaluating any changes made to the PaCE policy script, you can review the execution log generated.

Before you begin

Role required: sn_pace.execution_reader

Procedure

1. In the **Policy builder** tab, click the policy version you want to review/evaluate.
2. Select the Test playground icon .
3. Click the **Logs** tab to view the execution logs generated.

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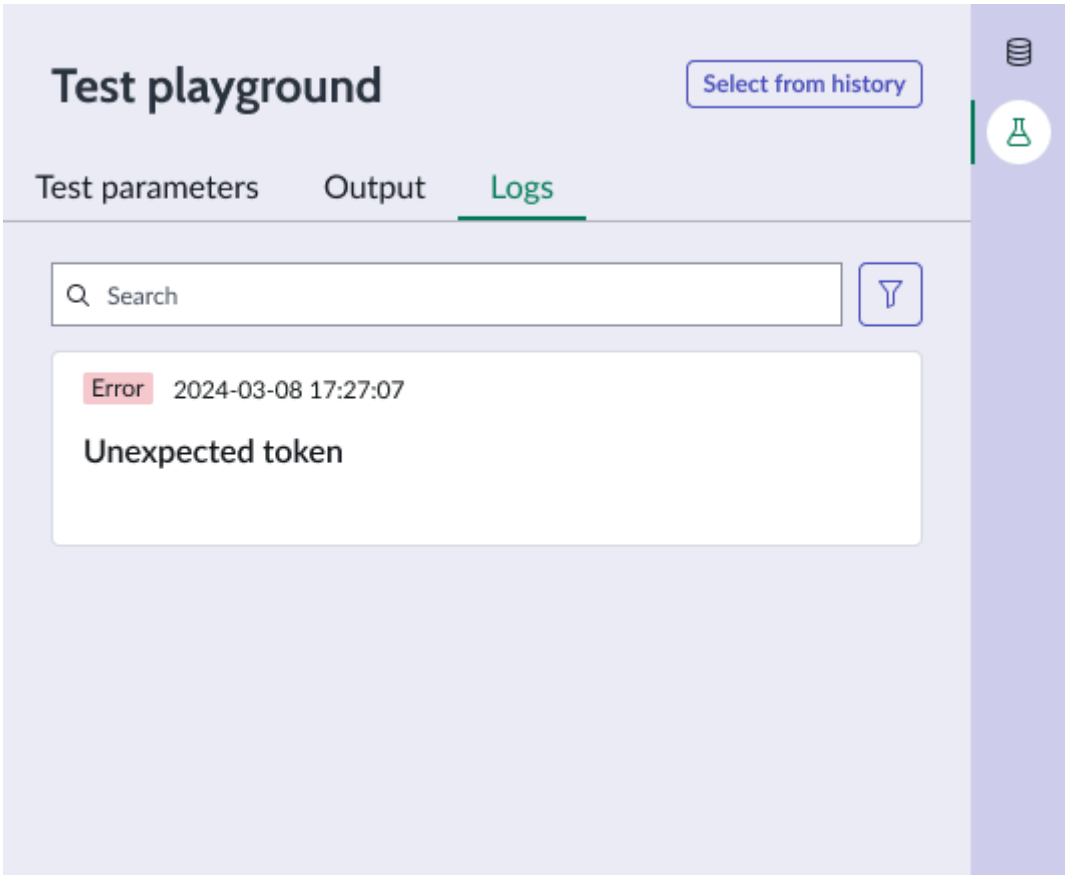

The displayed logs include all execution data generated during the evaluation. To filter logs, select the filter icon .

Execute policies

Execute a policy to determine if the policy is compliant or non-compliant. Executions can be run as part of your policy evaluation process, or in real time when mapped to an object (table or document ID).

Before you publish a policy version, you can run a test evaluation of the version to determine if it is compliant, non-compliant, compliant-exception, or other. Evaluating a policy enables you to test repeatedly and apply any required changes to the policy version, before moving it to a production environment. For further information about testing your policy version, see Use the Test Playground for PaCE policies.

When the version is ready to be moved into the production environment, make sure that all policy mappings are in place and verified. When the policy is invoked by the relevant object, its execution output is stored for review. For further information, see Review executed policy activity.

Review executed policy activity

You can review the execution activity of any policy at any time. Recorded execution activity includes the time taken to execute, decisions of compliance, execution types, and the outcome of the execution.

Before you begin
Role required: sn_pace.execution_reader

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Procedure

1. Navigate to **All** > **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click **Executions** to display the execution activity for the selected policy.
3. Review the execution information in the following columns.

Column	Description
Number	The automatically generated execution number. Click the link to review the following execution information: ○ Caller and mapping inputs used in the execution. ○ The JSON output generated on execution. ○ The execution log. ○ The policy script used in the execution.
Version	The policy version used in the execution. Click the link to review the version details.
Type	The type of execution performed: ○ Test ○ Standard
Start time	The time and date the execution was initiated.
Processing time (ms)	The execution processing time, in milliseconds.
Decision	The decision reached on execution: ○ Compliant ○ Non-compliant ○ Compliant-exception ○ Other
State	The state of the execution.
CDM application	The name of the relevant application. Click the link to review and update the application details.
Name	The name of the object. Click the link to review and update the object details.

Manage PaCE policy categories and tags

Use categories and tags to manage and group your PaCE policies more efficiently. As the policy administrator, you can create and edit any number of categories and tags.

You must have the sn_pace.admin role to manage categories and tags.

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Policy categories and how to use them

Policy categories enable you to categorize your policies into relevant groups or sections.

You can create any number of categories, but only one category can be assigned at any one time to a policy. Categories can include product or industry-specific terms, such as PCI, HIPAA, or FedRAMP. If a PCI or HIPAA-specific update must be applied to a policy, select the relevant category to locate and update the policies under that category.

When creating or updating the policy with a category, the category must be pre-defined.

Policy tags and how to use them

Policy tags enable you to define a policy with relevant reference tags. These tags can be defined according to your requirements, providing an element of flexibility to your policy management. For example, if a group of users have access to some policies, you can create a meaningful tag or a set of tags only for those policies.

You can add any number of tags to a policy, and also configure who can view the tags. You can also add tags on-the-fly as you view or edit policies.

Tags can be especially useful in collaboration efforts, in turn making the entire policy life-cycle easier to manage.

Managing categories in PaCE

Use the Categories option to group your PaCE policies more efficiently. As the policy administrator, you can create and edit any number of categories.

Categories are especially useful for grouping your policies into relevant sections. You can create and edit categories as required, but only one category can be assigned at any one time to a policy.

In addition, when creating a policy, the category must be pre-defined to ensure it can be assigned to the policy.

Create a category

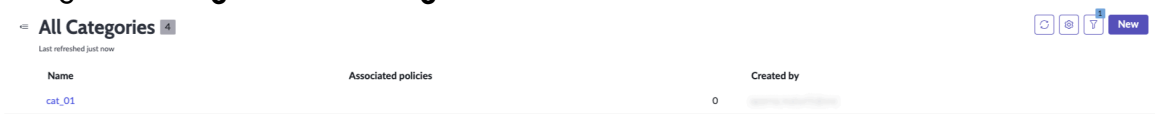
Create PaCE policy categories to assign to a policy when creating or updating a policy. Categories enable you to categorize and manage policies more efficiently.

Before you begin

Role required: sn_pace.policy_editor

Procedure

1. Navigate to **Categories** > **All Categories**.



2. Click **New**.
3. In the Create New Category form, define a name and description for the category.
4. Click **Save**.
   The new category is added to the All Categories form.

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Edit categories

Update categories for a PaCE policy as required. You can also update categories for Active policies.

Before you begin

Role required: sn_pace.policy_editor

Procedure

1. Navigate to **Categories** > **All Categories**.

2. Click the name of the category that you want to edit.
3. In the Details form for the selected category, edit the category **Name** and **Description** fields, as required.
   When updating a category name, the update is applied to all policies assigned with that category, whatever their state.
4. Click **Save**.
   The edited category is updated in the All Categories form.

> **Note:**
> You can also delete a category, as long as the category is not assigned to an Active policy. To delete a category, in the Details form for the selected category, click **Delete**.

View PaCE policies associated with a category

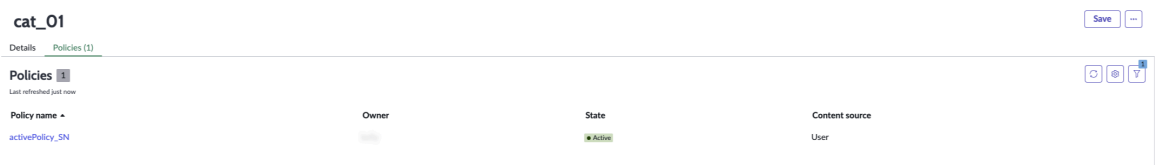
You can view the PaCE policies that have been assigned to a specific category. All the categories created, together with their associated policies, can be viewed in the All Categories table.

Before you begin

Role required: sn_pace.execution_reader

Procedure

1. Navigate to **Categories** > **All Categories**.
2. In the All Categories table, click the relevant category name.
3. In the displayed Details form, click the **Policies** tab.
   The policies associated with the selected category are displayed.



4. Click a policy name to view the policy and its settings.

Managing tags in PaCE

Use tags to manage your PaCE policies more efficiently. As the policy administrator, you can create and edit any number of tags.

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Policy tags enable you to add any number of reference tags to a policy. Tags can be especially useful in collaboration efforts, and can easily be viewed and edited. They can also be used to group policies based on any number of tags.

Add tags to PaCE policies

Add or create policy tags on-the-fly for any PaCE policy, including currently Active policies. Tags enable you to manage policies more efficiently.

Before you begin

Role required: sn_pace.admin

Procedure

1. Navigate to **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the policy name for the policy that you want to add a tag to.
3. In the Policy Details page, click the tag icon.

   Note:
   Unlike categories, you do not have to pre-define a tag before adding it to a policy.

4. In the **Add Tag** field, enter the required tag.

5. Press **Enter** to add the tag.
   The tag is added to the **Tags** dialog.

   Note:
   By default, the added tags are viewable to you only. Edit the tag to modify who can view the tag.

6. Repeat as required for additional tags.

   Note:

   - Tags are not case-sensitive, you cannot create tags using different capitalization.
   - Tags are automatically assigned to the policy when added in the **Tags** dialog, you don't need to save the policy to save the assigned tags.

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Edit PaCE policy tags

Edit and remove tags from a PaCE policy as required. When editing a tag, you can also define who can view the tag.

Before you begin

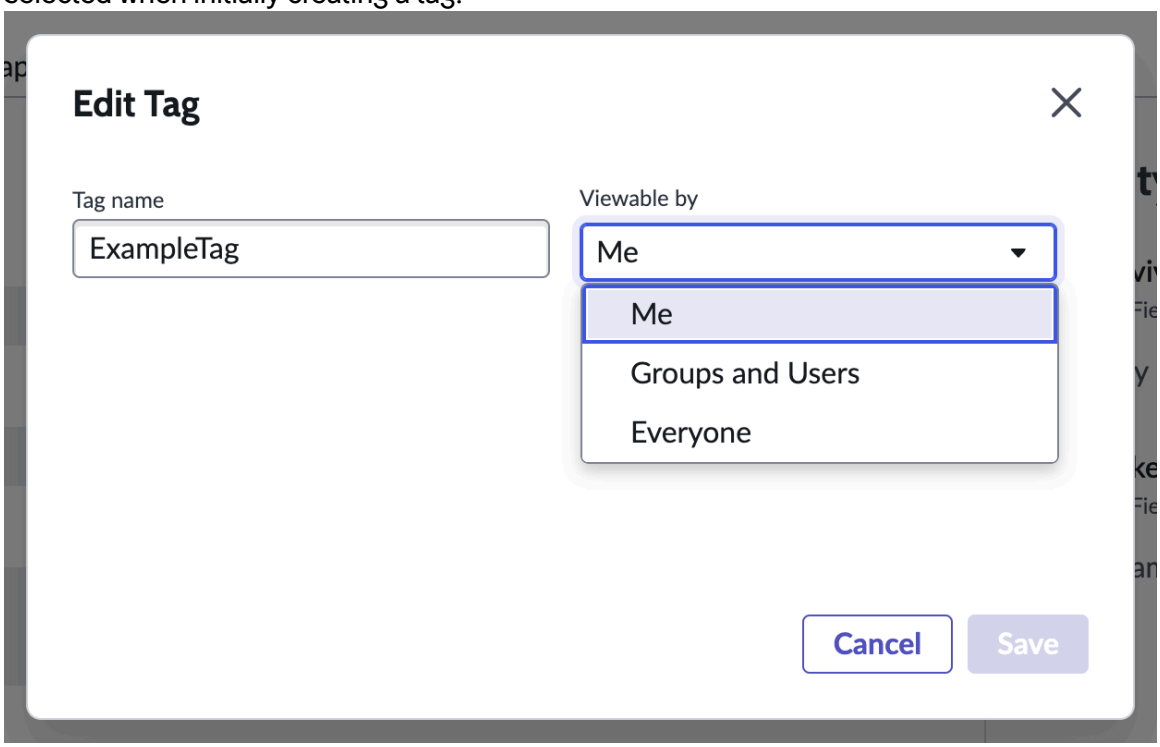
Role required: sn_pace.admin

Procedure

1. Navigate to **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the policy name for the policy that you want to edit or remove tags from.
3. In the Policy Details page, click the tag icon.
4. To edit a tag:
   a. Click the tag.
   b. In the Edit Tag dialog, edit the tag name.
   c. In the Viewable by list, select from **Me**, **Groups and Users**, or **Everyone**. By default, **Me** is selected when initially creating a tag.



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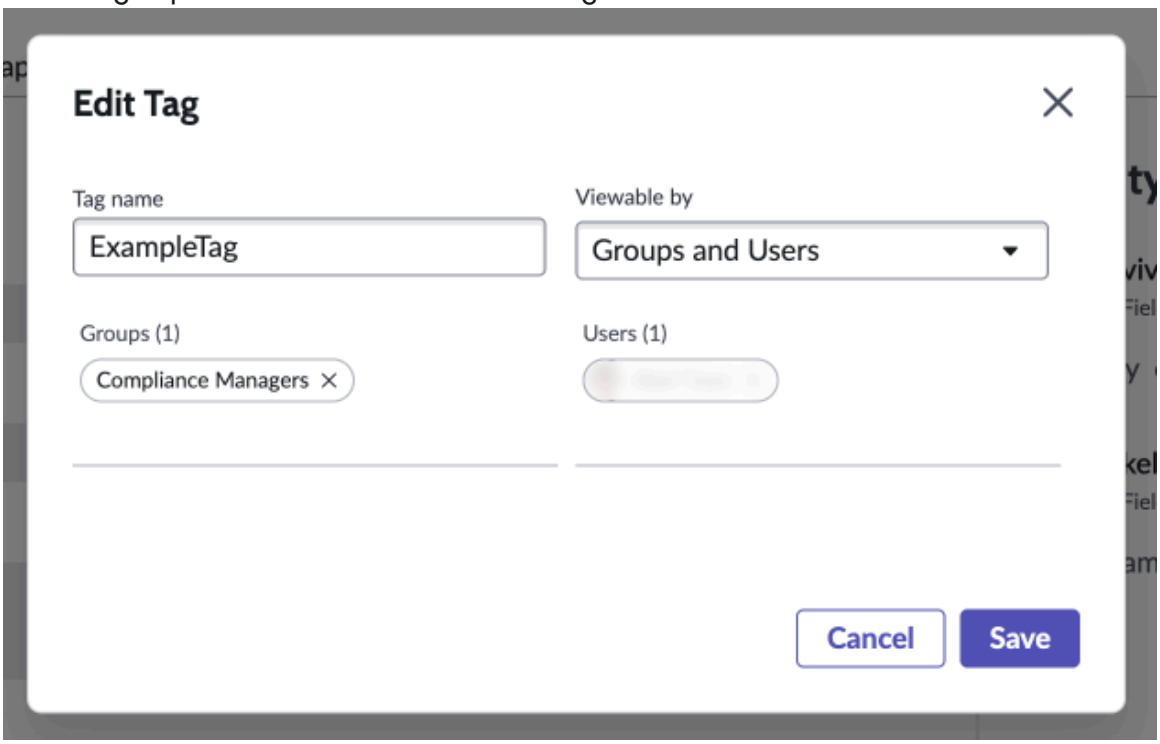
Note:
When you select **Groups and Users**, you are prompted to choose the ServiceNow AI Platform groups and users who can view the tag.



d. Click **Save**.

5. To remove a tag, click the x on the tag itself.

The tag is removed from the policy.

View PaCE policies associated with a tag

You can view the PaCE policies that have been assigned to a specific tag. All tags together with their associated policies can be viewed in the All Tags table.

Before you begin

Role required: sn_pace.admin

Procedure

1. Navigate to **Tags** > **All Tags**.

2. In the All Tags table, click the name of the relevant tag.

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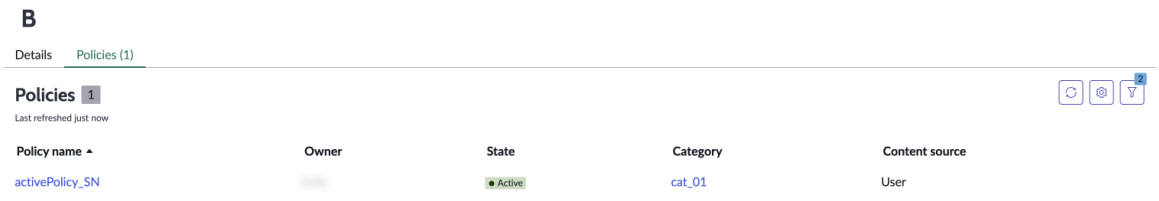
3. In the displayed Details form, click the **Policies** tab.
   The policies associated with the selected tag are displayed.



4. Click a policy name to view the policy and its settings.

How to write and test custom PaCE policies

This section provides guidelines on how to write and test PaCE policies.

You can write PaCE policies using JavaScript and create the policy record within your instance application scope. PaCE policies can be executed within the scope in which they are created and all functions available in this scope are available to the policy.

When a policy is invoked, a default set of parameters is passed and these parameters can be used in the policy logic as required. A decision indicating whether the policy is compliant, non-compliant, or compliant-exception and additional information is returned using the decision object.

Structure of a PaCE policy script

This section describes the structure of a PaCE policy script.

When a policy is executed, a set of parameters is passed and the policy developer can use these parameters in this policy script to make a decision whether it is compliant, non-compliant, or compliant-exception and return this decision back to the calling service. The following image shows a sample script:

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Sample policy script

```
/**
 @param logger: ExecutionLogger.
 @param currentRecord: GlideRecord('sn_pace_policy_version').
 @param documentRecord: GlideRecord(documentTable), where documentTable is runtime value provided as a part of invocation.
 @param apiVars: Object, passed as a invocation input.
 @param configParams: Object, retrieved from application for the current run.
 @param recordRefs: Object, retrieved from application for the current run that are evaluated based on other parameters.
 @param dataCollectors: Object, stores data collectors of this policy version and has access to the corresponding outputs. A Data collector is a scripted function which takes inputs and gives outputs.
 @param childrenOutputs: Array, stores outputs of children executions for the policy, where if present the first output is always a result of data collector, followed by outputs from other children policies.
 @param output: Object - { decision: 'compliant/non_compliant', results: [], failures: [], warnings: [] } is exposed, where output of the script is stored.
*/
(function(logger, currentRecord, documentRecord, apiVars, configParams, recordRefs, dataCollectors, childrenOutputs, output) {
  var snapshotId = apiVars.snapshotId;
  var dbPort = configParams.dbPort;
  // var cdmQ = new sn_cmdb_ci_class.CdmQuery().version ("latest").snapshotId(snapshotId).query();
  var cdmQ = new sn_cdm. CdmQuery().version ("latest").followIncludes (true).decryptPassword(true).substituteVariable(true).useCache(true).snapshotId(snapshotId).query();
  while (node = cdmQ.next()) {
    if (node.getValue('name') === "dbPort") {
      if (!gs.nil(cdmQ.getValue('value')) && Number (node.getValue('value')>= 30000)) {
        logger.info("dbPort is: " + node.getValue('value'));
        output.failures.push('The DB Port is not in range');
      }
    }
  }
  output.decision = output. failures.length? "non_compliant": "compliant";
  return output;
})(logger, currentRecord, documentRecord, apiVars, configParams, recordRefs, dataCollectors, childrenOutputs, output);
```

To debug the script, select the Debugger script icon . For more information, see Script Debugger API.

The following table lists the policy function parameters and how can they be used in your policy script.

Variable Name	Description
logger	`Logger` is an object that the policy coder can use to log messages. The log messages are stored in the `sn_pace_execution_log` table. You can review these log messages for debugging, tracking, or monitoring purposes. The log messages can be logged with one of the following levels: • 1: info • 2: debug • 3: warning • 4: error When a policy is invoked through the API, you can specify the desired log level. For example:The format is as follows: `logger.info("** snapshotId is: "+snapshotId);`
current Record	`currentRecord` is an object of the current version of the policy that is executed when the policy is used. To view the `currentRecord` details, navigate to the **Versions** tab on the Policy Home page and locate the policy whose version state is set to **Current**. In the image below, you can see that the current active version of the policy highlighted. It shows the following details: • version number • last update date • the name of the user who updated the version • the number of times it was executed by the calling application • the number of times it was run in the test environment The policy script can access this data during policy execution time by interacting with the `currentRecord` object passed to the policy.

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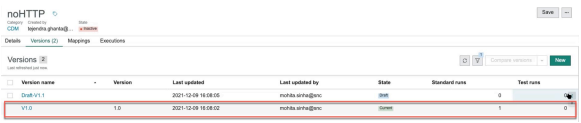
Variable Name	Description
	 This example shows how a policy developer can access the properties of the policy version record: `(function(logger, currentRecord, documentRecord, apiVars, configParams, recordRefs, dataCollectors, childrenOutputs, output) { //retrieve the input values logger.info(currentRecord.getValue('name')); })(logger, currentRecord, documentRecord, apiVars, configParams, recordRefs, dataCollectors, childrenOutputs, output);`

document Record	The `documentRecord` is used to map the policy to the relevant object (table and documentID) that is being validated. The `documentRecord` is a combination of the table_name and sysID. Based on the properties of the object, the policy logic is used to manage and interact with the object being validated to determine the right decision.
	
	For example: In the DevOps Config environment, a policy can be mapped to the deployable. When the API is invoked, a query is initiated on the document (deployable) table and the Sys ID of the deployable.
	
	`{ "table": "sn_cdm_deployable", "sysId": "d1be8f5e87d80110eec7dbdd3fbb357d" }`
	
	This example shows how the documentRecord can be used in a policy script:
	
	`(function(logger, currentRecord, documentRecord, apiVars, configParams, recordRefs, dataCollectors, childrenOutputs, output) { //assuming that associated document has state field var documentState = documentRecord.getValue(“state”); if (documentState == “new”) … else … })(logger, currentRecord, documentRecord, apiVars, configParams, recordRefs, dataCollectors, childrenOutputs, output);`

apiVars	The apiVars is passed to the PaCE API when it is invoked. It includes all the API variables defined in the policy version. See <Defining Caller Inputs> section for details

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Variable Name	Description
	The Sample policy script shows how policies can be used to validate configuration data in the DevOps environment. In the sample script, the apiVars variable is defined as `var snapshotId = apiVars.snapshotId;` where the specified `snapshotId` is mapped to the corresponding `snapshotId` of the DevOps Config deployable being validated based on specified criteria. The policy developer can define logic in the policy script to use the apiVars values passed when the API is invoked to determine the decision. For example, the SnapshotID passed is used to identify key-values related to the specific snapshotID for a deployable passed in the documentRecord object.
configParams	Config Parameters are variables are passed when mapping the policy and includes all the Config Parameters variables defined for a specific version of the policy. The `configParams` variable is defined as follows in the Sample policy script. `var dbPort = configParams.dbPort;` The policy developer can define the logic in the policy script to use the values passed at mapping to determine the decision. For example, the `dbPort` number must be less than 30000, otherwise the policy is considered to be non_compliant.
recordRefs	Record references define queries to extract data from any ServiceNow® tables and use the data to configure the policy logic. There is an auto-completion function that can select the record reference in the Javascript editor.
dataCollectors	The data collectors function collects input process data from ServiceNow or an external data source to provide an output.
children	Not supported in this version.
Outputs	

output

This parameter is used to pass the output of the policy execution that includes the decision back to the calling service. It provides a decision related to this policy, with additional information such as errors, warnings, and result details.

This example shows a sample output with compliant and non_compliant decisions:

```
{
    "decision": "compliant",
    "results": [],
    "warnings": [],
    "failures": [],
    "state": "complete"
}


{
    "decision": "non_compliant",
    "results": [],
    "warnings": [],
```

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Variable Name	Description

	<pre>"failures": [“Failed to validate key”],
	"state": "complete"
	}</pre>

output. decision	The decision property can be set to: • Compliant: Determines that the policy complies with requirements. • Non-compliant: Determines that the policy does not comply with the requirements. • Compliant-exception: Determines that an exception to the policy has been approved and any policies that are non-compliant are set to the compliant-exception state. The decision is returned in a JSON format back to the calling service. **Note:** If a value is not specified in the `output.decision` field in the script, when the policy is executed, by default this field is set to **compliant** if there are no failures.
output. results	The `results` property can be used to pass data back to the calling service on decisions made during the policy validation phase. A list object with a list of results can be passed back to the calling service.
output. warnings	The `warnings` property can be used to pass data back to the calling service on any warnings that occurred during the policy validation phase.
output. failures	The `failures` property can be used to pass data back to the calling service on any errors that occurred during the policy validation phase.
Note: The following fields are automatically filled in when the PaCE policy script is executed.	
output. name	The name (current version) of the policy being executed.
output. state	It indicates the state of the policy invocation. • Complete: The invocation was completed successfully. • Pending: Indicates that the policy could not be successfully executed and is an incomplete state.

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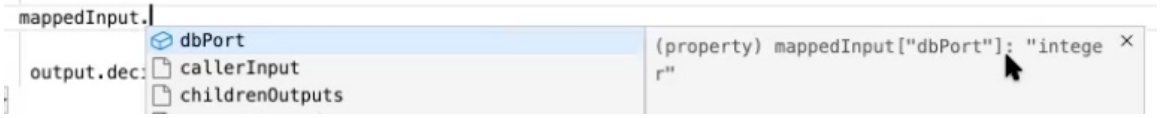
Note:

- Auto-complete suggestions are available in the policy script editor for the `logger`, `callerInput` and `mappedInput` parameter.
- To view additional information for a parameter, enter the parameter name and select one of the options as follows:



Policy invocation API

When a PaCE policy is invoked, the calling service passes the relevant object (tables and document IDs) that is being validated by providing the `documentRecord` object. A calling service is a service or product that uses the PaCE API. PaCE determines which policies must be executed by using the mapping table and the `documentRecord`.

All selected policies are executed concurrently. When all the policies have been executed, a final single decision is returned (in JSON format) with information on all executed policies and policy-level decisions. The final decision can be:

- compliant: Indicates that all the selected policies comply with the requirements and have returned a compliant decision.
- non_compliant: Indicates that one or more of the selected policies do not comply with the requirements and have returned a non_compliant decision.
- complaint-exception: Indicates that a policy exception has been approved and any policies that are non-compliant are set to the compliant-exception state.
- other: Indicates decisions that are not complaint, non_compliant, or complaint-exception.

Policy invocations can be in one of the following states:

- new
- in_progress
- complete
- canceled
- error
- timeout

Sample API

The following is a sample invocation request when the PaCE API is executed.

```
var request = {"documentIds":

 [{"table":"sn_cdm_deployable","sysId":"d1be8f5e87d80110eec7dbdd
3fbb357d"}],"service":"CDM","category":"CDM","data":{"snapshotId
":"2bcec7de87d80110eec7dbdd3fbb3529"},"options":{"verboseRespons
e":true,"logLevel":"debug","type":"standard","failFast":false,
 "executionTag":"cdm"}}


         try {
```

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```
            var api = new sn_pace.InvocationAPI();


            var execResponse = api.execute(request);


            gs.info(" Got execution response:\n " +
JSON.stringify(execResponse,null,4));


        } catch (err) {


            //var errJSON = JSON.parse(err);


            //gs.info(errJSON.code);


            gs.info(" Error message is:" + err + "\n stack:" +
err.stack);


            // gs.info(" Error is:" + err);


        }
```

PaCE API invocation parameters

This table describes the properties that can be configured when the PaCE API is invoked. These properties can be set whenever the API is invoked or when you test a policy in the Test Playground.

Property name	Required	Default value	Description
service	yes		The calling service that is invoking the API.
category	no		The category type.
type	no	standard	Can be standard or test.
documentIds	yes (array of table, sysID)		The documentIds is an array of the table and sysID (of the deployable).

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Property name	Required	Default value	Description
Note: The properties shown in the preceding table cannot be configured in the Test Playground. They can only be used when the PaCE API is invoked.			
data	yes		The policy-specific data that includes all possible caller inputs.
executionTag	no		Can be used to tag one or more policy executions records resulting from this invocation. It can be used to retrieve execution details of the policy based on the executionTag.

verboseResponse	no	false	Default value is **false**. If set to **true**, additional debug information (in this case the ids of the mapped policies) is returned.
			
			A sample invocation response with options.verboseResponse:true is shown here:
			
			`// Sample execution response`
			`{`
			`"rootExecutionId": "50202b3ec37b101017e06c576e40dd81",`
			`"mappedPolicies": [`
			`{`
			`"policyId": "3d1de0a8c363101017e06c576e40dde4",`
			`"policyName": "Production Database Policy",`
			`"shortDescription": "Policy to check database passwords",`
			`"versonId": "4ed08520c3a3101017e06c576e40ddcb",`
			`"versonTyep": "4f2cb75473331010ce6c39282bf6a753",`
			`"versionState": "published",`
			`"versionApproval": "approved"`
			`},`
			`{`
			`"policyId": "addd2ca8c363101017e06c576e40dd12",`

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Property name	Required	Default value	Description

			<pre>"policyName": "API Policy",
			"shortDescription": "Policy to check API policies",
			"versonId": "a6418920c3a3101017e06c576e40dd57",
			"versonTyep": "4f2cb75473331010ce6c39282bf6a753",
			"versionState": "published",
			"versionApproval": "approved"
			}
			],
			"logs": []
			}</pre> If `options.verboseResponse:false`, the mapped policies are not included in the response.

failFast	no	false	The default value is **false**. If this property is set to **true**, the first failed policy stops the execution of all the mapped policies.
logLevel	no	info	This parameter can be used to specify how the log messages should be displayed. • info • debug • warn • error
timeout	no	3600	The timeout period in seconds. The default value is 3600.
waitForResult	no	3600	The waitForResult period in seconds. **Note:** This parameter is available only in the Test Playground.

About policy exceptions

By integrating Policy as Code Engine with Integrated Risk Management and Policy and Compliance Management workspace, the Compliance administrator can manage an

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organization's overall compliance posture and provide a business and regulatory context for codified policies.

The Compliance administrator can associate PaCE policies with control objectives and map policies to other deployables. It enables preventive controls and ensures that no risky or non-compliant changes are introduced in the production environment. If required, you can also grant and monitor exceptions on these policies. This provides real-time risk visibility of control objectives and exception management to accelerate the pipeline process. Refer to the Governance, Risk, and Compliance documentation for more information on the exception management process.

Enable exceptions for a policy

Enable exceptions for a PaCE policy and associate it with a control objective in GRC.

Before you begin

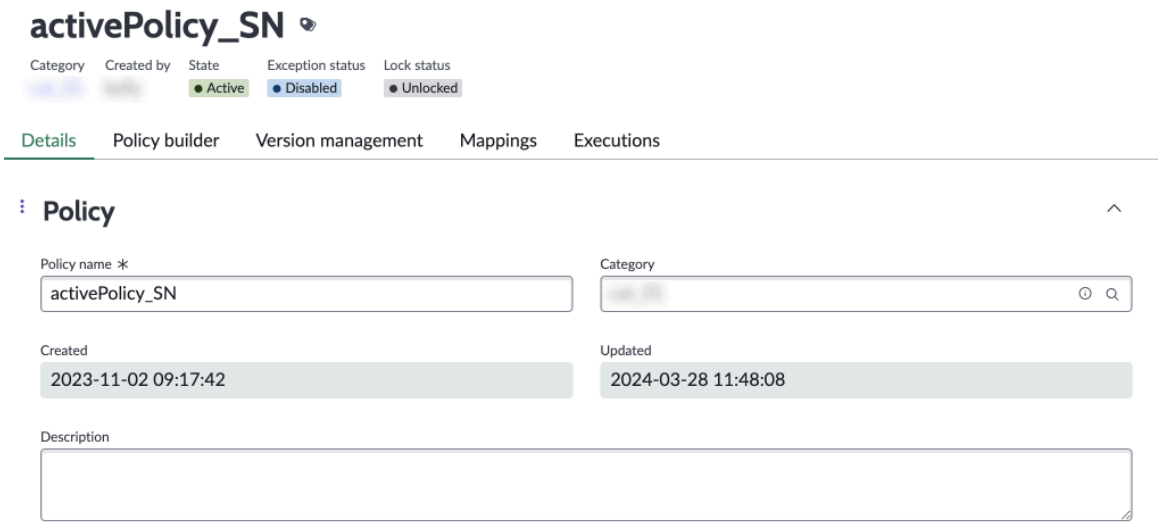
- Role required: sn_pace.admin
- Governance, Risk, and Compliance 14.1 or later

Procedure

1. Navigate to **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the policy for which you want to enable exceptions.
   The Details page is displayed.



   As you can see in this image, the Exception status is **Disabled**.

3. Click the **More Actions** icon and select **Enable exceptions**.
   The Exception status is changed to **Enabled**.

   Note:
   After an exception has been enabled, the policy must be configured in the Policy and Compliance Management workspace and connected to a control objective. See Policy as Code Engine for Preventive compliance management for details.

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Result

After the policy has been configured in Policy and Compliance Management workspace, the Exception status for the policy is updated to **Enabled and Configured**. The sn_pace.admin can then request exceptions to this policy.

Disable exceptions for a policy

You can disable exceptions for a policy for which exceptions have been granted. When this option is selected, you can no longer request exceptions and control objectives can no longer be associated with the policy.

Before you begin

- Role required: sn_pace.admin

Procedure

1. Navigate to **Policies** > **My Policies**.

   Note:
   To view all policies generated by admin/other users, navigate to **Policies** > **All Policies**.

2. Click the policy for which an exception has already been granted.
   The Details page is displayed.
3. Click the **More Actions** icon and select **Disable exceptions**.
   The Exception status is changed to **Disabled** You can no longer request exceptions for this policy.

Request exception for a policy

After a policy has been enabled and configured for exceptions, you can map a policy to a deployable and request an exception.

Before you begin

Role required: sn_pace.admin

Procedure

1. Navigate to the Mappings page.

2. Select a mapping from the list and click **Request exception.**.
3. In the Request policy exception window, specify the following:
   - Reason for exception: Select a reason for the exception from the drop-down list. Refer to the Governance, Risk, and Compliance for details.
   - Business justification: Enter a business justification for the exception.

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- Start and End Date: Specify the period for which the exception should be valid. The default validity period is 30 days. The default period can be modified by the Compliance administrator (sn_compliance.admin).

  Note:
  - You can also specify a Start Date that is in the future.
  - When the request is approved, the sn_compliance.admin can override the requested dates.

4. Click **Request** and navigate to the **Exceptions** tab to view the requested exceptions.

   You can see that the exception status is **Pending**. The Compliance Manager assesses this exception request and can choose to approve or reject the request. See Policy as Code Engine for Preventive compliance management for details. For each exception request, the following details are displayed:

   - Exception ID: Click the Exception ID to view detailed information about the exception request.
   - Deployable: Click the link to view the details of the deployable mapped to the policy.
   - Exception active: If the exception has been granted, the status is set to **Yes**.

     Note:
     If the exception has been granted for a future date, the status is set to **No** until the effective Start Date.

   - Status: The status of the request:
     - Pending: An exception request has been created but has not been approved.
     - Granted: The exception request has been approved.
     - Extension Pending: An extension request for a granted exception has been created.
     - Extension Granted: The extension request has been approved.
     - Declined: The exception request was not approved.
     - Extension Declined: The request to extend a granted exception was declined.
     - Expired: The period for which the exception was granted has expired.
     - Withdrawn: The granted exception request is withdrawn.
   - Expires in: The number of days after which the exception request expires.

5. After the request is approved, navigate to the **Exceptions** tab.
   You can see that the exception request status has changed to **Granted**. You can also see the number of days and minutes for which the exception is valid.
6. After an exception has been granted, you can request an extension before the end of the validity period.
7. Select a request with a **Granted** status and click **Extend**.

   Note:
   You can request an extension for only one policy at a time.

8. In the Request extension window, specify a business justification, an end date for the request and click **Request**.
9. Navigate to the **Exceptions** tab.

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The exception status has changed to **Extension Pending**. The sn_compliance.admin assesses this extension request and can choose to approve or reject the request. See Governance, Risk, and Compliance for details.

10. After the request is approved, navigate to the **Exceptions** tab.
    You can see that the exception request status has changed to **Extension Granted**. You can also see the number of days for which the extension is valid.

> **Note:**
> When you execute a policy with exceptions, it is validated and returns a **Compliant-exception** result.

Withdraw an exception request

If an exception is no longer required, you can withdraw a granted exception request for a policy.

Before you begin

Role required: sn_pace.admin

Procedure

1. Navigate to **Policies** > **My Policies**.
2. Navigate to the policy that has been enabled and configured for exceptions and click the **Exceptions** tab.
3. Select the granted exception request and click **Withdraw**.
   A confirmation message appears.
4. Click **Withdraw** to withdraw the exception request.
   The request status is changed to **Withdrawn**.

Integrating PaCE with other applications

Extend the capabilities of Policy as Code Engine (PaCE) by creating policies with other applications.

PaCE provides integrations with the applications listed in the following table:

PaCE Integrations

Integration	Description
Digital Product Release (DPR)	Define policies in Digital Product Release, see the Define policies in Digital Product Release topic.
Software Bill of Materials (SBOM)	Starting with version 4.0 of SBOM Response, an application that is part of the Security Operations suite of applications, you can view components that are identified as stale or abandoned as 'Non-compliant' in the Policy as Code Engine (PaCE) interface that is available in the Software Bill of Materials Workspace. • Determine if components are stale or abandoned with the *Run PaCE policies for SBOM Response* scheduled job. This scheduled job is deactivated by default.

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PaCE Integrations (continued)

Integration	Description
	• View components that are identified as stale or abandoned as Non-compliant in the PaCE interface that is available and viewed in the SBOM Workspace. See Configuring the Deps.dev, OSV.dev, and PaCE integrations for Software Bill of Materials for more information.

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